Texas Commission on Environmental Quality

Title V Existing

1378

Site Information (Regulated Entity)

What is the name of the permit area to be authorized?	TEXARKANA MILL
Does the site have a physical address?	Yes
Physical Address	
Number and Street	9978 FM 3129
City	QUEEN CITY
State	TX
ZIP	75572
County	CASS
Latitude (N) (##.######)	33.255833
Longitude (W) (-###.######)	94.071388
Primary SIC Code	2631
Secondary SIC Code	
Primary NAICS Code	32211
Secondary NAICS Code	
Regulated Entity Site Information	
What is the Regulated Entity's Number (RN)?	RN100543115
What is the name of the Regulated Entity (RE)?	GRAPHIC PACKAGING INTERNATIONAL TEXARKANA MILL
Does the RE site have a physical address?	Yes
Physical Address	
Number and Street	9978 FM 3129
City	QUEEN CITY
State	TX
ZIP	75572
County	CASS
Latitude (N) (##.######)	33.255833
Longitude (W) (-###.######)	-94.071388
Facility NAICS Code	
What is the primary business of this entity?	KRAFT PAPERBOARD MILL PRODUCING BLEACHED PULP

Customer (Applicant) Information

How is this applicant associated with this site?	Owner Operator
What is the applicant's Customer Number (CN)?	CN601710460
Type of Customer	Corporation
Full legal name of the applicant:	
Legal Name	Graphic Packaging International, LLC
Texas SOS Filing Number	4414206
Federal Tax ID	840772929
State Franchise Tax ID	18407729294

State Sales Tax ID	
Local Tax ID	
DUNS Number	840772929
Number of Employees	501+
Independently Owned and Operated?	No

Responsible Official Contact

Person TCEQ should contact for questions about this application:	
Organization Name	GRAPHIC PACKAGING INTERNATIONAL LLC
Prefix	MR
First	MARCUS
Middle	
Last	DANIEL
Suffix	
Credentials	
Title	VP MILLS
Enter new address or copy one from list:	
Mailing Address	
Address Type	Domestic
Mailing Address (include Suite or Bldg. here, if applicable)	9978 FM 3129
Routing (such as Mail Code, Dept., or Attn:)	
City	QUEEN CITY
State	TX
ZIP	75572
Phone (###-###-####)	9037961518
Extension	
Alternate Phone (###-###-####)	
Fax (###-###-####)	
E-mail	mark.daniel@graphicpkng.com

Duly Authorized Representative Contact

Person TCEQ should contact for questions about this application	
Select existing DAR contact or enter a new contact.	JEFFERY SUELZER(GRAPHIC PACKAGI...)
Organization Name	GRAPHIC PACKAGING INTERNATIONAL LLC
Prefix	MR
First	JEFFERY
Middle	
Last	SUELZER
Suffix	
Credentials	
Title	MANUFACTURING DIRECTOR
Enter new address or copy one from list	
Mailing Address	
Address Type	Domestic

Mailing Address (include Suite or Bldg. here, if applicable)	9978 FM 3129
Routing (such as Mail Code, Dept., or Attn:)	
City	QUEEN CITY
State	TX
Zip	75572
Phone (###-###-####)	9037961638
Extension	
Alternate Phone (###-###-####)	
Fax (###-###-####)	
E-mail	jefferey.suelzer@graphicpkg.com

Technical Contact

Person TCEQ should contact for questions about this application:	
Select existing TC contact or enter a new contact.	JOHN FUSSELL(GRAPHIC PACKAGI...)
Organization Name	GRAPHIC PACKAGING INTERNATIONAL LLC
Prefix	MR
First	JOHN
Middle	
Last	FUSSELL
Suffix	
Credentials	
Title	SR ENVIRONMENTAL ENGINEER
Enter new address or copy one from list:	
Mailing Address	
Address Type	Domestic
Mailing Address (include Suite or Bldg. here, if applicable)	9978 FM 3129
Routing (such as Mail Code, Dept., or Attn:)	
City	QUEEN CITY
State	TX
ZIP	75572
Phone (###-###-####)	9037991197
Extension	
Alternate Phone (###-###-####)	
Fax (###-###-####)	7702406334
E-mail	john.t.Fussell@graphicpkg.com

Title V General Information - Existing

1) Permit Type:	SOP
2) Permit Latitude Coordinate:	33 Deg 15 Min 21 Sec
3) Permit Longitude Coordinate:	94 Deg 4 Min 17 Sec
4) Is this submittal a new application or an update to an existing application?	New Application
4.1. What type of permitting action are you applying for?	Streamlined Revision
4.1.1. Are there any permits that should be voided upon issuance of this permit application	No

through permit conversion?	
4.1.2. Are there any permits that should be voided upon issuance of this permit application through permit consolidation?	No
5) Who will electronically sign this Title V application?	Duly Authorized Representative
6) Does this application include Acid Rain Program or Cross-State Air Pollution Rule requirements?	N/A

Title V Attachments Existing

Attach OP-1 (Site Information Summary)

Attach OP-2 (Application for Permit Revision/Renewal)

[File Properties]

File Name	OP_2_GPI Tex TV Revision (6-5-26).pdf
Hash	DF019E3098952FF9B65D0969BE91757533CFF96B186CDE6675A32970F0663BCD
MIME-Type	application/pdf

Attach OP-REQ1 (Application Area-Wide Applicability Determinations and General Information)

Attach OP-REQ2 (Negative Applicable Requirement Determinations)

Attach OP-REQ3 (Applicable Requirements Summary)

[File Properties]

File Name	OP_REQ3_GPI Tex TV Revision (6-5-26).pdf
Hash	DF019E3098952FF9B65D0969BE91757533CFF96B186CDE6675A32970F0663BCD
MIME-Type	application/pdf

Attach OP-PBRSUP (Permits by Rule Supplemental Table)

Attach OP-SUMR (Individual Unit Summary for Revisions)

Attach OP-MON (Monitoring Requirements)

[File Properties]

File Name	OP_MON_GPI Tex TV Revision (6-5-26).pdf
Hash	DF019E3098952FF9B65D0969BE91757533CFF96B186CDE6675A32970F0663BCD
MIME-Type	application/pdf

Attach OP-UA (Unit Attribute) Forms

[File Properties]

File Name	GPI Tex TV Revision (6-5-26).pdf
Hash	DF019E3098952FF9B65D0969BE91757533CFF96B186CDE6675A32970F0663BCD
MIME-Type	application/pdf

If applicable, attach OP-AR1 (Acid Rain Permit Application)

Attach OP-CRO2 (Change of Responsible Official Information)

Attach OP-DEL (Delegation of Responsible Official)

Attach any other necessary information needed to complete the permit.

[File Properties]

File Name	GPI Tex TV Revision (6-5-26).pdf
Hash	DF019E3098952FF9B65D0969BE91757533CFF96B186CDE6675A32970F0663BCD
MIME-Type	application/pdf

An additional space to attach any other necessary information needed to complete the permit.

Expedite Title V

1) Per Texas Health and Safety Code, Section 382.05155, does the applicant want to expedite the processing of this application?	No

Certification

I certify that I am the Duly Authorized Representative for this application and that, based on information and belief formed after reasonable inquiry, the statements and information on this form are true, accurate, and complete.

1. I am Jeffery Suelzer, the owner of the STEERS account ER116292.
2. I have the authority to sign this data on behalf of the applicant named above.
3. I have personally examined the foregoing and am familiar with its content and the content of any attachments, and based upon my personal knowledge and/or inquiry of any individual responsible for information contained herein, that this information is true, accurate, and complete.
4. I further certify that I have not violated any term in my TCEQ STEERS participation agreement and that I have no reason to believe that the confidentiality or use of my password has been compromised at any time.
5. I understand that use of my password constitutes an electronic signature legally equivalent to my written signature.
6. I also understand that the attestations of fact contained herein pertain to the implementation, oversight and enforcemer of a state and/or federal environmental program and must be true and complete to the best of my knowledge.
7. I am aware that criminal penalties may be imposed for statements or omissions that I know or have reason to believe are untrue or misleading.
8. I am knowingly and intentionally signing Title V Existing 1378.
9. My signature indicates that I am in agreement with the information on this form, and authorize its submittal to the TCEC

OWNER OPERATOR Signature: Jeffery Suelzer OWNER OPERATOR

Account Number:	ER116292
Signature IP Address:	170.85.72.185
Signature Date:	2026-06-22
Signature Hash:	464C001B70E1E1E1FDCC7A1E766BE3048DFF3AFBE83DD755C6C9A80E10355EAA
Form Hash Code at time of Signature:	96FD8F79FADE7D6C8E519AEC09B41CD14F46C67EE73BDA892CA03AA8E5493484

Submission

Reference Number:	The application reference number is 934873
Submitted by:	The application was submitted by ER116292/Jeffery Suelzer
Submitted Timestamp:	The application was submitted on 2026-06-22 at 15:37:44 CDT
Submitted From:	The application was submitted from IP address 170.85.72.185
Confirmation Number:	The confirmation number is 778382
Steers Version:	The STEERS version is 6.94
Permit Number:	The permit number is 1378

Additional Information

Application Creator: This account was created by Troy Gayer

Site Operating Permit Revision Application

Graphic Packaging International, LLC

Texarkana, TX

Submitted by:

Graphic Packaging International

June 2026

Submitted to:

Graphic Packaging International, LLC
9978 FM Road 3129
Queen City, Texas 75572

Texas Commission on Environmental Quality
Air Permits Division
12100 Park 35 Circle, MC-163
Austin, Texas 78753

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1. INTRODUCTION

Graphic Packaging International, LLC (GPI) owns and operates a kraft pulp and paper mill near Texarkana, Texas (Texarkana Mill, Mill, or Facility). The Texarkana Mill is located in Cass County, Texas, which is in attainment with the National Ambient Air Quality Standards (NAAQS) for ozone and all criteria pollutants. The Texarkana Mill produces pulp and paper through the following operations: woodyard, power, chemical recovery, caustic plant, non-condensable gas system, pulping, bleaching, papermaking, wastewater treatment, miscellaneous support operations and extruders.

The Facility operates in accordance with Texas Commission on Environmental Quality (TCEQ) Site Operating Permit (SOP) No. O1378 issued December 23, 2025 (Permit). The Facility is classified as a major source with respect to the TCEQ Title V Program, as defined in Title 30 of the Texas Administrative Code (TAC) Chapter 122. The SOP, or Title V Operating Permit (TVOP), expires on December 23, 2030.

GPI conducted particulate matter (PM) testing in February of 2025 and total reduced sulfur (TRS) testing in October of 2025. GPI is requesting to update the Compliance Assurance Monitoring (CAM) deviation limit for the wet scrubbers associated with Nos. 1 and 2 Smelt Dissolving Tanks (Unit IDs SM01 and SM02) to be consistent with the most recent source testing performed. In addition, SM02 was rebuilt in 2019, making SM02 subject to New Source Performance Standards (NSPS) Subpart BBa, Standards of Performance for Kraft Pulp Mill Affected Sources for Which Construction, Reconstruction, or Modification Commenced after May 23, 2013. Permitting was not completed to incorporate the applicable standards. GPI conducted an audit in 2025 under the Texas Audit Privilege Act (TAPA) to voluntarily disclose any violations at the Facility. Findings of the audit, along with the information required under TAPA, have been submitted to the TCEQ on December 10, 2025.

GPI is submitting this minor revision application (Application) to incorporate updates to the CAM and periodic monitoring requirements for the Unit IDs SM01 and SM02 and to add positive applicability for United States Environmental Protection Agency (U.S. EPA) Title 40 Code of Federal Regulations Part 60, Subpart BBa (40 CFR Part 60, Subpart BBa) to unit ID SM02 (Project). The Unit IDs and their associated regulatory updates are summarized in **Table 1-1**.

Table 1-1
Summary of Regulatory Updates by Unit ID

Unit ID	Description	Regulation	Revision
SM01	No. 1 Smelt Dissolving Tank - Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BBa	Add positive applicability of 40 CFR Part 60, Subpart BBa.
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BB	Remove applicability of 40 CFR Part 60, Subpart BB.
SM02	No. 2 Smelt Dissolving Tank – Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).

This Application contains all required forms and supporting information for the revision of the Permit. The following forms are included in this Application: Form OP-2, Form OP-CRO1, Form OP-UA1, Form OP-REQ3, and Form OP-MON. The certification by a responsible official is included in Form OP-CRO1. Form OP-REQ3 is included to document the detailed citations associated with emissions unit that require a revision at the Facility. Tables 1a and 1b of Form OP-REQ3 show the applicable requirements for emissions units undergoing revisions.

There were no off-permit changes or operational flexibility notifications submitted since the last renewal. Therefore, there are no minor new source review (NSR) authorizations that need to be incorporated with this Application.

2. IDENTIFYING AND ADMINISTRATIVE INFORMATION

This section contains identifying and administrative information for the Mill. The following forms are included in this section:

- OP-2: Application for Permit Revision/Renewal

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1)

Date: **6/5/2026**	
Permit No.: **O1378**	
Regulated Entity No.: **RN100543115**	
Company Name: **Graphic Packaging International, LLC**	
For Submissions to EPA	
Has an electronic copy of this application been submitted (or is being submitted) to EPA?	☒ YES ☐ NO
I. Application Type	
Indicate the type of application:	
☐ Renewal	
☒ Streamlined Revision (Must include provisional terms and conditions as explained in the instructions.)	
☐ Significant Revision	
☐ Revision Requesting Prior Approval	
☐ Administrative Revision	
☐ Response to Reopening	
II. Qualification Statement	
For SOP Revisions Only	☒ YES ☐ NO
For GOP Revisions Only	☐ YES ☐ NO

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1 *continued*)

III.	**Major Source Pollutants (Complete this section if the permit revision is due to a change at the site or change in regulations.)**					
Indicate all pollutants for which the site is a major source based on the site's potential to emit: *(Check the appropriate box[es].)*						
☒ VOC	☒ NO_X	☒ SO_2	☒ PM_{10}	☒ CO	☐ Pb	☒ HAP
Other:						
IV.	**Reference Only Requirements** *(For reference only)*					
Has the applicant paid emissions fees for the most recent agency fiscal year (September 1 - August 31)?					☒ YES ☐ NO ☐ N/A	
V.	**Delinquent Fees and Penalties**					
Notice: This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ are paid in accordance with the Delinquent Fee and penalty protocol.						

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 2
Texas Commission on Environmental Quality

Date: **6/5/2026**
Permit No.: **O1378**
Regulated Entity No.: **RN100543115**
Company Name: **Graphic Packaging International, LLC**

Using the table below, provide a description of the revision.

Revision No.	Revision Code	Unit/Group Process			NSR Authorization	Description of Change and Provisional Terms and Conditions
		New Unit	ID No.	Applicable Form		
1	MS-C	NO	SM01	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM01 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
2	MS-C	NO	SM02	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM02 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
3	MS-C	NO	SM02	OP-UA1	N/A	GPI is requesting to add positive applicability for 40 CFR Part 60, Subpart BBa to SM02. In addition, GPI is requesting to remove 40 CFR Part 60, Subpart BB applicability for SM02. No additional emissions unit, emission point, or process is being added or deleted. Suggested regulations to be added to the Permit are found in Form OP-REQ3.

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 3
Texas Commission on Environmental Quality

Date: **6/5/2026**		
Permit No.: **O1378**		
Regulated Entity No.: **RN100543115**		
Company Name: **Graphic Packaging International, LLC**		
I.	**Significant Revision** *(Complete this section if you are submitting a significant revision application or a renewal application that includes a significant revision.)*	
A.	Is the site subject to bilingual requirements pursuant to 30 TAC § 122.322?	☐ YES ☐ NO
B.	Indicate the alternate language(s) in which public notice is required:	
C.	Will, there be a change in air pollutant emissions as a result of the significant revision?	☐ YES ☐ NO

Using the table below, indicate the air pollutant(s) that will be changing and include a brief description of the change in pollutant emissions for each pollutant:

Pollutant	Description of the Change in Pollutant Emissions

3. RESPONSIBLE OFFICIAL CERTIFICATION

This section contains certification requirements of this Application for the Mill. The following forms are included in this section:

- Form OP-CRO1: Certification by Responsible Official

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program

All initial permit application, revision, renewal, and reopening submittals requiring certification must be addressed using this form. Updates to site operating permit (SOP) and temporary operating permit (TOP) applications, other than public notice verification materials, must be certified prior to authorization of public notice or start of public announcement. Updates to general operating permit (GOP) applications must be certified prior to receiving an authorization to operate under a GOP.

I. Identifying Information	
RN: **RN100543115**	
CN: **CN601710460**	
Account No.: **CG-0010-G**	
Permit No.: **O1378**	
Project No.: **TBA**	
Area Name: **Texarkana Mill**	
Company Name: **Graphic Packaging International, LLC**	
II. Certification Type *(Please mark appropriate box)*	
☒ Responsible Official Representative	☐ Duly Authorized Representative
III. Submittal Type *(Please mark appropriate box) (Only one response can be accepted per form)*	
☐ SOP/TOP Initial Permit Application	☒ Permit Revision, Renewal, or Reopening
☐ GOP Initial Permit Application	☐ Update to Permit Application
☐ Other: _____	

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program
Texas Commission on Environmental Quality

All initial issuance, revision, and renewal permit application submittals requiring certification must be accompanied by this form. Updates to acid rain or CSAPR (other than public notice verification materials) must be certified prior to authorization of public notice for the draft permit.

IV. Certification of Truth
This certification does not extend to information which is designated by TCEQ as information for reference only.
I, **Jeffery Suelzer** certify that I am the **RO** *(Certifier Name printed or typed)* *(RO or DAR)* and that, based on information and belief formed after reasonable inquiry, the statements and information dated during the time period or on the specific date(s) below, are true, accurate, and complete: *Note: Enter Either a Time Period or Specific Date(s) for each certification. This section must be completed. The certification is not valid without documentation date(s).*
Time Period: From _____ to _____ *(Start Date)* *(End Date)*
Specific Dates: **6/5/2026** _____ _____ _____ *(Date 1)* *(Date 2)* *(Date 3)* *(Date 4)*
_____ _____ *(Date 5)* *(Date 6)*
Signature: _____ Signature Date: _____ Title: **Manufacturing Director**

4. PROCESS DESCRIPTION

The Texarkana Mill produces bleached kraft pulp that is used to make paperboard for packaging materials. The operations with air emissions sources at the Texarkana Mill include the following:

- Woodyard
- Power
- Chemical Recovery
- Caustic Plant
- Non-Condensable Gas System
- Pulping
- Bleaching
- Papermaking
- Wastewater Treatment
- Miscellaneous Support Operations
- Extruders

GPI woodyard operations debark logs, process chips, and intake purchased chips as raw materials to the process, which are digested under elevated temperature and pressure in an alkaline solution of sodium sulfide and sodium hydroxide, called “white liquor.” The two pulping lines process hardwood and softwood to produce a pulp slurry which is bleached and sent to the paper machines. The final product is dried and can be laminated through extruders that combine it with polyethylene.

This Application only concerns the smelt dissolving tanks used in the chemical recovery operations. There have been no additional changes to the Mill’s operations since the last renewal of the TVOP application; therefore, only a discussion of the chemical recovery operations is included.

CHEMICAL RECOVERY OPERATIONS

The Texarkana Mill operates two liquor recovery systems that process kraft black liquor from the hardwood and softwood pulping operations. Weak liquor from the pulping process is collected in separate weak black liquor storage tanks, one for the No. 1 System and one for the No. 2 System. The liquor from each system is sent to the multiple effect evaporator set associated with that system. Black liquor from these evaporators is then sent to heavy liquor storage before being further processed in the concentrators. Emissions from the No. 1 and No. 2 Multiple Effect Evaporator Sets and No. 1 and No. 2

Concentrators are collected and controlled by the non-condensable gas (NCG) system. The foul condensates are collected in the evaporator hotwells and routed to the sewer and wastewater treatment system. The combined contaminated condensate is collected and may be used as shower water in the brown stock washers or sewered.

Tall oil soap is produced as a byproduct of the evaporation process. Liquor is extracted from an intermediate stage of each evaporator system and sent to No. 2 Weak Liquor Storage Tank. The soap is then concentrated and kept in the No. 1 and No. 2 Soap Storage Tanks prior to loading into trucks for offsite processing.

The Texarkana Mill recovers cooking chemicals by firing concentrated black liquor into either of the two indirect contact recovery furnaces, No. 1 Recovery Furnace (RB01) and No. 2 Recovery Furnace (RB02). The organics from the liquor are combusted to generate heat for process steam, while the inorganic chemicals collect in the bottom of the furnaces in the form of molten smelt. The recovery furnaces are also permitted to fire natural gas, primarily during start-up operations. Each furnace operates as an independent system that includes: a smelt tank, electrostatic precipitator (ESP) for PM control, and two exhaust stacks. Ash from the ESPs is returned to the system in the Precipitator Ash Tanks (one for each recovery furnace) that are vented to the smelt dissolving tank scrubbers. The molten smelt from each recovery furnace is directed to one of two dedicated smelt tanks, where it is dissolved into weak wash or water to form green liquor, a preliminary step to regenerating white liquor in the causticizing operation. SM01 and SM02 are equipped with scrubbers. The control devices are designed to capture particulates and TRS compounds and return them to the smelt tanks. Weak wash, an aqueous solution of sodium hydroxide, sodium sulfide, and sodium carbonate, is used as the scrubbing medium.

5. PROJECT DESCRIPTION

GPI is requesting to update the CAM deviation limit for the wet scrubbers associated with SM01 and SM02 to be consistent with the most recent source testing performed. Pursuant to 40 CFR §63.864(j)(5)(i)(B)(1), "the minimum fan amperage operating limit must be set as the midpoint between the lowest of the 1-hour average fan amperage values associated with each test run demonstrating compliance with the applicable emission limit in §63.862 and the no-load amperage value." The no-load amperage value is determined using manufacturers specifications, or by performing a no-load test of the fan motor for each smelt dissolving tank scrubber. In 2025, GPI completed PM source testing of SM01 and SM02, on February 11 and 12, respectively. TRS source testing was also performed on SM02 on October 28, 2025. While both pollutants were tested under the applicable NSPS BBa requirements for SM02, the operating parameters (i.e., fan amps and scrubber flow) are established based on the PM performance tests as the operating parameter values were higher than those observed during the TRS test. Therefore, SM01 and SM02 utilize the PM source testing results for the 1-hour average fan amperages of the wet scrubber. The no-load fan amperage value for SM01 and SM02 have been obtained from no-load tests performed in 2015 and 2023, respectively. Therefore, GPI has calculated the lowest 1-hour average fan amperage, as provided in the Source Test Report, and the no-load value, and is requesting the value be used for the CAM deviation limit. Please see Table 5-1 for current Permit values and proposed values. The suggested permit revisions can be found in strikethrough and red text in Form OP-MON.

Table 5-1
Smelt Dissolving Tank Test Results and Proposed Values

Unit Name	No. 1 Smelt Dissolving Tank	No. 2 Smelt Dissolving Tank
Unit ID No.	SM01	SM02
Current Permit Average Fan Amp Value	77	36
No Load Fan Amp Values	50.2	28
Minimum 1-Hour Average Fan Amp	81.8	43.19
Proposed Average Fan Amp Value	66	36
Current Permit Weak Wash Flow to Fan (gpm)	48	75
Proposed Weak Wash Flow to Fan (gpm)	48	77
Current Permit Weak Wash Flow to Scrubber (gpm)	88	95
Proposed Weak Wash Flow to Scrubber (gpm)	87	90

In addition, SM02 was rebuilt in 2019 and is therefore subject to NSPS Subpart BBa. Permitting was not completed to incorporate the applicable Subpart BBa standards associated with SM02. Pursuant to Section 10(G) of the Environmental, Health and Safety Audit Privilege Act, which provides immunity for violations voluntarily disclosed as a result of a compliance audit, the Mill conducted an audit under the TAPA, commencing April 30, 2025, to voluntarily disclose any violations at the Facility. The audit was complete on November 18, 2025 and the audit findings were submitted on December 10, 2025. In addition, a source test for TRS was performed on SM02 on October 28, 2025 to demonstrate compliance with Subpart BBa. Since there were no additions or deletions of an emissions unit, emissions point, or process, Form OP-SUMR is not required per form instructions. However, GPI is requesting to update the Unit Summary of the Permit to include a row for 40 CFR Part 60, Subpart BBa requirements for SM02. An example of the row to include, in red, is found below.

Unit/Group/Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
SM02	KRAFT PULP MILLS	N/A	60BBa-01	40 CFR Part 60, Subpart BBa	No changing attributes.

40 CFR Part 60, Subpart BBa lists additional requirements for sources constructed, reconstructed, or modified after May 23, 2013. SM02 was reconstructed in 2019 and is now regulated by Subpart BBa, rather than Subpart BB. GPI is requesting that the Applicable Requirements Summary also be updated to include the regulations applicable to SM02 in Subpart BBa and to delete regulatory requirements of Subpart BB. The suggested regulations applicable to SM02 to include (in red) and delete (in strikethrough) in the Permit can be found in the example on the following page and in Form OP-REQ3.

Applicable Requirements Summary

Unit Group Process ID No.	Unit Group Process Type	SOP Index No.	Pollutant	State Rule or Federal Regulation Name	Emission Limitation, Standard or Equipment Specification Citation	Textual Description (See Special term and Condition 1.B.)	Monitoring and Testing Requirements	Recordkeeping Requirements (30 TAC §122.144)	Reporting Requirements (30 TAC §122.145)
~~SM02~~	~~EU~~	~~60BB-01~~	~~PM~~	~~40 CFR Part 60, Subpart BB~~	~~§60.282(a)(2)~~	~~On and after the test completion no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases containing PM > 0.1 g/kg black liquor solids (dry weight).~~	~~§ 60.285(a) [G]§ 60.285(c) § 60.285(f)(1) ** See CAM Summary~~	~~None~~	~~None~~

~~SM02~~	~~EU~~	~~60BB-01~~	~~TRS~~	~~40 CFR Part 60, Subpart BB~~	~~§60.283(a)(4)~~	~~On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.~~	~~§ 60.284(b) [G]§ 60.284(b)(2) § 60.284(c)(4) § 60.284(f) § 60.285(a) [G]§ 60.285(e) § 60.285(f)(2)~~	~~§60.284(c)(4)~~	~~None~~
SM02	EU	60BBa-01	PM	40 CFR Part 60, Subpart BBa	§60.282a(a)(3)	On and after the performance test completion no owner/operation shall discharge to the atmosphere from any new smelt dissolving tank that is not associated with a new or reconstructed	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

						recovery furnace subject to the provisions of 60.282a(a)(2) any gases which contain filterable particulate matter in excess of 0.1 gram per kilogram (g/kg) of black liquor solids (dry weight).			
SM02	EU	60BBa-01	TRS	40 CFR Part 60, Subpart BBa	§60.283a(a)(4)	On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7) §60.285a(e) §60.285a(f)(2)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

6. UNIT ATTRIBUTE INFORMATION

This section contains the applicable unit attribute forms to document regulatory applicability. The following forms are included in this section:

- OP-UA1: Miscellaneous and Generic Unit Attributes

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

General Information

Requested Information	Response
Date:	06/05/2026
Customer Reference No.:	CN601710460
Regulated Entity No.:	RN100543115
Permit No.:	O1378
Permit Area Name:	Texarkana Mill
Permit Type:	SOP
Project Type:	Revision
Submission Type:	Existing Application Update
Project Number (if available):	TBD
Form Information	**TCEQ Entry Only**
Title V Form Release Date:	10/1998
Form Number:	10044
APD ID Number:	35v1.0
Version Revised Date:	07/2025
	This form is for use by facilities subject to air quality permit requirements and may be revised periodically.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

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Table	Regulation	Page	Data Submitted
N/A	N/A	OP-SUM Table 1	Yes
N/A	N/A	OP-REQ2	Yes
Table 1	N/A	Page 1	Yes

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-SUM - Individual Unit Summary
Table 1

Unit AI	Revision No.	Unit ID No.	Group ID No.	Unit Name/Description	CAM	PCA AI	Preconstruction Authorization (PCA) Category	Authorization/ Registration Number	Permit By Rule (PBR) Number	PBR Effective Date
	1	SM01		NO. 1 SMELT TANK	Y			2975		
	1	SM01		NO. 1 SMELT TANK	Y			PSDTX778M2		
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.261	03/14/1997
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.262	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			2975		
	2	SM02		NO. 2 SMELT TANK	Y			PSDTX778M2		
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.261	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.262	03/14/1997

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-REQ2 - Negative Applicable/Superseded Requirement Determinations

Unit AI	Revision No.	Unit ID No.	Potentially Applicable Regulatory Name	Negative Applicability/Superseded Requirement Citation	Negative Applicability/Superseded Requirement Reason
	3	SM02	**40 CFR Part 60, Subpart BBa**	40 CFR Part 60, Subpart BB	SM02 has been rebuilt and is now subject to 40 CFR Part 60, Subpart BBa, which promulgates requirements for sources that have been constructed, reconstructed, or modified after May 23, 2013. 40 CFR Part 60, Subpart BB no longer applies.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table 1

Unit ID No.	SOP/GOP Index No.	Unit Type	Date Constructed/Placed in Service	Functionally Identical Replacement	Maximum Rated Capacity	Technical Information and Unit Description
SM02	60BBa-01	EU	**10/03/2019**			No. 2 Smelt Tank was rebuilt in 2019 and is therefore subject to 40 CFR Part 60, Subpart BBa.

Go to the Table of Contents

7. APPLICABLE REQUIREMENT INFORMATION

This section contains forms that document potentially applicable requirements. The following forms are included in this section:

- OP-REQ3: Applicable Requirements Summary

Applicable Requirements Summary
Form OP-REQ3
(Page 1)
Federal Operating Permit Program
Table 1a: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	Unit/Group/Process Applicable Form	SOP/GOP Index No	Pollutant	Applicable Regulatory Requirement Name	Applicable Regulatory Requirement Standard(s)
3	*SM02*	OP-UA1	*60BBa-01*	*PM & TRS*	*40 CFR Part 60, Subpart BBa*	*§ 60.280a* *§ 60.282a(a)(3)* *§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)* *§ 60.287a(a)* *§ 60.287a(b)(4)* *§ 60.287a(b)(7)* *§ 60.287a(c)* *§60.288a*

Applicable Requirements Summary
Form OP-REQ3 (Page 2)
Federal Operating Permit Program
Table 1b: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	SOP/GOP Index No.	Pollutant	Monitoring and Testing Requirements	Recordkeeping Requirements	Reporting Requirements
2	SM02	60BBa-01	PM & TRS	*§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)*	§ 60.287a(a) § 60.287a(b)(4) § 60.287a(b)(7) § 60.287a(c)	§60.288a

8. COMPLIANCE ASSURANCE MONITORING AND PERIODIC MONITORING

CAM is a Federal program established under 40 CFR Part 64 regulations. The regulatory requirements governing implementation of CAM in Texas are also established in 30 TAC Chapter 122, Subchapter G. CAM applies to an emissions unit located at a major source that meets all of the following:

- The emissions unit is subject to an emissions limitation or standard for an air pollutant in an applicable requirement;
- The emissions unit uses a control device to achieve compliance with the applicable emissions limitation or standard; and
- The emissions unit has the pre-control potential-to-emit greater than or equal to the amount in tons per year required for the site to be classified as a major source.

CAM applicability is determined on a pollutant-by-pollutant basis. Please note that 30 TAC §122.604(c) and (d) include CAM exemptions for certain emissions limitations or standards and certain utility units. For example, CAM does not apply to emissions limitations or standards proposed by U.S. EPA after November 15, 1990 under the Federal Clean Air Act Sections §111 (Standards of Performance for New Stationary Sources) or §112 (Hazardous Air Pollutants). Additionally, CAM does not apply to emissions limitations or standards for which the applicable requirement specifies a continuous compliance determination method.

CAM applicability is determined for the emissions unit, not the control device. Sites are required to address CAM as part of the Title V application process. As such, GPI has reviewed the applicable existing CAM plans for accuracy. Form OP-MON has been included with this Application for the CAM plans that require revisions.

Periodic monitoring is a Federal monitoring program established under 40 CFR Part 70 regulations. The regulatory requirements governing implementation of periodic monitoring in Texas are also established in 30 TAC Chapter 122, Subchapter G. An emissions unit will require periodic monitoring for an emissions limitation or standard when the regulation does not specify sufficient monitoring to determine compliance with the applicable requirement. Form OP-MON has been included to document revisions of the periodic monitoring at the Mill.

Pursuant to 40 CFR §64.2(b)(1), the CAM requirements under 40 CFR Part 64 do not apply to SM02. §64.2(b)(1) exempts units subject to emissions limitations or standards in NSPS promulgated after

November 15, 1990. Subpart BBa lists its own monitoring, performance testing, and compliance provisions for PM and TRS, satisfying the intent of CAM. GPI is requesting to remove CAM requirements that no longer apply to SM02 and has included the suggested strikethrough in Form OP-MON.

Texas Commission on Environmental Quality
Monitoring Requirements
Form OP-MON
(PAGE 3)
Federal Operating Permit Program
Table 1c: CAM/PM Case-By-Case Additions

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**1**		
Unit/EPN/Group/Process ID No.: **SM01**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: **30 TAC Chapter 111, Nonagricultural Processes & 30 TAC Chapter 111, Visible Emissions**		
SOP/GOP Index No.: **R1151-01 & R1111-01**		
Pollutant: **PM & Opacity**		
Main Standard: **§111.151(a) & §111.111(a)(1)(B)**		
Monitoring Type: **CAM & Periodic Monitoring**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 66 ~~77~~ amps; [ii] Minimum liquid flow rate = 87.17 ~~88~~ gpm to scrubber and 47.99 ~~48~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM01**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: **Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**		

Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:
± 2% of span; or
± 5% of design liquid flow rate

Verification Procedures:
N/A

Representative Date: **N/A**

VI. Periodic Monitoring Case-by-case: N/A - No changes to periodic monitoring

Indicator: **[I] Fan motor current; [II] Liquid flow rate**	Minimum Frequency: **Four times per hour**

Averaging Period: **3 hour**

Periodic Monitoring Text:
[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**2**		
Unit/EPN/Group/Process ID No.: **SM02**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: ~~**40 CFR Part 60, Subpart BB &**~~ **30 TAC Chapter 111, Nonagricultural Processes**		
SOP/GOP Index No.: ~~**60BB-01 &**~~ **R1111-01**		
Pollutant: ~~**PM &**~~ **Opacity**		
Main Standard: ~~**§60.282(a)(2) &**~~ **§111.11(a)(1)(B)**		
Monitoring Type: **CAM**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 35.6 ~~36~~ amps; [ii] Minimum liquid flow rate = 89.62 ~~95~~ gpm to scrubber and 76.54 ~~75~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM02**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: ~~**Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**~~ ~~**Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:**~~ ~~**± 2% of span; or**~~ ~~**± 5% of design liquid flow rate**~~		

Verification Procedures: **N/A**	
Representative Date: **N/A**	
VI. Periodic Monitoring Case-by-case	
Indicator: **Fan Amperage & Liquid Flow Rate**	Minimum Frequency: **Four times per hour**
Averaging Period: **3 hour**	
Periodic Monitoring Text: **[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.** **[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.**	

APPENDIX A -
PM AND TRS SOURCE TESTING RESULTS

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Test Dates:
February 11-13, 2025

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subparts MM & S

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Lucas Hotubbee
lucas.hotubbee@alliancetg.com
(479) 206-1157

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewer
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

COMPANY:		Graphic Packaging International		SOURCE:		LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, NCG01	
REVIEWER:				DATE OF SAMPLING:		February 11-13, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. E	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. E	Operating parameters of the pollution control equipment					
13.	App. E	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. D	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	App. C	Chain of custody of samples					
31.	App. C	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. D	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the source) tested and operating conditions for the specific test dates and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections in the test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

March 11, 2025

Riley Wilson, QSTI – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

Appendix A Sample Calculations
Appendix B Field Data
Appendix C Laboratory Data
Appendix D Quality Assurance/Quality Control Data
Appendix E Process Operating/Control System Data
Appendix F CSV Data
Appendix G Illustrations
Appendix H Resume of Field Team Leader
Appendix I Laboratory NELAP Certification
Appendix J SSTP and Associated Documentation
Appendix K TCEQ Permit Sections

Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing was conducted to determine the concentrations and emission rates of particulate matter (PM), particulate matter no more than 10 microns in diameter (PM_{10}), particulate matter no more than 2.5 microns in diameter ($PM_{2.5}$), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	$PM/PM_{10}/PM_{2.5}$
No. 2 Lime Kiln	LK02	$PM/PM_{10}/PM_{2.5}$
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	$PM/PM_{10}/PM_{2.5}$
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	$PM/PM_{10}/PM_{2.5}$
No. 1 Smelt Tank Scrubber	SM01	$PM/PM_{10}/PM_{2.5}$
No. 2 Smelt Tank Scrubber	SM02	$PM/PM_{10}/PM_{2.5}$
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John T. Fussell
Alliance Personnel	Riley Wilson Dominic Bradley Ethan Dobbs Lucas Hotubbee Joshua Moore Marcus Nichols Chris Shepard Calvin Standridge

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) developed by Alliance.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on February 11-13, 2025. Testing consisted of determining the concentration and emission rate of CH_3OH at the exhaust of NCG01 and of $PM/PM_{10}/PM_{2.5}$ at the exhausts of LK1, LK2, RB01A/RB01B, RB02A/RB02B, SM01, and SM02.

Tables 2-1 through 2-4 provide a summary of the emission testing results with comparisons to the applicable NESHAP or TCEQ permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Table 2-1: Summary of Results – Nos. 1 and 2 Lime Kilns

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
LK01 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.015	0.015	0.013	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**22**
Total PM[1] Emission Rate, lb/hr	4.7	4.6	4.4	4.5
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	27.60
Percent of Limit, %	--	--	--	**16**
LK02 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.018	0.006	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**21**
Total PM[1] Emission Rate, lb/hr	6.6	6.6	2.8	5.3
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	26.30
Percent of Limit, %	--	--	--	**20**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-2: Summary of Results – Nos. 1 and 2 Recovery Furnaces

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
RB01A (North Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0082	0.0051	0.0074	0.0069
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**16**
Total PM[1] Emission Rate, lb/hr	6.5	3.6	5.2	5.1
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**19**
RB01B (South Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0013	0.0012	0.0010	0.0011
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**3**
Total PM[1] Emission Rate, lb/hr	1.2	1.2	1.1	1.2
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**4**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
RB02A (West Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.014	0.043	0.025
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**56**
Total PM[1] Emission Rate, lb/hr	21.2	19.9	53.2	31.5
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**74**
RB02B (East Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.030	0.012	0.014	0.019
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**43**
Total PM[1] Emission Rate, lb/hr	36.2	16.2	18.4	23.6
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**55**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-3: Summary of Results – Nos. 1 and 2 Smelt Tank Scrubbers

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
SM01 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.15	0.083	0.073	0.10
NESHAP PM Limit, lb/ton	--	--	--	0.40
Percent of Limit, %	--	--	--	
Total PM[1] Emission Rate, lb/hr	7.8	4.4	3.9	5.4
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	10.9
Percent of Limit, %	--	--	--	**49**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
SM02 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.077	0.063	0.060	0.067
NESHAP PM Limit, lb/ton	--	--	--	0.20
Percent of Limit, %	--	--	--	**33**
Total PM[1] Emission Rate, lb/hr	8.0	7.4	6.4	7.3
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	19.85
Percent of Limit, %	--	--	--	**37**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-4: Summary of Results – NCG Oxidation Unit Scrubber

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
Methanol Data				
Concentration, ppmvd @ 10% O_2	1.1	1.1	0.97	1.1
NESHAP Limit, ppmvd @ 10% O_2	--	--	--	20
Percent of Limit, %	--	--	--	**5**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture	320	FTIR – Continuous Sampling

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated to equivalent diameters and compared to Figure 1-1 in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and an inclined manometer. The stack gas temperature was measured with a K-type thermocouple and a pyrometer.

The O_2 and CO_2 concentrations were assumed to be ambient for the molecular weight and volumetric flow rate calculations at the Nos. 1 and 2 Smelt Tank Scrubbers (SM01 and SM02).

Stack gas velocity pressure and temperature readings were recorded during each test run and were utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing were conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on-site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content (BWS) was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to the testing, each impinger was filled with a known quantity of water or silica gel. Each impinger was analyzed gravimetrically before and after each test run to determine the amount of condensed moisture. All gravimetric analyses were performed on the same balance.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing was conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system consisted of a stainless-steel nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, an un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and five (5) chilled impingers. The first and second impingers were initially empty, the third impinger contained 100 mL of de-ionized water, the fourth impinger was initially empty, and the fifth impinger contained 200-300 grams of silica gel. The un-weighed, 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of 248 ±25°F, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained at a temperature that was greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The nitrogen purge was omitted because the amount of condensate that was collected in the dry impingers was minimal. After the leak check, the impinger contents were measured for moisture gain.

The front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 120-minute purge was conducted at a rate of 14 liters per minute. The nitrogen purge was started within 30 minutes of the conclusion of sampling. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. Condensate was collected in the first dry impinger; therefore, the front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 60-minute purge was conducted at a rate of 14 liters per minute. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder were rinsed six (6) times with acetone to remove any adhering particulate matter, and the resulting rinses were recovered in container 2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water, then with acetone and then with hexane. The resulting water rinse was recovered in container CPM Cont. #1, and the acetone and hexane rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed sequentially

with DIUF water, acetone, and hexane. The resulting water rinse was added to container CPM Cont. #1, and the resulting acetone and hexane rinses were added to container CPM Cont. #2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for condensable particulate matter analysis. The total moles of sulfate and ammonium were determined in the sample fraction and the maximum mass adjustment factor (MMAF) was calculated to correct for residual ammonia in accordance with OTM-59.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture were determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream was extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 FTIR, which was operated with a portable computer. FTIR spectra for each calibration gas were stored on the computer's hard drive, and these single component calibration spectra were used to analyze the spectra of the measured samples. The gas components to be measured were selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio were measured and recorded to document the analyzer's performance. A leak check was performed on the sample cell. The instrument path length was verified by using ethylene as the Calibration Transfer Standard. Dynamic spiking was performed by using a certified standard of the target compound or appropriate surrogate, which was balanced in nitrogen with sulfur hexafluoride blended as a tracer, to calculate the dilution factor. All test spectra, interferograms, and analytical method information were recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at the Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) was introduced directly to the instrument sample port. The signal amplitude was recorded, a background spectra was taken, a linearity check was performed and recorded, the peak-to-peak noise and the root mean square in the spectral region of interest were measured and a screenshot was recorded, all while the nitrogen was flowing.

Following the zero gas checks, room air was pulled through the sample chamber, the line width and resolution were verified to be at 1879 cm-1, the peak position was entered and a screenshot of the FWHH was recorded. Following these checks, another background spectra was recorded, and the calibration transfer standard (CTS) was introduced directly to the instrument sample port. The CTS instrument recovery was recorded, and the instrument mechanical response time was measured.

Next, stack gas was introduced to the FTIR through the sampling system and several scans were taken until a stable reading was achieved. The native concentration of our target spiking analyte (methanol) was recorded. Spike gas was introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate, and a corresponding dilution ratio and a system response time were calculated. Matrix spike recovery spectra were recorded and were within ± 30% of the calculated value of the spike concentration in accordance with the method's requirements.

The matrix spike recovery was conducted one (1) time at the beginning of the testing, and the CTS recovery procedures were repeated following each test run. The corresponding values were recorded.

Appendix A

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	13.3	= average analyzer value during test, % dry
C_o	0.2	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	10.1	= average of pretest & posttest calibration responses, % dry
C_{O_2}	13.2	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.1	= average analyzer value during test, % dry
C_o	0.0	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.8	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	3.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
ΔH	2.158	= pressure differential of orifice, in H_2O
Pm	30.19	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
Pg	-0.48	= static pressure, in. H_2O
Ps	29.99	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Y \times Vm \times Pm}{Tm}$$

where,

Y	0.999	= meter correction factor
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Tm	523.5	= absolute meter temperature, °R
Vmstd	48.077	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	506	= weight of H_2O collected, g
Vwstd	23.863	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37} - \left(\frac{2,827}{Ts + 365}\right)}{Ps}$$

where,

Ts	363.9	= stack temperature, °F
Ps	29.99	= absolute stack gas pressure, in. Hg
BWSsat	1.000	= dimensionless

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	23.863	= standard wet volume, scf
Vmstd	48.077	= standard meter volume, dscf
BWS	0.332	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	1.000	= moisture fraction (theoretical at saturated conditions)
BWSmsd	0.332	= moisture fraction (measured)
BWS	0.332	

Excess Air (EA), %

$$EA = \frac{(\%O_2 - [0.5 \times \%CO]) \times 100}{(0.264 \times \%N_2) - \%O_2 - (0.5 \times \%CO)}$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
CO	0.0	= carbon monoxide concentration, % (assumed zero)
N_2	79.5	= nitrogen concentration, %
EA	40.97259538	= %

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
Md	30.55	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	30.55	= molecular weight (DRY), lb/lb mol
BWS	0.332	= moisture fraction, dimensionless
Ms	26.39	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.804	= pitot tube coefficient
$\Delta P^{1/2}$	0.713	= velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Ms	26.39	= molecular weight of stack gas, lb/lb mol
Vs	50.0	= ft/sec

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	50.0	= stack gas velocity, ft/sec
As	46.16	= cross-sectional area of stack, ft^2
Qa	138,543	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	138,543	= average stack gas flow at stack conditions, acfm
BWS	0.332	= moisture fraction, dimensionless
Ps	29.99	= absolute stack gas pressure, in. Hg
Ts	823.5	= absolute stack temperature, °R
Qs	59,472	= dscfm

Dry Gas Meter Calibration Check (Yqa), dimensionless

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{0.0319 \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0.999	= meter correction factor, dimensionless
Θ	60	= run time, min.
Vm	47.32	= total meter volume, dcf
Tm	523.5	= absolute meter temperature, °R
ΔH@	1.832	= orifice meter calibration coefficient, in. H_2O
Pb	30.03	= barometric pressure, in. Hg
ΔH avg	2.158	= average pressure differential of orifice, in H_2O
Md	30.55	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	1.469	= average squareroot pressure differential of orifice, $(in. H2O)^{1/2}$
Yqa	0.2	= percent

Volume of Nozzle (Vn), ft^3

$$Vn = \frac{Ts \times \left(0.002669 \times Vlc + \frac{Vm \times Pm \times Y}{Tm} \right)}{Ps}$$

where,

Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Vlc	506.0	= volume of H_2O collected, ml
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Y	0.999	= meter correction factor, unitless
Tm	523.5	= absolute meter temperature, °R
Vn	111.928	= volume of nozzle, ft^3

Isokinetic Sampling Rate (I), %

$$I = \left(\frac{Vn}{\theta \times 60 \times An \times Vs} \right) \times 100$$

where,

Vn	111.928	= nozzle volume, ft3
θ	60.0	= run time, minutes
An	0.00059	= area of nozzle, ft^2
Vs	50.0	= average velocity, ft/sec
I	104.7	= %

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Filterable PM Concentration (C_s), grain/dscf

$$C_s = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn	29.2	= filterable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_s	0.0094	= grain/dscf

Filterable PM Emission Rate (PMR), lb/hr

$$PMR = \frac{C_s \times Qs \times 60}{7.0E+03}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
PMR	4.78	= lb/hr

Condensable PM Concentration (C_{CPM}), grain/dscf

$$C_{CPM} = \frac{M_{CPM} \times 0.0154}{Vmstd}$$

where,

M_{CPM}	10.7	= condensable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_{CPM}	0.0034	= grain/dscf

Condensable PM Emission Rate (ER_{CPM}), lb/hr

$$ER_{CPM} = \frac{C_{CPM} \times Qs \times 60\frac{min}{hr}}{7.0E+03}$$

where,

C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
ER_{CPM}	1.75	= lb/hr

Total PM Concentration (C_{TPM}), grain/dscf

$$C_{TPM} = C_S + C_{CPM}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
C_{TPM}	0.0128	= grain/dscf

Total PM Emission Rate (ER_{TPM}), lb/hr

$$ER_{TPM} = PMR + ER_{CPM}$$

where,

PMR	4.78	= filterable PM emission rate, lb/hr
ER_{CPM}	1.75	= condensable PM emission rate, lb/hr
ER_{TPM}	6.53	= lb/hr

Location:	Graphic Packaging International - Queen City, TX
Source:	NCG Oxidation Unti Scrubber (NCG01)
Project No.:	AST-2024-4204
Run No. /Method	Run 1 / Method 320
Run No.	1
Target	35

Methanol - Outlet Concentration (C_{CH_3OH}), ppmvd

$$C_{CH_3OH} = \frac{C_{CH_3OHw}}{1 - BWS}$$

where,

C_{CH_3OHw}	0.5	= Methanol - Outlet Concentration, ppmvw
BWS	0.444	= moisture fraction, unitless
C_{CH_3OH}	0.8	= ppmvd

Methanol - Outlet Concentration (C_{CH_3OHw}), ppmvw

$$C_{CH_3OHw} = C_{CH_3OH} \times (1 - BWS)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
BWS	0.444	= moisture fraction, unitless
C_{CH_3OHw}	0.5	= ppmvw

Methanol - Outlet Concentration (C_{CH_3OHc10}), ppmvd @ 10% O_2

$$C_{CH_3OHc10} = C_{CH_3OH} \times \left(\frac{20.9 - 10}{20.9 - O_2}\right)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
C_{O_2}	13.2	= oxygen concentration, %
C_{CH_3OHc10}	1.1	= ppmvd @10% O_2

Methanol - Outlet Emission Rate (ER_{CH_3OH}), lb/hr

$$ER_{CH_3OH} = \frac{C_{CH_3OH} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 454 \frac{g}{lb}}$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
MW	32.04	= CH_3OH molecular weight, g/g-mole
Qs	6,235	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{CH_3OH}	2.65	= lb/hr

Location Graphic Packaging
Source(s) NCG Incinerator
Project No. AST-2024-4204
Date(s) 2/5/2025

CTS Recovery Value (CTS_R), %

$$\frac{CTS_{avg}}{CTS_{cyl}} \times 100$$

Where,

CTS_{avg}	98.17	= average of all CTS calibration gas readings, ppm
CTS_{cyl}	103	= CTS bottle certified gas value, ppm
CTS_R	95.3%	= CTS recovery value, %

Spike Dilution Factor (DF), %

$$\frac{SF6_{spike} - SF6_{nat}}{SF6_{dir}} \times 100$$

Where,

$SF6_{dir}$	12.03	= average of direct tracer gas value readings
$SF6_{nat}$	0.01	= average of native tracer gas value readings
$SF6_{spike}$	0.759135	= average of dynamic spike tracer gas value readings
DF	6.23%	= spike dilution factor, %

Calculated Spike ($Spike_{calc}$), ppm

$$(DF \times Analyte_{dir}) + (Analyte_{nat} \times (1 - DF))$$

Where,

%DF	6.23%	= spike dilution factor, %
$Analyte_{dir}$	100.07	= average of direct analyte gas values, ppm
Analyte $_{nat}$	0.49	= average of native analyte gas values, ppm
$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm

Spike Recovery Value ($Spike_R$), %

$$\frac{Analyte_{spike}}{Spike_{calc}} \times 100$$

Where,

$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm
$Analyte_{spike}$	5.39	= average of spiked analyte gas values, ppm
$Spike_R$	80.55%	= spike recovery value, %

Appendix B

LK01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

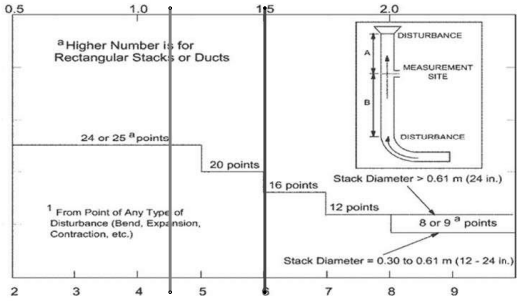
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	160.00	160.10	160.06	160.05
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	42.600	42.370	39.800	41.590
Meter Temperature, °F	(Tm)	47.5	48.5	48.3	48.1
Meter Temperature, °R	(Tm)	507.2	508.2	508.0	507.8
Meter Orifice Pressure, in. WC	(ΔH)	1.633	1.583	1.600	1.606
Volume H_2O Collected, mL	(Vlc)	190.2	195.2	196.8	194.1
Nozzle Diameter, in	(Dn)	0.247	0.247	0.247	0.247
Area of Nozzle, ft^2	(An)	0.0003	0.0003	0.0003	0.0003
Filterable PM Mass, mg	(Mn)	53.7	55.5	44.9	51.4
Condensable PM Mass, mg	(M_{CPM})	4.6	1.8	5.9	4.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.028	44.691	41.999	43.906
Standard Water Volume, ft^3	(Vwstd)	8.970	9.206	9.281	9.152
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
Meter Pressure, in Hg	(Pm)	30.46	30.46	30.46	30.46
Volume at Nozzle, ft^3	(Vn)	59.617	59.606	56.658	58.63
Isokinetic Sampling Rate, (%)	(I)	103.3	103.8	97.1	101.4
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	2.2	3.2	-3.6	0.6
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.019	0.016	0.018
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.015	0.015	0.013	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	4.3	4.5	3.8	4.2
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0016	0.0006	0.0022	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.37	0.14	0.51	0.34
Total PM Concentration, grain/dscf	(C_{TPM})	0.020	0.020	0.019	0.019
Total PM Emission Rate, lb/hr	(ER_{TPM})	4.7	4.6	4.4	4.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Lime Kiln (LK01)
Project No.: AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	56.50	in
Nipple Length:	8.50	in
Depth of Duct:	48.00	in
Cross Sectional Area of Duct:	12.57	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	1.5	(must be ≥ 0.5)
Distance B:	18.0	ft
Distance B Duct Diameters:	4.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/13/25	
Reviewer (Initial and Date):	CAL 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

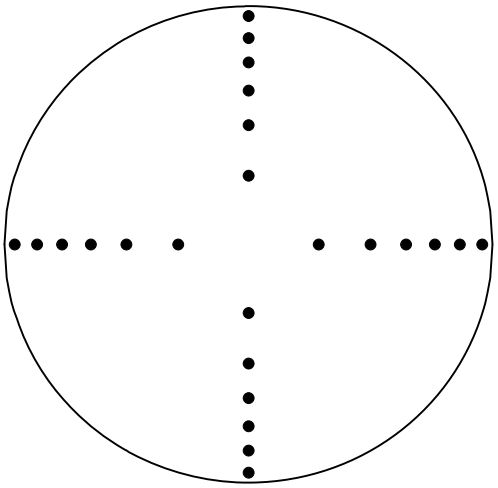
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

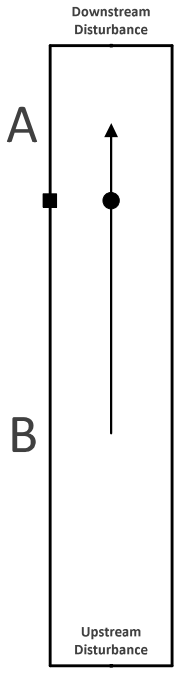
*Percent of stack diameter from inside wall to traverse point.

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.01	9 1/2
2	6.7	3.22	11 11/16
3	11.8	5.66	14 3/16
4	17.7	8.50	17
5	25.0	12.00	20 1/2
6	35.6	17.09	25 9/16
7	64.4	30.91	39 7/16
8	75.0	36.00	44 1/2
9	82.3	39.50	48
10	88.2	42.34	50 13/16
11	93.3	44.78	53 5/16
12	97.9	46.99	55 1/2

Stack Diagram
A = 6 ft.
B = 18 ft.
Depth of Duct = 48 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	6
2	4
3	3
4	5
5	5
6	3
7	2
8	0
9	5
10	2
11	6
12	8
13	2
14	10
15	6
16	5
17	0
18	6
19	6
20	8
21	2
22	3
23	3
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.44	0.42	0.43	0.43
Point 2		0.69	0.69	0.70	0.69
Point 3		0.76	0.67	0.73	0.72
Point 4		0.68	0.66	0.67	0.67
Point 5		0.70	0.70	0.69	0.70
Point 6		0.73	0.71	0.72	0.72
Point 7		0.74	0.72	0.74	0.73
Point 8		0.74	0.75	0.75	0.75
Point 9		0.66	0.66	0.67	0.66
Point 10		0.64	0.64	0.65	0.64
Point 11		0.58	0.56	0.57	0.57
Point 12		0.55	0.54	0.53	0.54
Point 13		0.45	0.45	0.44	0.45
Point 14		0.71	0.72	0.71	0.71
Point 15		0.75	0.73	0.73	0.74
Point 16		0.69	0.70	0.70	0.70
Point 17		0.70	0.70	0.69	0.70
Point 18		0.73	0.74	0.73	0.73
Point 19		0.72	0.73	0.72	0.72
Point 20		0.74	0.71	0.71	0.72
Point 21		0.65	0.66	0.66	0.66
Point 22		0.65	0.64	0.65	0.65
Point 23		0.59	0.60	0.60	0.60
Point 24		0.55	0.54	0.53	0.54
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.810	0.805	0.807	0.808
Pitot Tube Coefficient	(Cp)	0.832	0.832	0.832	0.832
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.66	-0.66	-0.65	-0.66
Stack Pressure, in. Hg	(Ps)	30.29	30.29	30.29	30.29
Stack Cross-sectional Area, ft^2	(As)	12.57	12.57	12.57	12.57
Stack Temperature, °F	(Ts)	130.3	131.3	130.8	130.8
Stack Temperature, °R	(Ts)	590.0	591.0	590.5	590.5
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
O_2 Concentration, %	(O_2)	7.3	7.1	6.9	7.10
CO_2 Concentration, %	(CO_2)	16.5	16.9	17.2	16.87
N_2 Concentration, %	(N_2)	76.2	76	75.9	76.03
Excess Air, %	(EA)	56.96	54.77	52.52	54.75
Molecular Weight, lb/lb-mole (dry)	(Md)	30.93	30.99	31.03	30.98
Molecular Weight, lb/lb-mole (wet)	(Ms)	29.00	28.99	29.06	29.02
Velocity, ft/sec	(Vs)	47.2	47.0	47.0	47.1
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	35,619	35,424	35,457	35,500
At Standard Conditions, scfm	(Qsw)	32,251	32,021	32,080	32,117
At Standard Conditions, dscfm	(Qs)	27,423	27,097	27,218	27,246

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	14:50	2/13/2025	16:38	2/13/2025	18:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	7.32	16.48	7.07	16.92	6.90	17.15
Analysis #2	7.32	16.49	7.05	16.92	6.90	17.15
Analysis #3	7.32	16.49	7.06	16.92	6.90	17.15
Average	7.3	16.5	7.1	16.9	6.9	17.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.7	815.0	689.0	654.7	1014.9	3533.3
Final Mass, g	498.0	852.6	692.8	656.7	1023.4	3723.5
Gain	138.3	37.6	3.8	2.0	8.5	190.2
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.6	641.4	687.6	557.7	939.6	3320.9
Final Mass, g	633.7	680.7	691.3	558.4	952.0	3516.1
Gain	139.1	39.3	3.7	0.7	12.4	195.2
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.4	662.6	692.8	656.7	1023.4	3533.9
Final Mass, g	631.5	701.3	706.4	657.9	1033.6	3730.7
Gain	133.1	38.7	13.6	1.2	10.2	196.8

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	13:20	**Source:** No.1 Lime Kiln (LK01)
Date:	2/13/25	Run 1 VALID	**End Time:**	14:26	**Project No.:** AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	14.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26962-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	190.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.3 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.237	in.		CO_2:	16.5 %	2.505
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- -- 8			Mid 3 (cf)	--
Ms:	28.94	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. 45	Amb. 45	Ideal	Actual		Amb. 45	Amb. 45	Amb. 45	Amb. 45		
A1	0.00	2.50	168.410	0.44	49	129	1.09	1.10	3	255	257	38	66	93.6	38.66
2	2.50	5.00	169.750	0.69	48	129	1.71	1.70	4	255	254	39	70	92.4	48.42
3	5.00	7.50	171.400	0.76	47	129	1.88	1.90	4	256	256	39	69	103.2	50.81
4	7.50	10.00	173.330	0.68	47	129	1.68	1.70	5	252	253	39	72	104.0	48.06
5	10.00	12.50	175.170	0.70	47	129	1.73	1.70	5	253	255	39	70	102.5	48.77
6	12.50	15.00	177.010	0.73	47	128	1.81	1.80	5	251	255	38	69	103.0	49.76
7	15.00	17.50	178.900	0.74	47	129	1.83	1.80	5	250	254	39	71	101.9	50.14
8	17.50	20.00	180.780	0.74	47	129	1.83	1.80	5	249	256	39	73	101.3	50.14
9	20.00	22.50	182.650	0.66	47	129	1.63	1.60	5	247	255	39	72	102.1	47.35
10	22.50	25.00	184.430	0.64	47	131	1.58	1.60	5	243	253	40	68	103.9	46.71
11	25.00	27.50	186.210	0.58	47	130	1.43	1.40	4	251	255	41	67	103.4	44.43
12	27.50	30.00	187.900	0.55	47	130	1.36	1.40	4	244	254	41	66	104.3	43.26
B1	30.00	32.50	189.560	0.45	48	131	1.11	1.10	4	252	255	41	68	105.4	39.17
2	32.50	35.00	191.080	0.71	47	131	1.75	1.80	5	250	255	41	69	102.5	49.20
3	35.00	37.50	192.930	0.75	47	131	1.85	1.90	5	250	250	42	71	103.0	50.56
4	37.50	40.00	194.840	0.69	48	131	1.70	1.70	5	254	256	42	72	101.5	48.50
5	40.00	42.50	196.650	0.70	48	132	1.72	1.70	5	257	254	42	73	102.0	48.89
6	42.50	45.00	198.480	0.73	48	131	1.80	1.80	6	251	258	43	73	100.4	49.88
7	45.00	47.50	200.320	0.72	48	132	1.77	1.80	6	250	251	42	74	101.7	49.58
8	47.50	50.00	202.170	0.74	48	131	1.82	1.80	6	244	255	43	76	101.3	50.23
9	50.00	52.50	204.040	0.65	48	132	1.60	1.60	5	243	255	43	76	102.4	47.11
10	52.50	55.00	205.810	0.65	48	132	1.60	1.60	5	245	255	43	78	101.8	47.11
11	55.00	57.50	207.570	0.59	48	132	1.45	1.50	5	249	255	43	79	106.2	44.88
12	57.50	60.00	209.320	0.55	48	131	1.36	1.40	5	253	256	44	81	106.1	43.30
	Final DGM:		211.010												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.600	ft^3	0.66	in. WC	47.5	°F	130.3	°F	6	1.633	in. WC	103.3	0.150	2.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	15:05	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	16:10	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26961-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	195.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.1 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	16.9 %	2.42
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.007	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	211.150	0.42	46	130	1.02	1.00	3	261	257	43	67	102.5	37.89
2	2.50	5.00	212.560	0.69	47	131	1.67	1.70	4	248	255	44	69	102.7	48.61
3	5.00	7.50	214.370	0.67	47	131	1.62	1.60	4	248	256	46	69	102.5	47.90
4	7.50	10.00	216.150	0.66	47	131	1.59	1.60	4	244	253	46	70	106.7	47.54
5	10.00	12.50	217.990	0.70	47	130	1.69	1.70	4	244	256	46	70	95.1	48.92
6	12.50	15.00	219.680	0.71	47	130	1.72	1.70	4	248	255	47	71	101.7	49.26
7	15.00	17.50	221.500	0.72	48	131	1.74	1.70	4	250	256	48	71	100.3	49.65
8	17.50	20.00	223.310	0.75	48	130	1.82	1.80	5	248	254	48	71	102.1	50.63
9	20.00	22.50	225.190	0.66	48	131	1.60	1.60	4	241	254	48	71	104.2	47.54
10	22.50	25.00	226.990	0.64	49	131	1.55	1.60	4	249	259	48	70	105.0	46.81
11	25.00	27.50	228.780	0.56	49	131	1.36	1.40	4	253	256	48	71	106.6	43.79
12	27.50	30.00	230.480	0.54	49	133	1.31	1.30	4	245	255	49	72	102.9	43.07
B1	30.00	32.50	232.090	0.45	49	132	1.09	1.10	3	253	257	49	74	99.3	39.29
2	32.50	35.00	233.510	0.72	49	133	1.74	1.70	5	251	255	49	75	102.5	49.74
3	35.00	37.50	235.360	0.73	49	133	1.76	1.80	5	252	255	49	76	104.1	50.08
4	37.50	40.00	237.250	0.70	49	132	1.69	1.70	5	256	254	49	78	103.3	49.00
5	40.00	42.50	239.090	0.70	49	132	1.69	1.70	5	254	255	50	78	102.8	49.00
6	42.50	45.00	240.920	0.74	49	132	1.79	1.80	5	252	252	50	77	101.1	50.38
7	45.00	47.50	242.770	0.73	49	131	1.77	1.80	5	247	252	50	74	103.3	49.99
8	47.50	50.00	244.650	0.71	49	132	1.72	1.70	5	246	256	51	72	102.0	49.35
9	50.00	52.50	246.480	0.66	50	132	1.60	1.60	5	250	256	51	69	104.5	47.58
10	52.50	55.00	248.290	0.64	50	131	1.56	1.60	5	252	256	51	69	109.5	46.81
11	55.00	57.50	250.160	0.60	50	131	1.46	1.50	5	253	255	51	70	99.8	45.33
12	57.50	60.00	251.810	0.54	51	131	1.32	1.30	5	256	255	52	70	108.7	43.00
	Final DGM:		253.520												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.370	ft^3	0.65	in. WC	48.5	°F	131.3	°F	5	1.583	in. WC	103.8	0.154	3.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	16:25	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	17:45	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	49	°F	26970-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	131	°F		Pg:	-0.65 in. WC	196.8
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.65	in. WC		O_2:	6.9 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	17.2 %	2.421
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.004	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	253.680	0.43	49	130	1.05	1.10	3	252	244	46	70	105.0	38.34
2	2.50	5.00	255.150	0.70	49	129	1.70	1.70	5	246	252	46	68	95.8	48.87
3	5.00	7.50	256.860	0.73	49	129	1.78	1.80	5	250	257	46	68	94.9	49.91
4	7.50	10.00	258.590	0.67	48	128	1.63	1.60	5	253	255	45	69	97.4	47.77
5	10.00	12.50	260.290	0.69	48	130	1.67	1.70	5	243	248	45	73	98.5	48.56
6	12.50	15.00	262.030	0.72	49	130	1.75	1.80	5	251	251	45	76	97.3	49.61
7	15.00	17.50	263.790	0.74	49	131	1.79	1.80	5	251	247	45	74	92.3	50.34
8	17.50	20.00	265.480	0.75	48	129	1.82	1.80	5	252	245	45	69	100.3	50.59
9	20.00	22.50	267.330	0.67	49	130	1.63	1.60	4	253	251	45	68	98.5	47.86
10	22.50	25.00	269.050	0.65	48	132	1.57	1.60	6	253	258	43	67	94.0	47.22
11	25.00	27.50	270.660	0.57	48	131	1.38	1.40	5	247	260	43	67	93.4	44.18
12	27.50	30.00	272.160	0.53	47	131	1.28	1.30	4	254	263	43	68	95.7	42.60
B1	30.00	32.50	273.640	0.44	47	131	1.06	1.10	3	255	259	43	68	98.6	38.81
2	32.50	35.00	275.030	0.71	47	132	1.71	1.70	5	254	262	43	68	98.5	49.35
3	35.00	37.50	276.790	0.73	48	131	1.77	1.80	6	254	260	43	69	96.4	49.99
4	37.50	40.00	278.540	0.70	48	131	1.69	1.70	5	255	254	44	69	96.7	48.96
5	40.00	42.50	280.260	0.69	48	132	1.67	1.70	5	253	260	44	70	95.8	48.65
6	42.50	45.00	281.950	0.73	48	131	1.77	1.80	6	252	263	45	71	92.0	49.99
7	45.00	47.50	283.620	0.72	48	131	1.74	1.70	5	251	259	46	72	92.6	49.65
8	47.50	50.00	285.290	0.71	49	132	1.72	1.70	5	250	259	47	72	98.7	49.35
9	50.00	52.50	287.060	0.66	49	132	1.60	1.60	5	249	258	48	73	99.5	47.58
10	52.50	55.00	288.780	0.65	49	132	1.57	1.60	5	248	259	48	75	95.6	47.22
11	55.00	57.50	290.420	0.60	49	132	1.45	1.50	4	258	261	49	78	98.8	45.36
12	57.50	60.00	292.050	0.53	49	132	1.28	1.30	4	253	258	50	83	92.2	42.64
	Final DGM:		293.480												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	39.800	ft^3	0.66	in. WC	48.3	°F	130.8	°F	6	1.600	in. WC	97.1	0.152	-3.6

LK02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

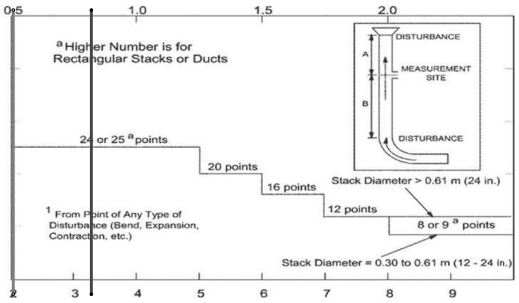
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	309.82	309.98	310.00	309.93
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.375	44.885	45.085	43.782
Meter Temperature, °F	(Tm)	53.6	54.0	57.1	54.9
Meter Temperature, °R	(Tm)	513.3	513.6	516.8	514.6
Meter Orifice Pressure, in. WC	(ΔH)	1.554	1.846	1.838	1.746
Volume H_2O Collected, mL	(Vlc)	336.8	374.0	370.4	360.4
Nozzle Diameter, in	(Dn)	0.416	0.416	0.416	0.416
Area of Nozzle, ft^2	(An)	0.0009	0.0009	0.0009	0.0009
Filterable PM Mass, mg	(Mn)	51.7	64.4	23.3	46.5
Condensable PM Mass, mg	(M_{CPM})	10.4	2.3	5.6	6.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	43.210	46.875	46.794	45.626
Standard Water Volume, ft^3	(Vwstd)	15.883	17.638	17.468	16.996
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
Meter Pressure, in Hg	(Pm)	30.45	30.48	30.48	30.47
Volume at Nozzle, ft^3	(Vn)	67.623	73.830	73.701	71.72
Isokinetic Sampling Rate, (%)	(I)	91.2	98.8	99.9	96.6
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.8	0.5	0.9	0.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.021	0.008	0.016
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.017	0.018	0.006	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	5.5	6.4	2.3	4.7
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.004	0.001	0.002	0.002
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.11	0.23	0.55	0.63
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.022	0.010	0.018
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.6	6.6	2.8	5.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	89.50	in
Nipple Length:	2.00	in
Depth of Duct:	87.50	in
Cross Sectional Area of Duct:	41.76	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	0.8	**(must be ≥ 0.5)**
Distance B:	15.0	ft
Distance B Duct Diameters:	2.1	**(must be ≥ 2)**
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/13/25	
Reviewer (Initial and Date):	EDO 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

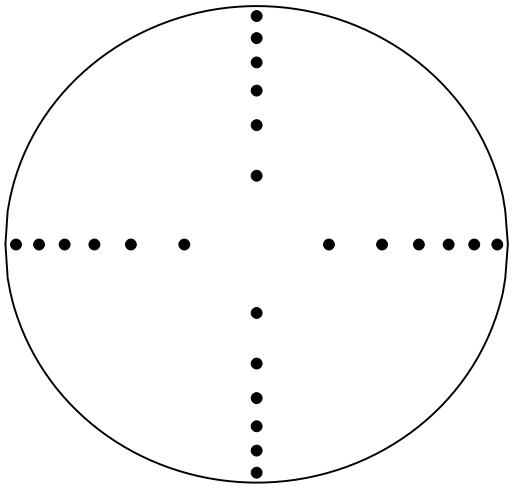
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.84	3 13/16
2	6.7	5.86	7 7/8
3	11.8	10.33	12 5/16
4	17.7	15.49	17 1/2
5	25.0	21.88	23 7/8
6	35.6	31.15	33 1/8
7	64.4	56.35	58 3/8
8	75.0	65.63	67 5/8
9	82.3	72.01	74
10	88.2	77.18	79 3/16
11	93.3	81.64	83 5/8
12	97.9	85.66	87 11/16

Stack Diagram
A = 6 ft.
B = 15 ft.
Depth of Duct = 87.5 in.

Cross Sectional Area



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	4
2	3
3	8
4	2
5	0
6	1
7	-2
8	-3
9	4
10	3
11	2
12	0
13	3
14	3
15	1
16	-3
17	3
18	4
19	2
20	1
21	0
22	0
23	3
24	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.13	0.12	0.12	0.12
Point 2		0.12	0.13	0.13	0.13
Point 3		0.14	0.14	0.12	0.13
Point 4		0.13	0.13	0.14	0.13
Point 5		0.15	0.12	0.13	0.13
Point 6		0.14	0.14	0.13	0.14
Point 7		0.13	0.13	0.13	0.13
Point 8		0.12	0.12	0.14	0.13
Point 9		0.15	0.13	0.13	0.14
Point 10		0.13	0.12	0.14	0.13
Point 11		0.11	0.14	0.12	0.12
Point 12		0.12	0.13	0.13	0.13
Point 13		0.14	0.12	0.15	0.14
Point 14		0.13	0.14	0.13	0.13
Point 15		0.12	0.14	0.14	0.13
Point 16		0.14	0.13	0.12	0.13
Point 17		0.13	0.12	0.11	0.12
Point 18		0.15	0.13	0.13	0.14
Point 19		0.14	0.13	0.12	0.13
Point 20		0.11	0.13	0.11	0.12
Point 21		0.12	0.15	0.14	0.14
Point 22		0.14	0.14	0.13	0.14
Point 23		0.12	0.15	0.15	0.14
Point 24		0.13	0.13	0.14	0.13
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.361	0.363	0.361	0.362
Pitot Tube Coefficient	(Cp)	0.819	0.819	0.819	0.819
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.08	-0.06	-0.07	-0.07
Stack Pressure, in. Hg	(Ps)	30.33	30.34	30.33	30.33
Stack Cross-sectional Area, ft^2	(As)	41.76	41.76	41.76	41.76
Stack Temperature, °F	(Ts)	152.8	152.9	154.2	153.3
Stack Temperature, °R	(Ts)	612.5	612.6	613.9	613.0
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
O_2 Concentration, %	(O_2)	8.8	7.9	8	8.23
CO_2 Concentration, %	(CO_2)	15.1	16.4	16.2	15.90
N_2 Concentration, %	(N_2)	76.1	75.7	75.8	75.87
Excess Air, %	(EA)	77.94	65.37	66.60	69.97
Molecular Weight, lb/lb-mole (dry)	(Md)	30.77	30.94	30.91	30.87
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.39	27.51	27.41	27.43
Velocity, ft/sec	(Vs)	21.7	21.8	21.7	21.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	54,429	54,507	54,393	54,443
At Standard Conditions, scfm	(Qsw)	47,539	47,604	47,403	47,515
At Standard Conditions, dscfm	(Qs)	34,943	34,965	34,517	34,809

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	9:40	2/13/2025	11:22	2/13/2025	12:45
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	8.81	15.09	7.88	16.36	7.95	16.18
Analysis #2	8.80	15.10	7.90	16.39	7.96	16.19
Analysis #3	8.80	15.10	7.89	16.39	7.96	16.19
Average	8.8	15.1	7.9	16.4	8.0	16.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.3	816.2	718.0	651.0	1012.3	3556.8
Final Mass, g	557.1	923.9	733.1	655.4	1024.1	3893.6
Gain	197.8	107.7	15.1	4.4	11.8	336.8
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.8	641.0	743.5	560.0	982.0	3421.3
Final Mass, g	685.5	741.6	787.0	578.6	1002.6	3795.3
Gain	190.7	100.6	43.5	18.6	20.6	374.0
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.7	671.0	731.0	617.3	975.2	3504.2
Final Mass, g	699.5	772.5	774.0	634.1	994.5	3874.6
Gain	189.8	101.5	43.0	16.8	19.3	370.4

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	8:15	**Source:**	No.2 Lime Kiln (LK02)	
Date:	2/13/25	Run 1 VALID	**End Time:**	9:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26973-A	Pb:	30.34	in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	148	°F		Pg:	-0.08	in. WC	336.8
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.14	in. WC		O_2:	8.8	%	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.428	in.		CO_2:	15.1	%	11.960
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	26.35	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
					50	50	Ideal	Actual		50	50	50	50		
A1	0.00	2.50	36.145	0.13	50	152	1.53	1.50	4	259	254	44	66	99.7	22.08
2	2.50	5.00	37.830	0.12	50	153	1.41	1.40	4	256	255	43	66	102.0	21.24
3	5.00	7.50	39.485	0.14	51	152	1.65	1.70	4	254	260	40	67	102.2	22.92
4	7.50	10.00	41.280	0.13	51	153	1.53	1.50	4	253	257	41	67	101.6	22.10
5	10.00	12.50	43.000	0.15	51	153	1.76	1.80	4	255	253	41	67	101.8	23.74
6	12.50	15.00	44.850	0.14	51	153	1.65	1.70	4	251	255	41	67	101.4	22.94
7	15.00	17.50	46.630	0.13	51	152	1.53	1.50	4	254	255	41	68	100.7	22.08
8	17.50	20.00	48.335	0.12	52	152	1.42	1.40	4	251	250	41	68	102.1	21.22
9	20.00	22.50	50.000	0.15	52	153	1.77	1.80	4	253	255	42	69	101.1	23.74
0	22.50	25.00	51.840	0.13	53	153	1.54	1.50	4	250	254	42	70	100.6	22.10
11	25.00	27.50	53.550	0.11	53	153	1.30	1.30	4	252	260	43	71	100.4	20.33
12	27.50	30.00	55.120	0.12	53	152	1.42	1.40	4	258	256	44	73	101.6	21.22
B1	30.00	32.50	56.780	0.14	54	153	1.66	1.70	4	251	259	45	73	101.1	22.94
2	32.50	35.00	58.565	0.13	54	154	1.54	1.50	4	255	256	45	73	101.1	22.12
3	35.00	37.50	60.285	0.12	55	153	1.42	1.40	4	255	254	45	74	100.4	21.24
4	37.50	40.00	61.930	0.14	55	153	1.66	1.70	4	254	258	46	74	100.6	22.94
5	40.00	42.50	63.710	0.13	55	152	1.54	1.60	4	251	252	46	75	101.4	22.08
6	42.50	45.00	65.440	0.15	55	153	1.78	1.80	5	253	254	47	76	101.6	23.74
7	45.00	47.50	67.300	0.14	56	153	1.66	1.70	5	255	257	47	78	101.0	22.94
8	47.50	50.00	69.090	0.11	56	154	1.31	1.30	5	255	255	47	78	101.5	20.35
9	50.00	52.50	70.685	0.12	57	153	1.43	1.40	5	250	256	47	78	102.1	21.24
10	52.50	55.00	72.365	0.14	57	154	1.66	1.70	5	256	258	46	80	101.1	22.96
11	55.00	57.50	74.160	0.12	57	153	1.43	1.40	5	258	251	46	80	100.9	21.24
12	57.50	60.00	75.820	0.13	57	152	1.55	1.60	5	256	254	47	82	99.2	22.08
	Final DGM:		77.520												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.375	ft^3	0.13	in. WC	53.6	°F	152.8	°F	5	1.554	in. WC	91.2	0.265	0.8

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	9:55	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	11:00	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26960-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.06 in. WC	374.0
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	7.9 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.419	in.		CO_2:	16.4 %	14.03
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	77.745	0.12	53	153	1.68	1.70	4	258	255	42	65	101.0	20.88
2	2.50	5.00	79.540	0.13	53	154	1.82	1.80	4	254	256	42	66	100.9	21.75
3	5.00	7.50	81.405	0.14	53	154	1.96	2.00	4	256	254	42	67	100.2	22.57
4	7.50	10.00	83.325	0.13	53	154	1.82	1.80	4	253	258	43	68	100.7	21.75
5	10.00	12.50	85.185	0.12	53	154	1.68	1.70	4	253	259	43	68	99.9	20.90
6	12.50	15.00	86.960	0.14	53	153	1.96	2.00	4	254	256	43	68	100.6	22.56
7	15.00	17.50	88.890	0.13	53	153	1.82	1.80	4	256	253	43	68	100.3	21.74
8	17.50	20.00	90.745	0.12	53	153	1.68	1.70	5	258	250	44	68	99.3	20.88
9	20.00	22.50	92.510	0.13	54	152	1.83	1.80	5	253	255	45	70	98.9	21.72
0	22.50	25.00	94.345	0.12	54	152	1.69	1.70	5	254	259	45	71	99.9	20.87
11	25.00	27.50	96.125	0.14	54	152	1.97	2.00	5	253	260	45	69	100.3	22.54
12	27.50	30.00	98.055	0.13	54	153	1.82	1.80	5	252	254	45	69	99.6	21.74
B1	30.00	32.50	99.900	0.12	54	153	1.68	1.70	5	259	257	48	72	100.0	20.88
2	32.50	35.00	101.680	0.14	54	154	1.96	2.00	5	260	255	47	73	100.0	22.57
3	35.00	37.50	103.600	0.14	54	153	1.96	2.00	5	253	255	48	73	100.4	22.56
4	37.50	40.00	105.530	0.13	54	153	1.82	1.80	5	255	256	48	75	100.9	21.74
5	40.00	42.50	107.400	0.12	54	151	1.69	1.70	5	253	255	49	75	100.9	20.85
6	42.50	45.00	109.200	0.13	55	152	1.83	1.80	5	251	255	50	75	101.4	21.72
7	45.00	47.50	111.085	0.13	55	152	1.83	1.80	5	253	255	51	75	100.9	21.72
8	47.50	50.00	112.960	0.13	55	153	1.83	1.80	5	256	254	52	75	100.7	21.74
9	50.00	52.50	114.830	0.15	55	153	2.11	2.00	5	257	251	53	75	99.8	23.35
10	52.50	55.00	116.820	0.14	55	153	1.97	2.00	5	254	250	53	77	100.7	22.56
11	55.00	57.50	118.760	0.15	55	153	2.11	2.10	5	255	253	55	77	100.9	23.35
12	57.50	60.00	120.770	0.13	55	153	1.83	1.80	5	255	259	55	79	100.2	21.74
	Final DGM:		122.630												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.885	ft^3	0.13	in. WC	54.0	°F	152.9	°F	5	1.846	in. WC	98.8	0.265	0.5

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	12:20	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26972-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.07 in. WC	370.4
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.418	in.		CO_2:	16.2 %	14.042
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	-- -- --	0.000		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	122.895	0.12	56	153	1.69	1.70	4	258	258	48	68	101.0	20.88
2	2.50	5.00	124.700	0.13	56	155	1.83	1.80	4	250	259	45	66	99.9	21.77
3	5.00	7.50	126.555	0.12	56	154	1.69	1.70	4	258	252	45	66	100.5	20.90
4	7.50	10.00	128.350	0.14	56	155	1.97	2.00	4	257	252	46	68	101.5	22.59
5	10.00	12.50	130.305	0.13	56	155	1.83	1.80	4	255	253	47	69	101.0	21.77
6	12.50	15.00	132.180	0.13	56	154	1.83	1.80	4	258	256	47	69	100.9	21.75
7	15.00	17.50	134.055	0.13	56	155	1.83	1.80	4	258	255	47	70	100.1	21.77
8	17.50	20.00	135.915	0.14	57	154	1.97	2.00	4	258	256	48	70	100.9	22.57
9	20.00	22.50	137.865	0.13	57	155	1.83	1.80	4	257	250	49	70	101.8	21.77
0	22.50	25.00	139.760	0.14	57	154	1.97	2.00	4	254	258	49	70	101.2	22.57
11	25.00	27.50	141.715	0.12	57	153	1.69	1.70	4	256	257	51	72	101.0	20.88
12	27.50	30.00	143.525	0.13	57	154	1.83	1.80	4	258	259	53	72	101.5	21.75
B1	30.00	32.50	145.415	0.15	57	155	2.11	2.00	4	258	252	54	72	100.4	23.39
2	32.50	35.00	147.420	0.13	57	154	1.83	1.80	4	257	253	55	73	100.9	21.75
3	35.00	37.50	149.300	0.14	57	154	1.97	2.00	4	256	254	55	73	100.2	22.57
4	37.50	40.00	151.235	0.12	57	155	1.69	1.70	4	255	257	58	74	98.7	20.92
5	40.00	42.50	153.000	0.11	57	155	1.55	1.60	5	257	256	57	74	100.4	20.03
6	42.50	45.00	154.720	0.13	58	154	1.84	1.80	5	255	255	58	74	101.0	21.75
7	45.00	47.50	156.605	0.12	58	154	1.70	1.70	5	257	256	59	75	101.8	20.90
8	47.50	50.00	158.430	0.11	58	154	1.55	1.60	5	258	259	59	75	101.3	20.01
9	50.00	52.50	160.170	0.14	58	154	1.98	2.00	5	256	260	59	75	101.3	22.57
10	52.50	55.00	162.130	0.13	59	153	1.84	1.90	5	252	260	59	75	100.5	21.74
11	55.00	57.50	164.010	0.15	59	154	2.12	2.10	5	250	254	60	75	101.7	23.37
12	57.50	60.00	166.050	0.14	59	154	1.98	2.00	5	251	257	60	76	99.5	22.57
	Final DGM:		167.980												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.085	ft^3	0.13	in. WC	57.1	°F	154.2	°F	5	1.838	in. WC	99.9	0.272	0.9

RB01A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

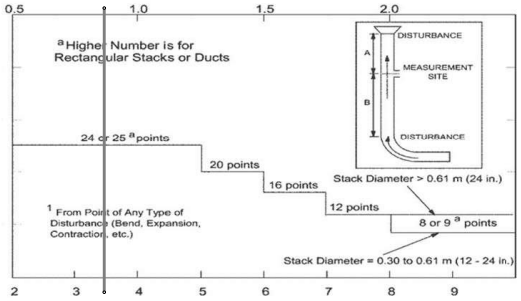
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	47.320	47.695	47.820	47.612
Meter Temperature, °F	(Tm)	63.8	65.7	68.5	66.0
Meter Temperature, °R	(Tm)	523.5	525.4	528.1	525.7
Meter Orifice Pressure, in. WC	(ΔH)	2.158	2.179	2.183	2.174
Volume H_2O Collected, mL	(Vlc)	506.0	450.5	464.3	473.6
Nozzle Diameter, in	(Dn)	0.330	0.330	0.330	0.330
Area of Nozzle, ft^2	(An)	0.0006	0.0006	0.0006	0.0006
Filterable PM Mass, mg	(Mn)	29.2	18.1	26.2	24.5
Condensable PM Mass, mg	(M_{CPM})	10.7	3.3	4.6	6.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.077	48.287	48.162	48.175
Standard Water Volume, ft^3	(Vwstd)	23.863	21.246	21.896	22.335
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
Meter Pressure, in Hg	(Pm)	30.19	30.19	30.19	30.19
Volume at Nozzle, ft^3	(Vn)	111.928	108.082	108.829	109.61
Isokinetic Sampling Rate, (%)	(I)	104.7	101.2	102.2	102.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.2	0.3	0.2	0.2
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0094	0.0058	0.0084	0.0079
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0082	0.0051	0.0074	0.0069
Filterable PM Emission Rate, lb/hr	(PMR)	4.8	3.1	4.4	4.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0034	0.0011	0.0015	0.0020
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.75	0.56	0.77	1.03
Total PM Concentration, grain/dscf	(C_{TPM})	0.013	0.007	0.010	0.010
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.5	3.6	5.2	5.1

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/24	
Reviewer (Initial and Date):	EDO 2/11/24	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

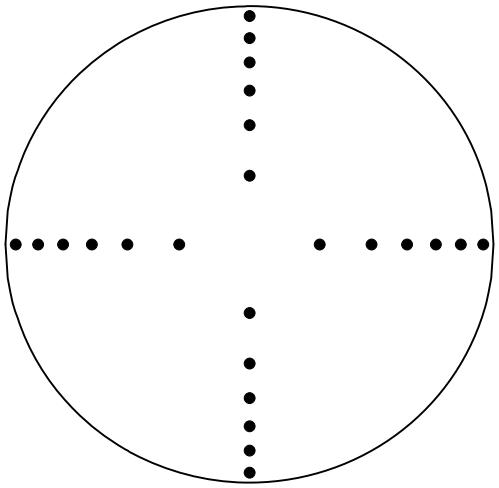
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

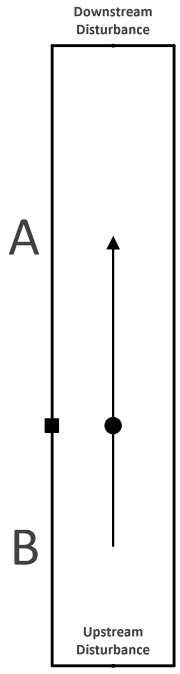
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	5
5	4
6	0
7	3
8	6
9	-2
10	0
11	4
12	1
13	5
14	4
15	2
16	9
17	7
18	4
19	5
20	2
21	3
22	6
23	5
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.51	0.52	0.50	0.51
Point 2		0.48	0.53	0.53	0.51
Point 3		0.49	0.51	0.51	0.50
Point 4		0.53	0.53	0.49	0.52
Point 5		0.52	0.52	0.52	0.52
Point 6		0.49	0.49	0.51	0.50
Point 7		0.51	0.48	0.49	0.49
Point 8		0.53	0.51	0.50	0.51
Point 9		0.51	0.52	0.48	0.50
Point 10		0.48	0.50	0.51	0.50
Point 11		0.52	0.53	0.52	0.52
Point 12		0.54	0.54	0.54	0.54
Point 13		0.52	0.54	0.50	0.52
Point 14		0.51	0.53	0.51	0.52
Point 15		0.48	0.49	0.53	0.50
Point 16		0.53	0.50	0.52	0.52
Point 17		0.51	0.48	0.48	0.49
Point 18		0.49	0.52	0.50	0.50
Point 19		0.53	0.51	0.53	0.52
Point 20		0.50	0.53	0.54	0.52
Point 21		0.53	0.55	0.55	0.54
Point 22		0.51	0.53	0.52	0.52
Point 23		0.49	0.50	0.49	0.49
Point 24		0.51	0.48	0.48	0.49
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.713	0.717	0.714	0.715
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.48	-0.45	-0.46	-0.46
Stack Pressure, in. Hg	(Ps)	29.99	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	363.9	363.1	362.6	363.2
Stack Temperature, °R	(Ts)	823.5	822.8	822.3	822.9
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
O_2 Concentration, %	(O_2)	6.1	6.2	6.2	6.17
CO_2 Concentration, %	(CO_2)	14.4	14.2	14.3	14.30
N_2 Concentration, %	(N_2)	79.5	79.6	79.5	79.53
Excess Air, %	(EA)	40.97	41.85	41.93	41.58
Molecular Weight, lb/lb-mole (dry)	(Md)	30.55	30.52	30.54	30.53
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.39	26.70	26.62	26.57
Velocity, ft/sec	(Vs)	50.0	49.9	49.8	49.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	138,543	138,342	137,991	138,292
At Standard Conditions, scfm	(Qsw)	88,990	88,949	88,779	88,906
At Standard Conditions, dscfm	(Qs)	59,472	61,771	61,032	60,758

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:25	2/11/2025	12:50	2/11/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.10	14.34	6.20	14.22	6.16	14.25
Analysis #2	6.10	14.36	6.19	14.24	6.16	14.25
Analysis #3	6.11	14.36	6.19	14.24	6.16	14.26
Average	6.1	14.4	6.2	14.2	6.2	14.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.4	640.6	698.9	644.3	934.1	3411.3
Final Mass, g	705.0	761.1	722.3	779.6	949.3	3917.3
Gain	211.6	120.5	23.4	135.3	15.2	506.0
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.6	656.8	740.2	636.0	941.0	3472.6
Final Mass, g	686.4	748.9	774.0	762.4	951.4	3923.1
Gain	187.8	92.1	33.8	126.4	10.4	450.5
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.0	639.8	722.0	648.9	942.2	3446.9
Final Mass, g	711.2	731.2	743.7	771.2	953.9	3911.2
Gain	217.2	91.4	21.7	122.3	11.7	464.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	50	°F	26987-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	350	°F		Pg:	-0.48 in. WC	506.0
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.47	in. WC		O_2:	6.1 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.333	in.		CO_2:	14.4 %	4.162
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	771.740	0.51	62	359	2.15	2.20	4	257	251	39	73	101.1	49.52
2	2.50	5.00	773.720	0.48	62	361	2.02	2.00	4	258	256	41	73	99.0	48.10
3	5.00	7.50	775.600	0.49	62	363	2.05	2.10	4	254	258	43	74	100.7	48.66
4	7.50	10.00	777.530	0.53	62	366	2.21	2.20	4	254	257	45	75	100.6	50.69
5	10.00	12.50	779.530	0.52	63	365	2.18	2.20	4	255	258	46	75	101.3	50.18
6	12.50	15.00	781.530	0.49	63	365	2.05	2.10	4	258	256	48	75	99.1	48.71
7	15.00	17.50	783.430	0.51	63	364	2.14	2.20	4	256	256	48	75	101.4	49.67
8	17.50	20.00	785.415	0.53	63	366	2.22	2.20	4	258	254	48	76	100.9	50.69
9	20.00	22.50	787.425	0.51	63	365	2.14	2.20	4	254	255	50	76	101.2	49.70
0	22.50	25.00	789.405	0.48	63	364	2.01	2.00	4	256	251	50	76	101.6	48.19
11	25.00	27.50	791.335	0.52	63	363	2.18	2.20	4	253	253	51	76	100.6	50.12
12	27.50	30.00	793.325	0.54	64	360	2.28	2.30	4	255	258	59	78	100.4	50.98
1	30.00	32.50	795.355	0.52	64	362	2.19	2.20	4	257	257	56	78	99.6	50.09
2	32.50	35.00	797.330	0.51	64	364	2.14	2.20	4	257	256	54	79	100.7	49.67
3	35.00	37.50	799.305	0.48	64	365	2.02	2.00	4	257	255	53	80	100.4	48.21
4	37.50	40.00	801.215	0.53	64	368	2.22	2.20	4	253	253	53	80	100.8	50.76
5	40.00	42.50	803.225	0.51	65	366	2.14	2.20	4	252	254	53	80	100.9	49.73
6	42.50	45.00	805.205	0.49	65	365	2.06	2.10	4	251	251	53	79	100.0	48.71
7	45.00	47.50	807.130	0.53	65	365	2.23	2.20	4	250	250	55	76	100.4	50.66
8	47.50	50.00	809.140	0.50	65	363	2.11	2.10	4	258	255	55	74	101.2	49.15
9	50.00	52.50	811.110	0.53	65	365	2.23	2.20	5	257	256	56	74	100.4	50.66
10	52.50	55.00	813.120	0.51	66	365	2.15	2.20	5	259	258	57	72	100.9	49.70
11	55.00	57.50	815.105	0.49	66	362	2.07	2.10	5	258	259	57	72	100.2	48.63
12	57.50	60.00	817.040	0.51	66	362	2.16	2.20	5	253	259	57	72	102.5	49.61
	Final DGM:		819.060												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.320	ft^3	0.51	in. WC	63.8	°F	363.9	°F	5	2.158	in. WC	104.7	0.332	0.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	11:15	**Source:**	No.1 Recovery Furnace (RB01A) North Stack	
Date:	2/11/25	Run 2 VALID	**End Time:**	12:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	64	°F	26988-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	364	°F		Pg:	-0.45 in. WC	450.5
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.323	in.		CO_2:	14.2 %	4.21
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- --	0.002		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	819.395	0.52	64	360	2.20	2.20	4	251	254	40	71	101.3	50.03
2	2.50	5.00	821.405	0.53	64	361	2.24	2.20	4	252	254	41	71	100.6	50.54
3	5.00	7.50	823.420	0.51	64	361	2.15	2.20	4	255	255	41	71	100.8	49.58
4	7.50	10.00	825.400	0.53	64	361	2.23	2.30	4	258	253	41	73	100.7	50.54
5	10.00	12.50	827.415	0.52	64	361	2.19	2.20	4	256	258	41	73	99.1	50.06
6	12.50	15.00	829.380	0.49	65	362	2.07	2.10	4	253	256	45	73	100.6	48.63
7	15.00	17.50	831.320	0.48	65	362	2.03	2.00	4	256	253	45	73	100.8	48.13
8	17.50	20.00	833.245	0.51	65	362	2.15	2.20	4	259	251	46	74	99.9	49.61
9	20.00	22.50	835.210	0.52	65	363	2.19	2.20	4	254	250	46	74	100.5	50.12
0	22.50	25.00	837.205	0.50	65	363	2.11	2.10	4	251	258	50	74	100.7	49.15
11	25.00	27.50	839.165	0.53	66	364	2.24	2.30	4	252	259	51	74	101.5	50.63
12	27.50	30.00	841.200	0.54	66	364	2.28	2.30	4	255	254	51	75	101.3	51.11
1	30.00	32.50	843.250	0.54	66	363	2.28	2.30	4	255	256	52	75	101.4	51.08
2	32.50	35.00	845.305	0.53	66	365	2.23	2.30	5	255	254	52	76	99.5	50.66
3	35.00	37.50	847.300	0.49	66	365	2.07	2.00	5	256	255	53	77	98.5	48.71
4	37.50	40.00	849.200	0.50	66	364	2.11	2.10	5	258	255	51	77	101.6	49.18
5	40.00	42.50	851.180	0.48	67	365	2.03	2.00	5	253	256	50	76	101.4	48.21
6	42.50	45.00	853.120	0.52	67	365	2.20	2.20	5	254	256	49	78	100.5	50.18
7	45.00	47.50	855.120	0.51	67	365	2.15	2.20	5	257	258	49	78	100.5	49.70
8	47.50	50.00	857.100	0.53	67	365	2.24	2.30	5	252	254	49	79	100.3	50.66
9	50.00	52.50	859.115	0.55	67	364	2.32	2.30	5	254	253	53	80	101.4	51.58
10	52.50	55.00	861.190	0.53	67	364	2.24	2.20	5	256	252	52	79	99.7	50.63
11	55.00	57.50	863.195	0.50	67	363	2.12	2.10	5	255	259	53	78	100.6	49.15
12	57.50	60.00	865.160	0.48	67	363	2.03	2.00	5	255	253	53	77	100.8	48.16
	Final DGM:		867.090												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.695	ft^3	0.51	in. WC	65.7	°F	363.1	°F	5	2.179	in. WC	101.2	0.306	0.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	66	°F	26696-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	363	°F		Pg:	-0.46	in. WC	464.3
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2	%	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.322	in.		CO_2:	14.3	%	4.224
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial	Final	Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	--	--	0.001	Mid 1 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf)			--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)			--
												Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	867.500	0.50	67	358	2.13	2.10	3	254	255	42	69	102.0	49.00
2	2.50	5.00	869.500	0.53	67	359	2.25	2.30	3	255	256	42	69	101.4	50.48
3	5.00	7.50	871.545	0.51	67	359	2.17	2.20	3	251	258	42	69	100.6	49.52
4	7.50	10.00	873.535	0.49	67	361	2.08	2.10	3	253	257	42	69	101.5	48.60
5	10.00	12.50	875.500	0.52	67	360	2.21	2.20	3	256	256	42	71	100.7	50.03
6	12.50	15.00	877.510	0.51	68	361	2.17	2.20	3	258	259	43	70	100.8	49.58
7	15.00	17.50	879.505	0.49	68	361	2.08	2.10	4	256	258	45	71	100.2	48.60
8	17.50	20.00	881.450	0.50	68	361	2.13	2.10	4	259	258	45	70	99.5	49.09
9	20.00	22.50	883.400	0.48	68	361	2.04	2.10	4	259	253	43	72	98.9	48.10
0	22.50	25.00	885.300	0.51	68	361	2.17	2.20	4	260	250	43	72	101.1	49.58
11	25.00	27.50	887.300	0.52	68	364	2.20	2.20	4	251	260	45	73	101.0	50.15
12	27.50	30.00	889.315	0.54	68	364	2.29	2.30	4	252	251	44	73	99.4	51.11
1	30.00	32.50	891.335	0.50	68	365	2.12	2.10	4	255	254	45	76	99.7	49.21
2	32.50	35.00	893.285	0.51	68	365	2.16	2.20	4	256	258	45	76	100.8	49.70
3	35.00	37.50	895.275	0.53	68	365	2.24	2.30	4	257	259	46	76	101.4	50.66
4	37.50	40.00	897.315	0.52	69	365	2.20	2.20	5	253	253	48	77	99.4	50.18
5	40.00	42.50	899.300	0.48	69	364	2.04	2.10	5	252	255	48	75	100.2	48.19
6	42.50	45.00	901.225	0.50	69	363	2.12	2.10	5	257	258	50	75	100.7	49.15
7	45.00	47.50	903.200	0.53	69	363	2.25	2.30	5	258	254	51	74	100.8	50.60
8	47.50	50.00	905.235	0.54	69	363	2.29	2.30	5	256	257	53	73	101.4	51.08
9	50.00	52.50	907.300	0.55	70	365	2.33	2.30	5	259	256	52	70	101.1	51.61
10	52.50	55.00	909.380	0.52	71	364	2.21	2.20	5	252	258	55	70	100.9	50.15
11	55.00	57.50	911.405	0.49	71	365	2.08	2.10	5	255	259	55	71	99.9	48.71
12	57.50	60.00	913.350	0.48	71	365	2.04	2.10	5	253	255	56	72	102.2	48.21
	Final DGM:		915.320												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.820	ft^3	0.51	in. WC	68.5	°F	362.6	°F	5	2.183	in. WC	102.2	0.313	0.2

RB01B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

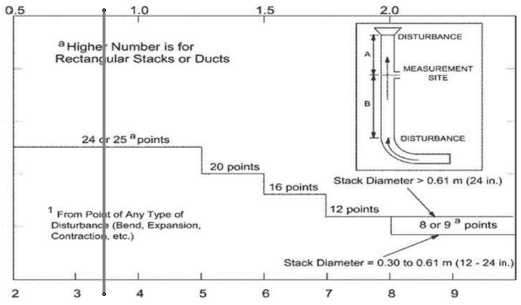
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	40.100	43.045	41.880	41.675
Meter Temperature, °F	(Tm)	62.2	68.3	63.0	64.5
Meter Temperature, °R	(Tm)	521.8	528.0	522.7	524.2
Meter Orifice Pressure, in. WC	(ΔH)	1.621	1.838	1.792	1.750
Volume H_2O Collected, mL	(Vlc)	261.9	266.2	247.8	258.6
Nozzle Diameter, in	(Dn)	0.362	0.362	0.362	0.362
Area of Nozzle, ft^2	(An)	0.0007	0.0007	0.0007	0.0007
Filterable PM Mass, mg	(Mn)	3.4	3.2	2.7	3.1
Condensable PM Mass, mg	(M_{CPM})	4.4	5.1	4.6	4.7
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	40.450	42.936	42.193	41.860
Standard Water Volume, ft^3	(Vwstd)	12.351	12.554	11.686	12.197
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
Meter Pressure, in Hg	(Pm)	30.15	30.17	30.16	30.16
Volume at Nozzle, ft^3	(Vn)	82.136	86.257	83.691	84.03
Isokinetic Sampling Rate, (%)	(I)	93.7	98.3	96.8	96.2
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.3	0.5	-0.4	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0013	0.0012	0.0010	0.0011
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0013	0.0012	0.0010	0.0011
Filterable PM Emission Rate, lb/hr	(PMR)	0.52	0.46	0.40	0.46
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0017	0.0018	0.0017	0.0017
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.67	0.74	0.68	0.69
Total PM Concentration, grain/dscf	(C_{TPM})	0.0030	0.0030	0.0027	0.0029
Total PM Emission Rate, lb/hr	(ER_{TPM})	1.2	1.2	1.1	1.2

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01B) South Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/25	
Reviewer (Initial and Date):	EDO 2/11/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

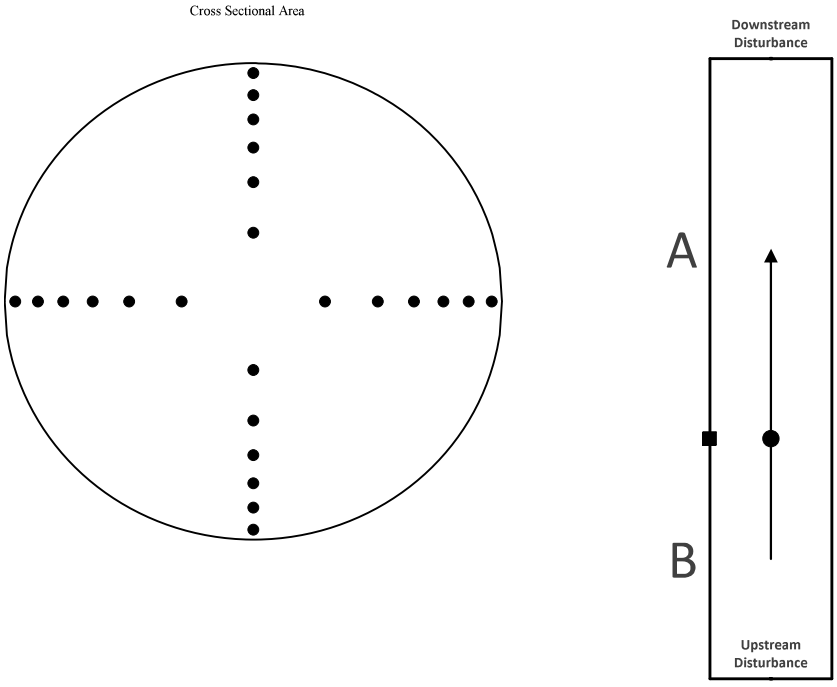
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	2
2	6
3	8
4	4
5	1
6	0
7	2
8	3
9	0
10	-2
11	1
12	8
13	4
14	2
15	6
16	3
17	2
18	3
19	4
20	7
21	5
22	9
23	5
24	2
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.21	0.21	0.20	0.21
Point 2		0.23	0.24	0.21	0.23
Point 3		0.24	0.23	0.23	0.23
Point 4		0.25	0.24	0.25	0.25
Point 5		0.23	0.22	0.24	0.23
Point 6		0.21	0.20	0.20	0.20
Point 7		0.22	0.24	0.21	0.22
Point 8		0.24	0.22	0.25	0.24
Point 9		0.21	0.25	0.23	0.23
Point 10		0.22	0.23	0.22	0.22
Point 11		0.24	0.21	0.24	0.23
Point 12		0.23	0.24	0.21	0.23
Point 13		0.22	0.23	0.23	0.23
Point 14		0.24	0.21	0.25	0.23
Point 15		0.23	0.24	0.23	0.23
Point 16		0.21	0.22	0.20	0.21
Point 17		0.25	0.24	0.21	0.23
Point 18		0.20	0.23	0.21	0.21
Point 19		0.23	0.25	0.21	0.23
Point 20		0.25	0.24	0.22	0.24
Point 21		0.23	0.24	0.25	0.24
Point 22		0.22	0.25	0.23	0.23
Point 23		0.24	0.22	0.24	0.23
Point 24		0.25	0.23	0.23	0.24
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.478	0.480	0.474	0.477
Pitot Tube Coefficient	(Cp)	0.836	0.836	0.836	0.836
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.12	-0.13	-0.12	-0.12
Stack Pressure, in. Hg	(Ps)	30.02	30.02	30.02	30.02
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	364.3	363.7	363.1	363.7
Stack Temperature, °R	(Ts)	824.0	823.3	822.8	823.4
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
O_2 Concentration, %	(O_2)	8	8	8	8.00
CO_2 Concentration, %	(CO_2)	14	14	14	14.00
N_2 Concentration, %	(N_2)	78	78	78	78.00
Excess Air, %	(EA)	63.53	63.53	63.53	63.53
Molecular Weight, lb/lb-mole (dry)	(Md)	30.56	30.56	30.56	30.56
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.63	27.72	27.84	27.73
Velocity, ft/sec	(Vs)	34.1	34.1	33.6	33.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	94,410	94,473	93,103	93,996
At Standard Conditions, scfm	(Qsw)	60,665	60,750	59,913	60,443
At Standard Conditions, dscfm	(Qs)	46,475	47,006	46,918	46,800

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:33	2/11/2025	12:58	2/11/2025	16:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.91	13.52	7.11	13.23	7.18	13.38
Analysis #2	6.92	13.55	7.11	13.25	7.19	13.39
Analysis #3	6.91	13.53	7.11	13.25	7.19	13.38
Average	6.9	13.5	7.1	13.2	7.2	13.4

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.4	670.7	716.5	642.3	942.1	3482.0
Final Mass, g	651.4	760.2	733.5	646.2	952.6	3743.9
Gain	141.0	89.5	17.0	3.9	10.5	261.9
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	507.8	644.0	779.4	644.1	933.3	3508.6
Final Mass, g	639.0	740.2	803.0	648.1	944.5	3774.8
Gain	131.2	96.2	23.6	4.0	11.2	266.2
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.5	672.4	733.4	645.7	952.0	3514.0
Final Mass, g	689.0	723.0	740.1	647.8	961.9	3761.8
Gain	178.5	50.6	6.7	2.1	9.9	247.8

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26697-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	346	°F		Pg:	-0.12 in. WC	261.9
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.27	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.376	in.		CO_2:	14 %	6.965
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	-- -- -- 0.000			Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- -- -- 5			Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	293.420	0.21	61	360	1.47	1.50	3	259	259	40	72	100.6	33.06
2	2.50	5.00	295.015	0.23	61	361	1.61	1.60	3	255	251	41	72	101.9	34.62
3	5.00	7.50	296.705	0.24	61	363	1.67	1.70	3	254	251	42	73	101.4	35.41
4	7.50	10.00	298.420	0.25	61	365	1.74	1.80	3	253	254	42	73	100.9	36.18
5	10.00	12.50	300.160	0.23	61	366	1.60	1.60	3	252	258	43	73	101.3	34.73
6	12.50	15.00	301.835	0.21	61	363	1.47	1.50	3	258	259	43	73	100.1	33.12
7	15.00	17.50	303.420	0.22	61	365	1.53	1.50	3	257	259	45	78	101.3	33.94
8	17.50	20.00	305.060	0.24	61	366	1.67	1.70	3	255	256	48	78	98.9	35.47
9	20.00	22.50	306.730	0.21	61	365	1.46	1.50	3	256	255	48	78	102.5	33.16
10	22.50	25.00	308.351	0.22	61	365	1.53	1.50	3	252	252	48	78	101.9	33.94
11	25.00	27.50	310.000	0.24	62	366	1.67	1.70	3	250	254	48	78	100.5	35.47
12	27.50	30.00	311.700	0.23	62	365	1.60	1.60	4	251	255	50	76	101.1	34.71
B1	30.00	32.50	313.375	0.22	62	366	1.53	1.50	4	255	253	51	75	101.5	33.96
2	32.50	35.00	315.020	0.24	62	364	1.68	1.70	4	256	258	51	74	100.7	35.43
3	35.00	37.50	316.725	0.23	63	363	1.61	1.60	4	253	257	50	74	101.4	34.66
4	37.50	40.00	318.410	0.21	63	365	1.47	1.50	4	255	256	51	72	101.4	33.16
5	40.00	42.50	320.020	0.25	63	366	1.74	1.80	4	258	258	52	73	98.3	36.21
6	42.50	45.00	321.720	0.20	63	365	1.40	1.40	4	252	259	56	74	100.7	32.36
7	45.00	47.50	323.280	0.23	63	364	1.61	1.60	4	259	260	56	76	100.5	34.69
8	47.50	50.00	324.950	0.25	63	363	1.75	1.80	4	256	260	55	76	101.3	36.14
9	50.00	52.50	326.705	0.23	63	365	1.61	1.60	4	252	256	54	77	101.2	34.71
10	52.50	55.00	328.385	0.22	64	364	1.54	1.70	4	254	254	52	78	105.4	33.92
11	55.00	57.50	330.100	0.24	64	364	1.68	1.70	4	255	255	52	79	100.9	35.43
12	57.50	60.00	331.815	0.25	65	364	1.75	1.80	4	255	253	52	79	98.1	36.16
	Final DGM:		333.520												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	40.100 ft^3	0.23 in. WC	62.2 °F	364.3 °F	4	1.621 in. WC	93.7	0.234	0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	11:15	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 2	VALID	End Time:	12:20	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	62	°F	26698-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.13	in. WC	266.2
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.377	in.		CO_2:	14	%	7.82
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	334.150	0.21	66	362	1.66	1.70	4	255	253	40	68	100.1	32.72
2	2.50	5.00	335.845	0.24	66	363	1.89	1.90	4	254	258	40	68	100.4	35.00
3	5.00	7.50	337.660	0.23	67	363	1.82	1.80	4	255	254	41	68	101.2	34.27
4	7.50	10.00	339.455	0.24	67	363	1.90	1.90	4	254	256	42	70	105.7	35.00
5	10.00	12.50	341.370	0.22	67	363	1.74	1.80	4	258	258	42	70	100.0	33.51
6	12.50	15.00	343.105	0.20	67	363	1.58	1.60	4	260	259	42	71	99.7	31.95
7	15.00	17.50	344.755	0.24	67	363	1.90	1.90	4	256	254	45	71	100.8	35.00
8	17.50	20.00	346.580	0.22	68	364	1.74	1.80	4	253	257	45	70	101.6	33.53
9	20.00	22.50	348.345	0.25	68	365	1.98	2.00	4	258	256	45	71	100.9	35.77
10	22.50	25.00	350.210	0.23	68	365	1.82	1.80	4	254	251	45	72	100.9	34.31
11	25.00	27.50	352.000	0.21	68	365	1.66	1.70	4	255	257	48	71	101.4	32.78
12	27.50	30.00	353.720	0.24	68	364	1.90	1.90	5	255	254	48	73	100.4	35.02
B1	30.00	32.50	355.540	0.23	68	364	1.82	1.80	5	256	258	47	73	101.7	34.29
2	32.50	35.00	357.345	0.21	68	363	1.67	1.70	5	253	256	47	75	99.2	32.74
3	35.00	37.50	359.030	0.24	69	363	1.91	1.90	5	257	258	50	75	100.1	35.00
4	37.50	40.00	360.850	0.22	69	363	1.75	1.80	5	254	259	50	75	100.8	33.51
5	40.00	42.50	362.605	0.24	69	362	1.91	1.90	5	255	254	50	75	100.1	34.98
6	42.50	45.00	364.425	0.23	70	362	1.83	1.80	5	258	251	51	76	100.3	34.24
7	45.00	47.50	366.215	0.25	70	362	1.99	2.00	5	256	255	52	78	100.3	35.70
8	47.50	50.00	368.080	0.24	70	365	1.90	1.90	5	259	258	55	78	100.0	35.04
9	50.00	52.50	369.900	0.24	70	365	1.90	1.90	5	251	259	55	80	101.1	35.04
10	52.50	55.00	371.740	0.25	70	365	1.98	2.00	5	250	256	56	80	101.0	35.77
11	55.00	57.50	373.615	0.22	70	366	1.74	1.80	5	253	257	56	80	102.5	33.57
12	57.50	60.00	375.400	0.23	70	365	1.83	1.80	5	251	254	57	80	100.8	34.31
	Final DGM:		377.195												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.045	ft^3	0.23	in. WC	68.3	°F	363.7	°F	5	1.838	in. WC	98.3	0.226	0.5

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	68	°F	26699-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.12	in. WC	247.8
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.374	in.		CO_2:	14	%	7.923
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 / Mid 2 / Mid 3	Post	Mid 1 (cf)			--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.002	-- / -- / --	0.000	Mid 2 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- / -- / --	6	Mid 3 (cf)			--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- / -- / --	Pass	Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	377.420	0.20	60	360	1.57	1.60	4	254	255	41	75	99.7	31.89
2	2.50	5.00	379.050	0.21	60	361	1.64	1.70	4	251	252	42	75	98.5	32.70
3	5.00	7.50	380.700	0.23	60	362	1.80	1.80	4	253	251	42	75	100.5	34.24
4	7.50	10.00	382.460	0.25	61	363	1.95	2.00	4	258	254	42	76	101.3	35.72
5	10.00	12.50	384.310	0.24	61	365	1.87	1.90	4	254	252	42	76	100.7	35.04
6	12.50	15.00	386.110	0.20	61	365	1.56	1.60	4	257	256	43	76	98.6	31.99
7	15.00	17.50	387.720	0.21	61	364	1.64	1.70	4	256	259	44	76	101.2	32.76
8	17.50	20.00	389.415	0.25	61	365	1.95	2.00	4	258	258	45	76	100.6	35.77
9	20.00	22.50	391.250	0.23	61	365	1.79	1.80	4	256	257	45	76	99.9	34.31
10	22.50	25.00	393.000	0.22	61	363	1.72	1.70	4	253	255	45	77	99.1	33.51
11	25.00	27.50	394.700	0.24	62	363	1.88	1.90	4	256	255	46	77	100.9	35.00
12	27.50	30.00	396.510	0.21	62	363	1.65	1.70	4	254	253	47	78	101.3	32.74
B1	30.00	32.50	398.210	0.23	62	364	1.80	1.80	4	254	254	47	78	100.3	34.29
2	32.50	35.00	399.970	0.25	62	365	1.95	2.00	4	255	256	47	78	100.6	35.77
3	35.00	37.50	401.810	0.23	63	365	1.80	1.80	4	256	258	46	79	101.8	34.31
4	37.50	40.00	403.600	0.20	63	362	1.57	1.60	4	258	256	47	75	98.6	31.93
5	40.00	42.50	405.220	0.21	65	361	1.66	1.70	4	256	251	48	75	100.6	32.70
6	42.50	45.00	406.920	0.21	65	360	1.66	1.70	4	258	252	48	71	100.5	32.68
7	45.00	47.50	408.620	0.21	66	361	1.66	1.70	4	254	258	49	71	99.2	32.70
8	47.50	50.00	410.300	0.22	67	362	1.74	1.80	5	251	256	47	71	101.1	33.49
9	50.00	52.50	412.055	0.25	67	362	1.98	2.00	5	250	257	48	72	100.3	35.70
10	52.50	55.00	413.910	0.23	67	363	1.82	1.80	5	252	258	49	73	100.9	34.27
11	55.00	57.50	415.700	0.24	67	365	1.89	1.90	5	256	254	49	73	100.6	35.04
12	57.50	60.00	417.520	0.23	68	365	1.82	1.80	5	253	255	50	75	100.3	34.31
	Final DGM:		419.300												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.880	ft^3	0.23	in. WC	63.0	°F	363.1	°F	5	1.792	in. WC	96.8	0.217	-0.4

RB02A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

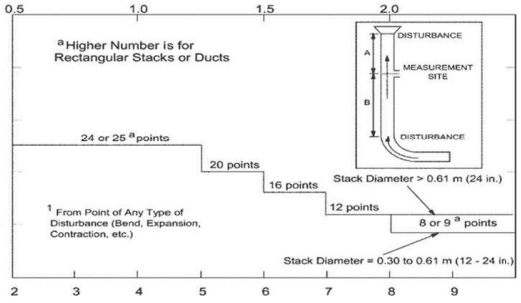
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.020	42.440	43.385	42.282
Meter Temperature, °F	(Tm)	48.3	61.7	68.3	59.4
Meter Temperature, °R	(Tm)	507.9	521.3	528.0	519.1
Meter Orifice Pressure, in. WC	(ΔH)	1.533	1.608	1.650	1.597
Volume H_2O Collected, mL	(Vlc)	251.0	250.6	288.0	263.2
Nozzle Diameter, in	(Dn)	0.292	0.292	0.292	0.292
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	57.8	51.0	152.4	87.1
Condensable PM Mass, mg	(M_{CPM})	2.9	5.9	3.7	4.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	42.463	42.810	43.215	42.829
Standard Water Volume, ft^3	(Vwstd)	11.837	11.818	13.582	12.413
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
Meter Pressure, in Hg	(Pm)	29.87	29.88	29.88	29.88
Volume at Nozzle, ft^3	(Vn)	88.809	86.910	90.386	88.70
Isokinetic Sampling Rate, (%)	(I)	96.9	96.7	99.4	97.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.2	0.1	0.0
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.021	0.018	0.054	0.031
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.017	0.014	0.043	0.025
Filterable PM Emission Rate, lb/hr	(PMR)	20.2	17.9	52.0	30.0
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0011	0.0021	0.0013	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.01	2.07	1.26	1.45
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.021	0.056	0.033
Total PM Emission Rate, lb/hr	(ER_{TPM})	21.2	19.9	53.2	31.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.2 Recovery Furnace (RB02A) West Stack
Project No.: AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	(must be ≥ 0.5)
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

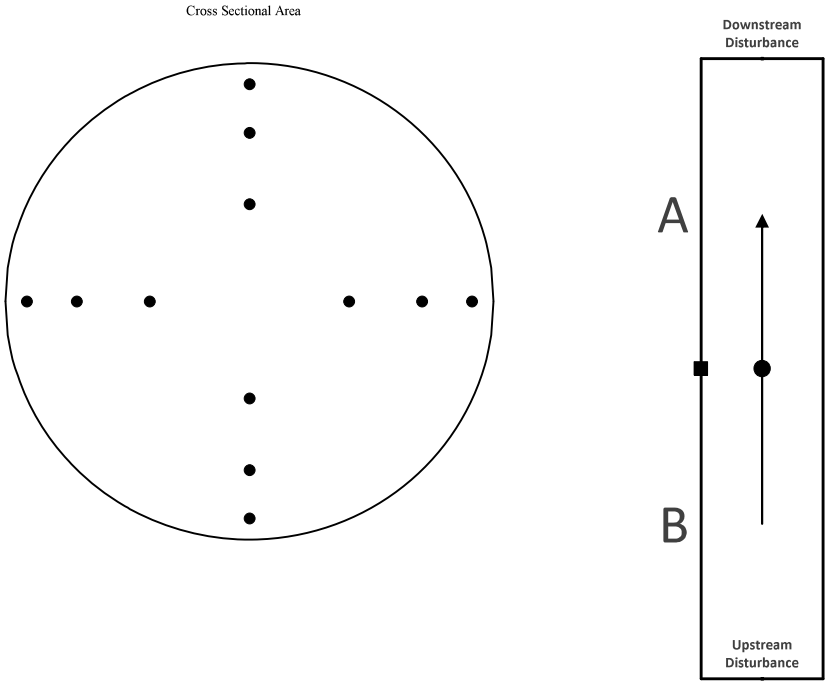
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	8
5	2
6	3
7	6
8	7
9	4
10	0
11	2
12	5
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.57	0.59	0.61	0.59
Point 2		0.59	0.63	0.63	0.62
Point 3		0.60	0.60	0.60	0.60
Point 4		0.63	0.61	0.63	0.62
Point 5		0.62	0.59	0.65	0.62
Point 6		0.64	0.61	0.61	0.62
Point 7		0.61	0.63	0.59	0.61
Point 8		0.63	0.60	0.62	0.62
Point 9		0.64	0.64	0.63	0.64
Point 10		0.60	0.61	0.61	0.61
Point 11		0.65	0.62	0.64	0.64
Point 12		0.60	0.59	0.59	0.59
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.784	0.781	0.786	0.784
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.63	-0.61	-0.62	-0.62
Stack Pressure, in. Hg	(Ps)	29.71	29.72	29.71	29.71
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	397.8	374.4	374.7	382.3
Stack Temperature, °R	(Ts)	857.4	834.1	834.3	841.9
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
O_2 Concentration, %	(O_2)	4.6	4.3	4.5	4.47
CO_2 Concentration, %	(CO_2)	16.2	16.5	16.3	16.33
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	28.21	25.89	27.42	27.17
Molecular Weight, lb/lb-mole (dry)	(Md)	30.78	30.81	30.79	30.79
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.99	28.04	27.73	27.92
Velocity, ft/sec	(Vs)	54.7	53.7	54.3	54.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	234,751	230,403	233,140	232,765
At Standard Conditions, scfm	(Qsw)	143,473	144,762	146,434	144,890
At Standard Conditions, dscfm	(Qs)	112,196	113,444	111,417	112,352

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:42	2/12/2025	14:15	2/12/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	4.58	16.15	4.25	16.51	4.46	16.22
Analysis #2	4.58	16.16	4.26	16.53	4.46	16.26
Analysis #3	4.59	16.17	4.26	16.52	4.46	16.27
Average	4.6	16.2	4.3	16.5	4.5	16.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.2	657.7	740.5	636.8	944.1	3478.3
Final Mass, g	679.7	704.2	750.9	639.5	955.0	3729.3
Gain	180.5	46.5	10.4	2.7	10.9	251.0
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	671.2	509.7	740.2	647.4	1008.0	3576.5
Final Mass, g	691.1	714.7	756.8	651.6	1012.9	3827.1
Gain	19.9	205.0	16.6	4.2	4.9	250.6
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.5	645.8	775.5	650.6	924.3	3505.7
Final Mass, g	734.8	665.7	802.7	653.5	937.0	3793.7
Gain	225.3	19.9	27.2	2.9	12.7	288.0

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02A) West Stack	
Date:	2/12/25	Run 1 VALID	End Time:	11:07	Project No.:	AST-2024-4204	Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26705-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	399	°F		Pg:	-0.63 in. WC	251.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.6 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.304	in.		CO_2:	16.2 %	2.505
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	--	-- --	0.000	Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	-- --	5	Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 55	Stack Amb. 55	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 55	Filter Amb. 55	Imp Exit Amb. 55	CPM Amb. 55	% ISO	Vs (fps)
A1	0.00	5.00	907.840	0.57	45	394	1.41	1.40	4	256	257	44	69	100.2	53.09
2	5.00	10.00	911.120	0.59	46	395	1.46	1.50	4	254	255	45	70	100.3	54.05
3	10.00	15.00	914.465	0.60	46	395	1.48	1.50	4	256	254	47	71	100.8	54.51
4	15.00	20.00	917.855	0.63	47	396	1.56	1.60	4	258	257	48	71	99.8	55.88
5	20.00	25.00	921.300	0.62	47	399	1.53	1.50	4	259	256	48	73	100.9	55.54
6	25.00	30.00	924.750	0.64	48	401	1.58	1.60	4	260	253	48	73	99.3	56.49
B1	30.00	35.00	928.200	0.61	48	400	1.51	1.50	4	260	252	50	72	100.0	55.12
2	35.00	40.00	931.595	0.63	50	400	1.56	1.60	4	254	258	50	71	99.9	56.02
3	40.00	45.00	935.055	0.64	50	399	1.59	1.60	5	256	259	49	73	100.5	56.43
4	45.00	50.00	938.565	0.60	50	398	1.49	1.50	5	258	260	49	74	100.6	54.60
5	50.00	55.00	941.970	0.65	51	398	1.62	1.60	5	255	256	51	75	100.2	56.83
6	55.00	60.00	945.505	0.60	51	398	1.49	1.50	5	254	254	53	78	98.9	54.60
	Final DGM:		948.860												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.020	ft^3	0.62	in. WC	48.3	°F	397.8	°F	5	1.533	in. WC	96.9	0.218	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26706-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	398	°F		Pg:	-0.61	in. WC	250.6
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.3	%	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.307	in.		CO_2:	16.5	%	2.48
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 / Mid 2 / Mid 3 / Post				Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	-- / -- / -- / 0.000				Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	-- / -- / -- / 5				Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	-- / -- / -- / Pass				Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	949.090	0.59	59	374	1.54	1.50	4	253	256	40	76	99.2	53.38
2	5.00	10.00	952.525	0.63	60	375	1.64	1.70	4	253	256	42	73	100.4	55.19
3	10.00	15.00	956.120	0.60	60	374	1.56	1.60	4	253	257	43	75	99.5	53.83
4	15.00	20.00	959.600	0.61	61	375	1.59	1.60	4	257	255	41	68	100.1	54.31
5	20.00	25.00	963.135	0.59	61	375	1.54	1.50	4	255	256	42	69	99.7	53.41
6	25.00	30.00	966.600	0.61	62	376	1.59	1.60	4	254	251	44	71	100.8	54.34
B1	30.00	35.00	970.165	0.63	62	375	1.65	1.70	4	255	254	46	72	100.1	55.19
2	35.00	40.00	973.765	0.60	62	374	1.57	1.60	4	254	256	46	73	100.6	53.83
3	40.00	45.00	977.300	0.64	63	375	1.68	1.70	5	256	258	45	75	100.1	55.63
4	45.00	50.00	980.935	0.61	63	374	1.60	1.60	5	256	257	48	76	100.2	54.28
5	50.00	55.00	984.490	0.62	63	373	1.63	1.60	5	259	254	49	78	99.5	54.69
6	55.00	60.00	988.050	0.59	64	373	1.55	1.60	5	260	255	51	78	99.5	53.35
	Final DGM:		991.530												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	42.440 ft^3	0.61 in. WC	61.7 °F	374.4 °F	5	1.608 in. WC	96.7	0.216	-0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	62	°F	26709-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	374	°F		Pg:	-0.62 in. WC	288.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.61	in. WC		O_2:	4.5 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.301	in.		CO_2:	16.3 %	2.613
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. --	Filter Amb. --	Imp Exit Amb. --	CPM Amb. --	% ISO	Vs (fps)
A1	0.00	5.00	992.320	0.61	67	373	1.61	1.60	3	254	252	48	70	100.3	54.25
2	5.00	10.00	995.910	0.63	67	373	1.67	1.70	3	254	258	48	71	99.7	55.13
3	10.00	15.00	999.535	0.60	67	374	1.58	1.60	3	258	256	48	71	100.5	53.83
4	15.00	20.00	1003.100	0.63	67	374	1.66	1.70	3	253	254	47	71	100.6	55.16
5	20.00	25.00	1006.755	0.65	68	374	1.72	1.70	3	256	257	46	73	99.4	56.03
6	25.00	30.00	1010.430	0.61	68	375	1.61	1.60	3	253	259	46	74	99.7	54.31
B1	30.00	35.00	1014.000	0.59	68	375	1.56	1.60	3	258	260	46	75	100.8	53.41
2	35.00	40.00	1017.550	0.62	69	376	1.64	1.70	3	256	260	49	75	100.9	54.79
3	40.00	45.00	1021.195	0.63	69	375	1.67	1.70	4	255	260	49	76	100.7	55.19
4	45.00	50.00	1024.865	0.61	70	376	1.62	1.60	4	254	258	51	78	100.4	54.34
5	50.00	55.00	1028.470	0.64	70	376	1.70	1.70	4	258	255	52	78	100.2	55.66
6	55.00	60.00	1032.155	0.59	70	375	1.57	1.60	4	256	256	52	78	100.4	53.41
	Final DGM:		1035.705												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.385	ft^3	0.62	in. WC	68.3	°F	374.7	°F	4	1.650	in. WC	99.4	0.239	0.1

RB02B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

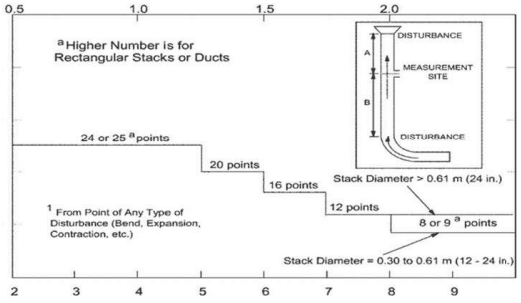
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	44.125	45.125	44.820	44.690
Meter Temperature, °F	(Tm)	53.3	72.4	62.2	62.6
Meter Temperature, °R	(Tm)	512.9	532.1	521.8	522.3
Meter Orifice Pressure, in. WC	(ΔH)	1.908	1.942	1.942	1.931
Volume H_2O Collected, mL	(Vlc)	319.2	291.3	328.1	312.9
Nozzle Diameter, in	(Dn)	0.295	0.295	0.295	0.295
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	105.1	43.2	51.4	66.6
Condensable PM Mass, mg	(M_{CPM})	4.0	4.8	4.5	4.4
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.319	44.680	45.250	45.083
Standard Water Volume, ft^3	(Vwstd)	15.053	13.738	15.473	14.755
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
Meter Pressure, in Hg	(Pm)	29.90	29.90	29.90	29.90
Volume at Nozzle, ft^3	(Vn)	96.813	95.419	99.108	97.11
Isokinetic Sampling Rate, (%)	(I)	100.1	98.4	100.8	99.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.3	0.0	-0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.036	0.015	0.018	0.023
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.030	0.012	0.014	0.019
Filterable PM Emission Rate, lb/hr	(PMR)	34.8	14.6	16.9	22.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0014	0.0017	0.0015	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.33	1.62	1.48	1.48
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.017	0.019	0.024
Total PM Emission Rate, lb/hr	(ER_{TPM})	36.2	16.2	18.4	23.6

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	**(must be ≥ 0.5)**
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

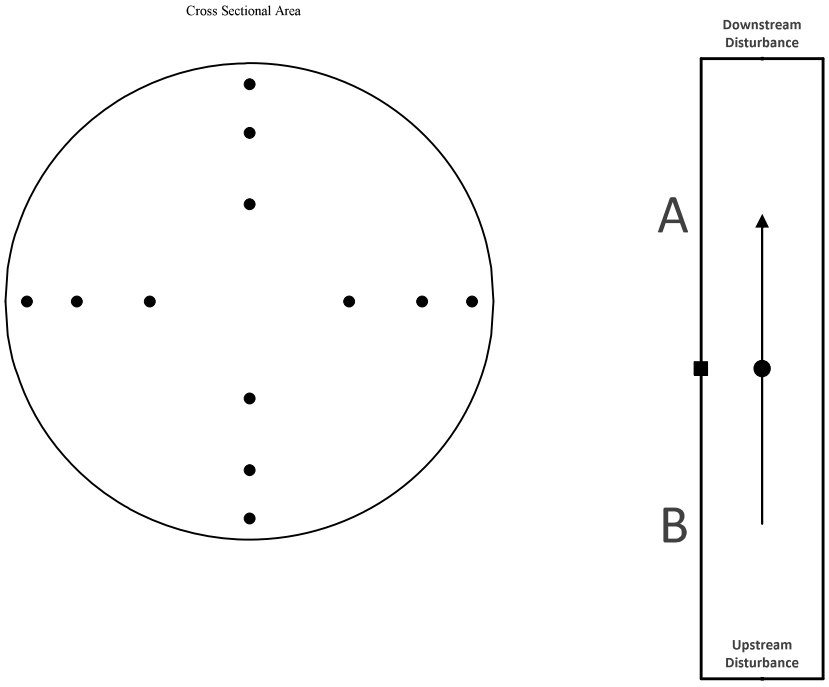
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	4
3	1
4	3
5	2
6	1
7	0
8	-2
9	-3
10	-1
11	0
12	6
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.62	0.60	0.59	0.60
Point 2		0.63	0.63	0.63	0.63
Point 3		0.65	0.61	0.65	0.64
Point 4		0.61	0.62	0.61	0.61
Point 5		0.59	0.64	0.64	0.62
Point 6		0.63	0.63	0.63	0.63
Point 7		0.61	0.59	0.61	0.60
Point 8		0.59	0.61	0.63	0.61
Point 9		0.61	0.63	0.64	0.63
Point 10		0.64	0.62	0.65	0.64
Point 11		0.65	0.59	0.61	0.62
Point 12		0.59	0.61	0.63	0.61
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.786	0.784	0.792	0.787
Pitot Tube Coefficient	(Cp)	0.830	0.830	0.830	0.830
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.54	-0.55	-0.53	-0.54
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	381.3	396.8	396.3	391.4
Stack Temperature, °R	(Ts)	840.9	856.5	855.9	851.1
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
O_2 Concentration, %	(O_2)	5.6	5.1	5.3	5.33
CO_2 Concentration, %	(CO_2)	15.2	15.7	15.5	15.47
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	36.58	32.26	33.96	34.27
Molecular Weight, lb/lb-mole (dry)	(Md)	30.66	30.72	30.69	30.69
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.50	27.73	27.46	27.56
Velocity, ft/sec	(Vs)	56.6	56.7	57.5	56.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	242,764	243,366	246,763	244,298
At Standard Conditions, scfm	(Qsw)	151,315	148,927	151,116	150,453
At Standard Conditions, dscfm	(Qs)	113,585	113,905	112,609	113,366

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:35	2/12/2025	14:07	2/12/2025	15:53
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	5.58	15.23	5.08	15.66	5.25	15.51
Analysis #2	5.59	15.23	5.10	15.67	5.25	15.49
Analysis #3	5.58	15.22	5.10	15.67	5.25	15.49
Average	5.6	15.2	5.1	15.7	5.3	15.5

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.9	645.2	748.0	647.7	933.7	3484.5
Final Mass, g	687.3	741.5	776.2	651.5	947.2	3803.7
Gain	177.4	96.3	28.2	3.8	13.5	319.2
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.7	640.3	746.6	649.0	961.2	3490.8
Final Mass, g	698.7	686.5	771.7	649.5	975.7	3782.1
Gain	205.0	46.2	25.1	0.5	14.5	291.3
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.9	658.1	750.2	639.4	952.3	3499.9
Final Mass, g	691.0	735.7	785.2	644.8	971.3	3828.0
Gain	191.1	77.6	35.0	5.4	19.0	328.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 1	VALID	End Time:	11:17	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	55	°F	26704-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	380	°F		Pg:	-0.54	in. WC	319.2
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.6	%	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.2	%	3.091
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.001	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 2 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					55	55				55	55	55	55		
A1	0.00	5.00	915.775	0.62	52	376	1.91	1.90	3	254	251	42	75	100.7	56.56
2	5.00	10.00	919.480	0.63	52	378	1.94	2.00	3	256	252	42	75	100.4	57.08
3	10.00	15.00	923.200	0.65	52	380	2.00	2.00	3	256	256	43	76	100.5	58.05
4	15.00	20.00	926.975	0.61	52	382	1.87	1.90	3	258	260	43	78	99.7	56.30
5	20.00	25.00	930.600	0.59	53	383	1.81	1.80	3	259	258	45	78	100.5	55.40
6	25.00	30.00	934.200	0.63	53	385	1.93	1.90	3	253	257	46	78	100.2	57.32
B1	30.00	35.00	937.905	0.61	53	385	1.87	1.90	3	254	256	48	78	99.7	56.40
2	35.00	40.00	941.530	0.59	54	383	1.81	1.80	4	253	253	49	81	100.4	55.40
3	40.00	45.00	945.135	0.61	54	383	1.88	1.90	4	257	252	50	81	100.5	56.33
4	45.00	50.00	948.800	0.64	54	381	1.97	2.00	4	255	255	52	83	100.1	57.63
5	50.00	55.00	952.545	0.65	55	380	2.01	2.00	4	255	254	52	83	100.3	58.05
6	55.00	60.00	956.335	0.59	55	379	1.83	1.80	4	256	251	53	82	98.9	55.27
	Final DGM:		959.900												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.125	ft^3	0.62	in. WC	53.3	°F	381.3	°F	4	1.908	in. WC	100.1	0.249	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	53	°F	26707-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	381	°F		Pg:	-0.55 in. WC	291.3
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.1 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.7 %	3.08
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.000	--	--	--	0.002	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	959.925	0.60	70	396	1.87	1.90	4	251	252	45	76	99.3	56.30
2	5.00	10.00	963.600	0.63	70	396	1.97	2.00	4	260	251	43	75	99.7	57.69
3	10.00	15.00	967.380	0.61	70	397	1.90	1.90	4	256	254	45	76	100.1	56.80
4	15.00	20.00	971.115	0.62	71	396	1.94	2.00	5	253	250	51	75	100.8	57.23
5	20.00	25.00	974.915	0.64	71	396	2.00	2.00	5	255	258	51	71	100.4	58.15
6	25.00	30.00	978.760	0.63	72	395	1.98	2.00	5	254	253	52	73	100.3	57.66
B1	30.00	35.00	982.580	0.59	73	397	1.85	1.90	5	255	258	53	75	99.6	55.86
2	35.00	40.00	986.255	0.61	74	397	1.92	1.90	5	252	253	53	76	99.6	56.80
3	40.00	45.00	990.000	0.63	74	398	1.98	1.90	5	252	255	54	78	100.8	57.76
4	45.00	50.00	993.850	0.62	74	398	1.95	2.00	5	254	254	55	80	100.7	57.30
5	50.00	55.00	997.665	0.59	75	399	1.85	1.90	5	256	257	56	80	100.5	55.93
6	55.00	60.00	1001.385	0.61	75	397	1.92	1.90	5	258	255	56	81	97.3	56.80
	Final DGM:		1005.050												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.125	ft^3	0.62	in. WC	72.4	°F	396.8	°F	5	1.942	in. WC	98.4	0.235	-0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	72	°F	26708-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	397	°F		Pg:	-0.53 in. WC	328.1
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.3 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.295	in.		CO_2:	15.5 %	3.133
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Mid 1 (cf) --
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 2 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 3 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	6.280	0.59	61	393	1.82	1.80	4	254	251	43	70	100.2	55.73
2	5.00	10.00	9.905	0.63	61	395	1.94	1.90	4	256	252	43	71	101.0	57.66
3	10.00	15.00	13.675	0.65	61	396	1.99	2.00	4	258	250	43	72	99.7	58.60
4	15.00	20.00	17.450	0.61	61	396	1.87	1.90	4	254	256	45	72	100.4	56.77
5	20.00	25.00	21.135	0.64	61	396	1.96	2.00	4	258	258	45	73	100.6	58.15
6	25.00	30.00	24.915	0.63	62	397	1.93	1.90	4	257	259	45	73	100.1	57.72
B1	30.00	35.00	28.655	0.61	62	397	1.87	1.90	4	256	260	46	74	100.7	56.80
2	35.00	40.00	32.355	0.63	63	397	1.94	2.00	4	258	254	48	75	100.5	57.72
3	40.00	45.00	36.115	0.64	63	397	1.97	2.00	4	259	257	49	78	99.7	58.18
4	45.00	50.00	39.875	0.65	63	398	2.00	2.00	5	257	255	50	79	99.8	58.67
5	50.00	55.00	43.665	0.61	64	397	1.88	1.90	5	256	255	51	79	100.2	56.80
6	55.00	60.00	47.360	0.63	64	396	1.94	2.00	5	255	256	51	82	99.7	57.69
	Final DGM:		51.100												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.820	ft^3	0.63	in. WC	62.2	°F	396.3	°F	5	1.942	in. WC	100.8	0.255	0.0

SM01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

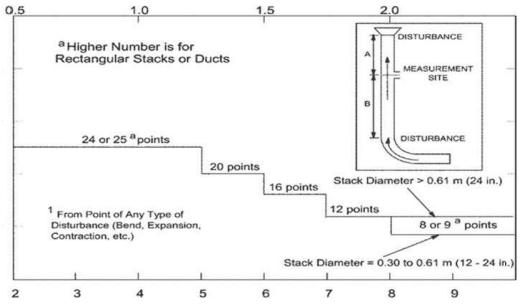
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	49.70	49.70	49.69	49.70
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	48.040	48.100	53.630	49.923
Meter Temperature, °F	(Tm)	51.4	49.9	53.6	51.6
Meter Temperature, °R	(Tm)	511.1	509.6	513.3	511.3
Meter Orifice Pressure, in. WC	(ΔH)	1.950	1.958	2.417	2.108
Volume H_2O Collected, mL	(Vlc)	806.2	438.4	456.0	566.9
Nozzle Diameter, in	(Dn)	0.382	0.382	0.382	0.382
Area of Nozzle, ft^2	(An)	0.0008	0.0008	0.0008	0.0008
Filterable PM Mass, mg	(Mn)	245.4	122.5	118.9	162.3
Condensable PM Mass, mg	(M_{CPM})	13.8	7.9	9.3	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	49.919	50.129	55.555	51.868
Standard Water Volume, ft^3	(Vwstd)	38.020	20.675	21.505	26.733
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
Meter Pressure, in Hg	(Pm)	30.17	30.17	30.21	30.19
Volume at Nozzle, ft^3	(Vn)	103.488	81.841	88.953	91.43
Isokinetic Sampling Rate, (%)	(I)	101.3	91.2	100.1	97.5
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	1.7	1.7	1.7	1.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.076	0.038	0.033	0.049
Filterable PM Emission Rate, lb/hr	(PMR)	7.4	4.1	3.6	5.1
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.15	0.083	0.073	0.10
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0043	0.0024	0.0026	0.0031
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.42	0.26	0.28	0.32
Total PM Concentration, grain/dscf	(C_{TPM})	0.080	0.040	0.036	0.052
Total PM Emission Rate, lb/hr	(ER_{TPM})	7.8	4.4	3.9	5.4

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Smelt Tank Scrubber (SM01)
Project No.: AST-2024-4204
Date: 02/10/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	54.00	in
Nipple Length:	9.00	in
Depth of Duct:	45.00	in
Cross Sectional Area of Duct:	11.04	ft^2
No. of Test Ports:	1	
Distance A:	112.0	ft
Distance A Duct Diameters:	29.9	(must be ≥ 0.5)
Distance B:	60.0	ft
Distance B Duct Diameters:	16.0	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/10/25	
Reviewer (Initial and Date):	CAL 2/10/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

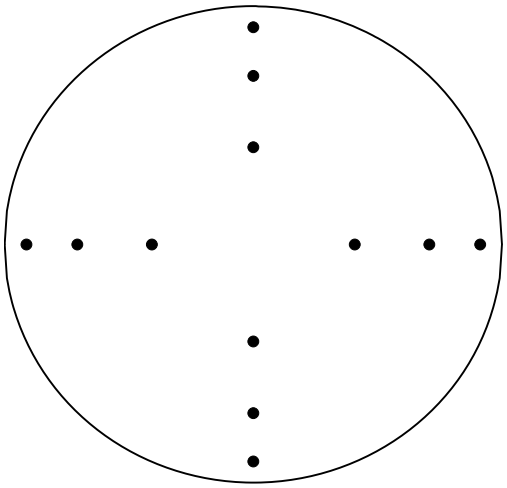
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

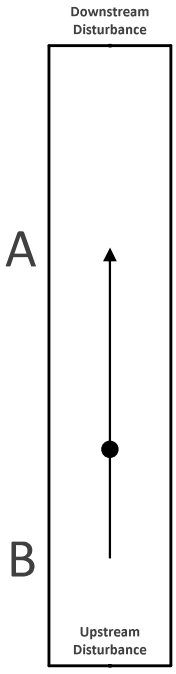
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	1.98	11
2	14.6	6.57	15 9/16
3	29.6	13.32	22 5/16
4	70.4	31.68	40 11/16
5	85.4	38.43	47 7/16
6	95.6	43.02	52
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 112 ft.
B = 60 ft.
Depth of Duct = 45 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	-4
2	-2
3	-1
4	1
5	0
6	2
7	3
8	5
9	4
10	3
11	-1
12	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.16	0.16	0.17	0.16
Point 2		0.17	0.18	0.18	0.18
Point 3		0.23	0.22	0.23	0.23
Point 4		0.32	0.31	0.30	0.31
Point 5		0.29	0.28	0.27	0.28
Point 6		0.27	0.28	0.27	0.27
Point 7		0.40	0.35	0.36	0.37
Point 8		0.29	0.34	0.33	0.32
Point 9		0.28	0.29	0.28	0.28
Point 10		0.24	0.23	0.25	0.24
Point 11		0.19	0.18	0.19	0.19
Point 12		0.16	0.17	0.17	0.17
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.495	0.495	0.496	0.495
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.39	-0.39	-0.39	-0.39
Stack Pressure, in. Hg	(Ps)	30.00	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	11.04	11.04	11.04	11.04
Stack Temperature, °F	(Ts)	163.5	152.3	151.4	155.7
Stack Temperature, °R	(Ts)	623.2	611.9	611.1	615.4
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	25.10	25.98	26.04	25.70
Velocity, ft/sec	(Vs)	31.0	30.1	30.2	30.4
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	20,517	19,971	19,993	20,160
At Standard Conditions, scfm	(Qsw)	17,420	17,268	17,310	17,333
At Standard Conditions, dscfm	(Qs)	11,402	12,707	12,830	12,313

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.2	648.2	744.6	544.8	948.7	3244.5
Final Mass, g	873.1	888.1	769.2	557.9	962.4	4050.7
Gain	514.9	239.9	24.6	13.1	13.7	806.2
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.0	799.4	763.4	637.7	942.4	3637.9
Final Mass, g	819.0	864.0	792.7	644.0	956.6	4076.3
Gain	324.0	64.6	29.3	6.3	14.2	438.4
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.9	828.8	768.8	556.4	956.3	3469.2
Final Mass, g	735.9	871.4	789.3	560.3	968.3	3925.2
Gain	377.0	42.6	20.5	3.9	12.0	456.0

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	Run 1	VALID	End Time:	9:40	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	160	°F	26974-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	163	°F		Pg:	-0.39 in. WC	806.2
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.313	in.		CO_2:	0 %	9.461
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- -- 12			Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					45	45				45	45	45	45		
1	0.00	5.00	756.890	0.16	48	167	1.23	1.20	3	254	255	43	68	100.6	25.11
2	5.00	10.00	760.060	0.17	49	163	1.32	1.30	3	256	254	35	73	101.1	25.80
3	10.00	15.00	763.360	0.23	49	167	1.77	1.80	4	254	254	35	69	99.5	30.10
4	15.00	20.00	767.120	0.32	50	168	2.46	2.50	7	256	256	36	67	99.4	35.54
5	20.00	25.00	771.550	0.29	50	168	2.24	2.20	6	255	253	38	80	101.8	33.83
6	25.00	30.00	775.870	0.27	51	164	2.10	2.10	6	255	257	40	83	102.5	32.54
7	30.00	35.00	780.090	0.40	52	162	3.12	3.10	9	255	257	41	78	99.0	39.54
8	35.00	40.00	785.060	0.29	53	163	2.27	2.30	8	256	254	41	73	103.8	33.70
9	40.00	45.00	789.510	0.28	53	162	2.19	2.20	7	255	256	41	68	100.3	33.08
10	45.00	50.00	793.740	0.24	54	160	1.89	1.90	7	256	249	40	72	103.8	30.58
11	50.00	55.00	797.810	0.19	54	159	1.50	1.50	7	255	256	39	74	105.0	27.19
12	55.00	60.00	801.480	0.16	54	159	1.26	1.30	6	253	250	40	71	107.5	24.95
	Final DGM:		804.930												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.040 ft^3	0.25 in. WC	51.4 °F	163.5 °F	9	1.950 in. WC	101.3	0.345	1.7

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 2**	**VALID**	**End Time:**	12:15	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	51	°F	26989-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	164	°F		Pg:	-0.39 in. WC	438.4
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.345	in.		CO_2:	0 %	7.80
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.005	-- -- --	0.002		Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
1	0.00	5.00	805.210	0.16	49	146	1.28	1.30	3	254	249	46	66	102.8	24.68
2	5.00	10.00	808.510	0.18	50	153	1.42	1.40	4	255	256	37	68	99.4	26.33
3	10.00	15.00	811.880	0.22	49	152	1.74	1.70	5	254	256	39	82	100.5	29.09
4	15.00	20.00	815.640	0.31	49	153	2.44	2.40	7	253	259	40	84	101.8	34.56
5	20.00	25.00	820.150	0.28	48	151	2.21	2.20	6	256	255	40	75	102.8	32.79
6	25.00	30.00	824.480	0.28	49	148	2.23	2.20	6	255	255	42	67	100.9	32.71
7	30.00	35.00	828.750	0.35	49	147	2.78	2.80	8	255	256	43	66	101.1	36.54
8	35.00	40.00	833.530	0.34	50	147	2.71	2.70	8	256	256	46	75	100.9	36.01
9	40.00	45.00	838.240	0.29	51	149	2.31	2.30	7	255	254	49	82	101.9	33.32
10	45.00	50.00	842.640	0.23	51	158	1.81	1.80	7	256	255	49	73	103.3	29.89
11	50.00	55.00	846.590	0.18	52	160	1.41	1.40	6	255	255	48	69	101.3	26.48
12	55.00	60.00	850.020	0.17	52	163	1.33	1.30	6	256	255	46	72	100.2	25.80
	Final DGM:		853.310												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.100 ft^3	0.25 in. WC	49.9 °F	152.3 °F	8	1.958 in. WC	91.2	0.264	1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	14:05	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 3**	**VALID**	**End Time:**	15:05	**Project No.:**	AST-2024-4204 — **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	27.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	50	°F	26700-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	152	°F		Pg:	-0.39 in. WC	456.0
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.328	in.		CO_2:	0 %	9.650
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm				
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 / Mid 3	Post	Check Pt. / Initial / Final / Corr.	
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- / --	0.002	Mid 1 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	--	-- / --	9	Mid 2 (cf)	--
Ms:	25.91	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	--	-- / --	Pass	Mid 3 (cf)	--
											Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
1	0.00	5.00	853.490	0.17	52	154	1.64	1.60	4	254	254	51	67	100.8	25.18
2	5.00	10.00	857.170	0.18	50	150	1.74	1.70	4	254	254	43	69	102.9	25.83
3	10.00	15.00	861.030	0.23	51	148	2.24	2.20	5	256	256	42	68	99.5	29.14
4	15.00	20.00	865.260	0.30	52	148	2.92	2.90	6	255	255	44	70	100.7	33.29
5	20.00	25.00	870.150	0.27	53	147	2.64	2.60	5	255	256	44	66	101.9	31.55
6	25.00	30.00	874.860	0.27	54	146	2.65	2.70	6	256	255	47	65	102.1	31.53
7	30.00	35.00	879.590	0.36	55	146	3.53	3.50	8	256	255	48	72	99.4	36.40
8	35.00	40.00	884.910	0.33	55	154	3.20	3.20	8	255	256	48	69	100.5	35.08
9	40.00	45.00	890.030	0.28	55	155	2.71	2.70	8	256	256	46	73	101.2	32.34
10	45.00	50.00	894.780	0.25	55	156	2.42	2.40	7	256	254	45	68	101.9	30.59
11	50.00	55.00	899.300	0.19	55	158	1.83	1.80	7	255	254	44	76	103.2	26.71
12	55.00	60.00	903.290	0.17	56	155	1.65	1.70	6	254	256	45	78	104.3	25.20
	Final DGM:		907.120												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	53.630 ft^3	0.25 in. WC	53.6 °F	151.4 °F	8	2.417 in. WC	100.1	0.259	1.7

SM02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

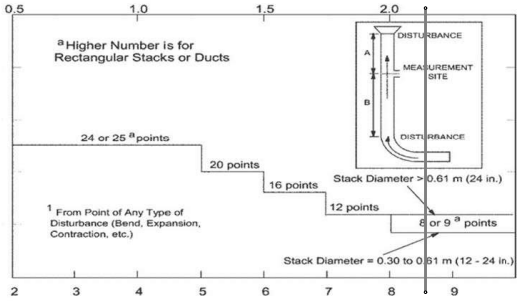
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	97.01	96.99	96.99	97.00
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	48.530	39.450	39.950	42.643
Meter Temperature, °F	(Tm)	61.0	63.1	64.0	62.7
Meter Temperature, °R	(Tm)	520.7	522.8	523.7	522.4
Meter Orifice Pressure, in. WC	(ΔH)	2.317	1.467	1.458	1.747
Volume H_2O Collected, mL	(Vlc)	467.7	380.9	370.7	406.4
Nozzle Diameter, in	(Dn)	0.344	0.305	0.305	0.318
Area of Nozzle, ft^2	(An)	0.0006	0.0005	0.0005	0.0006
Filterable PM Mass, mg	(Mn)	108.2	73.4	71.1	84.2
Condensable PM Mass, mg	(M_{CPM})	8.0	16.2	6.8	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.707	39.354	39.782	42.615
Standard Water Volume, ft^3	(Vwstd)	22.057	17.963	17.482	19.167
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
Meter Pressure, in Hg	(Pm)	29.93	29.87	29.87	29.89
Volume at Nozzle, ft^3	(Vn)	82.478	67.206	67.182	72.29
Isokinetic Sampling Rate, (%)	(I)	93.9	99.1	100.3	97.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	-1.7	0.2	1.6	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.034	0.029	0.028	0.030
Filterable PM Emission Rate, lb/hr	(PMR)	7.5	6.1	5.8	6.5
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.077	0.063	0.060	0.067
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0025	0.0064	0.0026	0.0038
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.55	1.35	0.56	0.82
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.035	0.030	0.034
Total PM Emission Rate, lb/hr	(ER_{TPM})	8.0	7.4	6.4	7.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN	
Reviewer (Initial and Date):	CAL	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

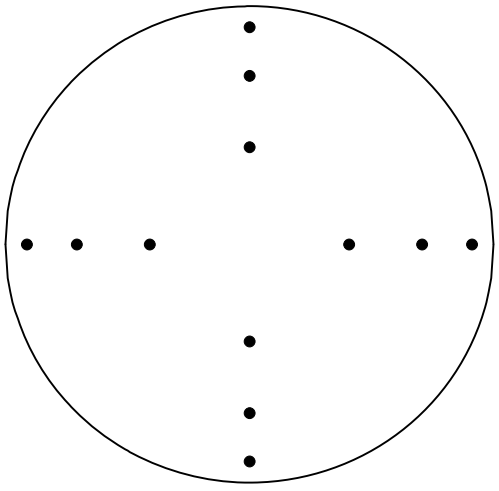
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

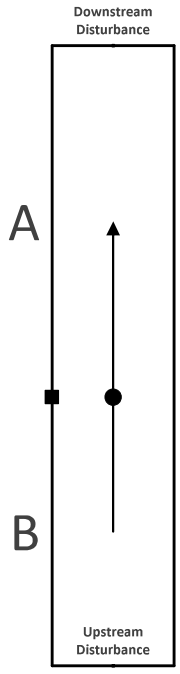
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 55 ft.
B = 42 ft.
Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	2
3	1
4	0
5	1
6	2
7	-3
8	-2
9	0
10	1
11	-1
12	3
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.36	0.35	0.34	0.35
Point 2		0.34	0.34	0.34	0.34
Point 3		0.31	0.30	0.32	0.31
Point 4		0.32	0.30	0.31	0.31
Point 5		0.34	0.33	0.35	0.34
Point 6		0.35	0.36	0.36	0.36
Point 7		0.35	0.36	0.35	0.35
Point 8		0.33	0.34	0.34	0.34
Point 9		0.32	0.33	0.31	0.32
Point 10		0.30	0.32	0.32	0.31
Point 11		0.33	0.33	0.34	0.33
Point 12		0.35	0.36	0.35	0.35
CALCULATED DATA					
Square Root of ΔP, $(in. WC)^{1/2}$	(ΔP)	0.577	0.579	0.579	0.578
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.61	-0.61	-0.61	-0.61
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	18.99	18.99	18.99	18.99
Stack Temperature, °F	(Ts)	151.5	155.2	155.5	154.1
Stack Temperature, °R	(Ts)	611.2	614.8	615.2	613.7
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.00	25.74	25.71	25.82
Velocity, ft/sec	(Vs)	35.3	35.7	35.7	35.6
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	40,191	40,629	40,702	40,507
At Standard Conditions, scfm	(Qsw)	34,462	34,630	34,673	34,589
At Standard Conditions, dscfm	(Qs)	25,439	24,719	24,670	24,942

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.9	799.9	724.0	643.3	951.8	3613.9
Final Mass, g	847.9	880.1	741.1	647.1	965.4	4081.6
Gain	353.0	80.2	17.1	3.8	13.6	467.7
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.7	829.0	790.1	560.5	971.9	3510.2
Final Mass, g	696.1	854.5	797.1	561.2	982.2	3891.1
Gain	337.4	25.5	7.0	0.7	10.3	380.9
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.2	799.1	740.3	641.5	938.2	3614.3
Final Mass, g	806.2	832.5	753.1	643.9	949.3	3985.0
Gain	311.0	33.4	12.8	2.4	11.1	370.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 1	VALID	End Time:	11:18	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26702-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	154	°F		Pg:	-0.61 in. WC	467.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.308	in.		CO_2:	0 %	6.815
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	-- --	0.002	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-344-3	SS	Vacuum (in Hg):	15	--	-- --	10	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.344		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 45	Stack Amb. 45	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 45	Filter Amb. 45	Imp Exit Amb. 45	CPM Amb. 45	% ISO	Vs (fps)
A1	0.00	5.00	420.260	0.36	55	154	2.47	2.50	6	248	246	41	68	96.9	37.04
2	5.00	10.00	424.350	0.34	54	151	2.34	2.30	6	247	257	40	72	99.8	35.91
3	10.00	15.00	428.450	0.31	54	149	2.14	2.10	5	246	256	46	70	95.2	34.23
4	15.00	20.00	432.190	0.32	60	149	2.24	2.20	6	254	257	47	68	98.1	34.78
5	20.00	25.00	436.150	0.34	63	149	2.39	2.40	6	250	252	47	67	97.8	35.85
6	25.00	30.00	440.240	0.35	64	148	2.47	2.50	7	251	248	46	69	99.6	36.35
B1	30.00	35.00	444.480	0.35	63	150	2.46	2.50	7	254	253	45	70	100.7	36.41
2	35.00	40.00	448.750	0.33	63	151	2.31	2.30	6	255	248	42	76	99.6	35.38
3	40.00	45.00	452.850	0.32	63	152	2.24	2.20	6	255	251	38	81	98.0	34.87
4	45.00	50.00	456.820	0.30	64	153	2.10	2.10	5	253	255	40	67	100.3	33.79
5	50.00	55.00	460.760	0.33	64	154	2.31	2.30	6	255	254	40	68	98.4	35.47
6	55.00	60.00	464.810	0.35	65	158	2.43	2.40	7	256	254	41	74	94.1	36.64
	Final DGM:		468.790												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	48.530	ft^3	0.33	in. WC	61.0	°F	151.5	°F	7	2.317	in. WC	93.9	0.262	-1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	61	°F	26703-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	152	°F		Pg:	-0.61 in. WC	380.9
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.33	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.307	in.		CO_2:	0 %	4.34
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- --	0.003	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	--	-- --	6	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	468.950	0.35	62	158	1.51	1.50	3	254	255	42	67	97.0	36.64
2	5.00	10.00	472.170	0.34	60	155	1.46	1.50	4	260	263	43	83	103.7	36.03
3	10.00	15.00	475.560	0.30	61	156	1.29	1.30	4	261	254	43	76	102.8	33.87
4	15.00	20.00	478.720	0.30	61	158	1.29	1.30	4	260	251	45	66	101.0	33.93
5	20.00	25.00	481.820	0.33	61	160	1.41	1.40	4	260	249	45	74	98.3	35.64
6	25.00	30.00	484.980	0.36	62	154	1.56	1.60	5	260	252	47	81	102.4	37.04
B1	30.00	35.00	488.440	0.36	63	151	1.57	1.60	4	246	244	47	73	98.7	36.95
2	35.00	40.00	491.790	0.34	64	153	1.48	1.50	4	257	252	51	68	101.5	35.97
3	40.00	45.00	495.140	0.33	64	152	1.45	1.50	4	259	250	49	72	101.3	35.57
4	45.00	50.00	498.450	0.32	66	154	1.40	1.40	4	260	241	49	72	102.1	34.92
5	50.00	55.00	501.730	0.33	66	156	1.44	1.40	4	258	246	50	69	99.8	35.52
6	55.00	60.00	504.980	0.36	67	155	1.57	1.60	5	261	254	51	67	100.4	37.07
	Final DGM:		508.400												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	39.450 ft^3	0.34 in. WC	63.1 °F	155.2 °F	5	1.467 in. WC	99.1	0.286	0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 3	VALID	End Time:	15:28	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	63	°F	26971-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	155	°F		Pg:	-0.61 in. WC	370.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.306	in.		CO_2:	0 %	4.327
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.007	-- -- --	0.009		Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	511.870	0.34	64	154	1.48	1.50	3	258	253	46	73	99.5	36.00
2	5.00	10.00	515.150	0.34	65	151	1.49	1.50	5	260	253	46	74	100.9	35.91
3	10.00	15.00	518.490	0.32	65	153	1.40	1.40	5	260	245	46	84	103.5	34.90
4	15.00	20.00	521.810	0.31	64	156	1.34	1.30	4	260	247	47	82	101.8	34.43
5	20.00	25.00	525.010	0.35	64	155	1.52	1.50	5	259	250	47	79	102.9	36.56
6	25.00	30.00	528.450	0.36	64	158	1.55	1.60	5	259	252	49	66	102.7	37.16
B1	30.00	35.00	531.920	0.35	64	158	1.51	1.50	5	259	249	47	67	102.0	36.64
2	35.00	40.00	535.320	0.34	64	158	1.47	1.50	4	261	251	47	70	103.8	36.12
3	40.00	45.00	538.730	0.31	63	156	1.34	1.30	4	260	246	48	69	100.7	34.43
4	45.00	50.00	541.890	0.32	63	155	1.39	1.40	4	263	248	47	68	101.3	34.95
5	50.00	55.00	545.120	0.34	64	156	1.47	1.50	4	257	255	47	67	99.4	36.06
6	55.00	60.00	548.390	0.35	64	156	1.52	1.50	4	261	251	46	66	102.7	36.58
	Final DGM:		551.820												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	39.950	ft^3	0.34	in. WC	64.0	°F	155.5	°F	5	1.458	in. WC	100.3	0.289	1.6

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

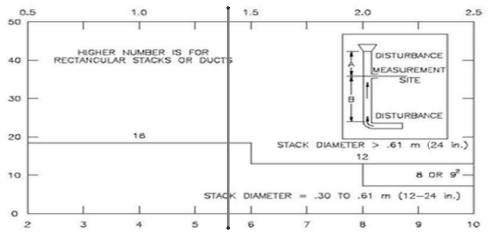
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		9:10	10:42	11:57	--
Stop Time		10:09	11:41	12:56	--
Input Data - Outlet					
Moisture Fraction, dimensionless	BWS	0.444	0.442	0.442	0.443
Volumetric Flow Rate (M1-4), dscfm	Qs	6,235	6,311	6,345	6,297
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	13.20	13.24	13.06	13.17
CO_2 Concentration, % dry	C_{CO_2}	3.13	3.20	3.19	3.17
Methanol - Outlet Concentration, ppmvd	C_{CH_3OH}	0.81	0.77	0.70	0.76
Methanol - Outlet Concentration, ppmvw	C_{CH_3OHw}	0.45	0.43	0.39	0.42
Methanol - Outlet Concentration, ppmvd @ 10 % O_2	C_{CH_3OHc15}	1.1	1.1	0.97	1.1
Methanol - Outlet Emission Rate, lb/hr	ER_{CH_3OH}	0.03	0.02	0.02	0.02

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unit Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	in
Nipple Length:	7.00	in
Depth of Duct:	29.00	in
Cross Sectional Area of Duct:	4.59	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	ft
Distance A Duct Diameters:	23.4	**(must be > 0.5)**
Distance B:	13.5	ft
Distance B Duct Diameters:	5.6	**(must be > 2)**
Actual Number of Traverse Points:	16	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	3.2	1.00	8
2	10.5	3.05	10 1/16
3	19.4	5.63	12 5/8
4	32.3	9.37	16 3/8
5	67.7	19.63	26 5/8
6	80.6	23.37	30 3/8
7	89.5	25.96	32 15/16
8	96.8	28.00	35
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

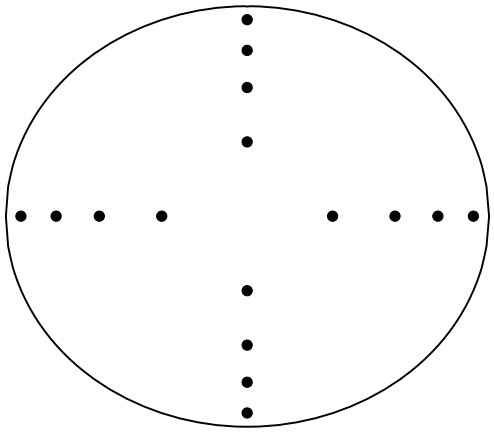
Stack Diagram

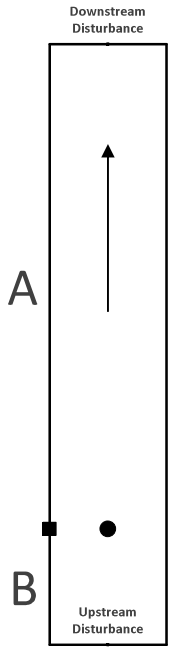
A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX

Source NCG Oxidation Unit Scrubber (NCG01)

Project No. AST-2024-4204

Date 2/13/25

Sample Point	Angle (ΔP=0)
1	3
2	5
3	2
4	6
5	5
6	2
7	8
8	5
9	10
10	5
11	12
12	8
13	8
14	2
15	2
16	5
Average	5.5

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204

Run No.	1		2		3	
Date	2/13/25		2/13/25		2/13/25	
Status	VALID		VALID		VALID	
Start Time	9:20		10:55		12:40	
Stop Time	9:30		11:05		12:50	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.54	174	0.58	176	0.55	177
2	0.53	175	0.55	176	0.54	177
3	0.51	175	0.54	176	0.55	178
4	0.46	175	0.51	177	0.56	178
5	0.46	176	0.49	177	0.52	177
6	0.45	176	0.46	178	0.51	177
7	0.46	176	0.49	178	0.48	178
8	0.43	177	0.52	178	0.45	178
B-1	0.54	176	0.55	176	0.49	176
2	0.55	177	0.58	177	0.56	177
3	0.56	177	0.56	177	0.59	178
4	0.59	178	0.54	178	0.60	178
5	0.55	178	0.54	178	0.61	177
6	0.57	177	0.57	178	0.56	178
7	0.58	178	0.54	177	0.52	177
8	0.60	178	0.51	177	0.54	177

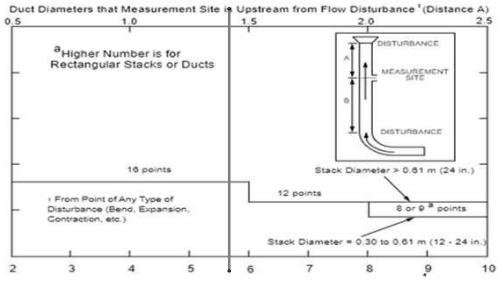
					Average
Square Root of ΔP, (in. WC)$^{1/2}$	**$(\Delta P)^{1/2}$**	0.723	0.730	0.734	0.729
Average ΔP, in. WC	**(ΔP)**	0.52	0.53	0.54	0.53
Pitot Tube Coefficient	**(Cp)**	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	**(Pb)**	30.46	30.46	30.46	30.46
Static Pressure, in. WC	**(Pg)**	-0.48	-0.45	-0.49	-0.47
Stack Pressure, in. Hg	**(Ps)**	30.42	30.43	30.42	30.43
Average Temperature, °F	**(Ts)**	176.4	177.1	177.4	177.0
Average Temperature, °R	**(Ts)**	636.1	636.8	637.0	636.6
Measured Moisture Fraction	**(BWSmsd)**	0.444	0.442	0.442	0.443
Moisture Fraction @ Saturation	**(BWSsat)**	0.457	0.464	0.467	0.463
Moisture Fraction	**(BWS)**	0.444	0.442	0.442	0.443
O2 Concentration, %	**(O2)**	13.20	13.24	13.06	13.17
CO2 Concentration, %	**(CO2)**	3.13	3.20	3.19	3.17
Molecular Weight, lb/lb-mole (dry)	**(Md)**	29.03	29.04	29.03	29.03
Molecular Weight, lb/lb-mole (wet)	**(Ms)**	24.14	24.17	24.16	24.16
Velocity, ft/sec	**(Vs)**	48.3	48.8	49.1	48.7
VFR at stack conditions, acfm	**(Qa)**	13,294	13,422	13,501	13,406
VFR at standard conditions, scfh	**(Qsw)**	672,819	678,628	682,305	677,917
VFR at standard conditions, scfm	**(Qsw)**	11,214	11,310	11,372	11,299
VFR at standard conditions, dscfm	**(Qsd)**	6,235	6,311	6,345	6,297

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unti Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date:	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	**in**
Nipple Length:	7.00	**in**
Depth of Duct:	29.00	**in**
Cross Sectional Area of Duct:	4.59	**ft²**
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	**ft**
Distance A Duct Diameters:	23.4	**(must be ≥ 0.5)**
Distance B:	13.5	**ft**
Distance B Duct Diameters:	5.6	**(must be ≥ 2)**
Minimum Number of Traverse Points:	16	
Actual Number of Traverse Points:	3	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

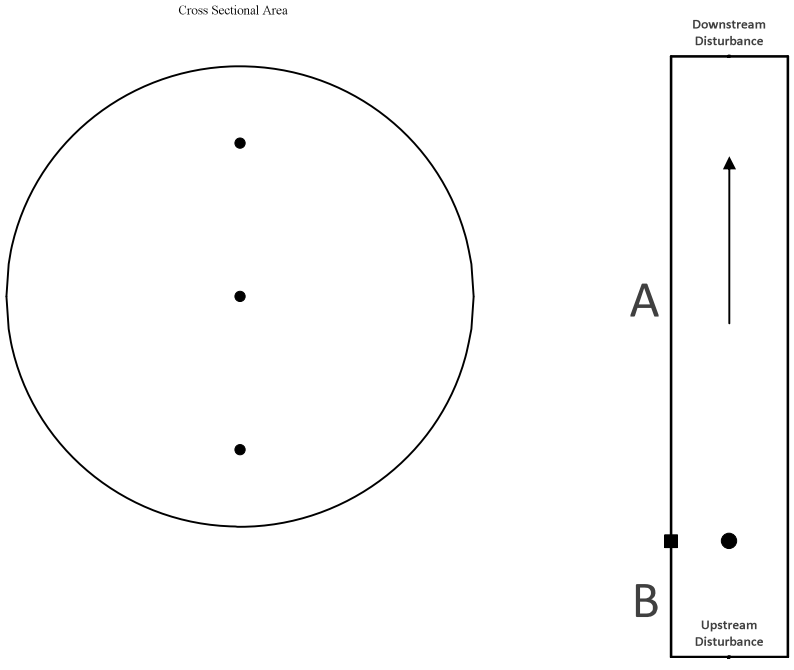
Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	4.84	11.84
2	50.0	14.50	21.50
3	83.3	24.16	31.16
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram

A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.



Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.26	3.08
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Average Zero Response (Co)	0.24	0.02
Pretest System Cal Response	10.10	9.81
Posttest System Cal Response	10.10	9.84
Average Cal Response (C_M)	10.10	9.83
Corrected Run Average (Corr)	13.20	3.13
9:10	13.46	2.95
9:11	13.66	2.75
9:12	13.34	2.77
9:13	13.13	2.98
9:14	13.70	2.72
9:15	13.11	2.92
9:16	13.41	3.01
9:17	13.39	2.88
9:18	13.33	2.91
9:19	12.86	3.11
9:20	13.58	2.83
9:21	13.71	2.67
9:22	12.94	3.14
9:23	13.04	3.23
9:24	13.54	2.92
9:25	13.17	2.91
9:26	13.11	3.07
9:27	13.40	2.93
9:28	13.23	2.87
9:29	13.28	2.97
9:30	12.74	3.15
9:31	13.00	3.24
9:32	13.55	2.90
9:33	13.89	2.64
9:34	13.33	2.94
9:35	13.43	3.07
9:36	13.43	3.05
9:37	13.65	3.07
9:38	13.28	3.13
9:39	12.98	3.54
9:40	13.29	3.31
9:41	13.01	3.64
9:42	13.10	3.53
9:43	12.76	3.54
9:44	13.11	3.51
9:45	12.67	3.43
9:46	12.19	3.68
9:47	12.61	3.60
9:48	13.24	3.12
9:49	13.73	2.71
9:50	13.53	2.80
9:51	12.98	3.19
9:52	12.80	3.23
9:53	13.65	2.74
9:54	13.86	2.61
9:55	13.79	2.60
9:56	13.81	2.67
9:57	13.77	2.73
9:58	13.85	2.86
9:59	13.48	3.05
10:00	12.71	3.50
10:01	13.43	3.36
10:02	13.28	3.26
10:03	12.38	3.78
10:04	12.85	3.65
10:05	13.83	2.98
10:06	13.98	2.74
10:07	13.30	2.97
10:08	12.74	3.27
10:09	12.11	3.76

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.32	3.17
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Average Zero Response (Co)	0.21	0.03
Pretest System Cal Response	10.10	9.84
Posttest System Cal Response	10.13	9.84
Average Cal Response (C_M)	10.12	9.84
Corrected Run Average (Corr)	13.24	3.20
10:42	12.69	3.47
10:43	13.78	2.68
10:44	13.66	2.62
10:45	13.75	2.57
10:46	13.10	3.07
10:47	13.52	2.74
10:48	13.38	2.78
10:49	13.02	3.03
10:50	12.91	3.28
10:51	13.26	3.25
10:52	13.68	3.02
10:53	13.83	2.85
10:54	13.60	2.88
10:55	13.23	3.33
10:56	13.45	3.19
10:57	13.25	3.16
10:58	13.22	3.28
10:59	13.88	3.08
11:00	13.21	3.20
11:01	13.20	3.44
11:02	13.43	3.29
11:03	12.83	3.41
11:04	12.73	3.61
11:05	12.85	3.60
11:06	13.26	3.37
11:07	13.69	3.11
11:08	13.44	3.10
11:09	13.39	3.21
11:10	13.04	3.26
11:11	12.95	3.49
11:12	12.91	3.34
11:13	13.32	3.25
11:14	12.83	3.26
11:15	13.00	3.40
11:16	13.42	3.21
11:17	13.64	3.06
11:18	13.64	2.93
11:19	13.56	2.96
11:20	13.54	3.01
11:21	13.22	3.11
11:22	13.45	3.23
11:23	13.22	3.17
11:24	13.30	3.28
11:25	12.88	3.27
11:26	13.28	3.31
11:27	13.22	3.15
11:28	14.05	2.80
11:29	13.66	2.79
11:30	13.79	3.02
11:31	13.38	3.04
11:32	13.49	3.30
11:33	13.57	3.06
11:34	13.08	3.44
11:35	13.44	3.27
11:36	13.02	3.37
11:37	13.56	3.30
11:38	13.06	3.29
11:39	12.69	3.60
11:40	13.41	3.23
11:41	13.54	3.11

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.16	3.15
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Average Zero Response (Co)	0.22	0.03
Pretest System Cal Response	10.13	9.84
Posttest System Cal Response	10.12	9.81
Average Cal Response (C_M)	10.13	9.83
Corrected Run Average (Corr)	13.06	3.19
11:57	13.24	2.94
11:58	12.96	3.17
11:59	13.51	2.85
12:00	13.07	3.00
12:01	13.43	3.13
12:02	13.15	3.06
12:03	13.55	3.05
12:04	13.64	2.82
12:05	13.53	3.01
12:06	12.69	3.36
12:07	12.85	3.57
12:08	13.00	3.45
12:09	12.44	3.56
12:10	12.67	3.72
12:11	12.83	3.56
12:12	13.24	3.26
12:13	13.12	3.08
12:14	13.17	3.10
12:15	13.37	2.92
12:16	13.30	2.90
12:17	13.01	3.07
12:18	12.88	3.21
12:19	13.43	3.04
12:20	13.60	2.73
12:21	13.35	3.03
12:22	13.23	3.04
12:23	13.02	3.33
12:24	13.43	3.03
12:25	12.54	3.45
12:26	12.79	3.63
12:27	12.54	3.44
12:28	12.82	3.53
12:29	13.21	3.10
12:30	12.76	3.50
12:31	13.11	3.21
12:32	13.04	3.18
12:33	13.14	3.10
12:34	12.97	3.04
12:35	13.14	3.05
12:36	13.33	2.95
12:37	13.49	2.83
12:38	13.59	2.79
12:39	13.45	2.80
12:40	13.72	2.88
12:41	13.64	2.86
12:42	13.58	2.98
12:43	13.07	3.26
12:44	13.05	3.59
12:45	12.84	3.48
12:46	12.54	3.60
12:47	13.55	3.18
12:48	12.87	3.29
12:49	13.38	3.18
12:50	13.09	3.09
12:51	13.50	2.99
12:52	13.36	2.87
12:53	12.84	3.09
12:54	13.22	3.10
12:55	13.38	2.89
12:56	13.18	2.95

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
9:10	191.0	1.037	0.4	45.0
9:11	191.0	1.036	0.5	45.8
9:12	191.0	1.036	0.5	44.7
9:13	191.0	1.036	0.6	45.2
9:14	191.0	1.035	0.5	46.0
9:15	191.0	1.036	0.5	45.8
9:16	191.0	1.036	0.4	45.1
9:17	191.0	1.036	0.5	45.7
9:18	191.0	1.036	0.5	45.8
9:20	190.9	1.037	0.4	44.5
9:21	191.1	1.036	0.5	45.3
9:22	191.1	1.037	0.5	44.5
9:23	191.0	1.036	0.5	44.0
9:24	191.0	1.036	0.5	44.0
9:25	191.0	1.036	0.4	44.1
9:26	191.0	1.037	0.4	45.4
9:27	191.0	1.036	0.4	45.4
9:28	191.1	1.036	0.4	44.6
9:29	191.0	1.036	0.4	45.2
9:30	190.9	1.036	0.4	44.9
9:31	190.9	1.036	0.4	45.5
9:32	191.0	1.036	0.4	46.4
9:33	190.9	1.037	0.4	44.6
9:34	190.9	1.038	0.5	43.1
9:35	191.0	1.036	0.5	43.6
9:36	191.2	1.037	0.5	44.0
9:37	191.1	1.037	0.5	43.8
9:38	191.0	1.037	0.4	43.4
9:39	191.0	1.037	0.4	42.9
9:40	191.0	1.037	0.4	43.0
9:41	191.0	1.037	0.3	42.9
9:43	191.0	1.037	0.3	43.7
9:44	191.0	1.037	0.3	43.0
9:45	191.0	1.037	0.4	45.2
9:46	191.0	1.037	0.3	43.4
9:47	191.0	1.037	0.3	44.3
9:48	191.0	1.037	0.4	45.1
9:49	190.9	1.037	0.4	44.7
9:50	191.0	1.037	0.5	44.1
9:51	191.0	1.037	0.5	43.8
9:52	191.0	1.036	0.5	44.3
9:53	191.0	1.037	0.4	45.6
9:54	191.0	1.037	0.4	45.5
9:55	191.0	1.037	0.5	45.2
9:56	191.0	1.038	0.6	44.4
9:57	191.0	1.037	0.8	43.6
9:58	191.0	1.038	0.7	42.7
9:59	191.0	1.038	0.6	42.6
10:00	191.0	1.038	0.5	43.1
10:01	191.0	1.037	0.5	43.4
10:02	191.0	1.037	0.4	43.4
10:03	191.0	1.037	0.4	42.6
10:05	191.0	1.037	0.3	44.1
10:06	191.0	1.037	0.4	45.6
10:07	191.0	1.037	0.5	43.4
10:08	191.0	1.038	0.6	43.4
10:09	190.9	1.037	0.5	43.9

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.037	0.5	44.4

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
10:42	191.0	1.040	0.5	43.3
10:43	191.0	1.040	0.4	44.8
10:44	191.0	1.039	0.5	45.1
10:45	191.0	1.040	0.6	44.5
10:46	191.0	1.040	0.7	43.6
10:47	191.0	1.040	0.7	43.8
10:48	191.0	1.040	0.6	44.6
10:49	191.0	1.040	0.6	43.9
10:50	191.0	1.040	0.5	44.1
10:51	191.0	1.039	0.4	45.4
10:52	191.0	1.039	0.4	44.9
10:53	191.0	1.040	0.5	43.9
10:54	191.0	1.040	0.5	43.9
10:55	191.0	1.039	0.5	43.4
10:56	191.0	1.039	0.5	44.4
10:57	191.0	1.040	0.3	42.9
10:58	191.0	1.040	0.4	44.0
10:59	191.0	1.040	0.5	43.1
11:00	191.0	1.040	0.4	43.1
11:01	191.0	1.040	0.4	44.1
11:03	190.9	1.040	0.4	44.0
11:04	190.9	1.040	0.5	44.7
11:05	191.0	1.040	0.3	43.5
11:06	191.0	1.040	0.3	43.8
11:07	191.0	1.039	0.3	44.9
11:08	191.0	1.040	0.3	43.8
11:09	191.0	1.040	0.4	43.5
11:10	191.0	1.039	0.4	45.0
11:11	191.0	1.039	0.4	44.6
11:12	191.0	1.039	0.4	45.4
11:13	191.0	1.040	0.4	45.7
11:14	191.0	1.040	0.3	44.5
11:15	191.0	1.039	0.3	45.7
11:16	191.0	1.039	0.3	45.6
11:17	191.0	1.039	0.3	44.4
11:18	190.9	1.040	0.4	43.2
11:19	190.9	1.039	0.4	44.4
11:20	190.9	1.040	0.5	43.0
11:21	190.9	1.040	0.4	43.1
11:22	190.9	1.039	0.5	43.1
11:23	191.0	1.040	0.4	43.3
11:25	191.1	1.039	0.4	43.1
11:26	191.1	1.039	0.4	45.0
11:27	191.0	1.039	0.3	45.4
11:28	191.0	1.039	0.4	45.2
11:29	191.0	1.039	0.4	44.6
11:30	191.0	1.039	0.5	44.8
11:31	191.0	1.040	0.7	43.0
11:32	191.0	1.039	0.5	43.5
11:33	190.9	1.039	0.5	43.9
11:34	190.9	1.039	0.4	43.8
11:35	190.9	1.039	0.4	44.5
11:36	190.9	1.039	0.4	44.7
11:37	190.9	1.038	0.4	44.8
11:38	190.9	1.040	0.3	44.5
11:39	191.0	1.039	0.4	44.5
11:40	191.0	1.039	0.4	45.6
11:41	191.0	1.039	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
11:57	190.9	1.039	0.3	43.3
11:58	190.9	1.039	0.3	43.6
11:59	190.9	1.039	0.4	43.8
12:00	190.9	1.040	0.4	43.5
12:01	190.9	1.039	0.4	43.4
12:02	191.0	1.039	0.4	42.8
12:03	191.0	1.040	0.5	42.8
12:04	191.0	1.040	0.5	43.1
12:05	191.1	1.039	0.5	44.3
12:06	191.1	1.040	0.4	42.2
12:07	191.1	1.040	0.3	41.7
12:09	191.0	1.040	0.3	43.0
12:10	190.9	1.039	0.4	44.6
12:11	190.9	1.039	0.4	44.5
12:12	191.0	1.039	0.3	44.6
12:13	191.1	1.039	0.3	43.5
12:14	191.1	1.040	0.4	43.4
12:15	191.1	1.039	0.3	43.5
12:16	191.0	1.040	0.3	44.2
12:17	191.0	1.039	0.4	43.4
12:18	191.0	1.040	0.3	43.3
12:19	191.0	1.039	0.3	45.1
12:20	190.9	1.039	0.4	44.5
12:21	190.9	1.039	0.4	44.0
12:22	190.8	1.039	0.5	44.1
12:23	190.9	1.039	0.4	43.0
12:24	191.0	1.040	0.4	42.5
12:25	191.1	1.039	0.4	43.6
12:26	191.1	1.039	0.3	45.6
12:27	191.1	1.039	0.4	44.8
12:28	191.0	1.039	0.3	44.6
12:29	191.0	1.039	0.3	44.0
12:31	191.0	1.039	0.3	45.0
12:32	191.0	1.038	0.3	44.7
12:33	191.0	1.038	0.3	46.1
12:34	191.0	1.038	0.4	45.3
12:35	191.0	1.039	0.3	44.7
12:36	191.0	1.038	0.4	45.8
12:37	191.0	1.038	0.4	45.3
12:38	191.0	1.039	0.6	44.8
12:39	190.9	1.038	0.5	44.0
12:40	190.9	1.039	0.5	44.1
12:41	190.9	1.039	0.5	43.1
12:42	190.9	1.039	0.5	44.7
12:43	191.0	1.039	0.5	43.6
12:44	191.1	1.039	0.5	44.3
12:45	191.0	1.038	0.4	45.1
12:46	191.0	1.038	0.3	45.1
12:47	191.0	1.038	0.4	45.9
12:48	191.0	1.039	0.3	44.5
12:49	191.1	1.038	0.4	44.9
12:50	191.0	1.039	0.4	44.5
12:51	191.0	1.038	0.4	46.0
12:53	191.0	1.038	0.3	45.4
12:54	191.0	1.038	0.4	44.7
12:55	191.0	1.038	0.4	45.8
12:56	190.9	1.038	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Appendix C

Alliance Technical Group, LLC
Analytical Services
214 Central Circle
Decatur, AL 35603
(256) 274-4488
www.alliancetg.com

Analytical Laboratory Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, Texas 75572

Project No. AST-2024-4204LS

Version No. LT 2022-00_24.4

Certification Statement

Alliance Technical Group, LLC (ATG) has completed the analysis as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and ATG is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Any deviations or problems are detailed in the relevant sections on the test report.

This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Validation Signature

The analytical data and all QC contained within this report was reviewed and validated by the following individual.

Rebecca Pope

Digitally signed by Rebecca Pope
Reason: I have reviewed this document
Location:
Date: 2025.03.06 12:42:30-06'00'
Foxit PDF Editor Version: 12.1.4

Rebecca Pope
Laboratory Quality Analyst

Date

Project Narrative

Analytical Method(s):	*Method 5 - Determination of Particulate Matter Emissions From Stationary Sources* *Method 202 - Dry Impinger Method for Determining Condensable Particulate Matter Emissions From Stationary Sources*
Filterable	The filter(s) were oven dried and desiccated per the method until a final weight was obtained. The liquid fractions were extracted if required, evaporated and cooled until a final weight was obtained. These fractions were summed together to provide the total Filterable Particulate Matter collected.
Condensable	The filter(s) were cut up and extracted per the method. The organic extract was added to the organic rinse, and the inorganic extract was added to the inorganic rinse. The inorganic fraction was extracted with solvent per the method. Extracts were combined with the organic rinse. The organic and inorganic fractions were evaporated and desiccated until a final weight was obtained.
MDL	The Minimum Detection Level (MDL) is 0.5 mg per fraction. If the measured result for a fraction is less than the MDL, the MDL was used in ensuing calculations.
Blank Correction	If blank correction is performed, only blank values returned higher than the MDL are used. If a blank returns a value less than the MDL, no correction is included. Method 202 Recovery Blank corrections are applied by fraction (inorganic subtracted from inorganic; organic subtracted from organic).
Custody:	The samples were received by Madilyn Golembeck on 02/24/25 in Decatur, AL. The samples were received in good condition with proper Chain-of-Custody documentation. No apparent container problems were noted upon receipt. Prior to analysis, the samples were kept secure with access limited to authorized personnel of ATG.
Number of Samples:	129
Labeling:	Acceptable
Analyst:	Evan Marth-Laboratory Analyst
Equipment:	Ohaus Balance PX224, S/N B919636400. This scale was used for analytical determinations. A&D Weighing AND EJ-1500, S/N 5A2845843. This scale was only used to measure the total mass of rinse collected. Analysis was performed on the same balance as the associated tare. Quincy Lab Inc oven, 40CG, SN G4-007640. Desiccator Number: 2 contained M5 rinse petri dishes.. Desiccator Number: 3 contained M5 filters. Desiccator Number: 4 contained organic rinse tins & inorganic rinse petri dishes. Desiccator Number: 5 contained M5 rinse petri dishes & organic rinse tins.
Lab Reagents:	Acetone Lot Number: 240513 Hexane Lot Number: 240648
QC Notes:	The samples met the minimum criteria established by the relevant method.
Reporting Notes:	The M5 samples were collected in the field using DI water in place of acetone for the rinse. The M202 DI water, hexane, and acetone reagent blanks were HELD. No. 1 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 2 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-E M5 rinse run 3 contains visibly more and darker PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-W M5 rinse run 1 contains visibly more PM than runs 2 and 3. No. 2 Smelt Tank Scrubber M5 rinse run 1 contains visbly more PM than runs 2 and 3.
Certifications:	Primary Accreditation: Louisiana Environmental Laboratory Accreditation Program (LELAP) Agency Interest (AI) No. 194891 Certificate: 05054, Expiration Date: 6/30/25 Secondary Accreditation: Texas Commission on Environmental Quality Certificate: T104704540-TX-C25-00047, Expiration Date: 2/28/26 Virginia Environmental Laboratory Accreditation Program (VELAP) VA Laboratory ID: 460299, Certificate: 13081 Expiration Date: 9/14/2025
State Registrations:	PADEP # 68-04598 NYDOH # 12146

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2294		2295		2296	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Filter ID	26987-A		26988-A		26696-A	
Filter Tare Weight, g	0.4609		0.4591		0.4504	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:00		8:01		8:02	
Filter Weight, g	0.4817		0.4711		0.4723	
Filter PM Mass, mg*	**20.8**		**12.0**		**21.9**	
Front Half Rinse						
Lab ID	2318		2319		2320	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5853		G5854		G5855	
Beaker tare, g	44.4445		46.9315		47.1823	
Field Vessel with DI Water, g	197.0		233.2		170.1	
Empty Field Vessel,g	28.6		28.2		27.4	
DI Water Mass, g	168.4		205.0		142.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:01	8:00	15:02	8:01	15:03	8:02
Weight, g	44.4531	44.4526	46.9378	46.9374	47.1868	47.1864
Rinse PM Mass, mg*	**8.4**		**6.1**		**4.3**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**29.2**		**18.1**		**26.2**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2297		2298		2299	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Filter ID	26697-A		26698-A		26699-A	
Filter Tare Weight, g	0.4586		0.4665		0.4639	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:03		8:04		8:05	
Filter Weight, g	0.4596		0.4688		0.4647	
Filter PM Mass, mg*	**1.0**		**2.3**		**0.8**	
Front Half Rinse						
Lab ID	2321		2322		2323	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5856		G5857		G5858	
Beaker tare, g	40.4982		42.8656		46.6289	
Field Vessel with DI Water, g	192.0		211.2		204.2	
Empty Field Vessel,g	28.1		28.1		28.5	
DI Water Mass, g	163.9		183.1		175.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:04	8:03	15:05	8:04	15:06	8:05
Weight, g	40.5008	40.5003	42.8667	42.8663	46.6309	46.6307
Rinse PM Mass, mg*	**2.4**		**0.9**		**1.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**3.4**		**3.2**		**2.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2300		2301		2302	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Filter ID	26974-A		26989-A		26700-A	
Filter Tare Weight, g	0.4583		0.4533		0.4701	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:06		8:07		8:08	
Filter Weight, g	0.6305		0.5645		0.5783	
Filter PM Mass, mg*	**172.2**		**111.2**		**108.2**	
Front Half Rinse						
Lab ID	2324		2325		2326	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5859		G5860		G5861	
Beaker tare, g	42.6719		40.4452		41.3230	
Field Vessel with DI Water, g	158.0		204.4		141.5	
Empty Field Vessel,g	29.1		28.5		29.0	
DI Water Mass, g	128.9		175.9		112.5	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:07	8:06	15:08	8:07	15:09	8:08
Weight, g	42.7452	42.7450	40.4567	40.4563	41.3338	41.3337
Rinse PM Mass, mg*	**73.2**		**11.3**		**10.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**245.4**		**122.5**		**118.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2303		2304		2305	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Filter ID	26704-A		26707-A		26708-A	
Filter Tare Weight, g	0.4591		0.4513		0.4611	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:09		8:10		8:11	
Filter Weight, g	0.4943		0.4947		0.5073	
Filter PM Mass, mg*	**35.2**		**43.4**		**46.2**	
Front Half Rinse						
Lab ID	2327		2328		2329	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5862		G5863		G5864	
Beaker tare, g	46.6607		33.1419		43.5493	
Field Vessel with DI Water, g	152.5		109.7		148.9	
Empty Field Vessel,g	27.3		27.8		27.0	
DI Water Mass, g	125.2		81.9		121.9	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:10	8:09	15:11	8:10	15:12	8:11
Weight, g	46.6834	46.6832	33.1496	33.1493	43.6557	43.6553
Rinse PM Mass, mg*	**22.6**		**7.6**		**106.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**57.8**		**51.0**		**152.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2306		2307		2308	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Filter ID	26705-A		26706-A		26709-A	
Filter Tare Weight, g	0.4641		0.4546		0.4555	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:12		8:13		8:14	
Filter Weight, g	0.5186		0.4899		0.4912	
Filter PM Mass, mg*	**54.5**		**35.3**		**35.7**	
Front Half Rinse						
Lab ID	2330		2331		2332	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5865		G5866		G5867	
Beaker tare, g	41.4498		46.8473		41.7306	
Field Vessel with DI Water, g	161.9		174.0		175.3	
Empty Field Vessel,g	26.9		28.3		27.2	
DI Water Mass, g	135.0		145.7		148.1	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:13	8:12	15:14	8:13	15:15	8:14
Weight, g	41.5004	41.5005	46.8552	46.8551	41.7462	41.7463
Rinse PM Mass, mg*	**50.6**		**7.9**		**15.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**105.1**		**43.2**		**51.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2309		2310		2311	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Filter ID	26702-A		26703-A		26971-A	
Filter Tare Weight, g	0.4583		0.4611		0.4626	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:15		8:16		8:17	
Filter Weight, g	0.5226		0.5186		0.5168	
Filter PM Mass, mg*	**64.3**		**57.5**		**54.2**	
Front Half Rinse						
Lab ID	2333		2334		2335	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5868		G5869		G5870	
Beaker tare, g	46.0004		38.3894		47.8755	
Field Vessel with DI Water, g	122.8		104.6		118.2	
Empty Field Vessel,g	29.4		27.7		27.9	
DI Water Mass, g	93.4		76.9		90.3	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:16	8:15	15:17	8:16	15:18	8:17
Weight, g	46.0441	46.0444	38.4051	38.4055	47.8925	47.8923
Rinse PM Mass, mg*	**43.9**		**15.9**		**16.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**108.2**		**73.4**		**71.1**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2312		2313		2314	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Filter ID	26962-A		26961-A		26970-A	
Filter Tare Weight, g	0.4713		0.4648		0.4520	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:18		8:19		8:20	
Filter Weight, g	0.5219		0.5158		0.4907	
Filter PM Mass, mg*	**50.6**		**51.0**		**38.7**	
Front Half Rinse						
Lab ID	2336		2337		2338	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5871		G5872		G5873	
Beaker tare, g	43.1226		42.5851		44.9883	
Field Vessel with DI Water, g	108.9		92.3		98.7	
Empty Field Vessel,g	28.2		27.2		28.1	
DI Water Mass, g	80.7		65.1		70.6	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:19	8:18	15:20	8:19	15:21	8:20
Weight, g	43.1258	43.1255	42.5898	42.5894	44.9947	44.9943
Rinse PM Mass, mg*	**3.1**		**4.5**		**6.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**53.7**		**55.5**		**44.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2315		2316		2317	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Filter ID	26973-A		26960-A		26972-A	
Filter Tare Weight, g	0.4544		0.4476		0.4644	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:21		8:22		8:23	
Filter Weight, g	0.4880		0.4856		0.4698	
Filter PM Mass, mg*	**33.6**		**38.0**		**5.4**	
Front Half Rinse						
Lab ID	2339		2340		2341	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5874		G5875		G5876	
Beaker tare, g	45.9829		40.9130		47.1276	
Field Vessel with DI Water, g	123.5		102.2		179.3	
Empty Field Vessel,g	29.2		28.2		27.9	
DI Water Mass, g	94.3		74.0		151.4	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:22	8:21	15:23	8:22	15:24	8:23
Weight, g	46.0011	46.0008	40.9396	40.9391	47.1458	47.1453
Rinse PM Mass, mg*	**18.1**		**26.4**		**17.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**51.7**		**64.4**		**23.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Blank Rinse		
Lab ID	2342	
Field ID	DI Water Blank	
Beaker ID	G5877	
Beaker tare, g	45.4094	
Field Vessel with DI Water, g	386.7	
Empty Field Vessel, g	178.6	
DI Water Mass, g	208.1	
Date - Desiccator	2/25/25	
Time - Desiccator	15:00	
Date of Weighing	2/26/25	2/27/25
Time of Weighing	15:25	8:24
Weight, g	45.4097	45.4097
Measured Blank Mass, mg	**0.3**	
Blank Mass, mg*	**0.3**	
Blank Mass, mg/g	**0.0014**	

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2343		2344		2345	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Organic Fraction						
Lab ID	2367		2368		2369	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	2367		2368		2369	
Beaker tare, g	4.1481		4.1697		4.1752	
Field Vessel w/ Solvent, g	301.0		277.6		261.7	
Empty Field Vessel, g	176.9		176.8		176.8	
Solvent Mass, g	124.1		100.8		84.9	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	4.1533	4.1537	4.1728	4.1731	4.1780	4.1784
Organic Condensable Mass, mg*	**5.4**		**3.3**		**3.0**	
Inorganic Fraction						
Lab ID	2391		2392		2393	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5878		G5879		G5880	
Beaker tare, g	42.8783		39.7638		46.7558	
Field Vessel w/ Water, g	677.1		575.1		654.6	
Empty Field Vessel, g	286.2		286.6		285.8	
Water Mass, g	390.9		288.5		368.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	42.8857	42.8855	39.7660	39.7657	46.7596	46.7592
Inorganic Condensable Mass, mg*	**7.3**		**2.0**		**3.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.7**		**3.3**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2346		2347		2348	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Organic Fraction						
Lab ID	2370		2371		2372	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	2370		2371		2372	
Beaker tare, g	4.1708		4.1859		4.1780	
Field Vessel w/ Solvent, g	292.3		272.5		278.4	
Empty Field Vessel, g	177.5		176.3		176.9	
Solvent Mass, g	114.8		96.2		101.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	4.1753	4.1755	4.1892	4.1891	4.1811	4.1810
Organic Condensable Mass, mg*	**4.6**		**3.2**		**3.1**	
Inorganic Fraction						
Lab ID	2394		2395		2396	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5881		G5882		G5883	
Beaker tare, g	41.1547		42.8616		31.5071	
Field Vessel w/ Water, g	640.1		606.9		636.0	
Empty Field Vessel, g	286.2		286.4		286.1	
Water Mass, g	353.9		320.5		349.9	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	41.1568	41.1563	42.8653	42.8657	31.5107	31.5106
Inorganic Condensable Mass, mg*	**1.8**		**3.9**		**3.5**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.4**		**5.1**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2349		2350		2351	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Organic Fraction						
Lab ID	2373		2374		2375	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	2373		2374		2375	
Beaker tare, g	4.2438		4.2125		4.2150	
Field Vessel w/ Solvent, g	298.4		291.4		220.1	
Empty Field Vessel, g	176.7		176.5		177.7	
Solvent Mass, g	121.7		114.9		42.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	4.2482	4.2485	4.2162	4.2165	4.2184	4.2187
Organic Condensable Mass, mg*	**4.6**		**3.8**		**3.6**	
Inorganic Fraction						
Lab ID	2397		2398		2399	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5884		G5885		G5886	
Beaker tare, g	50.4549		33.9860		42.7755	
Field Vessel w/ Water, g	1135.0		994.8		957.7	
Empty Field Vessel, g	441.2		441.6		439.7	
Water Mass, g	693.8		553.2		518.0	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	50.4661	50.4662	33.9919	33.9922	42.7833	42.7833
Inorganic Condensable Mass, mg*	**11.2**		**6.1**		**7.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**13.8**		**7.9**		**9.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2352		2353		2354	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Organic Fraction						
Lab ID	2376		2377		2378	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	2376		2377		2378	
Beaker tare, g	4.2256		4.2210		4.2251	
Field Vessel w/ Solvent, g	268.5		269.3		261.8	
Empty Field Vessel, g	178.0		178.3		177.5	
Solvent Mass, g	90.5		91.0		84.3	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	4.2289	4.2289	4.2243	4.2245	4.2278	4.2281
Organic Condensable Mass, mg*	**3.3**		**3.4**		**2.8**	
Inorganic Fraction						
Lab ID	2400		2401		2402	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5887		G5888		G5889	
Beaker tare, g	39.6069		45.8132		42.3755	
Field Vessel w/ Water, g	555.9		607.3		602.0	
Empty Field Vessel, g	286.0		286.2		286.3	
Water Mass, g	269.9		321.1		315.7	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	39.6085	39.6086	45.8175	45.8179	42.3783	42.3785
Inorganic Condensable Mass, mg*	**1.6**		**4.5**		**2.9**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**2.9**		**5.9**		**3.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2355		2356		2357	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Organic Fraction						
Lab ID	2379		2380		2381	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	2379		2380		2381	
Beaker tare, g	4.2316		4.2100		4.2438	
Field Vessel w/ Solvent, g	257.7		272.3		295.6	
Empty Field Vessel, g	177.0		177.7		177.2	
Solvent Mass, g	80.7		94.6		118.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	4.2352	4.2352	4.2142	4.2140	4.2464	4.2465
Organic Condensable Mass, mg*	**3.6**		**4.1**		**2.7**	
Inorganic Fraction						
Lab ID	2403		2404		2405	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5890		G5891		G5892	
Beaker tare, g	46.8411		33.4643		41.8922	
Field Vessel w/ Water, g	582.1		593.0		634.4	
Empty Field Vessel, g	286.0		285.9		285.9	
Water Mass, g	296.1		307.1		348.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	46.8433	46.8437	33.4670	33.4670	41.8960	41.8961
Inorganic Condensable Mass, mg*	**2.4**		**2.7**		**3.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.0**		**4.8**		**4.5**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2358		2359		2360	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Organic Fraction						
Lab ID	2382		2383		2384	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	2382		2383		2384	
Beaker tare, g	4.2097		4.2193		4.2603	
Field Vessel w/ Solvent, g	256.4		268.9		265.7	
Empty Field Vessel, g	178.7		177.1		177.3	
Solvent Mass, g	77.7		91.8		88.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	4.2135	4.2132	4.2261	4.2260	4.2634	4.2634
Organic Condensable Mass, mg*	**3.7**		**6.8**		**3.1**	
Inorganic Fraction						
Lab ID	2406		2407		2408	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5893		G5894		G5895	
Beaker tare, g	38.9202		45.5879		41.7805	
Field Vessel w/ Water, g	945.0		956.2		863.2	
Empty Field Vessel, g	440.0		441.8		441.4	
Water Mass, g	505.0		514.4		421.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	38.9267	38.9264	45.5993	45.5994	41.7863	41.7861
Inorganic Condensable Mass, mg*	**6.3**		**11.5**		**5.7**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**8.0**		**16.2**		**6.8**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2361		2362		2363	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Organic Fraction						
Lab ID	2385		2386		2387	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	2385		2386		2387	
Beaker tare, g	4.1945		4.2061		4.2093	
Field Vessel w/ Solvent, g	433.2		399.7		423.8	
Empty Field Vessel, g	285.6		285.0		285.6	
Solvent Mass, g	147.6		114.7		138.2	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	4.1982	4.1982	4.2092	4.2092	4.2125	4.2127
Organic Condensable Mass, mg*	**3.7**		**3.1**		**3.3**	
Inorganic Fraction						
Lab ID	2409		2410		2411	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5896		G5897		G5898	
Beaker tare, g	39.9904		38.9263		47.8517	
Field Vessel w/ Water, g	569.3		575.6		607.9	
Empty Field Vessel, g	285.7		286.1		285.3	
Water Mass, g	283.6		289.5		322.6	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	39.9933	39.9933	38.9268	38.9272	47.8564	47.8563
Inorganic Condensable Mass, mg*	**2.9**		**0.7**		**4.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.6**		**1.8**		**5.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2364		2365		2366	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Organic Fraction						
Lab ID	2388		2389		2390	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	2388		2389		2390	
Beaker tare, g	4.2001		4.2214		4.1849	
Field Vessel w/ Solvent, g	434.2		412.2		432.4	
Empty Field Vessel, g	285.1		284.9		284.9	
Solvent Mass, g	149.1		127.3		147.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	4.2073	4.2077	4.2241	4.2241	4.1891	4.1891
Organic Condensable Mass, mg*	**7.4**		**2.7**		**4.2**	
Inorganic Fraction						
Lab ID	2412		2413		2414	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5899		G5900		G5901	
Beaker tare, g	37.9457		41.3364		44.6145	
Field Vessel w/ Water, g	678.5		673.6		638.3	
Empty Field Vessel, g	285.8		285.7		285.8	
Water Mass, g	392.7		387.9		352.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	37.9508	37.9505	41.3381	41.3380	44.6181	44.6177
Inorganic Condensable Mass, mg*	**4.9**		**1.6**		**3.4**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.4**		**2.3**		**5.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2415		N/A	
Field ID	Field Train Blank		N/A	
Organic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2416		2418	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	2416		2418	
Beaker tare, g	4.2179		4.2326	
Field Vessel w/ Solvent, g	351.6		350.2	
Empty Field Vessel, g	177.2		176.5	
Solvent Mass, g	174.4		173.7	
Date - Desiccator	2/26/25		2/26/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	4.2204	4.2207	4.2328	4.2331
Measured Organic Mass, mg	**2.6**		**0.4**	
Organic Mass, mg*	**2.0**		**0.5**	
Inorganic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2417		2419	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	G5902		G5903	
Beaker tare, g	48.0627		39.1195	
Field Vessel w/ Water, g	321.9		329.5	
Empty Field Vessel, g	177.1		177.2	
Water Mass, g	144.8		152.3	
Date - Desiccator	3/3/25		3/3/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	48.0640	48.0641	39.1200	39.1195
Measured Inorganic Mass, mg	**1.4**		**0.2**	
Inorganic Mass, mg*	**1.4**		**0.5**	

The total results have been calculated based on MDL values for any sample fractions which were below the MDL.

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL
City, State: QUEEN CITY, TX
Source: RB01A-N, RB01B-S, SM01
Project No: AST-2024-4204

Turn Around Time: [✓] Standard [ ] Expedited ____ days
Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079
Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5 — Filter Number - 83mm Quartz	Method 5 — Filter Number - 83mm Teflon	Method 5 — Probe Nozzle Rinse - DIUF	Method 5 — Probe Nozzle Rinse - 1-bromopropane	Method 17 — Filter Number - 47mm Quartz	Method 17 — Nozzle Rinse - Acetone	Method 201A — PM 2.5 Filter Number- 47mm Quartz	Method 201A — PM 2.5 Rinse - Acetone	Method 201A — PM 10 Filter Number- 47mm Quartz	Method 201A — PM 10 Rinse - Acetone	Method 202 — CPM Filter - 83mm Tefon	Method 202 — Condensate Catch - DIUF	Method 202 — Solvent Rinse - DIUF/Hexane
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 1	5	2/11/25	11:30	RW		26987-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 2	5	2/11/25	13:55	RW		26988-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 3	5	2/11/25	17:30	RW		26696-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 1	5	2/11/25	11:40	RW		26697-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 2	5	2/11/25	13:40	RW		26698-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 3	5	2/11/25	17:10	RW		26699-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 1	5	2/11/25	11:20	RW		26974-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 2	5	2/11/25	13:45	RW		26989-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 3	5	2/11/25	17:00	RW		26700-A		✓								✓	✓	✓
M5 ~~ACETONE~~ BLANK DIUF	1	2/11/25	11:00	RW				✓										
M202 FT PROOF BLANK	2	2/11/25	11:15	RW													✓	✓
M202 FT RECOVERY BLANK	3	2/11/25	14:30	RW												✓	✓	✓
M202 ACETONE BLANK	1	2/11/25	11:00	RW														
M202 WATER BLANK	1	2/11/25	11:00	RW														
M202 HEXANE BLANK	1	2/11/25	11:00	RW														

Relinquished By _____ Date 2-14-25 Received By Madilyn Galenbeck Date 2/28/25

Relinquished By _____ Date _____ Received By _____ Date _____

Relinquished By _____ Date _____ Received By _____ Date _____

Sample Container Recieved Temperature (°F) 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL

City, State: QUEEN CITY, TX

Source: RB02A-E, RB02B-W, SM02), LK01, LK02

Project No.: AST-2024-4204

Turn Around Time: [✔] Standard [ ] Expedited ____ days

Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079

Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5: Filter Number - 83mm Quartz	Method 5: Filter Number - 83mm Teflon	Method 5: Probe Nozzle Rinse - DIUF	Method 5: Probe Nozzle Rinse - 1-bromopropane	Method 17: Filter Number - 47mm Quartz	Method 17: Nozzle Rinse - Acetone	Method 201A: PM 2.5 Filter Number - 47mm Quartz	Method 201A: PM 2.5 Rinse - Acetone	Method 201A: PM 10 Filter Number - 47mm Quartz	Method 201A: PM 10 Rinse - Acetone	Method 202: CPM Filter - 83mm Teflon	Method 202: Condensate Catch - DIUF	Method 202: Solvent Rinse - DIUF/Hexane
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 1	5	2/12/25	12:45	RW		26704-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 2	5	2/12/25	15:00	RW		26707-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 3	5	2/12/25	17:00	RW		26708-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 1	5	2/12/25	12:45	RW		26705-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 2	5	2/12/25	15:00	RW		26706-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 3	5	2/12/25	17:00	RW		26709-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 1	5	2/12/25	12:45	RW		26702-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 2	5	2/12/25	15:00	RW		26703-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 3	5	2/12/25	17:00	RW		26971-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 1	5	2/13/25	15:50	RW		26962-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 2	5	2/13/25	17:30	RW		26961-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 3	5	2/13/25	19:00	RW		26970-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 1	5	2/13/25	10:35	RW		26973-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 2	5	2/13/25	12:15	RW		26960-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 3	5	2/13/25	13:45	RW		26972-A		✔								✔	✔	✔

Relinquished By: [signature] Date: 2-14-25 Received By: madelyn Galenkeed Date: 2/24/25

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Sample Container Recieved Temperature (°F): 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-001

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	Ohaus	PA214	B919636400	Balance Room	210 g	0.0001g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000
5	0.0001	5.0000	0.0000	5	0.0001	5.0000	0.0000
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0.2	0.0001	0.2000	0.0000	0.2	0.0001	0.2000	0.0000
1	0.0001	1.0000	0.0000	1	0.0001	1.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
50	0.0003	49.9998	-0.0002	50	0.0003	49.9998	-0.0002
150	0.0003	149.9998	-0.0002	150	0.0003	149.9998	-0.0002

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	YES	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED		*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.00011g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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P.O. Box 266 Decatur, Al. Phone 1-800-461-4153

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-003

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	A&D	EJ-1500	5A2845843	LAB	1500 g	0.1g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0	0.0	0.0	0	0.0	0.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
0	0.0	0.0	0.0	0	0.0	0.0	0.0

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
100	0.1	100.0	0.0	100	0.1	100.0	0.0
200	0.1	200.0	0.0	200	0.1	200.0	0.0
500	0.1	500.0	0.0	500	0.1	500.0	0.0
1000	0.1	1000.0	0.0	1000	0.1	1000.0	0.0

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB-44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	**YES**	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED			*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.11g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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P.O. Box 266 Decatur, Al. Phone 1-800-461-4153

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26680-A	0.4978	11/14/24	MEG	S/N G4-007640	105° C	379990
26681-A	0.4918	11/14/24	MEG	S/N G4-007640	105° C	379990
26682-A	0.4955	11/14/24	MEG	S/N G4-007640	105° C	379990
26683-A	0.4954	11/14/24	MEG	S/N G4-007640	105° C	379990
26684-A	0.4894	11/14/24	MEG	S/N G4-007640	105° C	379990
26685-A	0.4901	11/14/24	MEG	S/N G4-007640	105° C	379990
26686-A	0.4930	11/14/24	MEG	S/N G4-007640	105° C	379990
26687-A	0.4940	11/14/24	MEG	S/N G4-007640	105° C	379990
26688-A	0.4948	11/14/24	MEG	S/N G4-007640	105° C	379990
26689-A	0.4879	11/14/24	MEG	S/N G4-007640	105° C	379990
26690-A	0.4676	11/27/24	MEG	S/N G4-007640	105° C	379990
26691-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26692-A	0.4628	11/27/24	MEG	S/N G4-007640	105° C	379990
26693-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26694-A	0.4669	11/27/24	MEG	S/N G4-007640	105° C	379990
26695-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26696-A	0.4504	11/27/24	MEG	S/N G4-007640	105° C	379990
26697-A	0.4586	11/27/24	MEG	S/N G4-007640	105° C	379990
26698-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26699-A	0.4639	11/27/24	MEG	S/N G4-007640	105° C	379990
26700-A	0.4701	11/27/24	MEG	S/N G4-007640	105° C	379990
26701-A	0.4645	11/27/24	MEG	S/N G4-007640	105° C	379990
26702-A	0.4583	11/27/24	MEG	S/N G4-007640	105° C	379990
26703-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26704-A	0.4591	11/27/24	MEG	S/N G4-007640	105° C	379990
26705-A	0.4641	11/27/24	MEG	S/N G4-007640	105° C	379990
26706-A	0.4546	11/27/24	MEG	S/N G4-007640	105° C	379990
26707-A	0.4513	11/27/24	MEG	S/N G4-007640	105° C	379990
26708-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26709-A	0.4555	11/27/24	MEG	S/N G4-007640	105° C	379990
26710-A	0.4571	11/27/24	MEG	S/N G4-007640	105° C	379990
26711-A	0.4452	11/27/24	MEG	S/N G4-007640	105° C	379990
26712-A	0.4487	11/27/24	MEG	S/N G4-007640	105° C	379990
26713-A	0.4460	11/27/24	MEG	S/N G4-007640	105° C	379990
26714-A	0.4481	11/27/24	MEG	S/N G4-007640	105° C	379990
26715-A	0.4502	11/27/24	MEG	S/N G4-007640	105° C	379990
26716-A	0.4512	11/27/24	MEG	S/N G4-007640	105° C	379990
26717-A	0.4510	11/27/24	MEG	S/N G4-007640	105° C	379990
26718-A	0.4406	11/27/24	MEG	S/N G4-007640	105° C	379990
26719-A	0.4459	11/27/24	MEG	S/N G4-007640	105° C	379990

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26960-A	0.4476	12/09/24	MEG	S/N G4-007640	105° C	379990
26961-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26962-A	0.4713	12/09/24	MEG	S/N G4-007640	105° C	379990
26963-A	0.4658	12/09/24	MEG	S/N G4-007640	105° C	379990
26964-A	0.4577	12/09/24	MEG	S/N G4-007640	105° C	379990
26965-A	0.4503	12/09/24	MEG	S/N G4-007640	105° C	379990
26966-A	0.4683	12/09/24	MEG	S/N G4-007640	105° C	379990
26967-A	0.4473	12/09/24	MEG	S/N G4-007640	105° C	379990
26968-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26969-A	0.4585	12/09/24	MEG	S/N G4-007640	105° C	379990
26970-A	0.4520	12/10/24	MEG	S/N G4-007640	105° C	379990
26971-A	0.4626	12/10/24	MEG	S/N G4-007640	105° C	379990
26972-A	0.4644	12/10/24	MEG	S/N G4-007640	105° C	379990
26973-A	0.4544	12/10/24	MEG	S/N G4-007640	105° C	379990
26974-A	0.4583	12/10/24	MEG	S/N G4-007640	105° C	379990
26975-A	0.4575	12/10/24	MEG	S/N G4-007640	105° C	379990
26976-A	0.4632	12/10/24	MEG	S/N G4-007640	105° C	379990
26977-A	0.4587	12/10/24	MEG	S/N G4-007640	105° C	379990
26978-A	0.4639	12/10/24	MEG	S/N G4-007640	105° C	379990
26979-A	0.4622	12/10/24	MEG	S/N G4-007640	105° C	379990
26980-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26981-A	0.4647	12/10/24	MEG	S/N G4-007640	105° C	379990
26982-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26983-A	0.4535	12/10/24	MEG	S/N G4-007640	105° C	379990
26984-A	0.4513	12/10/24	MEG	S/N G4-007640	105° C	379990
26985-A	0.4568	12/10/24	MEG	S/N G4-007640	105° C	379990
26986-A	0.4582	12/10/24	MEG	S/N G4-007640	105° C	379990
26987-A	0.4609	12/10/24	MEG	S/N G4-007640	105° C	379990
26988-A	0.4591	12/10/24	MEG	S/N G4-007640	105° C	379990
26989-A	0.4533	12/10/24	MEG	S/N G4-007640	105° C	379990
26990-A	0.4506	12/10/24	MEG	S/N G4-007640	105° C	379990
26991-A	0.4612	12/10/24	MEG	S/N G4-007640	105° C	379990
26992-A	0.4482	12/10/24	MEG	S/N G4-007640	105° C	379990
26993-A	0.4480	12/10/24	MEG	S/N G4-007640	105° C	379990
26994-A	0.4560	12/10/24	MEG	S/N G4-007640	105° C	379990
26995-A	0.4564	12/10/24	MEG	S/N G4-007640	105° C	379990
26996-A	0.4534	12/10/24	MEG	S/N G4-007640	105° C	379990
26997-A	0.4525	12/10/24	MEG	S/N G4-007640	105° C	379990
26998-A	0.4501	12/10/24	MEG	S/N G4-007640	105° C	379990
26999-A	0.4491	12/10/24	MEG	S/N G4-007640	105° C	379990

This is the last page of the report.

Appendix D

LK01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-247-1	0.247	0.248	0.247	0.247	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-203-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	P-205-3	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
14:45	70.0	16:30	68.0	18:00	73.0
15:00	70.0	16:45	68.0	18:15	73.0
15:15	70.0	17:00	69.0	18:30	74.0
15:30	70.0	17:15	69.0	18:45	74.0
15:45	71.0	17:30	69.0	19:00	75.0

LK02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-7	0.416	0.416	0.416	0.416	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-206-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	PR-208-3	150.0	150.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
9:40	70.0	11:20	73.0	12:40	73.0
9:55	70.0	11:35	73.0	12:55	73.0
10:10	70.0	11:50	73.0	13:10	74.0
10:25	70.0	12:05	74.0	13:25	74.0
10:40	70.0	12:20	73.0	13:40	74.0

RB01A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS07	0.330	0.330	0.330	0.330	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-2	365.0	365.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	68.0
10:30	73.0	12:55	70.0	16:00	68.0
10:45	73.0	13:10	70.0	16:15	67.0
11:00	74.0	13:25	69.0	16:30	67.0
11:15	74.0	13:40	69.0	16:45	66.0

RB01B

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-36	0.362	0.362	0.362	0.362	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-309-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-0	355.0	355.0	0.0%	± 1.5 % (absolute)	10'

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	66.0	12:40	72.0	15:45	75.0
10:30	66.0	12:55	72.0	16:00	74.0
10:45	67.0	13:10	72.0	16:15	74.0
11:00	67.0	13:25	72.0	16:30	75.0
11:15	68.0	13:40	71.0	16:45	75.0

RB02A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-07	0.292	0.292	0.292	0.292	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-209-2	385.0	384.0	0.1%	± 1.5 % (absolute)	9'

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

RB02B

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-7	0.295	0.295	0.295	0.295	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-202-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-210-2	395.0	395.0	0.0%	± 1.5 % (absolute)	10 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

SM01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-382-2	0.382	0.381	0.382	0.382	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-205-2	160.0	161.0	0.2%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	71.0
10:30	73.0	12:55	69.0	16:00	72.0
10:45	73.0	13:10	68.0	16:15	72.0
11:00	74.0	13:25	68.0	16:30	72.0
11:15	74.0	13:40	69.0	16:45	73.0

SM02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-344-3	0.344	0.344	0.345	0.344	0.001	≤ 0.004 in.	SS
2/12/25	SS-305-2	0.305	0.306	0.305	0.305	0.001		SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-205-2	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
2/13/25	P-203-1	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
2/13/25	P-203-1	176.0	178.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
2/13/25	Weather Station	NA	NA	NA	

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Make	Servomex	Servomex
Model	4900	4900
S/N	653218	653218
Operating Range	25	25
Cylinder ID		
Zero	NA	NA
Low	NA	NA
Mid	EB0096121	EB0096121
High	CC737073	CC737073
Cylinder Certified Values		
Zero	NA	NA
Mid	10	10
High	19.93	19.8
Cylinder Expiration Date		
Zero	NA	NA
Mid	8/18/32	8/18/32
High	9/15/32	9/15/32
Type of Sample Line	Heated Sample Line	

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	9:05	12.85	3.41
2	9:07	13.33	3.29
3	9:09	13.22	3.16
Average		13.1	3.3
Criteria Met		Single Point	Single Point

Alliance TECHNICAL GROUP

Calibration Data

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Parameter	O_2 - Outlet	CO_2 - Outlet
Expected Average Concentration	10.00	10.00
Span Between		
Low	10.00	10.00
High	50.00	50.00
Desired Span	19.93	19.80
Low Range Gas		
Low	NA	NA
High	NA	NA
Mid Range Gas		
Low	7.97	7.92
High	11.96	11.88
High Range Gas		
Low	NA	NA
High	NA	NA
Actual Concentration (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.00	10.00
High	19.93	19.80
Response Time (seconds)	35.00	35.00
Upscale Calibration Gas (C_{MA})	Mid	Mid
Instrument Response (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.10	10.04
High	19.92	19.84
Performance (% of Span or Cal. Gas Conc.)		
Zero	0.00	0.00
Low	NA	NA
Mid	0.50	0.20
High	0.05	0.20
Status		
Zero	PASS	PASS
Low	NA	NA
Mid	PASS	PASS
High	PASS	PASS

Bias/Drift Determinations

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1		
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Run 2		
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Run 3		
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 2/13/25		
Span Value	19.93	19.80
Initial Instrument Zero Cal Response	0.00	0.00
Initial Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Bias (%)		
Pretest Zero	1.30	0.00
Posttest Zero	1.05	0.20
Pretest Span	0.00	-1.16
Posttest Span	0.00	-1.01
Drift (%)		
Zero	-0.25	0.20
Mid	0.00	0.15
Run 2 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Bias (%)		
Pretest Zero	1.05	0.20
Posttest Zero	1.05	0.10
Pretest Span	0.00	-1.01
Posttest Span	0.15	-1.01
Drift (%)		
Zero	0.00	-0.10
Mid	0.15	0.00
Run 3 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81
Bias (%)		
Pretest Zero	1.05	0.10
Posttest Zero	1.15	0.15
Pretest Span	0.15	-1.01
Posttest Span	0.10	-1.16
Drift (%)		
Zero	0.10	0.05
Mid	-0.05	-0.15

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Response Times, seconds		
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**
Zero	35	35
Low	NA	NA
Mid	35	35

Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Date(s)	2/5/2025
Ethylene Cylinder ID	CC768666
Concentration (ppmv)	103.0
Instrument Outlet	MKS 20 (Serial #111455302)

CTS 1	98.03
CTS 2	98.31
CTS 3	98.14
CTS 4	98.19
CTS 5	--
CTS 6	--

CTS 7	--
CTS 8	--
CTS 9	--
CTS 10	--
CTS 11	--
CTS 12	--

AVERAGE	98.17
MAX	98.31
deviation	0.14
MIN	98.03
deviation	0.14

Greatest Deviation from average
0.14%

Agreement with Assumed Pathlength
95.31%
within 5% no correction required

CTS 1

Date	Time	File	Temperature (C	Pressure	Ethylene
2/12/25	17:51:48	24-4204_000007.LAB	191.0	1.002	98.15
2/12/25	17:52:51	24-4204_000008.LAB	191.0	1.002	97.88
2/12/25	17:53:54	24-4204_000009.LAB	191.0	1.002	98.07

CTS 2

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	7:41:32	24-4204_000785.LAB	190.9	1.020	98.26
2/13/25	7:42:35	24-4204_000786.LAB	191.0	1.020	98.36
2/13/25	7:43:38	24-4204_000787.LAB	191.0	1.020	98.31

CTS 3

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	10:32:36	24-4204_000947.LAB	191.0	1.025	97.92
2/13/25	10:33:38	24-4204_000948.LAB	191.0	1.025	98.10
2/13/25	10:34:41	24-4204_000949.LAB	191.0	1.025	98.40

CTS 4

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	13:25:54	24-4204_001111.LAB	191.0	1.026	98.21
2/13/25	13:26:57	24-4204_001112.LAB	191.0	1.026	98.22
2/13/25	13:28:00	24-4204_001113.LAB	191.1	1.025	98.14

CTS 5

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 6

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 7

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 8

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 9

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 10

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 11

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 12

Date	Time	File	Temperature (C	Pressure	Ethylene

Location	Graphic Packaging
Source	NCG Incinerator
Project No.	AST-2024-4204
Date	2/5/2025

Spike Cylinder ID	CC774584	Component
Spike Gas concentration	96.8	Methanol
Tracer Cylinder ID	CC774584	Component
Tracer Gas concentration	10.1	SF6
Instrument ID Outlet	MKS 20 (Serial #111455302)	

Direct Spike Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/12/25	18:06:28	24-4204_000021.LAB	191.0	1.030	98.62	12.006
02/12/25	18:07:30	24-4204_000022.LAB	190.9	1.030	99.29	12.015
02/12/25	18:08:33	24-4204_000023.LAB	190.9	1.030	99.83	12.021
02/12/25	18:09:36	24-4204_000024.LAB	190.9	1.030	100.33	12.027
02/12/25	18:10:39	24-4204_000025.LAB	191.0	1.031	100.46	12.029
02/12/25	18:11:42	24-4204_000026.LAB	190.9	1.031	100.82	12.037
02/12/25	18:12:45	24-4204_000027.LAB	191.0	1.031	101.13	12.049
				Average	**100.07**	**12.026**

Native Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	9:10:34	24-4204_000870.LAB	191.0	1.037	0.44	0.010
02/13/25	9:11:37	24-4204_000871.LAB	191.0	1.036	0.48	0.010
02/13/25	9:12:40	24-4204_000872.LAB	191.0	1.036	0.46	0.010
02/13/25	9:13:42	24-4204_000873.LAB	191.0	1.036	0.56	0.010
02/13/25	9:14:45	24-4204_000874.LAB	191.0	1.035	0.53	0.010
02/13/25	9:15:48	24-4204_000875.LAB	191.0	1.036	0.52	0.010
02/13/25	9:16:51	24-4204_000876.LAB	191.0	1.036	0.43	0.010
				Average	**0.49**	**0.010**

Spiked values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	8:42:17	24-4204_000843.LAB	191.0	1.036	5.14	0.757
02/13/25	8:43:20	24-4204_000844.LAB	191.1	1.035	5.25	0.766
02/13/25	8:44:23	24-4204_000845.LAB	191.1	1.036	5.17	0.757
02/13/25	8:45:26	24-4204_000846.LAB	191.0	1.035	5.38	0.764
02/13/25	8:46:28	24-4204_000847.LAB	191.0	1.034	5.72	0.758
02/13/25	8:47:31	24-4204_000848.LAB	191.0	1.036	5.58	0.763
02/13/25	8:48:34	24-4204_000849.LAB	191.0	1.035	5.50	0.751
				Average	**5.39**	**0.759**

Dilution Factor

6.2%

Calculated Spike

6.69

Spike Recovery

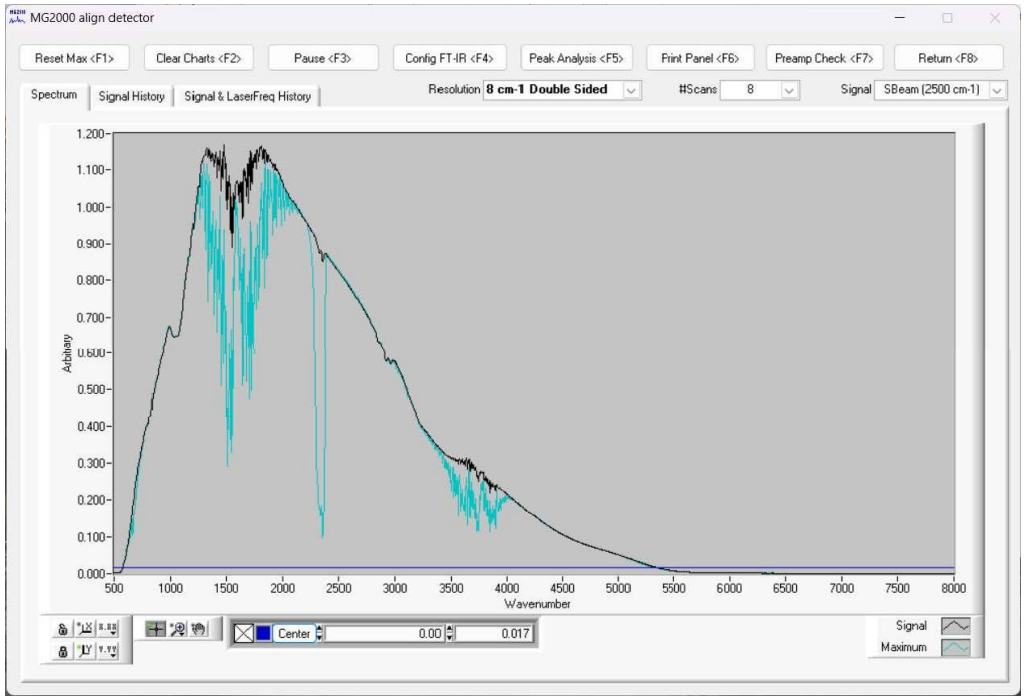
80.55%

Location	Graphic Packaging
Project No.	AST-2024-4204
Instrument	MKS 20 (Serial #111455302)

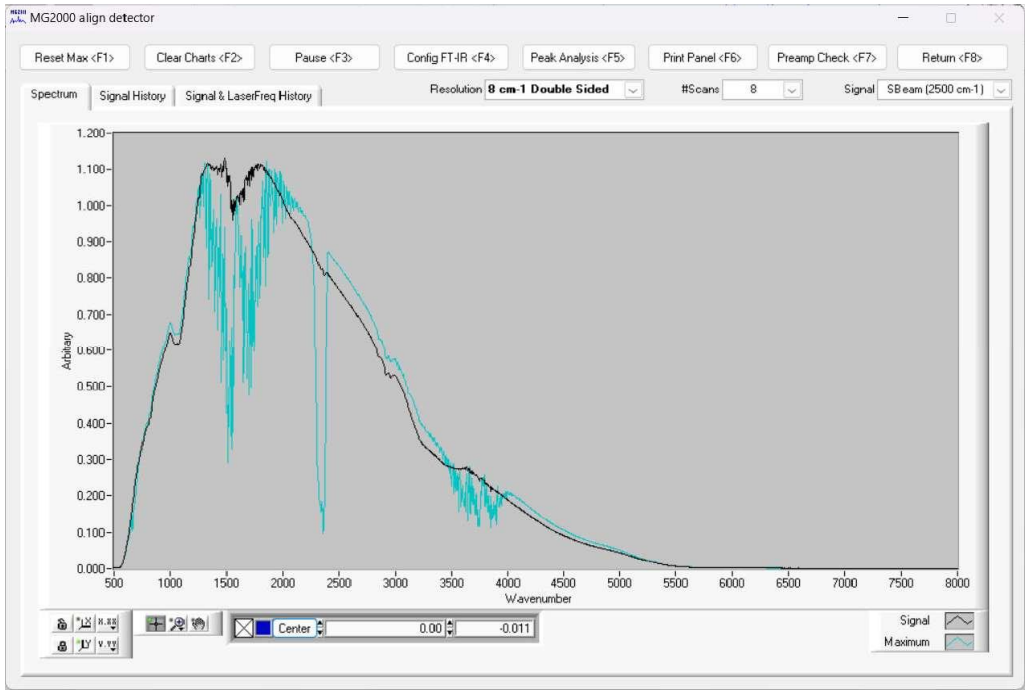
Summary of Spikes

Source	NCG Incinerator
Date	2/5/25
Time	8:42
Analyte	Methanol
Direct	100.07
Native	0.49
Spiked	5.39
Dilution	6.2%
Recovery	81%
Result	PASS

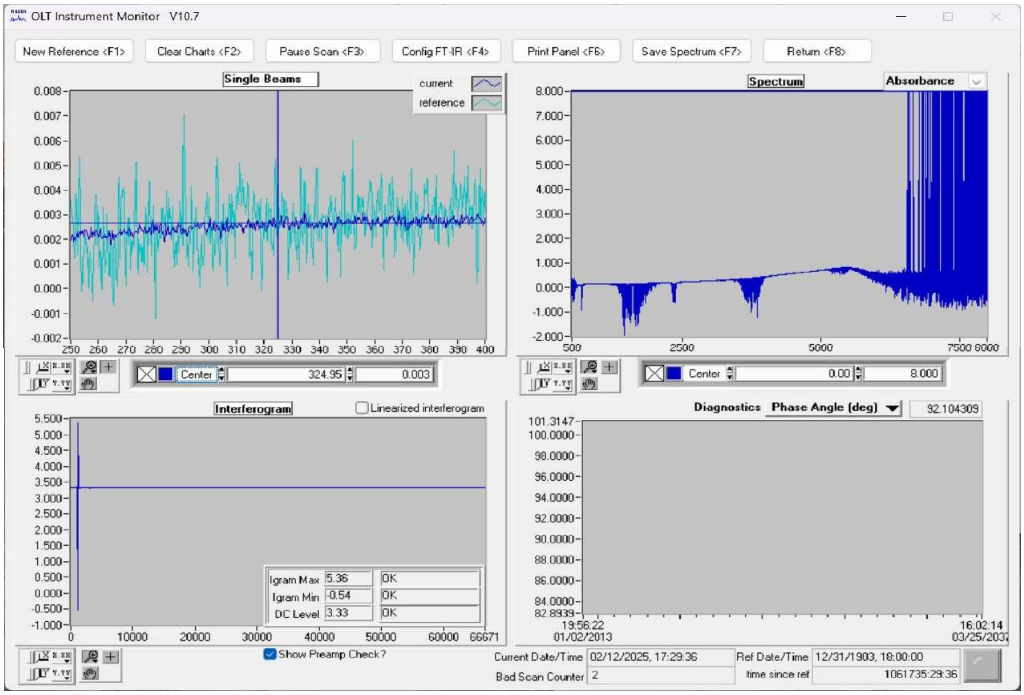
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Pre-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



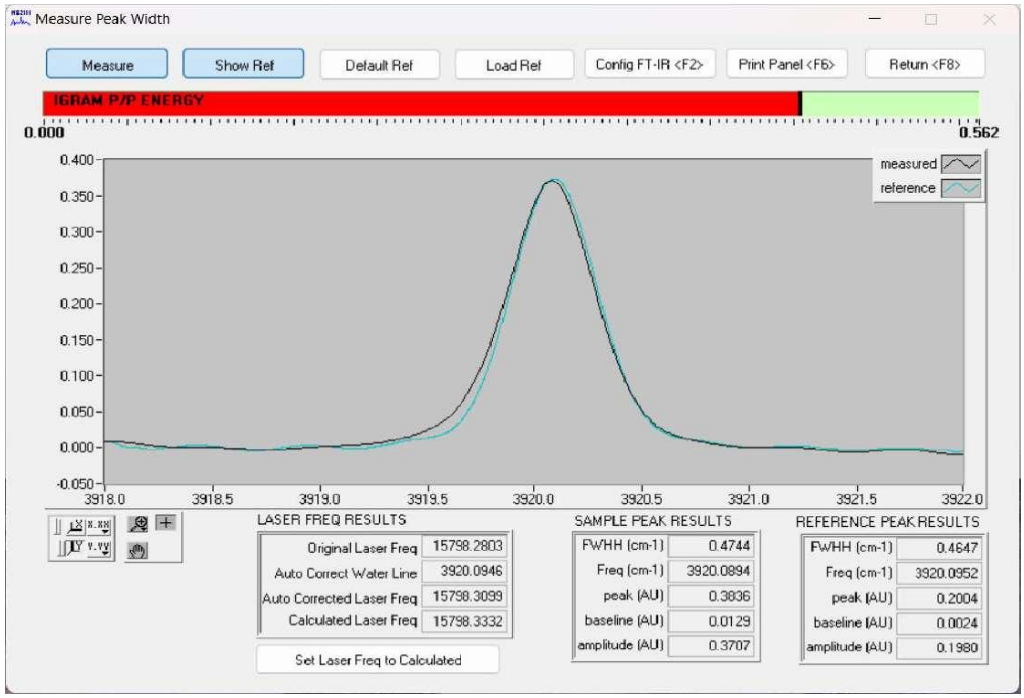
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Post-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/13/2025



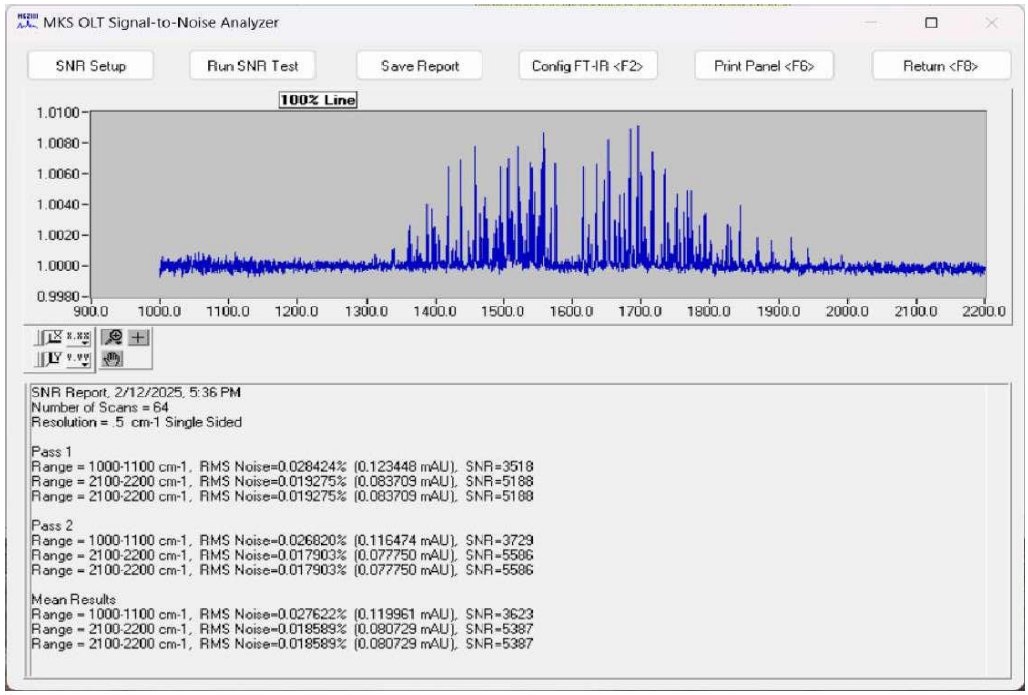
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Detector Linearity
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Peak Analysis
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Signal to Noise Ratio
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Analysis Validation Utility
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025

Analysis Validation Report

Sample Filename: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_001011.LAB

Filename for noise: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_000945.LAB
Interferences Filenames: C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2C
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
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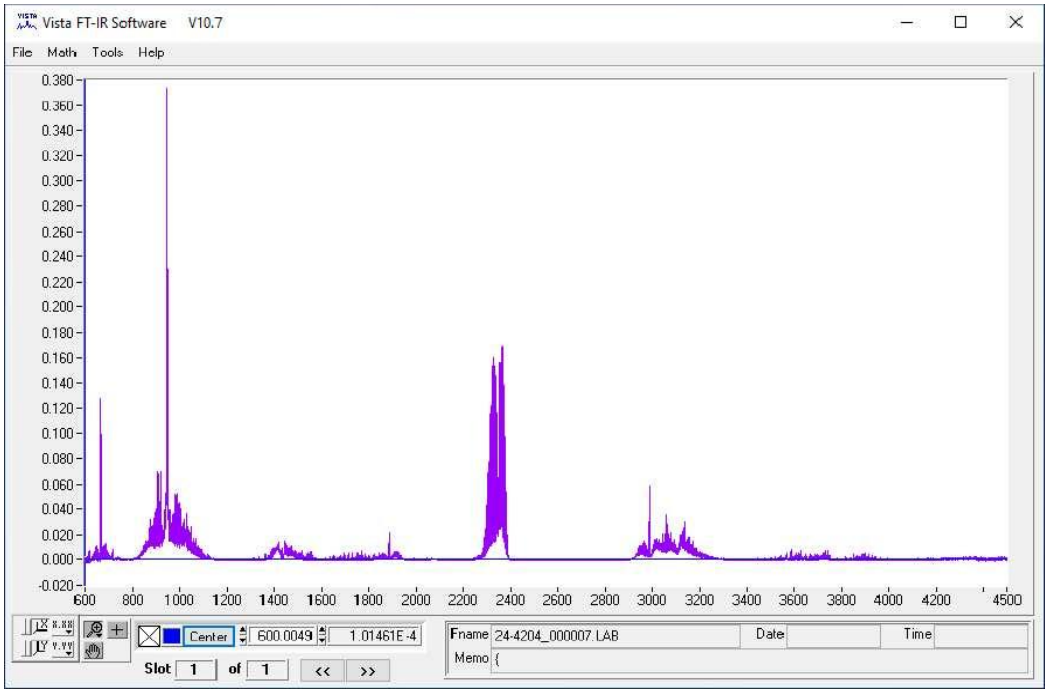
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #

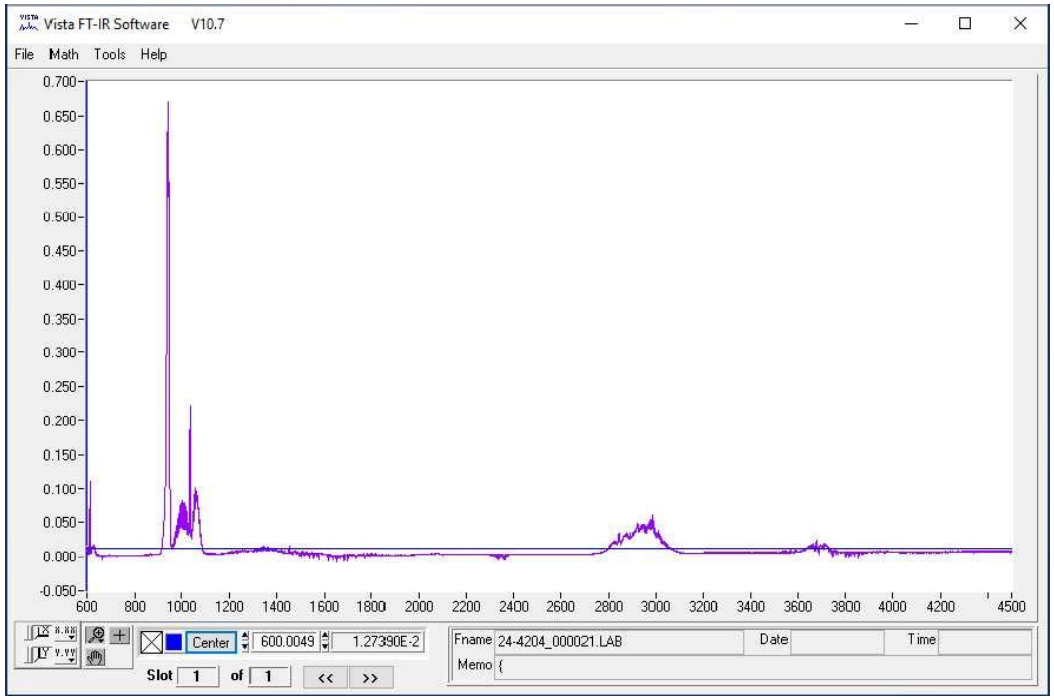
Recipe path: C:\OLT\RECIPES\Coal EGU Testing R3 - Copy DO NOT USE.MGRCP

Gas calibration Name	Conc	MDC3	**MDC2**	MDC1	MAU	FMU*R	OCU
NO (350,3000) 191C	19.47	5.27	**0.17**	0.26	0.36	7.19	7.19
NO2 (150) 191C (1OF2)	1.58	1.46	**0.16**	0.05	0.05	1.52	1.52
NO2 (2000) 191C (2OF2)	1.64	10.16	**0.5**	1.15	1.46	12.94	12.94
N2O (100,200,300) 191C	0.44	0.45	**0.05**	0.05	0.06	0.52	0.52
NH3 (300) 191C (1OF2)	0.07	1.38	**0.04**	0.15	0.25	2.34	2.34
NH3 (3000) 191C (2OF2)	6.47	33.8	**0.58**	1.37	2.59	63.76	63.76
CO (500) 191C (1OF2)	149.62	8.29	**0.1**	0.14	0.31	16.87	16.87
CO% (1) 191C (2OF2)	0.01	0	**0**	0	0	0.01	0.01
H2O% (40) 191C	44.5	0.44	-	0.01	0.02	0.75	0.75
CO2% (40) 191C	1.94	0.16	-	0.01	0.02	0.23	0.23
CH4 (250) 191C (1OF2)	-0.49	2.67	**0.05**	0.49	1.29	7.05	7.05
CH4 (3000) 191C (2OF2)	0.55	18.41	**0.6**	1.36	2.24	30.32	30.32
FORMALDEHYDE (70) 191C	-0.1	0.29	**0.09**	0.24	0.29	0.35	0.35
PROPYLENE (200,1000) 191(	-0.95	4.24	**0.25**	0.55	0.64	4.97	4.97
ETHYLENE (100,3000) 191C	-0.47	1.76	**0.11**	0.21	0.36	3.07	3.07
ACETYLENE (1000) 191C	0.43	4.8	**0.26**	0.83	1	5.78	5.78
PROPANE (100) 191C	0.15	1.01	**0.09**	0.16	0.19	1.2	1.2
ETHANE (500) 191C	-0.27	2.08	**0.16**	0.27	0.3	2.32	2.32
ACETALDEHYDE (1000) 191(	-0.85	1.18	**0.12**	0.42	0.46	1.28	1.28
HCL PPM (100) 191C	0.05	0.32	**0.08**	0.16	0.29	0.59	0.59
HF PPM (10) 191C	0.32	0.95	**0.04**	0.09	0.17	1.7	1.7
HCN (100) 191C	0.28	7.31	**0.13**	0.87	1.49	12.51	12.51
HBR (100) 180C	0.08	1.33	**0.27**	0.73	1.48	2.71	2.71
SO2 (1000) 191C	-1.9	3.46	**0.24**	0.2	0.38	6.66	6.66
SO3 (150) 191C	-749.83	0	-	0.07	0.07	0	0.07
COS (100) 150C	0.42	0.19	**0.01**	0.02	0.02	0.25	0.25
H2SO4 (50) 150C	-0.13	0.2	**0.05**	0.06	0.07	0.22	0.22
SF6 (10) 191C	-0.01	0.02	**0.01**	0.01	0.01	0.02	0.02
MEOH (10) 191C	0.37	0.56	**0.24**	0.15	0.17	0.65	0.65

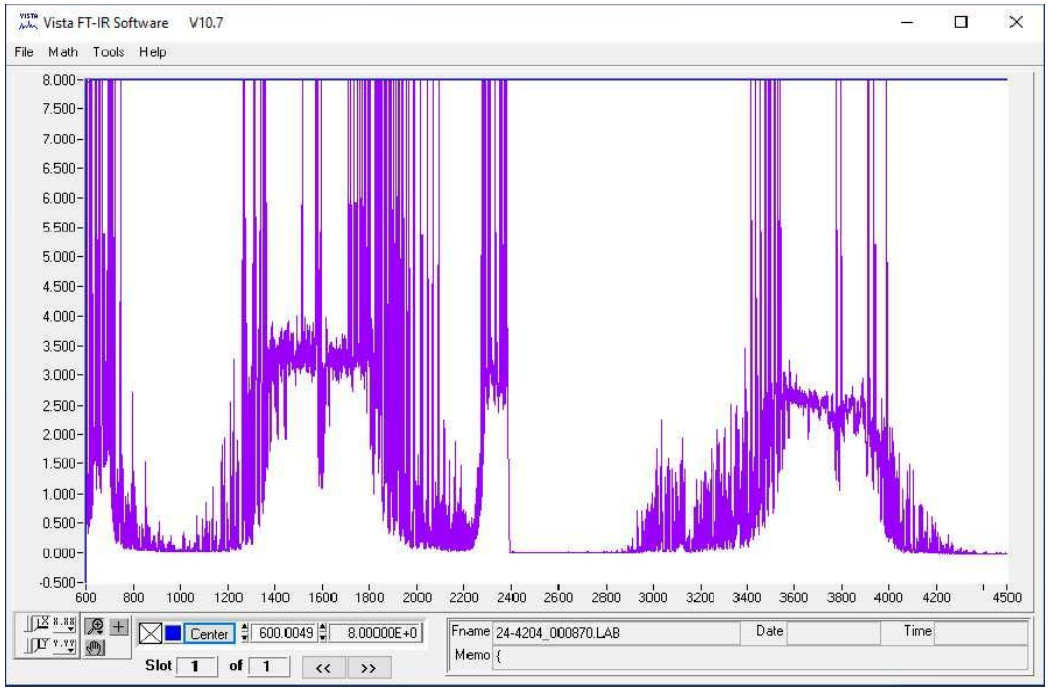
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (CTS)	24-4204_000007.LAB
Date	2/12/2025
Time	5:51:48 PM



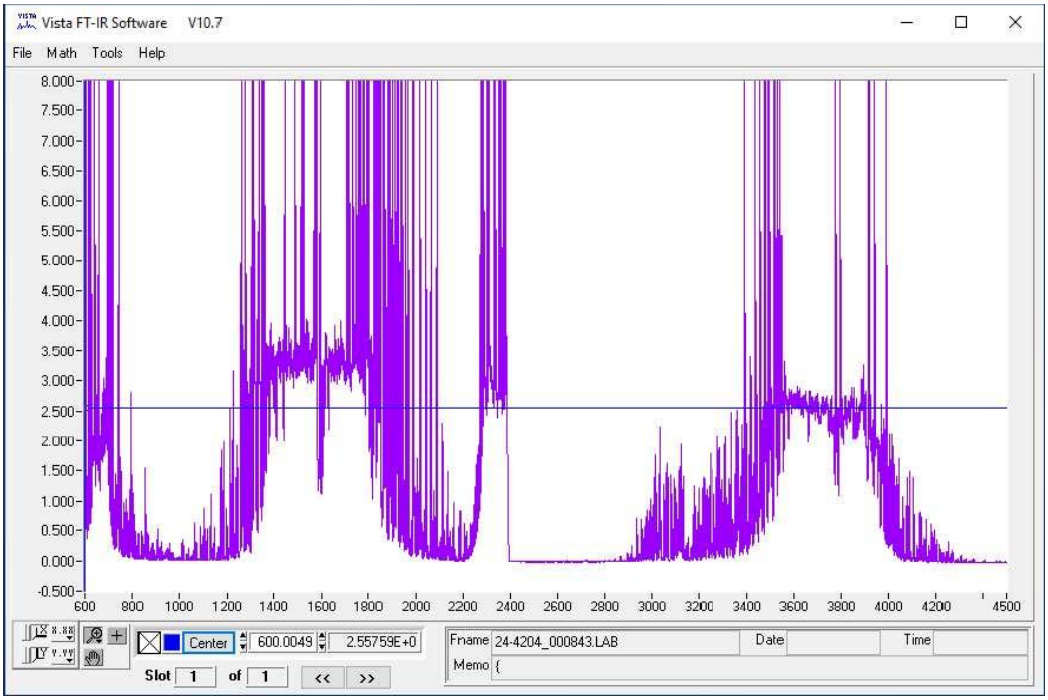
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Analyte Direct)	24-4204_000021.LAB
Date	2/12/2025
Time	6:06:28 PM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Native)	24-4204_000870.LAB
Date	2/13/2025
Time	9:10:34 AM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Spike)	24-4204_000843.LAB
Date	2/13/2025
Time	8:42:17 AM



Certifications & Calibrations

Equipment Detail - Dry Gas Meter

Console ID: MB-210-2447
Meter S/N: 20035533
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	30.17					
Final Barometric Pressure, in. Hg	(Pb_F)	30.20					
Average Barometric Pressure, in. Hg	(Pb)	30.19					
Critifcal Orifice ID	(Y)	29	29	19	19	6	6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	21.0	21.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	738.100	713.100	730.000	705.500	749.350	724.000
Final DGM Volume, ft^3	(Vm_F)	748.955	723.620	736.700	712.200	754.500	729.210
Total DGM Volume, ft^3	(Vm)	10.855	10.520	6.700	6.700	5.150	5.210
Ambient Temperature, °F	(Ta)	64	64	64	64	64	64
Initial DGM Temperature, °F	(Tm_I)	62	62	63	61	62	62
Final DGM Temperature, °F	(Tm_F)	63	63	64	63	63	62
Average DGM Temperature, °F	(Tm)	63	63	64	62	63	62
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.50	3.40	1.40	1.40	0.13	0.13
Standard Meter volume, ft^3	(Vmstd)	11.1629	10.8158	6.8420	6.8617	5.2530	5.3193
Standard Critical Orifice Volume, ft^3	(Vcr)	11.0047	11.0047	6.8537	6.8537	5.2497	5.2497
Meter Correction Factor	(Y)	0.986	1.017	1.002	0.999	0.999	0.987
Tolerance	--	0.013	0.019	0.003	0.000	0.001	0.011
Orifice Calibration Value	(ΔH @)	1.672	1.624	1.712	1.717	1.691	1.693
Tolerance	--	0.013	0.061	0.027	0.032	0.007	0.008
Orifice Cal Check	--	0.85		0.72		0.85	
Meter Correction Factor	**(Y)**	**0.998**					
Orifice Calibration Value	**(ΔH @)**	**1.685**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	99	559	0.2	1
223	683	224	684	-0.1	1
248	708	249	709	-0.1	1
273	733	274	734	-0.1	1
300	760	300	760	0.0	0
400	860	399	859	0.1	1
500	960	498	958	0.2	2
600	1,060	600	1,060	0.0	0
700	1,160	703	1,163	-0.3	3
800	1,260	802	1,262	-0.2	2
900	1,360	903	1,363	-0.2	3
1,000	1,460	1,003	1,463	-0.2	3
1,100	1,560	1,103	1,563	-0.2	3
1,200	1,660	1,203	1,663	-0.2	3

Personnel

Calibration By: EDO
Calibration Date: 2/4/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-211-2613
Meter S/N: MB-211-2613
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.89					
Final Barometric Pressure, in. Hg	(Pb_F)	29.89					
Average Barometric Pressure, in. Hg	(Pb)	29.89					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647s-6	1647s-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	22.0	22.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	59.700	71.250	83.820	91.100	98.000	103.400
Final DGM Volume, ft^3	(Vm_F)	70.545	82.082	90.650	97.904	103.241	108.615
Total DGM Volume, ft^3	(Vm)	10.845	10.832	6.830	6.804	5.241	5.215
Ambient Temperature, °F	(Ta)	55	55	55	55	55	55
Initial DGM Temperature, °F	(Tm_I)	56	56	60	60	67	67
Final DGM Temperature, °F	(Tm_F)	56	56	60	60	67	67
Average DGM Temperature, °F	(Tm)	56	56	60	60	67	67
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	4.10	4.10	1.60	1.60	0.15	0.15
Standard Meter volume, ft^3	(Vmstd)	11.2001	11.1867	6.9568	6.9303	5.2486	5.2226
Standard Critical Orifice Volume, ft^3	(Vcr)	10.9920	10.9920	6.8458	6.8458	5.2437	5.2437
Meter Correction Factor	(Y)	0.981	0.983	0.984	0.988	0.999	1.004
Tolerance	--	0.008	0.007	0.006	0.002	0.009	0.014
Orifice Calibration Value	(ΔH @)	1.971	1.971	1.956	1.956	1.921	1.921
Tolerance	--	0.022	0.022	0.007	0.007	0.029	0.029
Orifice Cal Check	--	1.95		1.56		1.99	
Meter Correction Factor	**(Y)**	**0.990**					
Orifice Calibration Value	**(ΔH @)**	**1.949**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIE
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	66	526	0.4	2
100	560	98	558	0.4	2
223	683	221	681	0.3	2
248	708	246	706	0.3	2
273	733	271	731	0.3	2
300	760	298	758	0.3	2
400	860	395	855	0.6	5
500	960	494	954	0.6	6
600	1,060	595	1,055	0.5	5
700	1,160	696	1,156	0.3	4
800	1,260	795	1,255	0.4	5
900	1,360	895	1,355	0.4	5
1,000	1,460	994	1,454	0.4	6
1,100	1,560	1,094	1,554	0.4	6
1,200	1,660	1,193	1,653	0.4	7

Personnel

Calibration By: David Larru
Calibration Date: 1/3/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-214-2990
Meter S/N: 18392990
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.66					
Final Barometric Pressure, in. Hg	(Pb_F)	29.66					
Average Barometric Pressure, in. Hg	(Pb)	29.66					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647-6	1647-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	16.0	16.0	20.0	20.0	24.0	23.0
Initial DGM Volume, ft^3	(Vm_I)	733.400	721.100	745.400	752.400	759.200	764.600
Final DGM Volume, ft^3	(Vm_F)	744.442	732.054	752.170	759.180	764.418	769.813
Total DGM Volume, ft^3	(Vm)	11.042	10.954	6.770	6.780	5.218	5.213
Ambient Temperature, °F	(Ta)	67	67	67	67	67	67
Initial DGM Temperature, °F	(Tm_I)	73	73	73	73	73	73
Final DGM Temperature, °F	(Tm_F)	73	73	73	73	73	73
Average DGM Temperature, °F	(Tm)	73	73	73	73	73	73
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.80	3.80	1.50	1.50	0.14	0.14
Standard Meter volume, ft^3	(Vmstd)	10.9475	10.8603	6.6741	6.6840	5.1268	5.1219
Standard Critical Orifice Volume, ft^3	(Vcr)	10.7824	10.7824	6.7153	6.7153	5.1437	5.1437
Meter Correction Factor	(Y)	0.985	0.993	1.006	1.005	1.003	1.004
Tolerance	--	0.014	0.007	0.007	0.005	0.004	0.005
Orifice Calibration Value	(ΔH @)	1.823	1.823	1.845	1.845	1.828	1.828
Tolerance	--	0.009	0.009	0.013	0.013	0.004	0.004
Orifice Cal Check	--	1.65		1.67		1.51	
Meter Correction Factor	**(Y)**	**0.999**					
Orifice Calibration Value	**(ΔH @)**	**1.832**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	100	560	0.0	0
223	683	228	688	-0.7	5
248	708	253	713	-0.7	5
273	733	278	738	-0.7	5
300	760	306	766	-0.8	6
400	860	407	867	-0.8	7
500	960	508	968	-0.8	8
600	1,060	612	1,072	-1.1	12
700	1,160	716	1,176	-1.4	16
800	1,260	817	1,277	-1.3	17
900	1,360	920	1,380	-1.5	20
1,000	1,460	1,021	1,481	-1.4	21
1,100	1,560	1,122	1,582	-1.4	22
1,200	1,660	1,224	1,684	-1.4	24

Personnel

Calibration By: David Larru
Calibration Date: 2/7/2025
Reviewed By: Timothy Branham

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE

Blend Type:	GAS	MOL	
Pressure:	2000	psia	**Sales Order: 1354918**
Volume:	138.9	cf	
Dew Point:	0 C		**RBTGS Part No.:** 304930

Cylinder Size: I-150
Valve Outlet: CGA 350
Cylinder No.: **CC774584**
Bar Code No.: 107623038

Lot No.: NV2411081526
Analysis Date: November 13, 2024
Date Issued: November 15, 2024
Expiration Date: November 15, 2028

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Sulfur Hexafluoride	2551-62-4	10.0	ppm	10.1	59.2	10.1	ppm	5%	M
Methanol	67-56-1	100.0	ppm	96.8	110.7	96.8	ppm	2%	B
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical Oxygen Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0096121	**Certification Date:**	08/20/2024
Product ID Number:	124300	**Expiration Date:**	08/18/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0096121.20240814-0	**Lot Number:**	EB0096121.20240814
Customer PO. NO.:		**Tracking Number:**	095703714
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.00 %**	±0.08 %	NDIR	08/20/2024
Oxygen	**10.00 %**	±0.03 %	MPA	08/19/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726207	CC726207.20230109	07/09/2031	GMIS	N2	O2	12.01 %	0.122	SRM 2659a
CC749195	CC749195.20230228	07/09/2031	GMIS	N2	O2	20.01 %	0.112	SRM 2659a
EB0006119	EB0006119.20210412	01/03/2032	GMIS	N2	CO2	19.58 %	0.375	C2190301.03
EB0016852	EB0016852.20210412	01/03/2032	GMIS	N2	CO2	11.92 %	0.235	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	07/29/2024
CO2	NDIR	Thermo	410i	1162980025	08/13/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC737073	**Certification Date:**	09/17/2024
Product ID Number:	124240	**Expiration Date:**	09/15/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC737073.20240903-0	**Lot Number:**	CC737073.20240903
Customer PO. NO.:		**Tracking Number:**	103890438
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.8 %**	±0.13 %	FTIR	09/17/2024
Oxygen	**19.93 %**	±0.03 %	MPA	09/10/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
CC769424	CC769424.20240512	08/05/2032	GMIS	N2	O2	19.98 %	0.155	SRM 2659a
EB0010822	EB0010822.20230816	07/09/2032	GMIS	N2	CO2	24.84 %	0.292	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/21/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	09/17/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

CERTIFIED GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC768666	**Certification Date:**	06/19/2024
Product ID Number:	124838	**Expiration Date:**	06/17/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC768666.20240618-0	**Lot Number:**	CC768666.20240618
Customer PO. NO.:		**Tracking Number:**	108819146
Customer:		**Previous Certification Dates:**	

This mixture is for laboratory use only, not for drug, household or other use.
This mixture is certified in Mole % to be within ±2% of the actual number reported with a confidence of 95%.
This mixture was manufactured by scale; weights traceable to N.I.S.T. Certificate #822/266926-02.
Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Ethylene	**103 PPM**	± 2% NIST	FTIR
Nitrogen	Balance		

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC734580	CC734580	07/26/2024	PS	N2	C2H4	1005 PPM	2	4034426

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
C2H4	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-G, Revised on 2017-07-02

Appendix E

LK01

#1 Lime Kiln Process Data

	Start Time:		2/13/25 16:25	2/13/25 15:05	2/13/25 13:20	
	End Time:		2/13/25 17:46	2/13/25 16:10	2/13/25 14:26	
Run #			3	2	1	Avgs
Tag						
FIC0262G.pv	Mud Flow	gpm	161.25	160.4	160.0	160.5
FYC0262G.pv	Lime Production	tons/day	160.06	160.1	160.0	160.0
FIC0275G.pv	Natural Gas Flow	cfm	832.71	835.0	822.8	830.2
AT0267G.pv	Kiln O2	%	1.96	2.0	2.0	2.0
AM0273BG.pv	Hot End Temp (oil)	°F	1313.76	1326.4	1247.3	1295.8
TT0273G.pv	Hot End Temp (gas)	°F	NA	NA	NA	
TT0269G.pv	Wet End Temp	°F	439.63	438.1	452.9	443.5
FT0296G.pv	Scrubber Recirc Flow	gpm	404.15	403.7	403.6	403.8
DPT0297G.pv	Scrubber delta P	in. H2O	17.16	17.2	17.3	17.2
DIC0260G.pv	Precoat Filter Solids	%	31.86	32.0	32.0	31.9
	Scrubber solids	%	NA	NA	NA	
CAUS-#1kiln.CARE	Carbonate Test	% CaCO3	4.40	4.4	13.0	7.3
H_LK01_TRS.avg	TRS/O2	ppm	8.27	8.2	5.9	7.5
I_LK01_o2.avg.filt	Excess stack O2	%	6.72	6.8	6.8	6.7

LK02

#2 Lime Kiln Process Data

		Start Time:	2/13/2025 11:15	2/13/2025 9:55	2/13/2025 8:15	
		End Time:	2/13/2025 12:20	2/13/2025 11:00	2/13/2025 9:20	
Run #		Units	3	2	1	AVG
Tag						
FIC0035G.pv	Mud Flow	gpm	287.16	287.09	287.02	287.2
FYC0035G.pv	Lime Production	tons/day	310.00	309.98	309.82	310.0
FIC0057G.pv	Natural Gas Flow	cfm	1241.62	1265.10	1175.79	1241.6
FIC3102G.pv	Fuel Oil Flow	gpm	0.00	0.00	0.00	0.0
AT0045G.pv	Excess O2	%	4.00	3.91	5.00	4.0
AM0047BG.pv	Hot End Temp (oil)	°F	1357.95	1226.80	1279.54	1357.9
TT0047G.pv	Hot End Temp (gas)	°F	1357.49	1228.54	1280.14	1357.5
TT0044G.pv	Wet End Temperature	°F	620.79	614.41	599.04	620.8
FT0066G.pv	Scrubber Recirc Flow	gpm	742.60	744.03	743.38	742.6
DPT0065G.pv	Scrubber delta P	in. H2O	32.29	32.57	32.73	32.3
DIC0036G.pv	Precoat Filter Solids	%	34.01	34.01	34.00	34.0
CAUS-#2kiln.CARB	Carbonate Test	% CaCO3	2.20	13.00	12.31	2.2
h_lk02_trs.avg	TRS/O2	ppm	0.30	0.40	0.40	0.3
i_lk02_o2.avg.filt	O2	%	8.12	8.13	9.13	8.1

RB01

#1 Recovery Boiler Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40 AM	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46 AM	
	Run	3	2	1	
Tag					Averages
FT0170E.pv	Steam load (kpph)	354.13	354.04	356.26	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.68	212.46	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.93	201.70	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.77	119.98	120.7
AIC0066E.pv	Excess O2	2.99	3.03	2.92	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.19	0.20	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.78	79.71	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.08	83.90	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.78	211.15	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	
TIC786E.PV	Bl. Liq. Nozzle temp. (F)	[-11059] No Good Data For Calculation	] No Good Data For Cal	] No Good Data For Cal	#DIV/0!
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.69	49.70	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
H_RB1N_TRS.AVG	TRS/O2 -- North (ppm)	1.18	1.46	1.44	1.4
H_RB1S_TRS.AVG	TRS/O2 -- South (ppm)	0.62	0.63	0.07	0.4
H_RB1N_SO2.AVG	SO2/O2 -- North (ppm)	0.05	19.56	3.11	7.6
H_RB1S_SO2.AVG	SO2/O2 -- South (ppm)	-0.17	24.73	4.34	9.6
I_RB1N_O2.FILT	O2 -- North %	5.88	5.92	5.76	5.9
I_RB1S_O2.FILT	O2 -- South %	7.20	7.27	6.75	7.1
AT0421BE.PV	Opacity -- North %	4.85	5.31	4.52	4.9
AT0421CE.PV	Opacity -- South %	4.01	4.21	4.10	4.1

RB02

#2 Recovery Boiler West Stack -- Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.9	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.1	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.7	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.1	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.2	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.2	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.6	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.5	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.2	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.4	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.2	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.0	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.0	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.5	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.1	90.3
H_RB2E_TRS.AVG	TRS/O2 -- East (ppm)	0.66	0.76	0.6	0.7
H_RB2W_TRS.AVG	TRS/O2 -- West (ppm)	0.32	0.26	#VALUE!	#VALUE!
H_RB2E_SO2.AVG	SO2/O2 -- East (ppm)	0.00	0.10	0.2	0.1
H_RB2W_SO2.AVG	SO2/O2 -- West (ppm)	0.00	0.00	0.1	0.0
I_RB2E_O2.FILT	O2 -- East %	4.25	3.90	4.4	4.2
I_RB2W_O2.FILT	O2 -- West %	4.98	4.79	5.3	5.0
AT2083E.PV	Opacity -- East %	9.71	9.61	10.0	9.8
AT2082E.PV	Opacity -- West %	10.90	10.75	11.6	11.1

SM01

#1 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46	
	Run #	3	2	1	**Averages**
Tag					
FT0170E.pv	Steam load (kpph)	354.13	354.0	356.3	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.7	212.5	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.9	201.7	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.8	120.0	120.7
AIC0066E.pv	Excess O2	2.99	3.0	2.9	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.2	0.2	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.8	79.7	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.1	83.9	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.8	211.2	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	Tag not found
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.7	49.7	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.0	0.0	0.0
Ft1024e.pv	Weak Wash flow to fan (gpm)	47.99	48.14	48.32	48.1
FT1030E.pv	Weak Wash flow to scrubber (gpm)	87.37	87.17	87.88	87.5
TIC786E.PV	Precip. Ash Tank Temp. (F)	59] No Good Data For Calcu	o Good Data For C	No Good Data For C	#DIV/0!
IT3025e.pv	Scrubber Fan Amps	83.46	83.5	81.8	82.9

SM02

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.91	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.12	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.72	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.08	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.21	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.19	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.60	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.49	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.22	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.35	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.20	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.01	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.54	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.09	90.3
TT2268E.PV	Precip. Ash Tank Temp. (F)	228.03	228.01	227.36	227.8
IT3028e.pv	Scrubber fan amps	43.19	43.19548758	43.70370315	43.4

NCG01

GRAPHIC PACKAGING INTERNATIONAL - TEXARKANA MILL
INCINERATOR EXHAUST STACK (NCG01)
PROCESS DATA

	Start Time:	2/13/25 11:57	2/13/25 10:42	2/13/25 9:10	
	End Time:	2/13/25 12:57	2/13/25 11:42	2/13/25 10:10	
					Avg
PI Tag No.	**Parameter Description**	**Run 3**	**Run 2**	**Run 1**	
TIC3076H.PV	Incinerator chamber temperature, F	1448.68	1449.0	1446.9	1448.20
AIC3112H.PV	Incinerator SO2 scrubber pH	9.82	9.8	9.6	9.74
FT3104H.PV	Incinerator SO2 scrubber recirc flow, gpm	405.99	405.9	412.0	407.97
	Hardwood blow rate	48	48	48	48.00
	Pine blow rate	67	67	67	67.00
FIC3387C.pv	A-line brown stock flow, gpm	2898.79	2900.7	2697.0	2832.17
FQC3377C.pv	B-line brown stock flow, gpm	4101.42	4036.0	4014.9	4050.79

Notes:
This testing for methanol at the incinerator stack was conducted due to the 40 CFR 63 requirement to retest certain MACT I sources.
The port tested was on west side of stack, approximately 20 feet above the 10th floor of #2 Power Boiler.
Pine and hardwood digesters were blown during the testing.
Several periods of digester double blows occurred during the testing.

Appendix F

Data Log

DAQ #	1.00	2.00
DasyLab #	0.00	1.00
Time	O2	CO2
2/13/2025 7:30	0.03	0.00
2/13/2025 7:31	0.00	0.00
2/13/2025 7:32	0.00	0.00
2/13/2025 7:33	0.00	0.00
2/13/2025 7:34	0.00	0.00
2/13/2025 7:35	7.79	7.03
2/13/2025 7:36	19.92	19.84
2/13/2025 7:37	16.14	16.33
2/13/2025 7:38	10.10	10.04
2/13/2025 7:39	6.34	6.47
2/13/2025 7:40	0.00	0.02
2/13/2025 7:41	0.00	0.01
2/13/2025 7:42	0.00	0.01
2/13/2025 7:43	0.00	0.00
2/13/2025 7:44	0.00	0.00
2/13/2025 7:45	0.00	0.01
2/13/2025 7:46	0.00	0.02
2/13/2025 7:47	2.36	0.04
2/13/2025 7:48	20.59	0.06
2/13/2025 7:49	20.77	0.06
2/13/2025 7:50	6.39	0.06
2/13/2025 7:51	0.36	0.01
2/13/2025 7:52	0.26	0.00
2/13/2025 7:53	5.48	4.91
2/13/2025 7:54	10.10	9.76
2/13/2025 7:55	10.10	9.79
2/13/2025 7:56	10.10	9.81
2/13/2025 7:57	12.21	7.97
2/13/2025 7:58	20.78	0.17
2/13/2025 7:59	20.85	0.08
2/13/2025 8:00	20.86	0.07
2/13/2025 8:01	20.87	0.06
2/13/2025 8:02	20.87	0.06
2/13/2025 8:03	20.87	0.05
2/13/2025 8:04	20.88	0.05
2/13/2025 8:05	20.88	0.05
2/13/2025 8:06	20.88	0.05
2/13/2025 8:07	20.09	0.44
2/13/2025 8:08	12.18	4.21
2/13/2025 8:09	12.22	4.17
2/13/2025 8:10	11.85	4.24
2/13/2025 8:11	11.14	4.55
2/13/2025 8:12	12.16	4.06
2/13/2025 8:13	12.03	3.97
2/13/2025 8:14	12.56	3.94
2/13/2025 8:15	12.66	3.69
2/13/2025 8:16	12.26	3.79
2/13/2025 8:17	11.42	4.21

Data Log

Time	O2	CO2
2/13/2025 8:18	10.55	4.51
2/13/2025 8:19	10.93	4.39
2/13/2025 8:20	12.03	3.71
2/13/2025 8:21	11.74	3.76
2/13/2025 8:22	12.08	3.69
2/13/2025 8:23	12.74	3.29
2/13/2025 8:24	12.54	3.32
2/13/2025 8:25	12.26	3.46
2/13/2025 8:26	11.69	3.75
2/13/2025 8:27	11.75	3.80
2/13/2025 8:28	10.96	4.10
2/13/2025 8:29	11.05	4.13
2/13/2025 8:30	11.35	4.42
2/13/2025 8:31	11.26	3.12
2/13/2025 8:32	10.39	3.27
2/13/2025 8:33	9.55	3.76
2/13/2025 8:34	10.03	3.58
2/13/2025 8:35	10.35	3.35
2/13/2025 8:36	10.20	3.38
2/13/2025 8:37	9.75	3.69
2/13/2025 8:38	9.98	3.69
2/13/2025 8:39	9.60	3.63
2/13/2025 8:40	9.61	3.74
2/13/2025 8:41	9.76	3.66
2/13/2025 8:42	10.02	3.56
2/13/2025 8:43	10.22	3.43
2/13/2025 8:44	10.06	3.31
2/13/2025 8:45	10.29	3.33
2/13/2025 8:46	10.14	3.24
2/13/2025 8:47	9.99	3.31
2/13/2025 8:48	9.83	3.38
2/13/2025 8:49	10.33	3.61
2/13/2025 8:50	11.03	3.86
2/13/2025 8:51	11.51	3.86
2/13/2025 8:52	11.72	3.74
2/13/2025 8:53	11.51	3.87
2/13/2025 8:54	11.71	3.81
2/13/2025 8:55	11.61	3.85
2/13/2025 8:56	11.79	3.89
2/13/2025 8:57	11.57	3.90
2/13/2025 8:58	11.66	3.99
2/13/2025 8:59	12.02	4.04
2/13/2025 9:00	12.52	3.89
2/13/2025 9:01	12.95	3.61
2/13/2025 9:02	12.98	3.57
2/13/2025 9:03	13.49	3.13
2/13/2025 9:04	13.06	3.16
2/13/2025 9:05	12.85	3.41
2/13/2025 9:06	12.94	3.42
2/13/2025 9:07	13.33	3.29
2/13/2025 9:08	13.16	3.17

Data Log

Time	O2	CO2
2/13/2025 9:09	13.22	3.16
2/13/2025 9:10	13.46	2.95
2/13/2025 9:11	13.66	2.75
2/13/2025 9:12	13.34	2.77
2/13/2025 9:13	13.13	2.98
2/13/2025 9:14	13.70	2.72
2/13/2025 9:15	13.11	2.92
2/13/2025 9:16	13.41	3.01
2/13/2025 9:17	13.39	2.88
2/13/2025 9:18	13.33	2.91
2/13/2025 9:19	12.86	3.11
2/13/2025 9:20	13.58	2.83
2/13/2025 9:21	13.71	2.67
2/13/2025 9:22	12.94	3.14
2/13/2025 9:23	13.04	3.23
2/13/2025 9:24	13.54	2.92
2/13/2025 9:25	13.17	2.91
2/13/2025 9:26	13.11	3.07
2/13/2025 9:27	13.40	2.93
2/13/2025 9:28	13.23	2.87
2/13/2025 9:29	13.28	2.97
2/13/2025 9:30	12.74	3.15
2/13/2025 9:31	13.00	3.24
2/13/2025 9:32	13.55	2.90
2/13/2025 9:33	13.89	2.64
2/13/2025 9:34	13.33	2.94
2/13/2025 9:35	13.43	3.07
2/13/2025 9:36	13.43	3.05
2/13/2025 9:37	13.65	3.07
2/13/2025 9:38	13.28	3.13
2/13/2025 9:39	12.98	3.54
2/13/2025 9:40	13.29	3.31
2/13/2025 9:41	13.01	3.64
2/13/2025 9:42	13.10	3.53
2/13/2025 9:43	12.76	3.54
2/13/2025 9:44	13.11	3.51
2/13/2025 9:45	12.67	3.43
2/13/2025 9:46	12.19	3.68
2/13/2025 9:47	12.61	3.60
2/13/2025 9:48	13.24	3.12
2/13/2025 9:49	13.73	2.71
2/13/2025 9:50	13.53	2.80
2/13/2025 9:51	12.98	3.19
2/13/2025 9:52	12.80	3.23
2/13/2025 9:53	13.65	2.74
2/13/2025 9:54	13.86	2.61
2/13/2025 9:55	13.79	2.60
2/13/2025 9:56	13.81	2.67
2/13/2025 9:57	13.77	2.73
2/13/2025 9:58	13.85	2.86
2/13/2025 9:59	13.48	3.05

Data Log

Time	O2	CO2
2/13/2025 10:00	12.71	3.50
2/13/2025 10:01	13.43	3.36
2/13/2025 10:02	13.28	3.26
2/13/2025 10:03	12.38	3.78
2/13/2025 10:04	12.85	3.65
2/13/2025 10:05	13.83	2.98
2/13/2025 10:06	13.98	2.74
2/13/2025 10:07	13.30	2.97
2/13/2025 10:08	12.74	3.27
2/13/2025 10:09	12.11	3.76
2/13/2025 10:10	12.28	3.74
2/13/2025 10:11	13.04	3.36
2/13/2025 10:12	13.47	3.04
2/13/2025 10:13	13.10	3.09
2/13/2025 10:14	13.29	3.22
2/13/2025 10:15	4.55	1.05
2/13/2025 10:16	0.21	0.04
2/13/2025 10:17	0.31	0.14
2/13/2025 10:18	9.35	8.93
2/13/2025 10:19	10.09	9.84
2/13/2025 10:20	10.10	9.84
2/13/2025 10:21	7.54	2.79
2/13/2025 10:22	0.02	0.02
2/13/2025 10:23	0.00	0.02
2/13/2025 10:24	0.00	0.02
2/13/2025 10:25	0.00	0.02
2/13/2025 10:26	0.00	0.02
2/13/2025 10:27	0.00	0.02
2/13/2025 10:28	0.00	0.02
2/13/2025 10:29	0.00	0.02
2/13/2025 10:30	0.05	0.28
2/13/2025 10:31	0.01	0.16
2/13/2025 10:32	0.00	0.03
2/13/2025 10:33	0.00	0.02
2/13/2025 10:34	0.00	0.02
2/13/2025 10:35	0.00	0.02
2/13/2025 10:36	3.68	0.84
2/13/2025 10:37	13.44	3.26
2/13/2025 10:38	13.62	2.92
2/13/2025 10:39	12.79	3.36
2/13/2025 10:40	13.76	2.89
2/13/2025 10:41	13.23	2.98
2/13/2025 10:42	12.69	3.47
2/13/2025 10:43	13.78	2.68
2/13/2025 10:44	13.66	2.62
2/13/2025 10:45	13.75	2.57
2/13/2025 10:46	13.10	3.07
2/13/2025 10:47	13.52	2.74
2/13/2025 10:48	13.38	2.78
2/13/2025 10:49	13.02	3.03
2/13/2025 10:50	12.91	3.28

Data Log

Time	O2	CO2
2/13/2025 10:51	13.26	3.25
2/13/2025 10:52	13.68	3.02
2/13/2025 10:53	13.83	2.85
2/13/2025 10:54	13.60	2.88
2/13/2025 10:55	13.23	3.33
2/13/2025 10:56	13.45	3.19
2/13/2025 10:57	13.25	3.16
2/13/2025 10:58	13.22	3.28
2/13/2025 10:59	13.88	3.08
2/13/2025 11:00	13.21	3.20
2/13/2025 11:01	13.20	3.44
2/13/2025 11:02	13.43	3.29
2/13/2025 11:03	12.83	3.41
2/13/2025 11:04	12.73	3.61
2/13/2025 11:05	12.85	3.60
2/13/2025 11:06	13.26	3.37
2/13/2025 11:07	13.69	3.11
2/13/2025 11:08	13.44	3.10
2/13/2025 11:09	13.39	3.21
2/13/2025 11:10	13.04	3.26
2/13/2025 11:11	12.95	3.49
2/13/2025 11:12	12.91	3.34
2/13/2025 11:13	13.32	3.25
2/13/2025 11:14	12.83	3.26
2/13/2025 11:15	13.00	3.40
2/13/2025 11:16	13.42	3.21
2/13/2025 11:17	13.64	3.06
2/13/2025 11:18	13.64	2.93
2/13/2025 11:19	13.56	2.96
2/13/2025 11:20	13.54	3.01
2/13/2025 11:21	13.22	3.11
2/13/2025 11:22	13.45	3.23
2/13/2025 11:23	13.22	3.17
2/13/2025 11:24	13.30	3.28
2/13/2025 11:25	12.88	3.27
2/13/2025 11:26	13.28	3.31
2/13/2025 11:27	13.22	3.15
2/13/2025 11:28	14.05	2.80
2/13/2025 11:29	13.66	2.79
2/13/2025 11:30	13.79	3.02
2/13/2025 11:31	13.38	3.04
2/13/2025 11:32	13.49	3.30
2/13/2025 11:33	13.57	3.06
2/13/2025 11:34	13.08	3.44
2/13/2025 11:35	13.44	3.27
2/13/2025 11:36	13.02	3.37
2/13/2025 11:37	13.56	3.30
2/13/2025 11:38	13.06	3.29
2/13/2025 11:39	12.69	3.60
2/13/2025 11:40	13.41	3.23
2/13/2025 11:41	13.54	3.11

Data Log

Time	O2	CO2
2/13/2025 11:42	13.67	3.01
2/13/2025 11:43	13.60	2.99
2/13/2025 11:44	3.47	1.05
2/13/2025 11:45	0.21	0.02
2/13/2025 11:46	1.56	1.13
2/13/2025 11:47	10.12	9.83
2/13/2025 11:48	10.13	9.84
2/13/2025 11:49	12.20	5.78
2/13/2025 11:50	13.28	2.93
2/13/2025 11:51	13.24	2.92
2/13/2025 11:52	13.22	2.83
2/13/2025 11:53	13.14	2.85
2/13/2025 11:54	13.31	2.91
2/13/2025 11:55	13.04	2.98
2/13/2025 11:56	13.15	3.19
2/13/2025 11:57	13.24	2.94
2/13/2025 11:58	12.96	3.17
2/13/2025 11:59	13.51	2.85
2/13/2025 12:00	13.07	3.00
2/13/2025 12:01	13.43	3.13
2/13/2025 12:02	13.15	3.06
2/13/2025 12:03	13.55	3.05
2/13/2025 12:04	13.64	2.82
2/13/2025 12:05	13.53	3.01
2/13/2025 12:06	12.69	3.36
2/13/2025 12:07	12.85	3.57
2/13/2025 12:08	13.00	3.45
2/13/2025 12:09	12.44	3.56
2/13/2025 12:10	12.67	3.72
2/13/2025 12:11	12.83	3.56
2/13/2025 12:12	13.24	3.26
2/13/2025 12:13	13.12	3.08
2/13/2025 12:14	13.17	3.10
2/13/2025 12:15	13.37	2.92
2/13/2025 12:16	13.30	2.90
2/13/2025 12:17	13.01	3.07
2/13/2025 12:18	12.88	3.21
2/13/2025 12:19	13.43	3.04
2/13/2025 12:20	13.60	2.73
2/13/2025 12:21	13.35	3.03
2/13/2025 12:22	13.23	3.04
2/13/2025 12:23	13.02	3.33
2/13/2025 12:24	13.43	3.03
2/13/2025 12:25	12.54	3.45
2/13/2025 12:26	12.79	3.63
2/13/2025 12:27	12.54	3.44
2/13/2025 12:28	12.82	3.53
2/13/2025 12:29	13.21	3.10
2/13/2025 12:30	12.76	3.50
2/13/2025 12:31	13.11	3.21
2/13/2025 12:32	13.04	3.18

Data Log

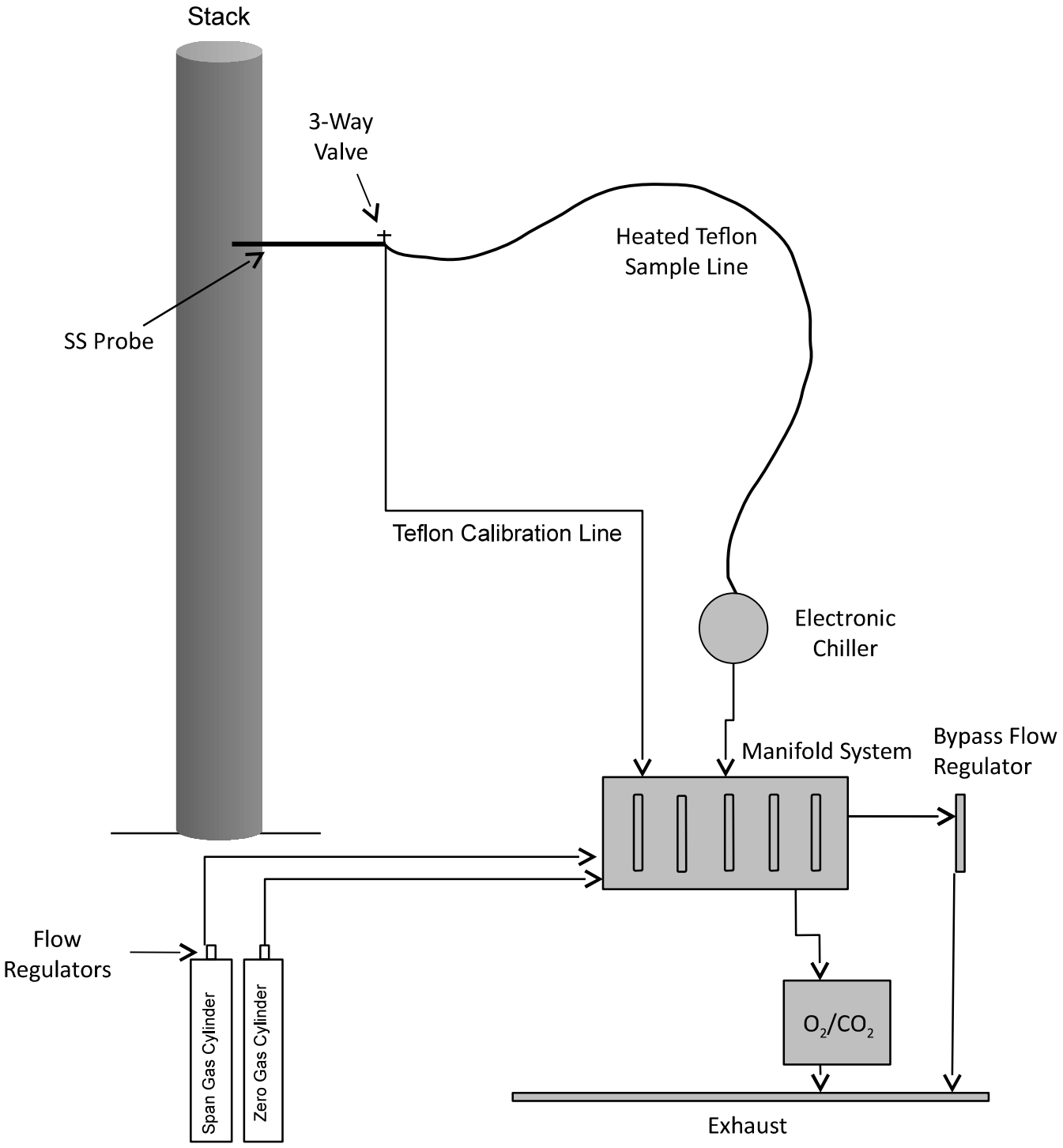
Time	O2	CO2
2/13/2025 12:33	13.14	3.10
2/13/2025 12:34	12.97	3.04
2/13/2025 12:35	13.14	3.05
2/13/2025 12:36	13.33	2.95
2/13/2025 12:37	13.49	2.83
2/13/2025 12:38	13.59	2.79
2/13/2025 12:39	13.45	2.80
2/13/2025 12:40	13.72	2.88
2/13/2025 12:41	13.64	2.86
2/13/2025 12:42	13.58	2.98
2/13/2025 12:43	13.07	3.26
2/13/2025 12:44	13.05	3.59
2/13/2025 12:45	12.84	3.48
2/13/2025 12:46	12.54	3.60
2/13/2025 12:47	13.55	3.18
2/13/2025 12:48	12.87	3.29
2/13/2025 12:49	13.38	3.18
2/13/2025 12:50	13.09	3.09
2/13/2025 12:51	13.50	2.99
2/13/2025 12:52	13.36	2.87
2/13/2025 12:53	12.84	3.09
2/13/2025 12:54	13.22	3.10
2/13/2025 12:55	13.38	2.89
2/13/2025 12:56	13.18	2.95
2/13/2025 12:57	13.44	3.04
2/13/2025 12:58	13.53	3.03
2/13/2025 12:59	13.52	3.05
2/13/2025 13:00	4.47	1.66
2/13/2025 13:01	0.23	0.03
2/13/2025 13:02	1.76	1.36
2/13/2025 13:03	10.12	9.80
2/13/2025 13:04	10.12	9.81
2/13/2025 13:05	11.99	5.97
2/13/2025 13:06	10.57	4.46
2/13/2025 13:07	10.41	4.66
2/13/2025 13:08	10.80	4.42
2/13/2025 13:09	11.56	4.06
2/13/2025 13:10	11.63	3.84
2/13/2025 13:11	9.24	3.35
2/13/2025 13:12	0.05	0.02
2/13/2025 13:13	0.02	0.00
2/13/2025 13:14	0.02	0.00
2/13/2025 13:15	0.01	0.00
2/13/2025 13:16	0.01	0.00
2/13/2025 13:17	0.00	0.00
2/13/2025 13:18	0.00	0.00
2/13/2025 13:19	0.00	0.00
2/13/2025 13:20	0.00	0.00
2/13/2025 13:21	0.00	0.00
2/13/2025 13:22	0.00	0.00
2/13/2025 13:23	0.02	0.28

Data Log

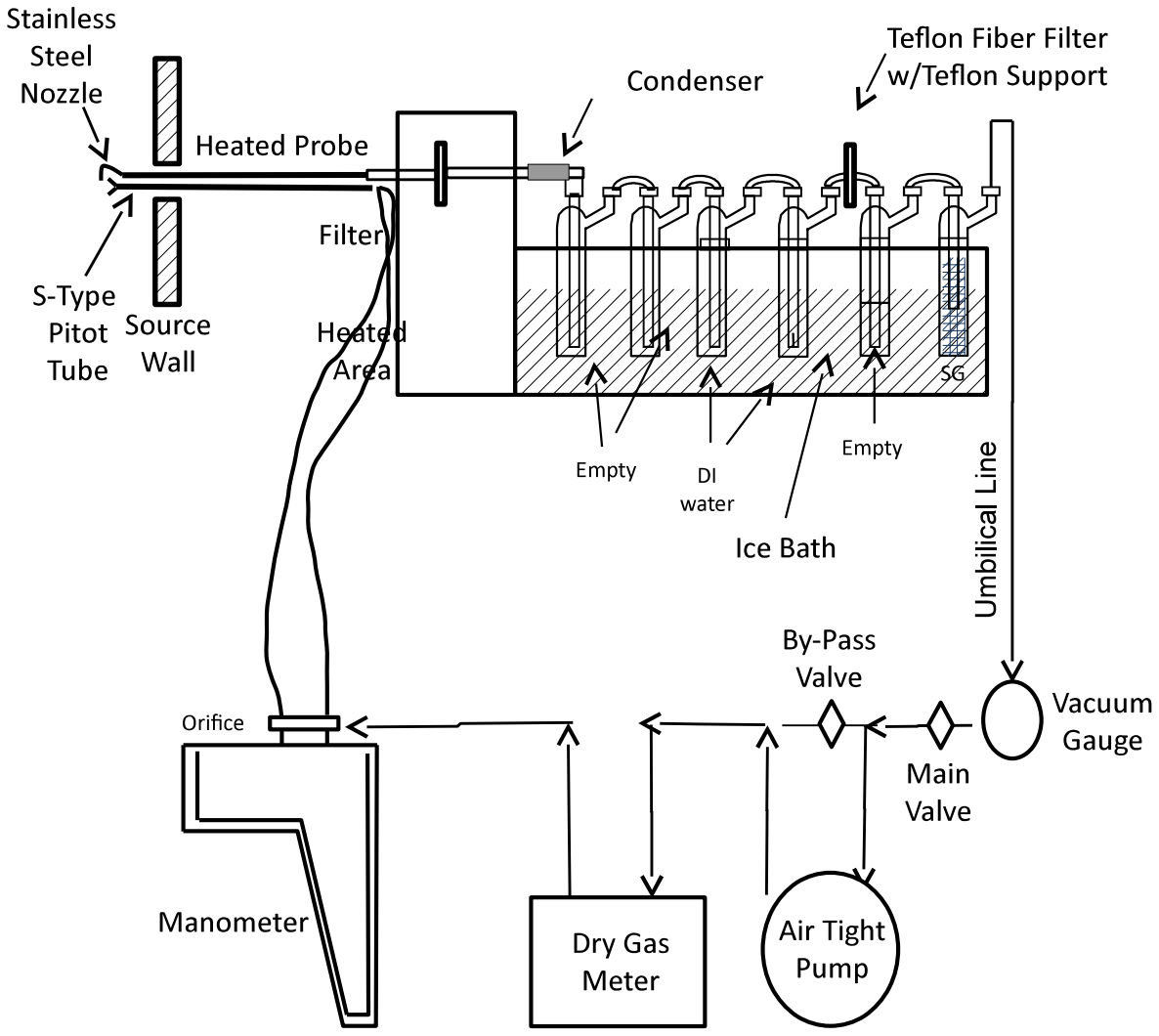
Time	O2	CO2
2/13/2025 13:24	0.02	0.11
2/13/2025 13:25	0.00	0.01
2/13/2025 13:26	0.00	0.00
2/13/2025 13:27	0.00	0.00
2/13/2025 13:28	0.00	0.00
2/13/2025 13:29	0.00	0.00
2/13/2025 13:30	0.00	0.00
2/13/2025 13:31	0.00	0.00
2/13/2025 13:32	0.00	0.00
2/13/2025 13:33	0.00	0.00
2/13/2025 13:34	0.00	0.00
2/13/2025 13:35	0.00	0.00
2/13/2025 13:36	0.00	0.00
2/13/2025 13:37	0.00	0.00
2/13/2025 13:38	0.00	0.00
2/13/2025 13:39	0.00	0.00
2/13/2025 13:40	0.00	0.00
2/13/2025 13:41	0.00	0.00
2/13/2025 13:42	0.00	0.00
2/13/2025 13:43	0.00	0.00
2/13/2025 13:44	0.00	0.00
2/13/2025 13:45	0.00	0.00
2/13/2025 13:46	0.00	0.00
2/13/2025 13:47	0.00	0.00

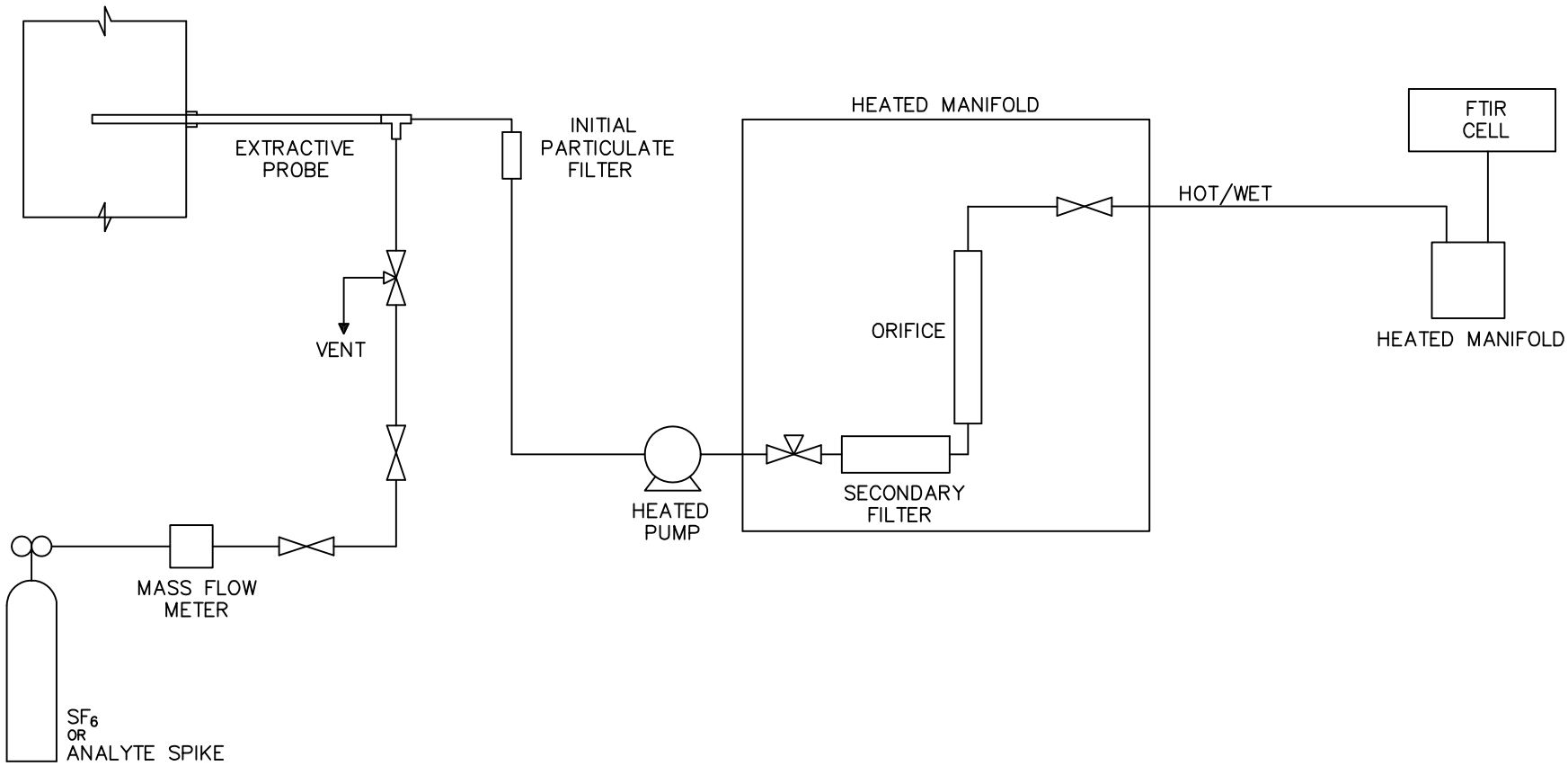
Appendix G

Reference Method Monitors Sampling System
(EPA Method 3A)



Schematic Diagram of the EPA Combined Methods 5/202 Sampling Train for Particulate Matter





EPA METHOD 320 FTIR SAMPLING/SPIKING SYSTEM

DRAWN BY:	KWB	JOB NO.:	2007-0308	REVISION:	1	SCALE:	NTS

E. ROBERTS Alley & Associates INCORPORATED
Environmental Engineering & Consulting
1931 Central Parkway SW Suite S
Decatur, AL 35601
Phone: (615) 351-0121
Fax: (615) 351-0151
www.eralley.com

Appendix H

CAREER SUMMARY

Mr. Wilson is a Project Scientist who has worked in the environmental field approximately four years. He has been involved with field testing activities on a broad scale and within several different industry types. Over the past four years, he has developed skills in several areas of emission testing including mobile laboratory operation and field team supervision.

Education
BS, Emergency Management
Arkansas Tech University
Russellville, AR

Joined Firm
2013

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

DeSoto Gathering Company – Arkansas

Conducted and field managed multiple NSPS, Subpart JJJJ and state permit compliance tests on natural gas-fired compressor engines at multiple stations throughout Arkansas. Responsibilities included project coordination and mobile laboratory and meter box console operation. Testing parameters included nitrogen oxides, carbon monoxide and non-methane volatile organic compounds. EPA Methods 3A, 7E, 10, 19 and 25A.

Saint Gobain – Bryant, Arkansas

Conducted and field managed compliance testing to determine the emission rates of multiple pollutants to demonstrate compliance with federal and state regulations. Testing involved wet chemistry (filterable and condensable particulate matter) and other isokinetic applications. Testing also involved instrumental analysis of sulfur dioxide, carbon monoxide, nitrogen oxides and volatile organic compounds. Mr. Wilson was responsible for operating the dry gas meter consoles and the mobile laboratory equipment as well as coordinating activities with the facility on site contact.

El Dorado Chemical – El Dorado, Arkansas

Conducted compliance testing on multiple sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods, instrumental, and FTIR analysis including U.S. EPA Reference Test Methods 5, 201A/202 (particulate matter & condensable particulate matter), 3A (oxygen and carbon dioxide), 6C (sulfur dioxide) 25A (volatile organic compounds), 7E (nitrogen oxides), 10 (carbon monoxide), and 320 (FTIR). Mr. Wilson was a member of the AST field team for this testing project.

Training

- TVTC Training
- CPR and First Aid
- Safeland
- MSHA Part 46 & Part 48

Appendix I

Brooke T. Paup, *Chairwoman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 13, 2025

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW,
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2025
Expiration Date: 02/28/2026
Certificate ID: TX-C25-00047

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation (FoA) specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Note: For the attached FoA table, matrices may include DW (drinking water), NPW (non-potable water), S (solid and chemical materials), A (air), and/ or BT (biological tissue).

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2025

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix J

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources to be Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Proposed Test Dates:
December 3-5, 2024

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subpart MM and 40 CFR 63, Subpart S

Source Information

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146
(subject to change)

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing will be conducted to determine the emission rates of particulate matter (PM), condensable particulate matter (CPM), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	PM, CPM
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NESHAP.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NESHAP, the facility will conduct a performance test program to determine the compliance status of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01.

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3/3A, 4, 5/202, and 320. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the facility TCEQ Permits, 40 CFR 63, Subpart MM, and 40 CFR 63, Subpart S.
- Emissions testing will be conducted on the exhaust of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01. The No. 1 and No. 2 Recovery Furnaces each exhaust to two (2) stacks: The No. 1 Recovery Furnace to the North (RB01A) and South (RB01B) Stacks, and the No. 2 Recovery Furnace to the West (RB02A) and East (RB02B) Stacks.
- Performance testing will be conducted at the maximum normal operation load for each source.
- Each of the three (3) test runs per source will be approximately 1 hour in duration.
- A minimum of 0.90 dscm (31.8 dscf) will be collected during each PM test run.
- Per Subpart MM, DI water will be used as the sample recovery solvent during PM testing.
- PM sample analysis will be conducted at Alliance's Decatur, AL laboratory.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

LK01 and LK02:

- Lime Production Rate, tons/day
- Scrubber Recirculation Flow, gph
- Scrubber Delta P, WC

RB01A/RB01B and RB02A/RB02B:

- Steam Load, kPPH
- Fuel Data

SM01 and SM02:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

NCG01:

- Chamber Temperature, °F
- Scrubber pH
- Scrubber Recirculation Flow, gph

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – December 2, 2024					
Equipment Setup & Pretest QA/QC Checks					6 hr
DAY 2 – December 3, 2024					
RB01A/RB01B & SM01	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 3 – December 4, 2024					
RB02A/RB02B & SM02	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 4 – December 5, 2024					
All Sources	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
LK01 & LK02	BWS	4			
	PM/CPM	5/202			
NCG01	BWS/CH_3OH	320			
DAY 5 – December 6, 2024					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
LK01	PM, CPM – 27.60 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
LK02	PM, CPM – 26.30 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
RB01A/RB01B	PM, CPM – 26.58 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
RB02A/RB02B	PM, CPM – 42.59 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
SM01	PM, CPM – 10.90 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
SM02	PM, CPM – 19.85 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
NCG01	CH_3OH – 20 ppmvd @ 10% O_2	63, Subpart S

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Laboratory Data* – Copies of laboratory report(s) and chain of custody(s).
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.
- *Photos* – Include stacks being tested and must include all ports and the nearest upstream and downstream disturbances, as well as all equipment being used to conduct the testing (e.g., glassware, meter box, gas cylinders, probe assembly, etc.).

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture Content	320	FTIR – Continuous Sampling

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with an EPA Method 1 verification measurement provided by the Field Team Leader. These measurements will be included in the test report.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample will be collected during each test run. The bags will be collected from the positive pressure side of the sample pump and conditioner. They will be collected through a manifold with a restriction (either rotameter or critical orifice) to ensure even filling throughout the course of the run. Samples will be concurrent with the test runs. The bag samples will be analyzed on site with a gas analyzer. The remaining stack gas constituent will be assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing will be conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system will consist of a glass nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train will consist of a coiled condenser and four (4) chilled impingers. The first and second impingers will be initially empty, the third will contain 100 mL of de-ionized water and the last impinger will contain 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter will be placed between the second and third impingers. The probe liner heating system will be maintained at a temperature of 248 ±25°F, and the impinger temperature will be maintained at 68°F or less throughout testing. The temperature of the Teflon filter will be maintained greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. If condensate is collected in the first dry impinger, then the front-half of the sample train (the nozzle, probe, and heated pre-weighed filter) will be removed in order to purge the back-half of the sample train (coil condenser, first and second impingers and CPM filter). A glass bubbler will be inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water will be added to the first impinger to raise the water level above the bubbler, then the coil condenser will be replaced. Zero nitrogen will be connected to the condenser, and a 60-minute purge at 14 liters per minute will be conducted. After the completion of the nitrogen purge the impinger contents will be measured for moisture gain. The nitrogen purge will be omitted if minimal condensate is collected in the dry impingers.

The pre-weighed quartz filter will be carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder will be rinsed three (3) times with DI water to remove any adhering particulate matter and these rinses will be recovered in container 2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 will be recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, the coil condenser, impingers 1 and 2 and all connecting glassware will be rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses will be added to container CPM Cont. #1 while the solvent rinses will be recovered in container CPM Cont. #2. The Teflon filter will be removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder will be rinsed with DIUF water and then with acetone, followed by hexane. The water rinse will be added to container CPM Cont. #1 while the solvent rinses will be added to container CPM Cont. #2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture will be determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream will be extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 or CAI 600 FTIR operated by a portable computer. The computer has FTIR spectra of calibration gases stored on the hard drive. These single component calibration spectra are used to analyze the measured sample spectra. The gas components to be measured will be selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio will be measured and recorded to document analyzer performance. A leak check will be performed on the sample cell. The instrument path length will be verified using ethylene as the Calibration Transfer Standard. Dynamic spiking will be performed using a certified standard of the target compound or appropriate surrogate in nitrogen with sulfur hexafluoride blended as a tracer to calculate the dilution factor. All test spectra, interferograms, and analytical method information are recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Low Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

EPA Protocol 1 Calibration Gases – Cylinder calibration gases used will meet EPA Protocol 1 (+/- 2%) standards or will be certified standards.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) will be introduced directly to the instrument sample port. While flowing nitrogen the signal amplitude will be recorded, a background spectra will be taken, a linearity check will be performed and recorded, the peak to peak noise and the root mean square in the spectral region of interest will be measured and a screenshot will be recorded.

Following the zero gas checks, room air will be pulled through the sample chamber and the line width and resolution will be verified to be at 1879 cm-1, the peak position will be entered and the FWHH will be recorded (screenshot). Following these checks, another background spectra will be recorded and the calibration transfer standard (CTS) will be introduced directly to the instrument sample port. The CTS instrument recovery will be recorded and the instrument mechanical response time will be measured.

Next, stack gas will be introduced to the FTIR through the sampling system and several scans will be taken until a stable reading will be achieved. The native concentration of our surrogate or target spiking analyte will be recorded. Spike gas will be introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate and a corresponding dilution ratio will be calculated along with a system response time. Matrix spike recovery spectra will be recorded and will be within the ± 30% of the calculated value of the spike concentration that the method requires.

The matrix spike recovery will be conducted once at the beginning of the testing and the CTS recovery procedures will be repeated following each test run. The corresponding values will be recorded.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Nozzles. Nozzles are measured three (3) times prior to initiating sampling with a caliper. The maximum difference between any two (2) dimensions is 0.004 in.
- Digital Calipers. Calipers are calibrated annually by Alliance by using gage blocks that are calibrated annually by an outside laboratory.

- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.
- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. A mass flow controller calibration is conducted on each Environics system annually following the procedures in the Manufacturer's Operation manual. A methane/ethane penetration factor check is conducted on the total hydrocarbon analyzers equipped with non-methane cutters every six (6) months following the procedures in 40 CFR 60, Subpart JJJJ. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- An isokinetic sampling rate of 90-110% will be maintained, as applicable.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

4.3 Analytical Laboratory

Analytical laboratory selection for sample analyses is based on the capabilities, certifications and accreditations that the laboratory possesses. An approved analytical laboratory subcontractor list is maintained with a copy of the certificate and analyte list as evidence of compliance. Alliance assumes responsibility to the client for the subcontractor's work. Alliance maintains a verifiable copy of the results with chain of custody documentation.

Jon Niermann, *Chairman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 14, 2024

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2024
Expiration Date: 02/28/2025
Document ID: TX-C24-00053

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2024

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix K

Special Conditions

Permit Numbers 2975 and PSDTX778M2

Emission Standards

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates," and those sources are limited to the emission limits and other conditions specified in the attached table including emissions from maintenance, startup, and shutdown (MSS) activities represented on pages B-1 and B-2 of the February 11, 2005, amendment application for Recovery Furnace Nos. 1 and 2.

   In addition, this permit authorizes all emissions from planned startup and shutdown activities associated with facilities or groups of facilities that are authorized by this permit.

Fuel Specifications

2. Fuel for mill combustion sources shall be limited as follows:

   A. Fuel for No. 2 Power Boiler (Emission Point Number [PN PB02]) shall be limited to bark and wood materials (defined as any uncontaminated wood materials including but not limited to sawdust, pallets, size-reduced limbs, and any other wood material from a tree such as nut shells); pipeline-quality, sweet natural gas as defined in the General Rules; Nos. 2, 4, and 6 fuel oil containing less than 3 percent sulfur by weight; primary clarifier underflow fiber cake (sludge from the wastewater treatment plant) as defined in the file by correspondence dated October 21, 1994, or used railroad crossties (26.2 tons per hour [tph] based on a 30-day average). All railroad crossties used as fuel in the No. 2 Power Boiler shall meet the specifications of Title 40 Code of Federal Regulations (40 CFR) Part 241, Subpart B, § 241.4(a). **(11/22)**

   The burning rate for bark is limited to 75 tph. Compliance with this rate shall be determined by a 30-day average. Records shall be maintained on-site for a rolling 24-month period and made available to personnel from the TCEQ upon request.

   B. Fuel for the No. 1 Power Boiler (EPN PB01) shall be limited to natural gas. Nos. 2, 4, and 6 fuel oils containing no more than 3 percent sulfur by weight. If the sulfur content of the fuel oil will exceed 3 weight percent, the permit holder must notify the TCEQ Regional Office and propose a fuel mixing plan that will not cause an exceedance of the maximum allowable emission rates; otherwise, the permit holder must obtain approval from the Executive Director.

   Annual fuel firing rates (MMBtu/yr, HHV) are limited as follows: Natural Gas - 5,725,625; No. 6 Fuel Oil - 681,120; Total Fuel Oils (Nos. 2, 4, and 6 Fuel Oils) - 3,300,910; Total - All Fuels (Natural Gas and Fuel Oils) - 5,725,625.

   While firing only No. 6 fuel oil, the total hours of operation for the No. 1 Power Boiler over any consecutive 12-month period shall not exceed a maximum of 720 hours.

   C. The Nos. 1 and 2 Lime Kilns (EPNs LK01 and LK02) shall burn only pipeline-quality, sweet natural gas as defined in the General Rule and Nos. 2, 4, and 6 fuel oils containing less than 3 percent sulfur by weight.

   D. Auxiliary fuel for the Recovery Furnace Nos. 1 and 2 shall be only pipeline-quality, sweet natural gas as defined in the General Rules.

   E. Auxiliary fuel for the NCG Oxidation Unit shall be sweet natural gas. This fuel shall be used, as necessary, to maintain the required minimum temperature in the NCG Oxidation Unit.

Use of any other fuel shall require prior approval from the Executive Director of the Texas Commission on Environmental Quality (TCEQ).

Federal Applicability

3. These facilities shall comply with all applicable requirements of the U.S. Environmental Protection Agency (EPA) regulations on Standards of Performance for New Stationary Sources in 40 CFR Part 60, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart BB - Kraft Paper Mills (The Smelt Dissolving Tank No. 2, the non-condensable gas (NCG) oxidation unit, the Recovery Furnace Nos. 1 and 2, and all affected facilities);

   C. Subpart D - Commercial Steam Generating Units (Power Boiler No. 2 [EPN PB02]); and

   D. Subparts A and BB, § 60.283 (a)(1)(iii) only - Kraft Pulp Mills (Power Boiler No. 2 [EPN PB02]).

4. These facilities shall comply with all applicable requirements of the EPA regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 63, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart S – Pulp and Paper Industry;

   C. Subpart MM - Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (Lime Kiln Nos. 1 and 2 (Emission Point Nos. [EPN] LK01 and LK02), Recovery Furnace Nos. 1 and 2 (EPNs RB01 and RB02), and Smelt Dissolving Tank Nos. 1 and 2 (EPNs SM01 and SM02); and

   D. Subpart DDDDD - Industrial, Commercial, and Institutional Boilers (Power Boiler No. 1 [EPN PB01] and Power Boiler No. 2 [EPN PB02], and all affected facilities).

5. These facilities shall comply with all applicable requirements of the EPA Regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 61, specifically the following:

   A. Subpart A - General Provisions; and

   B. Subpart E – Mercury (Power Boiler No. 2 [EPN PB02]).

Opacity/Visible Emission Limitations

6. Opacity of emissions from Power Boiler No. 1, the Smelt Tank Scrubber Nos. 1 and 2, the Lime Kiln Stack Nos. 1 and 2, the NCG oxidation unit scrubber, and the Recovery Furnace Stack Nos. 1 and 2 shall not exceed 20 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in Title 30 Texas Administrative Code (30 TAC) §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

7. Opacity of emissions from any uncontrolled stationary vent shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS. If this condition is violated, further controls may be required to be installed and/or implemented to limit visible emissions.

8. Opacity of emissions from the A-Line and B-Line Bleach Plant Scrubbers shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

Operational Limitations, Work Practice, and Plant Design

9. Power Boiler No. 1 (EPN PB01) emission concentrations are limited as follows during production operations:

   A. Nitrogen oxides (NO_x): 0.6 lb/ million British Thermal Unit (MMBtu) (24-hour average).

   B. Carbon monoxide (CO): 400 parts per million dry volume (ppmv), corrected to 3 percent dry oxygen. (24-hour average).

   C. Sulfur dioxide (SO_2): 440 ppmv (3-hour average) for fuel oil firing.

10. In-stack concentration of sulfur dioxide (SO_2) from Recovery Furnace Nos. 1 and 2 shall not exceed 300 parts per million by volume (ppmv) and 100 ppmv during production operations, averaged over a three-hour and a yearly period, respectively, and corrected to a dry 8 percent oxygen (O_2) basis. Compliance with the SO_2 concentrations provided in this condition may be determined by the use of continuous monitoring data.

11. The No. 1 Lime Kiln shall comply with the following limitations during production operations:

   A. The maximum total reduced sulfur (TRS) shall be 20 parts per million by volume (ppmv) corrected to 10 percent oxygen (O_2) (measured as hydrogen sulfide, 12-hour average).

   B. The maximum total carbon monoxide shall be 0.064lb/MMBtu (short term)(24-hr average) and 0.051 lb/MMBtu (annual).

   C. The maximum nitrogen oxides shall be 0.17 lb/MMBtu (fuel oil) (24-hour average) and 0.18 lb/MMBtu (natural gas) (24-hour average).

12. PB01 shall be equipped with multi-cyclones to control emissions of PM, and shall be equipped with at least a 218.9-foot tall stack, as measured from the ground level, to provide adequate dispersion of the boiler exhaust and shall have no raincaps or other similar devices that will prevent adequate dispersion of the boiler exhaust. The permit holder shall install stack testing port in the boiler stack.

13. The EPN PB02 shall be equipped with multi-cyclones and a scrubber with the following control efficiencies: 95 percent removal efficiency for hydrogen chloride, 98.5 percent for total particulate matter (PM) and 90 percent for SO_2.

14. Maximum hourly emission rates (ER) for EPN PB02 shall be based on 24-hour averages (except for SO_2 when firing fuel oil, which shall be based on a three-hour averaging time according to 30 TAC §112.9 and NO_x, which shall also be based on a three-hour averaging time according to 40 CFR Part 60, Subpart D).

    The mill is authorized to operate:

    24 hours/day, 7 days/week, 52 weeks/year, and 8,760 hours /year and 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

15. Emissions of chlorine (Cl_2) and chlorine dioxide (ClO2) from the bleaching plant shall be minimized by the use of weak wash (sodium sulfide solution) scrubbers equipped with a pH monitor and control system. The solution of the scrubbers shall be maintained at a minimum pH of eight in order to insure that the emission control efficiencies are maintained at the following values:

Scrubber and Emission Point No.	Emission Control Efficiencies
B-line (BP14)	95 percent (Cl_2/ClO2)
B-line (BP15)	95 percent (Cl_2/ClO2)
A-line (BP16)	95 percent (Cl_2/ClO2)

    The bleach plant lines are also authorized to operate as follows:

    A. When both the A- and B-lines are operating, the B-line bleach plant vents can be routed to the A-line bleach plant scrubber (EPN BP16).

    B. When the B-line is not operating, the A-line bleach plant vents can be routed to the B-line bleach plant scrubbers (EPNs BP14 and BP15).

        This is in line with MAERT statement that emissions from all three scrubbers shall be summed for compliance.

16. In order to maintain the maximum combustion efficiency for TRS compounds and NCGs, the NCG oxidation unit shall be operated as shown in Special Condition No. 21 with a residence time of 0.11 seconds (minimum) and a TRS removal efficiency of 99.9 percent. Immediate corrective action shall be taken when the O_2 deviates below 4 percent per (3-hour rolling average).

17. The SO_2 packed tower scrubber on the NCG oxidation unit shall use a recirculating sodium hydroxide solution. The solution shall be maintained at the minimum pH to ensure good SO_2 removal.

18. Recovery Furnace No. 1 (EPNs RB01A and RB01B) shall be limited to 54.5 tph of black liquor solids and a natural gas firing rate of 375 MMBtu/per hour (hr). Recovery Furnace No. 2 (EPNs RB02A and RB02B) is limited to 99.25 tph of black liquor solids and a natural gas firing rate of 750 MMBtu/hr. The maximum hourly ER for most pollutants from Recovery Furnace Nos.1 and 2 are based on a 24-hour averaging time except for TRS (as hydrogen sulfide [H_2S]) which is based on a 12-hour averaging time while PM and SO_2 are based on a 3-hour averaging time.

    The maximum ER for the Recovery Furnace Nos. 1 and 2 shall be split between the two stacks in the MAERT for accounting purposes only. To determine compliance with the MAERT, the

emission rates listed for each stack shall be summed since each furnace is a single facility and the individual stack emissions may vary.

In order to comply with the PM/PM_{10} MSS emission limits represented in the MAERT for the four Recovery Furnace Stacks (EPNs RB01A, RB01B, RB02A, and RB02B) during planned MSS activities, the planned MSS activities shall be limited to 25 hours per year for each of the four Recovery Furnace Stacks.

19. Lime Kiln No. 1 (LK01) is limited to 228 tons per day and 68,620 tons per year. The maximum firing rate for LK01 using either Nos. 2, 4, or 6 fuel oils shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 420,480 MMBtu/yr. The maximum firing rate for LK01 using natural gas shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 550,000 MMBtu/yr.

20. Lime Kiln No. 2 (LK02) shall be limited to 400 tons per day of lime with a burner rating of 132.3 MMBtu/hr for short-term oil firing or 113.3 MMBtu/hr for sustained oil firing, and 113.3 MMBtu/hr for both short-term and sustained firing for natural gas. The maximum hourly ER for most pollutants from EPN LK02 shall be based on a 24-hour averaging time except for TRS (as H_2S) which is based on a 12-hour averaging time while PM and SO_2 shall be based on a three-hour averaging time.

Demonstration of Continuous Compliance

21. The following parameters shall be monitored and recorded:

Table 1: Monitoring Parameters and Limits

Unit	Parameter	Limit
Smelt Tank Scrubber No. 1	PM - Fan motor current	Title V Compliance Assurance
	PM - Liquid flow rate to scrubber	Monitoring (CAM)*
	PM - Liquid flow rate to fan	Title V CAM*
	PM (Opacity) - Fan motor current	Title V CAM*
	PM (Opacity) - Liquid flow rate to scrubber	Title V Periodic Monitoring*
	PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring*
		Title V Periodic Monitoring*

Unit	Parameter	Limit
Smelt Tank Scrubber No. 2[H]	PM - Fan motor current PM - Liquid flow rate to scrubber PM - Liquid flow rate to fan PM (Opacity) - Fan motor current	Title V CAM * Title V CAM* Title V CAM* TitleV Periodic Monitoring*
Smelt Tank Scrubber No. 2[H]	PM (Opacity) - Liquid flow rate to scrubber PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring* Title V Periodic Monitoring*
Precipitator Ash Tank No. 2	Temperature	235^{O}F maximum, daily average
No. 2 Recovery Boiler Ash Tank	Temperature	235^{O}F maximum, daily average
Power Boiler No. 1	Opacity SO_2 - Fuel sulfur content	20 percent Title V Periodic Monitoring*
Power Boiler No. 2[I]	PM - Liquid flow rate PM - Pressure drop PM (Opacity) - Liquid flow rate PM (Opacity) - Pressure drop SO_2 NO_x O_2	Title V CAM* Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring* MAERT MAERT
Lime Kiln No. 1 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop	Title V CAM * Title V CAM* Title V Periodic Monitoring*

Unit	Parameter	Limit
	PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring*
Lime Kiln No. 2 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop PM (Opacity) - Liquid flow rate	Title V CAM * Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring*
A-Line Bleach Plant Scrubber	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber North	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber South	PM (opacity) -pH of scrubbing liquid PM (opacity) - Fan motor current PM(Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*

Unit	Parameter	Limit
Recovery Furnace No. 1 Stack[H]	PM - Opacity TRS SO_2 Black liquor solids Opacity	Title V CAM* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 54.5 ton/hr (24-hr average) 20% maximum
Recovery Furnace No. 2 Stack[H]	PM - Opacity PM (Opacity) - Opacity TRS SO_2 Black liquor solids	Title V CAM* Title V Periodic Monitoring* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 99.25 ton/hr (24-hr average)
NCG Oxidation Unit	TRS - Combustion Chamber temperature Excess O_2 in exhaust SO_2 - pH of scrubbing liquid SO_2 - Liquid flow rate	Title V CAM* with a minimum temperature of 1579^{O}F. <20 ppmv of Methanol (3-hour rolling averaging period) 4% minimum 7.0 minimum# 150 gpm minimum#

* The specific limit is included in the “Additional Monitoring Requirements Section” in the Title V permit (Permit No. O-01378).

H-see NSPS BB for recordkeeping requirements.

I-see NSPS D for recordkeeping requirements.

CAM Requirements for SO_2 emissions from NCGO1: In order to maintain adequate SO_2 control for the emissions associated with the NCG Oxidation Unit, the control device associated with this source shall be monitored according to the following:

Table 2: Monitoring Parameters for NCG Oxidation Unit

Control Device	Monitoring Parameter	Minimum Monitoring Frequency**	Deviation limit
NCG Oxidation Unit Scrubber (NCGO1)	pH	once per day	7.0 minimum
	Liquid flow rate	once per day	150 gpm

** International Paper may elect to collect monitoring data on a more frequent basis than is required by the minimum frequency and calculate a daily average for purposes of determining whether a deviation has occurred. However, the additional points must be collected on a regular basis and shall not be collected and used in particular instances in order to avoid reporting deviations.

pH: Each monitoring devices shall be cleaned with an automatic cleaning system, or cleaned weekly using hydraulic, chemical, or mechanical cleaning. Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least weekly, whichever is more frequent, and shall be accurate to within +0.5 pH unit.

Liquid flow rate: Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within one of the following:

- ±2% of span; or
- ±5% of design liquid flow rate

The monitoring parameter must be measured and recorded at the frequency indicated above. Immediate corrective action should be taken if the monitoring parameter falls outside of the range specified in this condition.

22. Disposal of particulate collected in all control devices shall be accomplished in such a manner which will prevent PM from becoming airborne.

23. The permit holder shall install, calibrate, and maintain a continuous emission monitoring system (CEMS) to measure and record the in-stack concentration of NO_x and SO_2 from Power Boiler No. 2 (EPN PBO2), TRS, and SO_2 from Recovery Furnace No. 1 (EPNs RBO1A and RBO1B) and Recovery Furnace No. 2 (EPNs RBO2A and RBO2B), and TRS from Lime Kiln Nos. 1 and 2 (EPNs LKO1 and LKO2).

    A. The CEMS shall meet the design and performance specifications, pass the field tests, and meet the installation requirements and the data analysis and reporting requirements specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B. If there are no applicable performance specifications in 40 CFR Part 60, Appendix B, contact

the TCEQ Office of Permitting, and Registration, Air Permits Division for requirements to be met.

B. Section 1 below applies to sources subject to the quality-assurance requirements of 40 CFR Part 60, Appendix F; section 2 applies to all other sources:

(1) The permit holder shall assure that the CEMS meets the applicable quality-assurance requirements specified in 40 CFR Part 60, Appendix F, Procedure 1. Relative accuracy exceedances, as specified in 40 CFR Part 60, Appendix F, § 5.2.3 and any CEMS downtime shall be reported to the appropriate TCEQ Regional Director, and necessary corrective action shall be taken. Supplemental stack concentration measurements may be required at the discretion of the appropriate TCEQ Tyler Regional Director. Downtime is not considered to include periods when the CEMS is operational but the 24-hour span drift exceeds the allowable amounts.

(2) The system shall be zeroed and spanned daily and corrective action taken when the 24-hour span drift exceeds two times the amounts specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B, or as specified by the TCEQ if not specified in Appendix B. Zero and span are not required on weekends and plant holidays if instrument technicians are not normally scheduled on those days, unless the monitor is required by a subpart of NSPS or NESHAPS in which case zero and span shall be done daily without exception.

Each monitor shall be quality-assured at least quarterly using cylinder gas audits (CGA) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.2, with the following exception: RATAs are not required for these systems. For non-NSPS sources, an equivalent quality-assurance method approved by the TCEQ may also be used and an annual RATA is not required.

C. The monitoring data shall be reduced to hourly average concentrations at least weekly, using a minimum of four equally-spaced data points from each one-hour period. The individual average concentrations shall be reduced to units of the permit allowable ER in pounds per hour (lb/hr) at least once every calendar quarter (except for O_2) as follows:

The measured hourly average concentration from the CEMS shall be multiplied by the gas flow rate (either as measured according to 40 CFR Part 60, Appendix A, Methods 1 through 4, or as calculated by appropriate F factor according to 40 CFR Part 60, Appendix A, Method 19) to determine the hourly ER.

D. All monitoring data and quality-assurance data shall be maintained for a period of 60 months. The data from the CEMS may, at the discretion of the TCEQ, be used to determine compliance with the conditions of this permit.

E. For SO_2 from EPNs RBO1A & RBO1B and EPNs RBO2A & RBO2B, and TRS from EPNs LKO1 and LKO2, up to 5 percent invalid monitoring data on a rolling 12-month basis is acceptable provided it is only generated when the monitor is broken down, out-of-control (producing inaccurate data); being repaired, having maintenance performed, or being calibrated (data not obtained during any daily zero and span performed is not considered invalid data).

The data availability shall be calculated as the total fired unit operating hours for which quality-assured data was recorded divided by the total fired unit operating hours. The measurements missed shall be estimated using engineering judgment and the methods used recorded. Options to increase system reliability to an acceptable value, including a redundant CEMS, may be required by the TCEQ Tyler Regional Director.

24. The holder of this permit shall install, calibrate, and maintain a continuous opacity monitoring system (COMS) to measure and record the in-stack concentration of opacity from PB01. The COMS shall be operated in accordance with 40 CFR § 60.13. This special condition shall only apply when fuel oil is being fired in PB01. **(01/18)**

25. Upon request by the TCEQ Executive Director, the holder of this permit shall be required to perform stack sampling analysis for PM, total volatile organic compounds (VOC), NO_x, CO, SO_2, methanol, and formaldehyde and/or other testing as required to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere from the facilities covered by this permit. Sampling must be conducted in accordance with appropriate procedures of the TCEQ Sampling Procedures Manual or in accordance with applicable U.S. Environmental Protection Agency Code of Federal Regulations procedures. Any deviations from those procedures must be approved by the TCEQ Executive Director prior to sampling. The holder of this permit is responsible for providing sampling and testing facilities and conducting the sampling and testing operations at his expense.

    The facilities shall operate at the maximum achievable fuel-firing rate during stack emission testing. Primary operating parameters that enable determination of fuel-firing rate shall be monitored and recorded during the stack test. These parameters are to be determined at the pretest meeting. If the facilities are unable to operate at maximum fuel-firing rate during testing, then future fuel-firing rate may be limited to the rate established during testing. Additional stack testing may be required when higher fuel-firing rates are achieved.

26. Upon request by the Executive Director of the TCEQ or any local air pollution control program having jurisdiction, the holder of this permit shall provide a sample and/or an analysis of the fuel utilized in this facility or shall allow air pollution control agency representatives to obtain a sample for analysis.

27. Due to the high moisture content in the gas stream exiting the scrubber, a continuous opacity monitor as specified in NSPS D is not feasible. To verify the particulate emissions are within NSPS limits, the Power Boiler No. 2 shall be tested once a year for total suspended particulate and any other pollutant at the request of the TCEQ Regional Office.

Recordkeeping Requirements

28. Records shall be maintained at this facility site and made available at the request of personnel from the TCEQ or any other air pollution control program having jurisdiction to demonstrate compliance with permit limitations. These records shall be totaled for each calendar month, retained for a rolling 60-month period, and include the following:

    A. Records of all production rates, ERs, and operating parameters necessary to demonstrate compliance with this permit on-site for a rolling five-year period. Records shall include certification from all suppliers of used railroad crossties that all railroad crossties received at the site meet the specifications of 40 CFR Part 241, Subpart B, § 241.4(a). The holder shall provide access and/or copies of these records to the Executive Director of the TCEQ and/or his representatives and any local air pollution control program upon request. **(11/22)**

    B. The quantity of each fuel (MMBtu/hr basis) fired per month (PB01 only).

    C. The quantity of calcium oxide (tons) produced per day.

D. Annual report from the natural gas supplier identifying total H_2S content and from the fuel oil supplier identifying total sulfur content of Nos. 2, 4, and 6 fuel oils sold to permit holder to demonstrate compliance with this permit.

E. Copies of stack sampling reports conducted on the facilities covered by this permit. The stack sampling reports shall be kept at the site for a period of at least five years from the time sampling was completed.

F. Preventive maintenance, schedule maintenance, and repairs performed on any abatement devices shall be recorded as they occur.

29. All the records required by this condition shall be maintained for at least five years and made available to representatives of the TCEQ or any local air pollution control program having jurisdiction upon request.

Date: November 15, 2022

Emission Sources - Maximum Allowable Emission Rates

Permit Numbers 2975 and PSDTX778M2

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SM01	No. 1 Smelt Tank Scrubber	PM	10.90	47.74
		PM_{10}	10.90	47.74
		$PM_{2.5}$	10.90	47.74
		VOC (note a)	1.37	6.02
		SO_2	3.28	14.37
		H_2SO_4	0.15	0.66
		TRS (note b)	1.80	7.88
		NO_X	1.80	7.88
		NH_3	2.51	8.99
SM02	No. 2 Smelt Tank Scrubber	PM	19.85	86.94
		PM_{10}	19.85	86.94
		$PM_{2.5}$	19.85	86.94
		VOC	2.50	10.95
		SO_2	6.78	29.70
		H_2SO_4	0.31	1.36
		TRS	3.28	14.35
		NO_X	3.28	14.35
		NH_3	4.57	16.37
LK01** (A^1)	Lime Kiln No. 1	PM	27.60	99.80
		PM_{10}	27.60	99.80
		$PM_{2.5}$	27.60	99.80

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	2.20	8.10
		SO_2	2.30	8.40
		H_2SO_4	0.06	0.13
		TRS	2.60	9.30
		NO_X	18.90	49.50
		CO	6.80	14.20
PB01*** (A^1, A^2)	No. 1 Power Boiler (Natural Gas and Fuel Oil Firing)	PM	61.21	185.22
		PM_{10}	61.21	185.22
		$PM_{2.5}$	61.21	185.22
		VOC	8.26	16.70
		NO_X	567.60	1717.69
		SO_2	841.20	1328.25
		CO	264.88	801.59
		H_2SO_4	4.03	4.43
		TRS	0.67	0.26
LK02** (A^1)	Lime Kiln No. 2	PM	26.30	115.19
		PM_{10}	26.30	115.19
		$PM_{2.5}$	26.30	115.19
		NO_X	38.91	145.90
		SO_2	1.20	5.26
		H_2SO_4	0.25	1.07
		CO	4.44	19.45
		TRS	2.50	10.95
		VOC	4.00	17.52

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
PB02**** (A^1, A^2, A^3)	Power Boiler No. 2 (including MSS) (note c)	PM	108.70	466.58
		PM_{10}	108.70	466.58
		$PM_{2.5}$	108.70	466.58
		VOC	54.81	237.80
		NO_X	326.10	1399.75
		SO_2	770.00	780.66
		CO	1102.55	4732.57
		H_2SO_4	16.57	71.02
		TRS	1.66	6.74
RB01A** (A^1, A^2)	No. 1 Recovery Furnace North Stack (Normal ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01A** (A^4)	No. 1 Recovery Furnace North Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB01B** (A^1, A^2)	No. 1 Recovery Furnace South Stack (Normal Ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01B** (A^4)	No. 1 Recovery Furnace South Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB02A** (A^1, A^2)	No. 2 Recovery Furnace West Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02A** (A^4)	No. 2 Recovery Furnace West Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
RB02B** (A^1, A^2)	No. 2 Recovery Furnace East Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02B** (A^4)	No. 2 Recovery Furnace East Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
BG01 (A^1)	Lime System Baghouse No. 1	PM	0.06	0.21
		PM_{10}	0.06	0.21
		$PM_{2.5}$	0.06	0.21
BG02 (A^1)	Lime System Baghouse No. 2	PM	0.10	0.44
		PM_{10}	0.10	0.44
		$PM_{2.5}$	0.10	0.44
LS01	No. 1 Lime Slaker	PM	0.02	0.08
		PM_{10}	0.02	0.08
		$PM_{2.5}$	0.02	0.08
		VOC	0.39	1.41
		NH_3	9.39	33.63
LS02	No. 2 Lime Slaker	PM	0.02	0.10
		PM_{10}	0.02	0.10
		$PM_{2.5}$	0.02	0.10
		VOC	0.68	2.99

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		NH_3	17.10	61.24
BP0351 (A^5)	Methanol Storage Tank	CH_3OH	19.03	0.73
BP0368 (A^5)	Hydrogen Peroxide Tank	H_2O_2	2.21	0.09
NCG01 (A^1, A^3)	NCG Oxidation Unit Scrubber	PM	2.57	9.19
		PM_{10}	2.57	9.19
		$PM_{2.5}$	2.57	9.19
		VOC (note a)	1.10	3.95
		NO_X	5.57	19.96
		SO_2	15.84	69.37
		CO	9.94	35.61
		H_2SO_4	6.01	26.28
		TRS	0.99	4.36
NCG02 (A^5)	Combined Contaminated Condensate Tank	TRS	<0.10	0.40
NCGF1	NCG Fugitives (4)	TRS	0.36	1.56
DIG1	Batch Digester Fugitives (4)	VOC	4.80	19.19
		TRS	0.87	3.46
WWTS1 (A^6, A^7)	Waste Water Treatment Fugitives (4)	VOC	348.16	740.78
		TRS	22.82	81.72
BP14#	B-Line Bleach Plant Scrubber (North)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BP15#	B-Line Bleach Plant Scrubber (South)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37
BP16#	A-Line Bleach Plant Scrubber (5)	Cl_2	0.20	0.86
		ClO_2	11.31	49.51
		CO	39.00	117.37
		VOC	4.17	12.28
		TRS	0.12	0.37
BP01	Bleach Plant Fugitives (4)	Cl_2	0.20	1.00
		ClO_2	0.20	1.00
CLT01 (A^5)	No. 1 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
CLT02 (A^5)	No. 2 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
WLT01 (A^5)	No. 1 Weak Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLT02 (A^5)	No. 2 Weak Liquor Storage Tank (5)	VOC	0.54	2.34
		TRS	0.12	0.51
HLT01 (A^5)	No. 1 Strong/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
HLT02 (A^5)	No. 2 Storage/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SCT01 (A[5])	No. 1 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SCT02 (A[5])	No. 2 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS01 (A[5])	No. 1 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS02 (A[5])	No. 2 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST01 (A[5])	No. 1 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST02 (A[5])	No. 2 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
BLDF01 (A[5])	Black Liquor Digester Fill Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
CT01 (A[5])	Spill Collection Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
ST01 (A[5])	Swing Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST01 (A[5])	No. 1 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST02 (A[5])	No. 2 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST03 (A[5])	No. 3 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BOT01 (A^5)	Evaporator Boil Out Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
DT01 (A^5)	Black Liquor Dump Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLSC01 (A^5)	Weak Liquor Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
FOT (A^5)	Fuel Oil Tank (5)	VOC	1.52	6.64
		TRS	0.19	0.84
CPFUG (note d)	Caustic Plant Fugitives (4)	NH_3	7.31	26.17
		VOC	16.25	68.30
		TRS	3.18	13.91
CP01 (A^5)	No. 1 Causticizer Tanks (5)	NH_3	2.59	9.28
		VOC	0.01	0.03
CP02 (A^5)	No. 2 Causticizer Tank (5)	NH_3	4.72	16.89
		VOC	0.01	0.06
WLOXT1 (A^5)	White Liquor Oxidation Tank (5)	NH_3	0.10	0.44
		VOC	0.26	1.16
		TRS	0.56	2.45
KNCONV	A-and B-Line Knotter Conveyor (4)	VOC	0.01	0.04
AQS	A-Line Quaternary Screen (4)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
BQS	B-Line Quaternary Screen (4)	VOC	0.01	0.03
		TRS	<0.01	<0.01
ASDT (A^5)	A-Line Screen Dilution	VOC	0.01	0.02

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Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
	Tank (5)	TRS	<0.01	<0.01
BSDT (A^5)	B-Line Screen Dilution Tank (5)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
ADHV1/ADSP1	A-Line Decker Hood Vent and A-Line Decker Seal Pit Vent (5)	VOC	9.24	27.20
		TRS	4.06	11.95
BDHV1/BDSP1	B-Line Decker Hood Vent and B-Line Decker Seal Pit Vent (5)	VOC	13.55	54.41
		TRS	5.95	23.89
CPS1 (note e)	Chip/Bark Handling Fugitives (4)	PM	3.35	13.59
		PM_{10}	1.58	6.43
		$PM_{2.5}$	1.58	6.43
REJBIN2	Reject Bin	CH_3OH	0.03	0.10
LOG-1A	Log Processing 1A (4)	PM	0.73	3.20
		PM_{10}	0.22	0.96
		$PM_{2.5}$	0.22	0.96
HDST1 (A^5)	No. 1 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
HDST2 (A^5)	No. 2 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
ALDST (A^5)	A-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
BLDST (A^5)	B-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
AWTST (A^5)	A-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94

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Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BWTST (A[5])	B-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
(note f)	Extruder No. 5 Vents and Fugitives (4)	PM	3.18	13.91
		PM_{10}	3.18	13.91
		$PM_{2.5}$	3.18	13.91
		VOC	2.07	9.05
		NO_X	0.29	1.29
		CO	0.25	1.08
		SO_2	<0.01	0.01
(note f)	Extruder No. 7 Vents and Fugitives (4)	PM	3.18	13.92
		PM_{10}	3.18	13.92
		$PM_{2.5}$	3.18	13.92
		VOC	2.07	9.05
		NO_X	0.30	1.33
		CO	0.26	1.12
		SO_2	<0.01	0.01
(note g)	Nos. 1 and 3 Paper Machines and Dryer Exhaust (5)	PM	0.19	0.83
		PM_{10}	0.19	0.83
		$PM_{2.5}$	0.19	0.83
		VOC	8.74	38.27
		NO_X	2.50	10.93
		CO	2.10	9.18
		SO_2	0.01	0.07
TNK0115, TNK0116,	Starch Silo Nos. 1 -3	PM	0.02	0.02

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
and TNK0175 (A[1])		PM_{10}	0.02	0.02
		$PM_{2.5}$	0.02	0.02
PAINTYD (A[8])	Sitewide Painting Activities (4)	PM	70.31	32.72
		PM_{10}	70.31	32.72
		$PM_{2.5}$	70.31	32.72
		VOC	96.05	28.94
BSS1 – BSS5 (A[5])	Nos. 1-5 Bleached Stock Storage Tanks (4)	VOC	0.04	0.17
(note h)	Paper Machine Tanks and Chests (4)	VOC	0.16	0.68
HVLC-1	HVLC Vent	VOC	157.78	23.09
		CO	3.19	0.51
		TRS	33.30	4.77
AWSST (A[5])	A-Line Washed Stock Chest (5)	VOC	0.72	3.16
		TRS	0.28	1.21
BWSST (A[5])	B-Line Washed Stock Chest (5)	VOC	0.74	3.26
		TRS	0.28	1.21

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) PM - particulate matter, suspended in the atmosphere, including PM_{10}
PM_{10} - total particulate matter equal to or less than 10 microns in diameter, including $PM_{2.5}$, as represented
$PM_{2.5}$ - particulate matter equal to or less than 2.5 microns in diameter
Emissions of $PM_{2.5}$ is added to the Maximum Allowable Emission Rates Table (MAERT) upon issuance of the permit. These emissions were previously quantified and authorized as PM or PM_{10}, but were not speciated in the MAERT.
VOC - volatile organic compounds as defined in Title 30 Texas Administrative Code §101.1
SO_2 - sulfur dioxide
H_2SO_4 - sulfuric acid
TRS - total reduced sulfur
NO_x - nitrogen oxides
NH_3 - ammonia
Cl_2 - chlorine
ClO_2 - chlorine dioxide (chlorine peroxide)

Emission Sources - Maximum Allowable Emission Rates

CO - carbon monoxide
H_2S - hydrogen sulfide
CH_3OH - methanol
H_2O_2 - hydrogen peroxide
$CHCl_3$ - chloroform
$CHBrCl_2$ - bromodichloromethane

(4) Fugitive emissions are an estimate only and should not be considered as a maximum allowable emission rate.
(5) The VOC and TRS emission rates for this point are considered to be estimates only and are not intended to be enforceable limits.
(6) Planned startup and shutdown emissions are included, as well as planned maintenance activities identified as part of permit alteration issued on April 24, 2013.
A^1 Emissions from planned startup and shutdown activities included.
A^2 Emissions from soot blowing included.
A^3 Emissions from control device for evaporator and concentrators boil outs included.
A^4 Emissions from planned MSS activities included.
A^5 Emissions from draining/degassing included.
A^6 Emissions from dredging and other maintenance (e.g., ponds and collection system) included.
A^7 Emissions from maintenance throughout the mill included.
A^8 Emissions from maintenance painting included.

* Unless otherwise specified, emission rates are based on operating 8,760 hours per year or 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

** Pound per hour rates, TRS emissions based on a 12-hour averaging time, PM/PM_{10} and SO_2 based on a 3-hour averaging time, all other pollutants are based on a 24-hour averaging time.

*** Pound per hour rates, SO_2 and NO_x emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

**** Pounds per hour rates, SO_2 emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

Emissions from the Bleach Plant Scrubbers (EPNs BP14, BP15, and BP16) should be summed up when determining compliance since individual emissions may vary.

Notes:

(a) All VOCs are reported as carbon unless otherwise specified.
(b) All TRS emission rates are reported as H_2S unless otherwise specified.
(c) The SO_2 hourly rates for the Power Boiler No. 2 include combustion of total reduced sulfur compounds during periods when the NCG oxidizer is inoperable.
(d) Green liquor clarifiers (2), green liquor storage tanks (3), weak wash storage tanks (2), white liquor clarifiers (2), white liquor storage tanks (4), white liquor/digestor fill tank, mud washers (2), mud storage tanks (2), mud precoat filters (2), and dregs filter.
(e) These fugitives occur from the chip and RDF handling operations.
(f) Includes the pre-treater stacks (EX5PRE1, EX5PRE2, EX7PRE1, EX7PRE2), the laminator stack (EX5LAM1, EX5LAM2, EX7LAM1, EX7LAM2), the post-treater stack (EX5POSTTR, EX7POSTTR), and fugitives (EXFUG5, EXFUG7) for each extruder.
(g) The Paper Machine Nos.1 and 3 consist of 18 exhaust vents and fugitive emissions.
(h) Includes pine tanks (PINETK3, PINETK1S, PINETK1), hardwood tanks (HDWD1, HDWD3), machine chests (MACHCH1, MACHCH3), and broke storage tanks (BRST1A, BRST1B, BRST3A).

Date: August 10, 2017

Last Page of Report

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source Tested:
No. 2 Smelt Tank Scrubber (SM02)

Test Date:
October 28, 2025

Project No. AST-2025-3989

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citations	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
W Graphic Packaging International Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Timothy Branham
timothy.branham@alliancetg.com
(479) 206-1993

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewers
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

COMPANY:		Graphic Packaging International		SOURCE:		SM02	
REVIEWER:				DATE OF SAMPLING:		October 28, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. D	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. D	Operating parameters of the pollution control equipment					
13.	App. D	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. C	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	N.A.	Chain of custody of samples					
31.	N.A.	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. C	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the sources and operating conditions that were tested during the specific test date and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections of this test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

November 17, 2025

Riley Wilson – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

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Appendix D Facility Data
Appendix E SSTP and Associated Documentation
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Appendix G Illustrations
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Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to the provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing was conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Tested Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-2: Project Team

Facility Personnel	John Fussell
Alliance Personnel	Riley Wilson Timothy Branham

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) that was developed by Alliance and approved by GPI. The SSTP is presented in Appendix E.

1.3 Technical Discussion

No operational or sampling pauses were recorded, and no technical difficulties or protocol deviations were encountered during this test program.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on October 28, 2025. Testing consisted of determining the concentration and emission rate of TRS at the exhaust of SM02.

Table 2-1 provides a summary of the emission testing results with comparisons to the applicable NSPS or TCEQ permit limits. Any difference between the summary of results listed in the following table and the detailed results contained in the appendices is due to rounding for presentation.

Table 2-1: Summary of Results

Run Number	Run 1	Run 2	Run 3	Average
Date	**10/28/25**	**10/28/25**	**10/28/25**	**--**
Total Reduced Sulfur (as H_2S) Data				
Emission Rate, lb/hr	0.70	0.91	0.91	0.84
Permit Limit, lb/hr	--	--	--	3.28
Percent of Limit, %	--	--	--	**26**
Emission Factor, lb/ton of black liquor solids	0.0075	0.0097	0.0097	0.0089
NSPS Limit, lb/ton of black liquor solids	--	--	--	0.033
Percent of Limit, %				**27**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods that are listed in Table 3-1. Method descriptions are provided below, and quality assurance/quality control data is provided in Appendix C.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Total Reduced Sulfur	16	Instrumental Analysis
Gas Dilution System Certification	205	---

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1 requirements. The inside diameter of the stack was determined. The upstream and downstream distances between the sampling point and the nearest flow disturbance were measured. The distance between each flow disturbance and the sampling point was expressed in units of stack diameters or stack equivalent diameter. In order to determine the minimum number of traverse points, the upstream and downstream distances were compared to Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas pressure differential (impact pressure vs. static pressure), static pressure and temperature at each measurement point. Pressure differential and static pressure were determined using an S-type pitot tube, an inclined manometer and flexible tubing used to connect both parts of the system. Stack gas temperature was determined using a K-type thermocouple and a pyrometer. The sensor tip of the K-type thermocouple was aligned with the nozzles of the S-type pitot tube in accordance with method requirements.

Stack gas pressure differential, static pressure and temperature measurements were recorded during each test run and were utilized to calculate stack gas velocity in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A –Oxygen and Carbon Dioxide Concentrations – Instrumental

The oxygen (O_2) and carbon dioxide (CO_2) concentrations were determined in accordance with U.S. EPA Reference Test Method 3A. Data was continuously collected and reported as one-minute averages. The sampling system consisted of a stainless-steel probe, unheated Teflon sample line(s), a gas conditioning system and the identified gas analyzer. The gas conditioning system consisted of a filter to remove particulate matter, and a non-contact condenser used to remove moisture from the stack gas. A portable non-contact condenser was placed in the system directly after the probe. A single-point sampling location was used for the determination of the stack gas molecular weight. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 16 – Total Reduced Sulfur

The total reduced sulfur testing was conducted in accordance with U.S. EPA Reference Test Method 16. The total reduced sulfur compounds consisted of hydrogen sulfide (H_2S), methyl mercaptan (MeSH), dimethyl sulfide (DMS), and dimethyl disulfide (DMDS).

The sampling system consisted of a heated Teflon probe, heated Teflon sample line, gas conditioning system, leak-free pump, unheated Teflon sample line, and a gas chromatograph (GC), which was equipped with a flame photometric detector (FPD). The gas conditioning system consisted of three (3) Teflon impingers. The first two (2) impingers each contained 100 mL of citrate buffer (for SO_2 removal), and the third impinger was empty. Each test run consisted of 16 injections, which were performed over a period of at least 3 hours.

The GC/FPD was calibrated for each reduced sulfur compound (H_2S, COS and CS_2) with a certified calibration gas, which was diluted with a dilution system. The dilution system was validated in accordance with EPA Method 205 to produce three (3) or more concentration levels, which spanned the linear range of the FPD. Calibration precision and calibration drift test values were maintained in accordance with EPA Method 16 requirements.

3.4 U.S. EPA Reference Test Method 205 – Gas Dilution System Certification

A calibration gas dilution system field check was conducted in accordance with U.S. EPA Reference Test Method 205. An initial three-point calibration was conducted with individual Protocol 1 gases on the analyzer used to complete the dilution system field check. Multiple dilution rates and total gas flow rates were utilized to force the dilution system to perform two (2) dilutions on each mass flow controller. The diluted calibration gases were sent directly to the analyzer, and the analyzer's response was recorded in an electronic field data sheet. A mid-level supply gas, which was certified to a concentration that was within 10% of one of the gas divider settings described above, was introduced directly to the analyzer, and the analyzer response was recorded in an electronic field data sheet. The analyzer's response was within 2% of the cylinder's concentration. These steps were repeated three (3) times. The average analyzer response was within 2% of the predicted gas concentration. No single injection differed by more than 2% from the average instrument response for its corresponding dilution. The Method 205 data is included in the Quality Assurance/Quality Control Appendix.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Direct Calibration & Calibration Error Test

Direct calibration consisted of introducing Low-Level gas directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration, and once the analyzer reading was stabilized, the analyzer value was recorded. This process was repeated with the High-Level gas. The Calibration Error Test consisted of sequentially introducing Low, Mid, and High-Level calibration gases directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

The system bias and response time were determined by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe, and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it

reached a stable value, and this value was recorded. Next, Low-Level gas was introduced at the probe, and the time that was required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) was recorded. If the Low-Level gas was zero gas, the response was 0.5% or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and the initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

Post test system bias checks were conducted by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe. Once the analyzer reading stabilized, the analyzer value was recorded. Next, Low-Level gas was introduced at the probe, and the analyzer response was recorded once it stabilized. If the System Bias was not within 5.0 percent of the Calibration Span or 0.5% absolute difference, the data was invalidated, and the Calibration Error Test and System Bias were repeated.

Post Test Drift Checks

Drift between pre- and post-run System Bias was within 3 percent of the Calibration Span or 0.5% absolute difference. If the drift exceeded 3 percent or 0.5%, the Calibration Error Test and System Bias were repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check was conducted prior to initiating testing. The pollutant concentrations were measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point was sampled for a minimum of twice the system response time.

The pollutant concentration at each traverse point did not differ more than 5 percent or 0.5 ppmv/0.3% (whichever was less restrictive) of the average pollutant concentration. A single point was sampled during the test runs. Copies of stratification check data can be found in the Quality Assurance/Quality Control Appendix.

Data Collection

A Data Acquisition System equipped with a battery backup was used to record the instrument response as one (1) minute averages. This data was continuously stored as a *.CSV file in Excel format, which was saved to the computer's hard drive. At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

Appendix A - Example Calculations

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	--	= barometric pressure, in. Hg
ΔH	--	= pressure differential of orifice, in H_2O
Pm	--	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	29.63	= barometric pressure, in. Hg
Pg	-0.50	= static pressure, in. H_2O
Ps	29.59	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Vm \times Pm \times Y}{Tm}$$

where,

Y	0.000	= meter correction factor
Vm	--	= meter volume, cf
Pm	--	= absolute meter pressure, in. Hg
Tm	--	= absolute meter temperature, °R
Vmstd	--	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	--	= weight of H_2O collected, g
Vwstd	--	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{\wedge}\left(6.37 - \left(\frac{2{,}827}{Ts + 364.47}\right)\right)}{Ps}$$

where,

Ts	146.6	= stack temperature, °F
Ps	29.6	= absolute stack gas pressure, in. Hg
BWSsat	0.233	= dimensionless

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	--	= standard wet volume, scf
Vmstd	--	= standard meter volume, dscf
BWS	--	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	0.233	= moisture fraction (theoretical at saturated conditions)
BWSmsd	--	= moisture fraction (measured)
BWS	0.233	

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	0.1	= carbon dioxide concentration, %
O_2	20.5	= oxygen concentration, %
Md	28.84	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	28.84	= molecular weight (DRY), lb/lb mol
BWS	0.233	= moisture fraction, dimensionless
Ms	26.32	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.84	= pitot tube coefficient
$\Delta P^{1/2}$	0.619	= average pre/post test velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	606.3	= average pre/post test absolute stack temperature, °R
Ps	29.59	= absolute stack gas pressure, in. Hg
Ms	26.32	= molecular weight of stack gas, lb/lb mol
Vs	39.1	= ft/sec

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	39.1	= stack gas velocity, ft/sec
As	18.99	= cross-sectional area of stack, ft^2
Qa	44,542	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	44,542	= average stack gas flow at stack conditions, acfm
BWS	0.233	= moisture fraction, dimensionless
Ps	29.59	= absolute stack gas pressure, in. Hg
Ts	606.3	= average pre/post test absolute stack temperature, °R
Qs	29,416	= dscfm

Dry Gas Meter Calibration Check (Yqa), percent

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{K \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0	= meter correction factor, dimensionless
Θ	0	= run time, min.
Vm	--	= total meter volume, dcf
K	0.0319	= K-factor, (in. Hg/°R) * cfm^2
Tm	--	= absolute meter temperature, °R
ΔH@	0	= orifice meter calibration coefficient, in. H_2O
Pb	--	= barometric pressure, in. Hg
ΔH avg	--	= average pressure differential of orifice, in H_2O
Md	--	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	#VALUE!	= average square root pressure differential of orifice, $(\text{in. } H_2O)^{1/2}$
Yqa	--	= percent

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	20.1	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.9	= average of pretest & posttest calibration responses, % dry
C_{O_2}	20.5	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	0.2	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.1	= actual concentration of calibration gas, % dry
C_M	9.7	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	0.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 16

TRS - Outlet Concentration (C_{TRS}), ppmvd

$$C_{TRS} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.8	= average analyzer value during test, ppmvd
C_o	NA	= average of pretest & posttest zero responses, ppmvd
C_{MA}	NA	= actual concentration of calibration gas, ppmvd
C_M	NA	= average of pretest & posttest calibration responses, ppmvd
C_{TRS}	4.5	= TRS Concentration, ppmvd

TRS - Outlet Emission Rate (ER_{TRS}), lb/hr

$$ER_{TRS} = \frac{C_{TRS} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 453.592 \frac{g}{lb}}$$

where,

C_{TRSc}	4.5	= TRS - Outlet Concentration, ppmvd
MW	34.081	= TRS molecular weight, g/g-mole
Qs	29,416	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{TRS}	0.70	= lb/hr as H_2S

TRS - Outlet Emission Factor (EF_{TRSPPT}), lb/ton

$$EF_{TRS} = \frac{ER_{TRS} \times 2{,}000 \ \frac{lb}{ton}}{FR}$$

where,

ER_{TRS}	0.70	= TRS - Outlet Emission Rate, lb/hr as H_2S
FR	188,000	= Feed Rate, lb/hr
EF_{TRS}	0.007	= lb/ton

Appendix B - Field Data

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

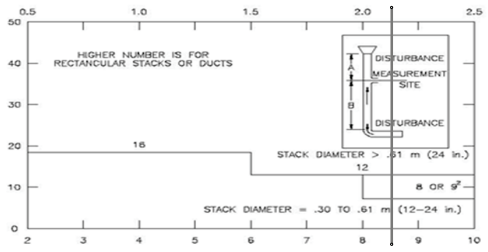
Run Number		Run 1	Run 2	Run 3	Average
Date		10/28/25	10/28/25	10/28/25	--
Start Time		8:15	11:35	14:58	--
Stop Time		11:14	14:34	17:57	--
Source Data					
Feed Rate, ton/hr BLS	FR	94	94	94	94
Input Data - Outlet					
Volumetric Flow Rate (M1-4), dscfm	Qs	29,416	29,913	29,037	29,455
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	20.46	20.48	20.50	20.48
CO_2 Concentration, % dry	C_{CO_2}	0.12	0.09	0.08	0.10
TRS (as SO_2) Concentration, ppmvd	C_{TRS}	4.5	5.7	5.9	5.4
TRS (as H_2S) Emission Rate, lb/hr	ER_{TRSc}	0.70	0.91	0.91	0.84
TRS (as H_2S) Emission Factor, lb/ton BLS	EF_{TRSc}	0.0075	0.0097	0.0097	0.0089

Method 1 Data

Location	Graphic Packaging International Texarkana Mill - Queen City, TX
Source	No. 2 Smelt Tank Scrubber (SM02)
Project No.	AST-2025-4218
Date	10/28/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Measurer (Initial and Date):	TJB 10/28/25	
Reviewer (Initial and Date):	RW 10/28/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall (in)	Distance from outside of port (in)
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

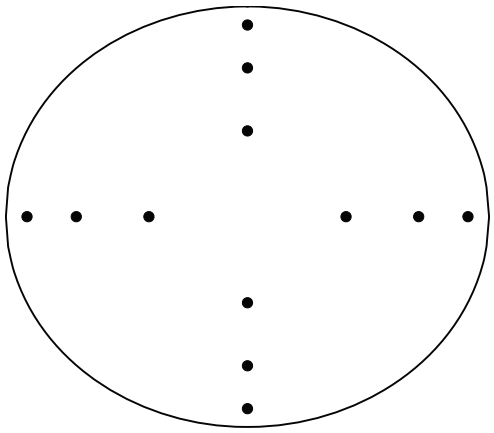
Stack Diagram

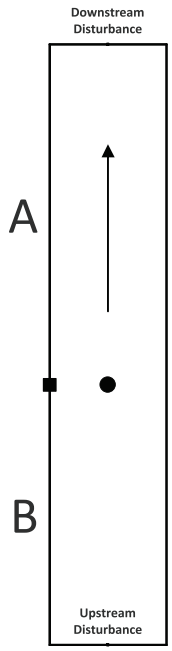
A = 55 ft.

B = 42 ft.

Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Date 10/28/25

Sample Point	Angle (ΔP=0)
1	2
2	5
3	5
4	1
5	6
6	8
7	5
8	2
9	2
10	0
11	8
12	5
Average	4.1

Field Data
Method 2 Data

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Run No.	1		2		3	
Date	10/28/25		10/28/25		10/28/25	
Status	VALID		VALID		VALID	
Start Time	10:45		11:50		16:20	
Stop Time	10:55		12:00		16:32	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.25	146	0.24	145	0.26	145
2	0.29	146	0.33	145	0.28	146
3	0.37	147	0.39	146	0.35	146
4	0.52	147	0.55	147	0.51	147
5	0.48	147	0.47	147	0.45	147
6	0.45	146	0.42	147	0.40	148
B-1	0.36	145	0.38	146	0.35	145
2	0.31	146	0.33	146	0.33	147
3	0.35	147	0.36	147	0.35	148
4	0.39	147	0.42	147	0.38	148
5	0.45	148	0.47	145	0.45	149
6	0.42	147	0.40	145	0.43	148

					Average
Square Root of ΔP, (in. WC)$^{1/2}$	$(\Delta P)^{1/2}$	0.619	0.627	0.612	0.619
Average ΔP, in. WC	(ΔP)	0.39	0.40	0.38	0.39
Pitot Tube Coefficient	(Cp)	0.838	0.838	0.838	0.838
Barometric Pressure, in. Hg	(Pb)	29.63	29.63	29.63	29.63
Static Pressure, in. WC	(Pg)	-0.50	-0.48	-0.45	-0.48
Stack Pressure, in. Hg	(Ps)	29.59	29.59	29.60	29.59
Average Temperature, °F	(Ts)	146.6	146.1	147.0	146.6
Average Temperature, °R	(Ts)	606.3	605.8	606.7	606.2
Moisture Fraction @ Saturation	(BWSsat)	0.233	0.230	0.235	0.233
Moisture Fraction	(BWS)	0.233	0.230	0.235	0.233
O2 Concentration, %	(O_2)	20.46	20.48	20.50	20.5
CO2 Concentration, %	(CO_2)	0.12	0.09	0.08	0.1
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.83	28.83	28.83
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.32	26.35	26.29	26.32
Velocity, ft/sec	(Vs)	39.1	39.6	38.7	39.1
VFR at stack conditions, acfm	(Qa)	44,542	45,085	44,132	44,586
VFR at standard conditions, scfh	(Qsw)	2,300,688	2,330,761	2,278,220	2,303,223
VFR at standard conditions, scfm	(Qsw)	38,345	38,846	37,970	38,387
VFR at standard conditions, dscfm	(Qsd)	29,416	29,913	29,037	29,455

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.10	0.19	3.83
Cal Gas Concentration (C_{MA})	10.02	10.09	NA
Pretest System Zero Response	0.13	0.07	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.14	0.08	NA
Pretest System Cal Response	9.91	9.78	NA
Posttest System Cal Response	9.92	9.69	NA
Average Cal Response (C_M)	9.92	9.74	NA
Corrected Run Average (Corr)	20.46	0.12	4.49
8:15	20.27	0.19	2.90
8:16	20.27	0.18	2.98
8:17	20.25	0.18	3.06
8:18	20.23	0.18	3.01
8:19	20.19	0.19	3.11
8:20	20.18	0.19	3.10
8:21	20.16	0.19	3.19
8:22	20.13	0.19	3.27
8:23	20.09	0.20	3.35
8:24	20.08	0.20	3.46
8:25	20.07	0.20	3.55
8:26	20.05	0.20	3.64
8:27	20.02	0.20	3.59
8:28	19.97	0.20	3.69
8:29	20.00	0.20	3.97
8:30	20.06	0.19	3.98
8:31	20.07	0.19	3.97
8:32	20.09	0.19	3.90
8:33	20.11	0.19	3.80
8:34	20.12	0.18	3.60
8:35	20.14	0.18	3.38
8:36	20.14	0.18	3.33
8:37	20.15	0.18	3.45
8:38	20.14	0.19	3.33
8:39	20.12	0.19	3.26
8:40	20.09	0.19	3.38
8:41	20.09	0.20	3.48
8:42	20.05	0.20	3.35
8:43	20.04	0.21	3.24
8:44	20.07	0.19	3.17
8:45	20.09	0.18	3.15
8:46	20.09	0.18	3.09
8:47	20.10	0.18	3.04
8:48	20.14	0.17	3.12
8:49	20.16	0.17	3.13

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
8:50	20.15	0.17	3.02
8:51	20.17	0.17	2.96
8:52	20.13	0.18	3.02
8:53	20.13	0.18	3.04
8:54	20.13	0.18	3.05
8:55	20.14	0.18	3.06
8:56	20.15	0.18	3.08
8:57	20.13	0.18	3.04
8:58	20.14	0.18	3.02
8:59	20.14	0.18	3.07
9:00	20.13	0.18	3.12
9:01	20.15	0.18	3.24
9:02	20.15	0.18	3.20
9:03	20.17	0.18	3.12
9:04	20.15	0.18	3.20
9:05	20.15	0.18	3.17
9:06	20.12	0.18	3.17
9:07	20.12	0.18	3.19
9:08	20.13	0.18	3.26
9:09	20.13	0.18	3.21
9:10	20.11	0.18	3.26
9:11	20.06	0.19	3.32
9:12	20.03	0.19	3.34
9:13	20.07	0.19	3.44
9:14	20.07	0.19	3.47
9:15	20.03	0.20	3.49
9:16	20.03	0.20	3.42
9:17	20.09	0.19	3.49
9:18	20.10	0.19	3.48
9:19	20.15	0.18	3.49
9:20	20.18	0.18	3.46
9:21	20.15	0.19	3.47
9:22	20.10	0.19	3.49
9:23	20.12	0.19	3.41
9:24	20.15	0.19	3.40
9:25	20.13	0.19	3.52
9:26	20.15	0.19	3.58
9:27	20.08	0.20	3.54
9:28	19.93	0.22	3.61
9:29	19.90	0.22	3.73
9:30	19.93	0.22	3.78
9:31	19.82	0.24	3.90
9:32	19.80	0.24	4.04
9:33	19.81	0.24	4.04
9:34	19.93	0.22	3.97

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
9:35	20.02	0.21	3.86
9:36	20.06	0.20	3.76
9:37	20.10	0.19	3.72
9:38	20.11	0.19	3.65
9:39	20.10	0.19	3.58
9:40	20.09	0.19	3.58
9:41	20.13	0.18	3.60
9:42	20.14	0.18	3.54
9:43	20.15	0.18	3.53
9:44	20.11	0.19	3.51
9:45	20.11	0.19	3.59
9:46	20.12	0.18	3.68
9:47	20.07	0.19	3.66
9:48	20.03	0.20	3.71
9:49	20.09	0.19	3.71
9:50	20.11	0.19	3.76
9:51	20.16	0.18	3.78
9:52	20.15	0.18	3.81
9:53	20.14	0.18	3.78
9:54	20.11	0.19	3.76
9:55	20.14	0.19	3.75
9:56	20.16	0.19	3.68
9:57	20.14	0.20	3.76
9:58	20.11	0.20	3.80
9:59	20.13	0.20	3.76
10:00	20.17	0.19	3.71
10:01	20.16	0.20	3.73
10:02	20.14	0.22	3.75
10:03	20.16	0.20	3.91
10:04	20.08	0.22	4.02
10:05	20.07	0.23	4.08
10:06	20.09	0.23	4.12
10:07	20.13	0.21	4.14
10:08	20.15	0.19	4.23
10:09	20.15	0.20	4.21
10:10	20.12	0.21	4.29
10:11	20.11	0.22	4.29
10:12	20.10	0.22	4.28
10:13	20.11	0.20	4.31
10:14	20.11	0.21	4.28
10:15	20.05	0.23	4.28
10:16	20.05	0.21	4.33
10:17	20.12	0.20	4.25
10:18	20.10	0.22	4.23
10:19	20.10	0.20	4.25

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
10:20	20.09	0.20	4.26
10:21	20.11	0.20	4.36
10:22	20.15	0.18	4.38
10:23	20.11	0.18	4.34
10:24	20.09	0.19	4.30
10:25	20.09	0.19	4.37
10:26	20.12	0.18	4.49
10:27	20.16	0.18	4.39
10:28	20.16	0.18	4.29
10:29	20.10	0.18	4.25
10:30	20.05	0.19	4.32
10:31	20.02	0.19	4.37
10:32	20.02	0.19	4.43
10:33	20.02	0.20	4.46
10:34	20.03	0.20	4.55
10:35	20.06	0.20	4.61
10:36	20.08	0.19	4.65
10:37	20.11	0.18	4.64
10:38	20.07	0.19	4.61
10:39	20.06	0.18	4.58
10:40	20.10	0.18	4.56
10:41	20.11	0.19	4.60
10:42	20.13	0.18	4.55
10:43	20.12	0.18	4.53
10:44	20.10	0.18	4.51
10:45	20.07	0.19	4.49
10:46	20.08	0.18	4.48
10:47	20.10	0.18	4.56
10:48	20.10	0.18	4.50
10:49	20.12	0.18	4.50
10:50	20.15	0.19	4.37
10:51	20.14	0.19	4.29
10:52	20.11	0.19	4.19
10:53	20.10	0.19	4.34
10:54	20.02	0.20	4.34
10:55	20.04	0.21	4.40
10:56	20.07	0.21	4.41
10:57	20.17	0.19	4.47
10:58	20.11	0.19	4.51
10:59	20.11	0.18	4.41
11:00	20.08	0.20	4.43
11:01	20.08	0.21	4.61
11:02	20.03	0.22	4.64
11:03	20.05	0.20	4.62
11:04	20.10	0.19	4.66

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
11:05	20.11	0.18	4.65
11:06	20.14	0.18	4.58
11:07	20.12	0.20	4.58
11:08	20.14	0.19	4.49
11:09	20.20	0.20	4.44
11:10	20.17	0.19	4.51
11:11	20.20	0.17	4.50
11:12	20.24	0.16	4.47
11:13	20.23	0.17	4.43
11:14	20.23	0.17	4.42

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.12	0.17	4.95
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.08	NA
Posttest System Zero Response	0.15	0.09	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.69	NA
Posttest System Cal Response	9.92	9.68	NA
Average Cal Response (C_M)	9.92	9.69	NA
Corrected Run Average (Corr)	20.48	0.09	5.72
11:35	20.16	0.20	4.78
11:36	20.21	0.20	4.72
11:37	20.21	0.18	4.64
11:38	20.19	0.18	4.57
11:39	20.19	0.18	4.55
11:40	20.19	0.18	4.62
11:41	20.24	0.17	4.52
11:42	20.20	0.19	4.52
11:43	20.20	0.18	4.49
11:44	20.21	0.17	4.46
11:45	20.21	0.17	4.49
11:46	20.23	0.16	4.51
11:47	20.22	0.17	4.52
11:48	20.17	0.18	4.43
11:49	20.07	0.20	4.53
11:50	20.13	0.19	4.48
11:51	20.14	0.20	4.52
11:52	20.15	0.20	4.54
11:53	20.20	0.17	4.54
11:54	20.27	0.16	4.53
11:55	20.26	0.16	4.58
11:56	20.22	0.16	4.56
11:57	20.18	0.16	4.57
11:58	20.16	0.17	4.59
11:59	20.19	0.16	4.63
12:00	20.21	0.16	4.64
12:01	20.23	0.17	4.68
12:02	20.21	0.18	4.70
12:03	20.21	0.17	4.74
12:04	20.21	0.17	4.65
12:05	20.21	0.18	4.60
12:06	20.16	0.20	4.58
12:07	19.99	0.23	4.72
12:08	20.01	0.20	4.81
12:09	20.05	0.19	4.87

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:10	20.06	0.19	5.00
12:11	20.10	0.18	5.06
12:12	20.17	0.17	5.01
12:13	20.22	0.17	4.93
12:14	20.20	0.17	4.87
12:15	20.20	0.17	4.95
12:16	20.23	0.16	4.82
12:17	20.24	0.16	4.73
12:18	20.24	0.16	4.66
12:19	20.27	0.16	4.69
12:20	20.25	0.16	4.68
12:21	20.18	0.17	4.74
12:22	20.20	0.16	4.79
12:23	20.14	0.17	4.67
12:24	20.15	0.17	4.75
12:25	20.19	0.16	4.75
12:26	20.19	0.16	4.78
12:27	20.18	0.17	4.91
12:28	20.17	0.17	4.94
12:29	20.17	0.16	4.90
12:30	20.18	0.16	4.87
12:31	20.16	0.17	4.87
12:32	20.19	0.16	4.95
12:33	20.22	0.16	4.93
12:34	20.23	0.16	4.94
12:35	20.23	0.16	4.91
12:36	20.21	0.16	4.87
12:37	20.22	0.15	4.65
12:38	20.25	0.15	4.35
12:39	20.23	0.15	4.31
12:40	20.22	0.15	4.43
12:41	20.16	0.16	4.53
12:42	20.05	0.18	4.59
12:43	19.92	0.19	4.76
12:44	19.90	0.19	4.86
12:45	19.97	0.18	4.97
12:46	20.06	0.17	4.92
12:47	20.11	0.16	4.93
12:48	20.12	0.16	4.97
12:49	20.18	0.15	4.94
12:50	20.22	0.15	4.96
12:51	20.23	0.15	4.89
12:52	20.21	0.15	4.80
12:53	20.18	0.16	4.72
12:54	20.13	0.16	4.72

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:55	20.11	0.17	4.68
12:56	20.07	0.17	4.74
12:57	20.08	0.17	4.76
12:58	20.02	0.17	4.83
12:59	19.94	0.18	4.96
13:00	19.97	0.18	5.01
13:01	19.94	0.18	4.99
13:02	19.97	0.18	5.08
13:03	20.01	0.17	5.21
13:04	20.05	0.17	5.33
13:05	20.09	0.16	5.35
13:06	20.11	0.16	5.40
13:07	20.11	0.16	5.39
13:08	20.11	0.16	5.35
13:09	20.09	0.16	5.30
13:10	20.07	0.17	5.25
13:11	20.08	0.17	5.24
13:12	20.02	0.18	5.32
13:13	19.98	0.18	5.37
13:14	20.01	0.17	5.39
13:15	19.98	0.18	5.51
13:16	19.95	0.18	5.59
13:17	20.00	0.18	5.53
13:18	20.06	0.17	5.50
13:19	20.06	0.17	5.51
13:20	20.03	0.18	5.42
13:21	20.08	0.18	5.37
13:22	20.08	0.17	5.37
13:23	20.05	0.18	5.35
13:24	20.11	0.17	5.16
13:25	20.15	0.17	5.14
13:26	20.17	0.17	5.14
13:27	20.18	0.17	5.10
13:28	20.18	0.17	5.13
13:29	20.20	0.17	5.22
13:30	20.20	0.17	5.14
13:31	20.17	0.17	5.13
13:32	20.14	0.17	5.16
13:33	20.16	0.18	5.17
13:34	20.17	0.17	5.11
13:35	20.14	0.18	5.15
13:36	20.13	0.18	5.06
13:37	20.10	0.19	5.06
13:38	20.15	0.18	5.10
13:39	20.20	0.17	5.10

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
13:40	20.22	0.16	5.02
13:41	20.21	0.17	4.90
13:42	20.18	0.17	4.88
13:43	20.18	0.17	4.86
13:44	20.13	0.17	4.86
13:45	20.11	0.18	4.87
13:46	20.14	0.18	4.93
13:47	20.12	0.18	4.90
13:48	20.15	0.18	4.87
13:49	20.15	0.17	4.92
13:50	20.16	0.17	4.86
13:51	20.16	0.17	4.86
13:52	20.14	0.17	4.95
13:53	20.13	0.17	4.97
13:54	20.08	0.18	5.00
13:55	20.00	0.19	4.97
13:56	19.97	0.19	5.02
13:57	19.96	0.19	5.07
13:58	19.94	0.19	5.01
13:59	19.96	0.19	5.08
14:00	19.99	0.18	5.17
14:01	20.01	0.18	5.26
14:02	20.01	0.18	5.34
14:03	19.96	0.19	5.33
14:04	19.91	0.19	5.45
14:05	19.97	0.18	5.53
14:06	20.00	0.18	5.32
14:07	19.99	0.18	5.28
14:08	20.02	0.18	5.25
14:09	19.98	0.18	5.25
14:10	20.00	0.18	5.31
14:11	20.03	0.18	5.29
14:12	19.98	0.19	5.24
14:13	20.04	0.18	5.23
14:14	19.97	0.19	5.16
14:15	19.97	0.19	5.25
14:16	20.02	0.18	5.28
14:17	20.01	0.18	5.22
14:18	20.05	0.17	5.17
14:19	20.07	0.17	5.14
14:20	20.06	0.17	5.10
14:21	20.07	0.17	5.18
14:22	20.08	0.17	5.25
14:23	20.07	0.17	5.23
14:24	20.03	0.17	5.07

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
14:25	20.03	0.17	4.96
14:26	20.05	0.17	4.98
14:27	20.13	0.16	4.94
14:28	20.15	0.16	4.93
14:29	20.16	0.16	4.95
14:30	20.19	0.16	4.95
14:31	20.21	0.15	4.90
14:32	20.20	0.16	4.87
14:33	20.22	0.15	4.85
14:34	20.22	0.15	4.70

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.16	0.16	5.31
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.09	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.68	NA
Posttest System Cal Response	9.95	9.65	NA
Average Cal Response (C_M)	9.94	9.67	NA
Corrected Run Average (Corr)	20.50	0.08	5.91
14:58	20.01	0.20	4.79
14:59	19.99	0.20	4.82
15:00	20.00	0.20	4.85
15:01	20.01	0.19	4.81
15:02	20.04	0.19	4.80
15:03	20.06	0.18	4.78
15:04	20.06	0.18	4.78
15:05	20.07	0.18	4.84
15:06	20.12	0.17	4.86
15:07	20.14	0.17	4.96
15:08	20.16	0.17	4.99
15:09	20.13	0.17	4.90
15:10	20.12	0.17	4.93
15:11	20.14	0.17	4.91
15:12	20.18	0.16	4.83
15:13	20.23	0.16	4.77
15:14	20.22	0.16	4.73
15:15	20.26	0.15	4.72
15:16	20.25	0.16	4.59
15:17	20.26	0.15	4.48
15:18	20.28	0.15	4.42
15:19	20.24	0.15	4.41
15:20	20.27	0.14	4.35
15:21	20.28	0.15	4.39
15:22	20.23	0.15	4.53
15:23	20.31	0.14	4.50
15:24	20.18	0.16	4.53
15:25	20.09	0.17	4.67
15:26	20.05	0.18	4.71
15:27	19.95	0.19	4.80
15:28	19.96	0.18	4.93
15:29	19.94	0.19	5.02
15:30	19.96	0.18	5.31
15:31	20.00	0.17	5.56
15:32	20.05	0.17	5.58

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
15:33	20.10	0.16	5.51
15:34	20.16	0.16	5.41
15:35	20.19	0.15	5.40
15:36	20.20	0.15	5.37
15:37	20.21	0.15	5.28
15:38	20.24	0.15	5.17
15:39	20.21	0.15	5.15
15:40	20.20	0.15	5.20
15:41	20.17	0.15	5.15
15:42	20.17	0.15	5.16
15:43	20.19	0.15	5.05
15:44	20.20	0.14	4.97
15:45	20.20	0.14	5.00
15:46	20.21	0.14	4.90
15:47	20.19	0.15	4.92
15:48	20.24	0.14	4.68
15:49	20.22	0.15	4.60
15:50	20.20	0.15	4.63
15:51	20.16	0.16	4.63
15:52	20.15	0.16	4.63
15:53	20.17	0.16	4.66
15:54	20.19	0.15	5.06
15:55	20.22	0.15	5.10
15:56	20.22	0.15	5.13
15:57	20.21	0.15	5.09
15:58	20.20	0.15	4.92
15:59	20.18	0.16	4.91
16:00	20.17	0.16	5.00
16:01	20.19	0.15	4.98
16:02	20.18	0.16	4.89
16:03	20.19	0.15	4.87
16:04	20.21	0.15	4.89
16:05	20.23	0.15	4.84
16:06	20.25	0.15	4.81
16:07	20.27	0.14	4.85
16:08	20.29	0.14	4.91
16:09	20.28	0.14	4.83
16:10	20.28	0.14	4.76
16:11	20.30	0.14	4.85
16:12	20.31	0.14	4.89
16:13	20.28	0.14	4.79
16:14	20.27	0.14	4.70
16:15	20.24	0.15	4.69
16:16	20.24	0.15	4.73
16:17	20.24	0.15	4.93

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
16:18	20.16	0.16	5.01
16:19	20.13	0.16	4.93
16:20	20.15	0.16	4.95
16:21	20.11	0.17	4.98
16:22	20.09	0.17	5.06
16:23	20.04	0.17	5.23
16:24	19.93	0.19	5.39
16:25	19.91	0.20	5.53
16:26	19.96	0.19	5.63
16:27	20.00	0.19	5.72
16:28	20.06	0.18	5.89
16:29	20.12	0.17	6.01
16:30	20.10	0.17	5.94
16:31	20.13	0.17	5.88
16:32	20.11	0.18	5.78
16:33	19.99	0.19	5.78
16:34	19.89	0.21	5.95
16:35	19.91	0.21	6.06
16:36	19.96	0.19	6.07
16:37	20.02	0.18	6.04
16:38	20.07	0.18	6.15
16:39	20.09	0.17	6.07
16:40	20.11	0.16	5.95
16:41	20.17	0.16	5.92
16:42	20.19	0.15	5.79
16:43	20.17	0.16	5.66
16:44	20.21	0.15	5.57
16:45	20.23	0.15	5.43
16:46	20.26	0.15	5.31
16:47	20.26	0.15	5.16
16:48	20.27	0.15	5.07
16:49	20.28	0.15	5.03
16:50	20.26	0.15	4.97
16:51	20.26	0.15	5.08
16:52	20.28	0.15	5.16
16:53	20.28	0.15	5.10
16:54	20.29	0.15	5.06
16:55	20.31	0.15	5.10
16:56	20.30	0.16	5.05
16:57	20.24	0.16	4.98
16:58	20.10	0.18	4.92
16:59	19.97	0.20	4.88
17:00	19.91	0.20	5.33
17:01	19.92	0.20	5.99
17:02	19.96	0.19	6.20

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:03	20.01	0.17	6.25
17:04	20.06	0.17	6.23
17:05	20.07	0.16	6.12
17:06	20.05	0.16	6.12
17:07	20.01	0.17	6.20
17:08	20.09	0.16	6.22
17:09	20.13	0.16	6.13
17:10	20.18	0.15	6.07
17:11	20.19	0.15	6.08
17:12	20.18	0.15	5.96
17:13	20.19	0.15	5.93
17:14	20.17	0.16	5.90
17:15	20.15	0.16	5.90
17:16	20.13	0.16	5.87
17:17	20.17	0.16	5.95
17:18	20.13	0.16	5.84
17:19	20.13	0.16	5.85
17:20	20.14	0.17	6.02
17:21	20.13	0.17	6.18
17:22	20.15	0.17	6.14
17:23	20.16	0.16	6.02
17:24	20.16	0.16	6.00
17:25	20.13	0.17	5.95
17:26	20.15	0.16	5.87
17:27	20.15	0.16	5.84
17:28	20.17	0.16	5.89
17:29	20.23	0.15	5.91
17:30	20.23	0.15	5.89
17:31	20.25	0.14	5.91
17:32	20.24	0.15	5.83
17:33	20.20	0.15	5.74
17:34	20.19	0.15	5.65
17:35	20.18	0.15	5.72
17:36	20.20	0.15	5.73
17:37	20.17	0.16	5.69
17:38	20.15	0.16	5.72
17:39	20.22	0.15	5.71
17:40	20.26	0.15	5.67
17:41	20.27	0.15	5.74
17:42	20.26	0.15	5.72
17:43	20.28	0.15	5.62
17:44	20.30	0.15	5.69
17:45	20.29	0.15	5.61
17:46	20.28	0.15	5.49
17:47	20.29	0.15	5.31

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:48	20.28	0.15	5.42
17:49	20.29	0.15	5.47
17:50	20.27	0.15	5.54
17:51	20.28	0.15	5.25
17:52	20.28	0.15	5.11
17:53	20.28	0.15	5.20
17:54	20.28	0.15	5.17
17:55	20.27	0.15	5.20
17:56	20.26	0.15	5.35
17:57	20.26	0.15	5.40

Appendix C - QA/QC

M205 QA Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date

Method Criteria	EPA
Parameter	O_2
Make	Servomex
Model	4900
S/N	900006
Span	19.9
Cylinder Number ID	
Zero	NA
Mid	CC780763
High	EB0074264
Cylinder Certified Values	
Zero	0.00
Mid	10.02
High	19.90
Instrument Response (% or ppm)	
Zero	0.00
Mid	10.04
High	19.91
Calibration Gas Selection (% of Span)	
Mid	50.4
High	100.0
Calibration Error Performance (% of Span)	
Zero	0.0
Mid	0.1
High	0.1
Linearity (% of Range)	
	0.1

Environics ID:	8033
Environics MFC Configuration:	10L, 10L, 1L
Component/Balance Gas:	O_2/N_2
Cylinder Gas ID (Dilution):	EB0074264
Cylinder Gas Concentration (Dilution), %:	19.90
Cylinder Gas ID (Mid-Level):	CC780763
Cylinder Gas Concentration (Mid-Level), %:	10.02

Target Mass Flow Contollers	Target Dilution (%)	Target Flow Rate lpm	Target Concentration (%)	Actual Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)
10L/10L*	90.0	7.0	17.9	17.9	17.95	18.04	18.08	18.02	0.12
10L/10L*	50.0	7.0	10.0	10.0	10.01	10.06	10.04	10.04	0.04
10L/1L	20.0	4.0	4.0	4.0	3.98	3.98	3.95	3.97	-0.03
10L/1L	10.0	4.0	2.0	2.0	1.99	2.05	2.04	2.03	0.03

*Not all AST Environics Units have 2-10L Mass Flow Controllers. For these units the 90% @ 7lpm and 80% @ 7lpm injections will not be conducted.

Average Analyzer Concentration (%)	Injection 1 Error (±2%)	Injection 2 Error (±2%)	Injection 3 Error (±2%)
18.02	-0.4%	0.1%	0.3%
10.04	-0.3%	0.2%	0.0%
3.97	0.3%	0.3%	-0.5%
2.03	-1.8%	1.2%	0.7%

Mid-Level Supply Gas Calibration Direct to Analyzer

Calibration Gas Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)	Average Error (±2%)
10.02	10.05	10.07	10.04	10.05	0.03	0.3%

Location Graphic Packaging International Texarkana Mill - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
10/28/25	PT-201-7	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
10/28/25	PR-208-1	145.0	147.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
10/28/25	Weather Station	NA	NA	NA	Texarkana, TX

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Make	Servomex	Servomex	Ametek
Model	4900	4900	9900
S/N	900006	900006	S13821
Operating Range	0-25	0-25	0-100
Cylinder ID			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	CC780763	CC780763	CC331726
High	EB0074264	EB0074264	CC331726
Cylinder Certified Values			
Zero	0.0	0.0	0.0
Low	NA	NA	NA
Mid	10.02	10.09	125.6
High	19.9	19.83	125.6
Cylinder Expiration Date			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	9/16/33	9/16/33	3/7/27
High	8/12/32	8/12/32	3/7/27
Type of Sample Line	Unheated Sample Line		

Stratification Check

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	8:15	20.27	0.19
2	8:17	20.25	0.18
3	8:19	20.19	0.19
Average		20.2	0.2
Criteria Met		Single Point	Single Point

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Expected Average Concentration	19.00	1.00	7.00
Span Between			
Low	19.00	1.00	7.00
High	95.00	20.00	35.00
Desired Span	19.90	19.83	30.00
Low Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Mid Range Gas			
Low	7.96	7.93	12.00
High	11.94	11.90	18.00
High Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Actual Concentration (% or ppm)			
Zero	0.00	0.00	0.00
Low	NA	NA	NA
Mid	10.02	10.09	15.00
High	19.90	19.83	30.00
Response Time (seconds)	45.00	45.00	45.00
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid
Instrument Response (% or ppm)			
Zero	-0.03	0.01	0.15
Low	NA	NA	NA
Mid	9.96	9.90	15.61
High	19.88	19.74	30.22
Performance (% of Span or Cal. Gas Conc.)			
Zero	0.15	0.05	0.50
Low	NA	NA	NA
Mid	0.30	0.96	2.03
High	0.10	0.45	0.73
Status			
Zero	PASS	PASS	PASS
Low	NA	NA	NA
Mid	PASS	PASS	PASS
High	PASS	PASS	PASS

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 10/28/25		
Span Value	19.90	19.83
Initial Instrument Zero Cal Response	-0.03	0.01
Initial Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.13	0.07
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.91	9.78
Posttest System Upscale Response	9.92	9.69
Bias (%)		
Pretest Zero	0.80	0.30
Posttest Zero	0.90	0.35
Pretest Span	-0.25	-0.61
Posttest Span	-0.20	-1.06
Drift (%)		
Zero	0.10	0.05
Mid	0.05	-0.45
Run 2 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.08
Posttest System Zero Response	0.15	0.09
Pretest System Upscale Response	9.92	9.69
Posttest System Upscale Response	9.92	9.68
Bias (%)		
Pretest Zero	0.90	0.35
Posttest Zero	0.90	0.40
Pretest Span	-0.20	-1.06
Posttest Span	-0.20	-1.11
Drift (%)		
Zero	0.00	0.05
Mid	0.00	-0.05
Run 3 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.09
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.92	9.68
Posttest System Upscale Response	9.95	9.65
Bias (%)		
Pretest Zero	0.90	0.40
Posttest Zero	0.90	0.35
Pretest Span	-0.20	-1.11
Posttest Span	-0.05	-1.26
Drift (%)		
Zero	0.00	-0.05
Mid	0.15	-0.15

Post Test Calibration Drift Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter		TRS (w SO2 gas) - Outlet
Actual Concentration (ppm)		
Mid		15.0
Instrument Response (ppm)		
Mid	**Initial**	15.6
	Post Test	15.7
Performance (% of Calibration Gas)		
Mid		0.3
Status		
Mid		PASS

Note: TRS calibrations were conducted using SO2/N2 calibration gas. Analyzer calibration drift was calculated by evaluating the initial instrument response versus the final instrument response. Performance is acceptable if this value is less than or equal to 3% or 0.5 ppmv.

System Performance Determinations

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	TRS - Outlet
H2S Gas Concentration, ppm	26
Cylinder Certification Number	CC194342
Run 1	
Pretest System Response, ppm	24.67
Posttest System Response, ppm	22.18
Pretest System Performance (%)	94.9
Posttest System Performance (%)	85.3
Run 2	
Posttest System Response, ppm	22.47
Posttest System Performance (%)	86.4
Run 3	
Posttest System Response, ppm	23.36
Posttest System Performance (%)	89.8

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Response Times, seconds			
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**	**TRS - Outlet**
Zero	35	35	45
Low	NA	NA	NA
Mid	35	35	45
Average	35.0	35.0	45.0

Alliance
SOURCE TESTING

Mass Flow Controller Calibration

Dilution System Make:	Environics
Dilution System Model:	4040
Dilution System S/N:	8033
Calibration Equipment Make:	Alicat Scientific
Calibration Equipment Model:	M-10SLPD/5MM-D/5M, M-1SLPM-D/5
Calibration Equipment S/N:	NC00075907 / NC0007908
Flow Cell S/N:	272121
Flow Cell S/N:	272120
Calibration Gas:	Nitrogen
Barometric Pressure, mmHg:	29.94
Ambient Temperature, °F:	68

Mass Flow Controller ID	#1			# 2			# 3		
Size, ccm:	10,000			10,000			1,000		
Make:	Environics			Environics			Environics		
Model:	EFC 202			EFC 202			EFC 202		
S/N:	455242005			455242006			455238003		
	Set Flow cc/min	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**
5%	500	494	1.2%	500	490	2.0%	50	48	4.0%
10%	1,000	1,006	0.6%	1,000	1,004	0.4%	100	97	3.0%
20%	2,000	2,025	1.3%	2,000	2,025	1.3%	200	195	2.5%
30%	3,000	3,046	1.5%	3,000	3,040	1.3%	300	294	2.0%
40%	4,000	4,050	1.3%	4,000	4,050	1.3%	400	391	2.3%
50%	5,000	5,066	1.3%	5,000	5,070	1.4%	500	490	2.0%
60%	6,000	6,086	1.4%	6,000	6,088	1.5%	600	589	1.8%
70%	7,000	7,103	1.5%	7,000	7,111	1.6%	700	691	1.3%
80%	8,000	8,133	1.7%	8,000	8,130	1.6%	800	795	0.6%
90%	9,000	9,167	1.9%	9,000	9,170	1.9%	900	904	0.4%
100%	10,000	10,202	2.0%	10,000	10,193	1.9%	1,000	1,016	1.6%

Note: The mass flow controller's calibration values are used by the dilution system's operating software to improve accuracy. These calibrations are not necessarily indicative of the systems overall performance. Performance is verified by conducting a Method 205 prior to each field use.

Calibration Performed By Timothy Branham

Date 2/21/25

Equipment Detail

Model: Type S
ID: 201-7

Calibration Detail

Time: 9:18
T_s: 69 °F
Pb: 29.47 in. Hg
Std Pitot ID: DAL 1
C_{pstd}: 0.990

Flow	ΔPstd			High Side - "A"			Low Side - 'B"		
	Standard	Start	End	ΔPs		σ	ΔPs		σ
fps	in. WC	in. WC	in. WC	in. WC	Cp(a)	Deviation	in. WC	Cp(b)	Deviation
20	0.09	0.09	0.09	0.13	0.840	0.002	0.13	0.840	0.007
30	0.20	0.20	0.20	0.29	0.829	-0.009	0.29	0.822	-0.011
40	0.36	0.36	0.36	0.51	0.832	-0.006	0.51	0.832	-0.001
50	0.56	0.56	0.56	0.78	0.839	0.001	0.79	0.834	0.001
60	0.81	0.81	0.81	1.15	0.831	-0.007	1.15	0.831	-0.002
70	1.10	1.10	1.10	1.50	0.848	0.010	1.55	0.834	0.001
80	1.44	1.44	1.44	2.00	0.840	0.002	2.00	0.840	0.007
90	1.82	1.82	1.83	2.50	0.846	0.008	2.60	0.829	-0.004
EPA Method 2 Section 10.1.3 QA/QC									
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.826	-0.007
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.829	-0.004
				Average	0.838	0.006		0.833	0.004
				Acceptability Criteria	--	≤ 0.01		--	≤ 0.01
					|Cp(a)-Cp(b)|≤ 0.01			|Cp(a)-Cp(b)|=	0.005

Personnel

Calibrated By: Alaina Drouin
Calibration Date: 12/30/24
Reviewed By: Timothy Branham

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12025

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC780763	**Certification Date:**	09/18/2025
Product ID Number:	124300	**Expiration Date:**	09/16/2033
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC780763.20250911-0	**Lot Number:**	CC780763.20250911
Customer PO. NO.:		**Tracking Number:**	113447110
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.09 %**	±0.08 %	NDIR	09/18/2025
Oxygen	**10.02 %**	±0.03 %	MPA	09/18/2025
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726840	CC726840.20211123	04/18/2031	GMIS	N2	O2	9.35 %	0.163	SRM 2659a
CC770488	CC770488.20240512	02/02/2033	GMIS	N2	O2	24.01 %	0.145	C2459101.03
EB0073532	EB0073532.20230816	09/17/2032	GMIS	N2	CO2	9.47 %	0.176	C2281801.04
EB0078951	EB0078951.20230816	09/17/2032	GMIS	N2	CO2	12.44 %	0.227	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i-HL	1162980025	09/08/2025
CO2	NDIR	Thermo	410i-HL	1162980025	09/10/2025

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0074264	**Certification Date:**	08/14/2024
Product ID Number:	124240	**Expiration Date:**	08/12/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0074264.20240730-0	**Lot Number:**	EB0074264.20240730
Customer PO. NO.:		**Tracking Number:**	084251978
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.83 %**	±0.08 %	FTIR	08/14/2024
Oxygen	**19.90 %**	±0.04 %	MPA	08/08/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
EB0022009	EB0022009.20201022	04/05/2030	GMIS	N2	CO2	24.76 %	0.237	C1847810.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/07/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	08/14/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Airgas Specialty Gases
Airgas USA LLC
9810 BAY AREA BLVD
Pasadena, TX 77507
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	GRAPHIC PACKAGING INTERNATIONAL		
Part Number:	E02NI99E15A0005	Reference Number:	163-401487138-1
Cylinder Number:	CC331726	Cylinder Volume:	144.4 CF
Laboratory:	124 - Pasadena (SG06) - TX	Cylinder Pressure:	2015 PSIG
PGVP Number:	A32019	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	May 07, 2019

Expiration Date: May 07, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	125.0 PPM	125.6 PPM	G1	+/- 0.8% NIST Traceable	04/30/2019, 05/07/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11010402	KAL004739	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Jul 28, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SO2-L-NICOLET iS50 AUP2010248	FTIR	Apr 13, 2019

Triad Data Available Upon Request

Signature on file

Approved for Release

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE
NORTH LITTLE ROCK, AR

Blend Type:	GAS	MOL	
Pressure:	1800	psia	**Sales Order: 1394449**
Volume:	125.0	cf	
Dew Point:	0 C		**RBTGS Part No.:** 130254

Cylinder Size: I-150
Valve Outlet: CGA 330 SS
Cylinder No.: **CC194342**
Bar Code No.: 040319029

Lot No.: RR2503141153
Analysis Date: March 24, 2025
Date Issued: March 24, 2025
Expiration Date: March 24, 2026

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Hydrogen Sulfide	7783-06-4	25.0	ppm	26.0	31.4	26.0	ppm	2%	G
Oxygen	7782-44-7	5.0	%	5.10	5.78	5.10	%	2%	H
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical H2S Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Appendix D - Facility Data

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	10/28/2025 14:58:00 PM	10/28/25 11:35	10/28/25 8:15	
	End Time:	10/28/25 17:58	10/28/25 14:35	10/28/25 11:15	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	657.19	656.52	663.25	659.0
FIC2037E.pv	Pri. Air load -- Total (kpph)	372.32	377.74	372.32	374.1
FIC2038E.pv	Sec. Air load (kpph)	332.76	331.01	331.99	331.9
FIC2039E.pv	Tertiary Air load (kpph)	195.07	195.46	197.83	196.1
AT2197E.pv	Excess O2	2.64	2.47	2.48	2.5
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.20	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	75.33	75.54	74.73	75.2
SIC2085E.pv	"B" I.D. fan speed (rpm)	76.15	76.37	75.54	76.0
FY2103E.pv	Bl. Liq. Burn flow (gpm)	408.46	408.93	413.13	410.2
NM2102E.pv	Bl. Liq. % density (%)	71.92	71.85	71.32	71.7
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	259.22	258.75	259.05	259.0
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	95.05	95.04	95.07	95.1
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	81.72	78.89	73.06	77.9
FT2004E.pv	Weak Wash flow to scrubber (gpm)	94.46	87.14	87.83	89.8
TT2268E.PV	Precip. Ash Tank Temp. (F)	224.93	224.46	224.04	224.5
IT3028e.pv	Scrubber fan amps	45.79	45.62	45.26	45.6

Appendix E - Test Plan

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source to be Tested:
No. 2 Smelt Tank Scrubber (SM02)

Proposed Test Dates:
October 29, 2025

Project No. AST-2025-4218

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citation	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameter*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Test Plan/Report Reviewer
Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing will be conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NSPS.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NSPS, the facility will conduct a performance test program to determine the compliance status of the No. 2 Smelt Tank Scrubber (SM02).

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3A, 4, and 16C. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the TCEQ Air Permit Nos. 2975 and PSDTX778M2 and 40 CFR 60, Subpart BBa.
- Emissions testing will be conducted on the exhaust of the No. 2 Smelt Tank Scrubber (SM02).
- Performance testing will be conducted at the maximum normal operation load.
- Each of the three (3) test runs will be approximately 3 hours in duration.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – October 29, 2025					
Equipment Setup & Pretest QA/QC Checks					12 hr
No. 2 Smelt Tank Scrubber (SM02)	VFR	1-2	3	180 min	
	O_2/CO_2	3A			
	BWS	4			
	TRS	16C			
DAY 2 – October 30, 2025					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
No. 2 Smelt Tank Scrubber (SM02)	TRS – 0.033 lb/ton of black liquor solids (BLS) as hydrogen sulfide (H_2S)	60, Subpart BBa
	TRS – 3.28 lb/hr	TCEQ Permit Nos. 2975 and PSDTX778M2

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Total Reduced Sulfur	16C	Instrumental Analysis

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with a verification measurement provided by the Field Team Leader.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3A. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line is used, then a portable non-contact condenser will be placed in the system directly after the probe. Otherwise, a heated Teflon sample line will be used. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a

known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Method 16C – Total Reduced Sulfur

The total reduced sulfur testing will be conducted in accordance with U.S. EPA Reference Test Method 16C. Data will be collected online and reported in one-minute averages during each test run. The sampling system will consist of a heated Teflon-lined probe, gas conditioning system, Teflon sample line(s), tube furnace and the identified analyzer. The gas conditioning system will consist of three (3) chilled Teflon impingers. The first and second impingers will contain 100 mL of citrate buffer solution while the third impinger will be empty. The citrate buffer solution will be used to remove any sulfur dioxide that will be present in the stack gas. The tube furnace will be operated at 800°C ±100°C. The quality control measures are described in Section 3.6.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Direct Calibration & Calibration Error Test

Low-Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. Next, Low-Level gas will be introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) will be recorded. If the Low-Level gas is zero gas, the acceptable response must be 5.0 percent of the upscale gas concentration or 0.5% (whichever was less restrictive). The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. The measurement system response time and initial system bias will be determined from these data. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe. After the analyzer response is stable, the value will be recorded. Next, Low-Level gas will be introduced at the probe, and the analyzer value will be recorded once it reaches a stable response. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference or the data is invalidated, and the Calibration Error Test and System Bias must be repeated.

Post Test Drift Checks

The Drift between pre- and post-run System Bias must be within 3 percent of the Calibration Span or 0.5% absolute difference or the Calibration Error Test and System Bias must be repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check will be conducted prior to initiating testing. The pollutant concentrations will be measured at twelve traverse points (as described in Method 1) or three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point will be sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point do not differ more than 5% or 0.3% (whichever is less restrictive) of the average pollutant concentration, then single point sampling will be conducted during the test runs. If the pollutant concentration does not meet these specifications but differs less than 10% or 0.5% from the average concentration, then three (3) point sampling will be conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differs by more than 10% or 0.5% from the average concentration, then sampling will be conducted at a minimum of twelve (12) traverse points. Copies of stratification check data will be included in the Quality Assurance/Quality Control Appendix of the report.

Data Collection

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 16C

EPA Protocol 1 Calibration Gases

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Direct Calibration

Low-Level sulfur dioxide (SO_2) gas will be introduced directly to analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading will be stable, the analyzer value will be recorded. This process will be repeated for the Mid-Level gas. Next, High-Level gas will be introduced directly to the analyzer, and the response recorded when it will be stable. All values will be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

System Performance Check

A system performance check will be completed prior to sample collection and after each run. The post-test system performance check will be conducted prior to making any sampling system modifications. The SO_2 scrubber system will be pre-conditioned with stack gas for approximately 10 minutes at 2 liters/min. Prior to starting the test run, Hydrogen Sulfide calibration gas ($\leq$ 100 ppmv) will be introduced at the probe tip and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever will be less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The system performance check will be repeated after the conclusion of each test run. The system performance must be within 80 and 120 percent of the calibration gas concentration. The raw run data will be corrected using the post-test system performance values.

Post-Test Direct Calibration Drift Check

Following the completion testing, a post-test calibration drift check will be performed. Mid-level SO_2 calibration gas will be introduced directly to the analyzer. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The drift value did not differ from the certified calibration gas value by more than 3% or 0.5 ppmv.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.

- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

Appendix F - Field Raw Data

Scaling	0-25	0-25	0-1000
Daisy Lab Channel	0	1	2
DAQ Channel	1	2	3
Time	O2 A	CO2 A	CO A
10/28/25 18:45	20.63	0.14	5.55
10/28/25 18:46	20.63	0.14	5.52
10/28/25 18:47	20.63	0.15	5.63
10/28/25 18:48	20.63	0.15	5.58
10/28/25 18:49	20.63	0.14	5.69
10/28/25 18:50	20.63	0.14	5.69
10/28/25 18:51	20.63	0.14	5.7
10/28/25 18:52	20.63	0.14	5.48
10/28/25 18:53	20.63	0.14	5.52
10/28/25 18:54	20.63	0.14	5.5
10/28/25 18:55	20.63	0.14	5.46
10/28/25 18:56	20.63	0.14	5.47
10/28/25 18:57	20.63	0.14	5.57
10/28/25 18:58	20.63	0.14	5.53
10/28/25 18:59	20.63	0.14	5.51
10/28/25 19:00	20.63	0.14	5.47
10/28/25 19:01	20.63	0.14	5.76
10/28/25 19:02	20.63	0.14	5.8
10/28/25 19:03	20.63	0.14	5.59
10/28/25 19:04	20.63	0.14	5.8
10/28/25 19:05	20.63	0.14	5.72
10/28/25 19:06	20.63	0.14	5.39
10/28/25 19:07	20.63	0.13	5.42
10/28/25 19:08	20.63	0.14	5.63
10/28/25 19:09	20.63	0.13	5.4
10/28/25 19:10	20.63	0.13	5.52
10/28/25 19:11	20.63	0.13	5.49
10/28/25 19:12	20.63	0.13	5.5
10/28/25 19:13	20.62	0.13	5.31
10/28/25 19:14	20.62	0.13	5.3
10/28/25 19:15	20.62	0.13	5.45
10/28/25 19:16	20.62	0.13	5.61
10/28/25 19:17	20.62	0.13	5.44
10/28/25 19:18	20.62	0.13	5.27
10/28/25 19:19	20.62	0.13	5.28
10/28/25 19:20	20.62	0.13	5.26
10/28/25 19:21	20.62	0.13	5.41
10/28/25 19:22	20.62	0.13	5.45
10/28/25 19:23	20.62	0.13	5.46
10/28/25 19:24	20.63	0.13	5.33
10/28/25 19:25	20.62	0.13	5.25
10/28/25 19:26	20.62	0.13	5.18
10/28/25 19:27	20.62	0.13	5.26
10/28/25 19:28	20.62	0.13	5.18
10/28/25 19:29	20.62	0.13	5.18
10/28/25 19:30	20.62	0.13	5.17
10/28/25 19:31	20.62	0.13	5.2
10/28/25 19:32	20.62	0.13	5.25

10/28/25 19:33	20.62	0.13	5.24
10/28/25 19:34	20.62	0.13	5.23
10/28/25 19:35	20.63	0.13	5.19
10/28/25 19:36	20.62	0.13	5.19
10/28/25 19:37	20.62	0.13	5.07
10/28/25 19:38	20.62	0.12	5.1
10/28/25 19:39	20.62	0.13	5.1
10/28/25 19:40	20.62	0.13	5.07
10/28/25 19:41	20.62	0.13	5.06
10/28/25 19:42	20.62	0.13	5.01
10/28/25 19:43	20.62	0.12	5.02
10/28/25 19:44	20.62	0.13	5.14
10/28/25 19:45	20.63	0.12	5.04
10/28/25 19:46	20.63	0.12	5.01
10/28/25 19:47	20.63	0.12	5.03
10/28/25 19:48	20.63	0.12	5.05
10/28/25 19:49	20.63	0.12	5.06
10/28/25 19:50	20.63	0.12	5.01
10/28/25 19:51	20.63	0.12	5.18
10/28/25 19:52	20.63	0.12	5.22
10/28/25 19:53	20.63	0.12	5.35
10/28/25 19:54	20.63	0.12	5.09
10/28/25 19:55	20.64	0.12	5.16
10/28/25 19:56	20.64	0.12	5.09
10/28/25 19:57	20.64	0.12	5.06
10/28/25 19:58	20.64	0.12	5.04
10/28/25 19:59	20.64	0.12	5.31
10/28/25 20:00	20.64	0.12	5.11
10/28/25 20:01	20.64	0.12	5.21
10/28/25 20:02	20.63	0.12	5.12
10/28/25 20:03	20.63	0.12	5.08
10/28/25 20:04	20.64	0.12	5.46
10/28/25 20:05	20.64	0.12	5.02
10/28/25 20:06	20.64	0.12	4.91
10/28/25 20:07	20.64	0.12	5.04
10/28/25 20:08	20.63	0.12	5.32
10/28/25 20:09	20.64	0.12	5
10/28/25 20:10	20.64	0.12	4.93
10/28/25 20:11	20.63	0.12	4.98
10/28/25 20:12	20.63	0.12	5.05
10/28/25 20:13	20.63	0.12	5.09
10/28/25 20:14	20.63	0.12	5
10/28/25 20:15	20.63	0.12	5.18
10/28/25 20:16	20.63	0.12	5.05
10/28/25 20:17	20.63	0.12	4.89
10/28/25 20:18	20.63	0.12	4.92
10/28/25 20:19	20.63	0.12	4.86
10/28/25 20:20	20.63	0.12	5.13
10/28/25 20:21	20.63	0.12	5.12
10/28/25 20:22	20.63	0.12	5.23
10/28/25 20:23	20.63	0.12	5.12
10/28/25 20:24	20.63	0.12	5.22
10/28/25 20:25	20.63	0.12	4.93
10/28/25 20:26	20.64	0.12	4.95
10/28/25 20:27	20.64	0.12	5.25

10/28/25 20:28	20.63	0.12	4.93
10/28/25 20:29	20.64	0.12	4.96
10/28/25 20:30	20.64	0.11	4.88
10/28/25 20:31	20.64	0.12	4.92
10/28/25 20:32	20.64	0.11	4.91
10/28/25 20:33	20.64	0.12	5.02
10/28/25 20:34	20.64	0.12	4.85
10/28/25 20:35	20.64	0.12	4.89
10/28/25 20:36	20.64	0.12	4.94
10/28/25 20:37	20.64	0.11	4.91
10/28/25 20:38	20.64	0.11	5.16
10/28/25 20:39	20.64	0.11	4.94
10/28/25 20:40	20.64	0.11	4.82
10/28/25 20:41	20.64	0.11	4.86
10/28/25 20:42	20.64	0.12	4.88
10/28/25 20:43	20.64	0.11	4.86
10/28/25 20:44	20.64	0.11	4.87
10/28/25 20:45	20.64	0.11	4.83
10/28/25 20:46	20.64	0.11	4.83
10/28/25 20:47	20.64	0.11	4.81
10/28/25 20:48	20.64	0.11	4.86
10/28/25 20:49	20.64	0.11	4.82
10/28/25 20:50	20.64	0.11	4.84
10/28/25 20:51	20.64	0.11	4.83
10/28/25 20:52	20.63	0.11	4.92
10/28/25 20:53	20.63	0.11	4.84
10/28/25 20:54	20.64	0.11	4.83
10/28/25 20:55	20.63	0.11	4.84
10/28/25 20:56	20.63	0.11	4.86
10/28/25 20:57	20.64	0.11	4.86
10/28/25 20:58	20.64	0.11	4.85
10/28/25 20:59	20.64	0.11	4.83
10/28/25 21:00	20.64	0.11	4.86
10/28/25 21:01	20.64	0.11	4.9
10/28/25 21:02	20.64	0.11	4.85
10/28/25 21:03	20.64	0.11	4.87
10/28/25 21:04	20.64	0.11	4.88
10/28/25 21:05	20.64	0.11	4.86
10/28/25 21:06	20.64	0.11	4.9
10/28/25 21:07	20.64	0.11	4.87
10/28/25 21:08	20.64	0.11	4.85
10/28/25 21:09	20.64	0.11	4.88
10/28/25 21:10	20.64	0.11	4.87
10/28/25 21:11	20.64	0.11	4.84
10/28/25 21:12	20.64	0.11	4.88
10/28/25 21:13	20.64	0.11	4.89
10/28/25 21:14	20.63	0.11	4.86
10/28/25 21:15	20.63	0.11	4.88
10/28/25 21:16	20.63	0.11	4.87
10/28/25 21:17	20.64	0.11	4.89
10/28/25 21:18	20.63	0.11	4.9
10/28/25 21:19	20.63	0.11	4.88
10/28/25 21:20	20.63	0.11	4.88
10/28/25 21:21	20.63	0.11	4.89
10/28/25 21:22	20.63	0.11	4.85

10/28/25 21:23	20.63	0.11	4.89
10/28/25 21:24	20.63	0.11	4.93
10/28/25 21:25	20.63	0.11	4.93
10/28/25 21:26	20.63	0.11	4.95
10/28/25 21:27	20.63	0.11	4.89
10/28/25 21:28	20.64	0.11	4.88
10/28/25 21:29	20.64	0.11	4.96
10/28/25 21:30	20.64	0.11	4.94
10/28/25 21:31	20.64	0.11	4.92
10/28/25 21:32	20.64	0.11	4.85
10/28/25 21:33	20.64	0.11	4.89
10/28/25 21:34	20.64	0.11	4.91
10/28/25 21:35	20.64	0.11	4.93
10/28/25 21:36	20.64	0.11	4.9
10/28/25 21:37	20.64	0.11	4.96
10/28/25 21:38	20.64	0.11	4.93
10/28/25 21:39	20.64	0.11	4.9
10/28/25 21:40	20.64	0.11	4.94
10/28/25 21:41	20.64	0.11	5.06
10/28/25 21:42	20.64	0.11	4.98
10/28/25 21:43	20.64	0.11	4.99
10/28/25 21:44	20.64	0.11	5.02
10/28/25 21:45	20.64	0.11	4.99
10/28/25 21:46	20.64	0.11	4.96
10/28/25 21:47	20.64	0.11	4.98
10/28/25 21:48	20.64	0.11	5.03
10/28/25 21:49	20.64	0.11	5
10/28/25 21:50	20.64	0.11	5.03
10/28/25 21:51	20.64	0.11	4.97
10/28/25 21:52	20.64	0.11	5.06
10/28/25 21:53	20.64	0.11	5.01
10/28/25 21:54	20.63	0.11	5.03
10/28/25 21:55	20.63	0.11	5.03
10/28/25 21:56	20.63	0.11	5.04
10/28/25 21:57	20.63	0.11	5.06
10/28/25 21:58	20.63	0.11	5.04
10/28/25 21:59	20.63	0.11	5.04
10/28/25 22:00	20.64	0.11	5.04
10/28/25 22:01	20.64	0.11	5.09
10/28/25 22:02	20.64	0.11	5.06
10/28/25 22:03	20.65	0.11	5.07
10/28/25 22:04	20.64	0.11	5.08
10/28/25 22:05	20.65	0.11	5.06
10/28/25 22:06	20.64	0.11	5.05
10/28/25 22:07	20.64	0.11	5.07
10/28/25 22:08	20.64	0.11	5.06
10/28/25 22:09	20.64	0.11	5.05
10/28/25 22:10	20.64	0.11	5.02
10/28/25 22:11	20.64	0.11	5.07
10/28/25 22:12	20.64	0.11	5.06
10/28/25 22:13	20.64	0.11	5.07
10/28/25 22:14	20.64	0.11	5.09
10/28/25 22:15	20.64	0.11	5.07
10/28/25 22:16	20.64	0.11	5.06
10/28/25 22:17	20.64	0.11	5.09

10/28/25 22:18	20.64	0.11	5.25
10/28/25 22:19	20.64	0.11	5.06
10/28/25 22:20	20.64	0.11	5.07
10/28/25 22:21	20.64	0.11	5.08
10/28/25 22:22	20.64	0.11	5.1
10/28/25 22:23	20.64	0.11	5.12
10/28/25 22:24	20.64	0.11	5.11
10/28/25 22:25	20.64	0.11	5.09
10/28/25 22:26	20.64	0.11	5.05
10/28/25 22:27	20.64	0.11	5.11
10/28/25 22:28	20.65	0.11	5.28
10/28/25 22:29	20.64	0.11	5.17
10/28/25 22:30	20.65	0.11	5.16
10/28/25 22:31	20.64	0.11	5.23
10/28/25 22:32	20.64	0.11	5.16
10/28/25 22:33	20.64	0.11	5.15
10/28/25 22:34	20.64	0.11	5.12
10/28/25 22:35	20.64	0.11	5.16
10/28/25 22:36	20.64	0.11	5.23
10/28/25 22:37	20.64	0.11	5.09
10/28/25 22:38	20.64	0.1	5.29
10/28/25 22:39	20.64	0.1	5.15
10/28/25 22:40	20.64	0.1	5.17
10/28/25 22:41	20.64	0.11	5.25
10/28/25 22:42	20.64	0.11	5.26
10/28/25 22:43	20.64	0.1	5.18
10/28/25 22:44	20.64	0.1	5.1
10/28/25 22:45	20.64	0.1	5.17
10/28/25 22:46	20.64	0.1	5.13
10/28/25 22:47	20.64	0.1	5.28
10/28/25 22:48	20.64	0.1	5.18
10/28/25 22:49	20.64	0.1	5.26
10/28/25 22:50	20.64	0.1	5.21
10/28/25 22:51	20.64	0.1	5.37
10/28/25 22:52	20.64	0.1	5.47
10/28/25 22:53	20.64	0.1	5.36
10/28/25 22:54	20.64	0.1	5.43
10/28/25 22:55	20.64	0.1	5.45
10/28/25 22:56	20.65	0.1	5.35
10/28/25 22:57	20.65	0.1	5.23
10/28/25 22:58	20.65	0.1	5.33
10/28/25 22:59	20.65	0.1	5.23
10/28/25 23:00	20.65	0.1	5.27
10/28/25 23:01	20.65	0.1	5.22
10/28/25 23:02	20.65	0.1	5.13
10/28/25 23:03	20.65	0.1	5.19
10/28/25 23:04	20.65	0.1	5.4
10/28/25 23:05	20.65	0.1	5.47
10/28/25 23:06	20.65	0.1	5.19
10/28/25 23:07	20.64	0.1	5.13
10/28/25 23:08	20.64	0.1	5.2
10/28/25 23:09	20.64	0.1	5.26
10/28/25 23:10	20.64	0.1	5.4
10/28/25 23:11	20.64	0.1	5.66
10/28/25 23:12	20.64	0.1	5.41

10/28/25 23:13	20.64	0.1	5.27
10/28/25 23:14	20.64	0.1	5.26
10/28/25 23:15	20.64	0.1	5.41
10/28/25 23:16	20.64	0.1	5.47
10/28/25 23:17	20.64	0.1	5.36
10/28/25 23:18	20.64	0.1	5.19
10/28/25 23:19	20.64	0.1	5.18
10/28/25 23:20	20.64	0.1	5.27
10/28/25 23:21	20.64	0.09	5.25
10/28/25 23:22	20.64	0.09	5.18
10/28/25 23:23	20.64	0.09	5.24
10/28/25 23:24	20.64	0.09	5.24
10/28/25 23:25	20.64	0.09	5.19
10/28/25 23:26	20.64	0.1	5.22
10/28/25 23:27	20.64	0.09	5.19
10/28/25 23:28	20.64	0.09	5.34
10/28/25 23:29	20.64	0.09	5.22
10/28/25 23:30	20.65	0.09	5.29
10/28/25 23:31	20.65	0.09	5.25
10/28/25 23:32	20.65	0.09	5.25
10/28/25 23:33	20.65	0.1	5.3
10/28/25 23:34	20.65	0.1	5.27
10/28/25 23:35	20.65	0.1	5.29
10/28/25 23:36	20.65	0.1	5.34
10/28/25 23:37	20.65	0.1	5.33
10/28/25 23:38	20.65	0.1	5.43
10/28/25 23:39	20.65	0.1	5.36
10/28/25 23:40	20.65	0.1	5.34
10/28/25 23:41	20.65	0.1	5.33
10/28/25 23:42	20.65	0.1	5.52
10/28/25 23:43	20.65	0.1	5.38
10/28/25 23:44	20.65	0.1	5.45
10/28/25 23:45	20.65	0.1	5.35
10/28/25 23:46	20.64	0.1	5.36
10/28/25 23:47	20.64	0.1	5.41
10/28/25 23:48	20.65	0.1	5.49
10/28/25 23:49	20.64	0.1	5.51
10/28/25 23:50	20.64	0.1	5.65
10/28/25 23:51	20.65	0.1	5.59
10/28/25 23:52	20.65	0.1	5.56
10/28/25 23:53	20.65	0.1	5.52
10/28/25 23:54	20.65	0.1	5.6
10/28/25 23:55	20.65	0.1	5.57
10/28/25 23:56	20.65	0.1	5.55
10/28/25 23:57	20.66	0.09	5.37
10/28/25 23:58	20.66	0.1	5.51
10/28/25 23:59	20.65	0.09	5.47
10/29/25 0:00	20.65	0.09	5.43
10/29/25 0:01	20.65	0.09	5.37
10/29/25 0:02	20.65	0.09	5.63
10/29/25 0:03	20.65	0.09	5.4
10/29/25 0:04	20.65	0.09	5.55
10/29/25 0:05	20.65	0.1	5.76
10/29/25 0:06	20.65	0.1	5.89
10/29/25 0:07	20.65	0.1	5.52

10/29/25 0:08	20.65	0.09	5.71
10/29/25 0:09	20.65	0.1	6
10/29/25 0:10	20.65	0.1	5.65
10/29/25 0:11	20.65	0.09	5.43
10/29/25 0:12	20.65	0.1	5.51
10/29/25 0:13	20.65	0.1	5.7
10/29/25 0:14	20.65	0.1	6.08
10/29/25 0:15	20.65	0.1	5.57
10/29/25 0:16	20.65	0.09	5.58
10/29/25 0:17	20.65	0.09	5.58
10/29/25 0:18	20.65	0.09	5.74
10/29/25 0:19	20.65	0.09	5.52
10/29/25 0:20	20.65	0.09	5.48
10/29/25 0:21	20.65	0.09	5.47
10/29/25 0:22	20.65	0.09	5.47
10/29/25 0:23	20.65	0.09	5.48
10/29/25 0:24	20.65	0.09	5.48
10/29/25 0:25	20.65	0.09	5.47
10/29/25 0:26	20.65	0.09	5.43
10/29/25 0:27	20.65	0.09	5.46
10/29/25 0:28	20.65	0.09	5.49
10/29/25 0:29	20.65	0.09	5.45
10/29/25 0:30	20.65	0.09	5.56
10/29/25 0:31	20.65	0.09	5.51
10/29/25 0:32	20.64	0.09	5.48
10/29/25 0:33	20.65	0.09	5.53
10/29/25 0:34	20.65	0.09	5.52
10/29/25 0:35	20.65	0.09	5.49
10/29/25 0:36	20.65	0.09	5.54
10/29/25 0:37	20.65	0.09	5.56
10/29/25 0:38	20.65	0.09	5.54
10/29/25 0:39	20.65	0.09	5.5
10/29/25 0:40	20.65	0.09	5.54
10/29/25 0:41	20.65	0.09	5.53
10/29/25 0:42	20.65	0.09	5.53
10/29/25 0:43	20.65	0.09	5.53
10/29/25 0:44	20.65	0.09	5.6
10/29/25 0:45	20.65	0.09	5.56
10/29/25 0:46	20.65	0.09	5.58
10/29/25 0:47	20.65	0.09	5.62
10/29/25 0:48	20.65	0.09	5.54
10/29/25 0:49	20.65	0.09	5.54
10/29/25 0:50	20.65	0.09	5.57
10/29/25 0:51	20.65	0.09	5.63
10/29/25 0:52	20.65	0.09	5.56
10/29/25 0:53	20.65	0.09	5.55
10/29/25 0:54	20.65	0.09	5.6
10/29/25 0:55	20.65	0.09	5.6
10/29/25 0:56	20.65	0.09	5.6
10/29/25 0:57	20.65	0.09	5.58
10/29/25 0:58	20.65	0.09	5.62
10/29/25 0:59	20.66	0.09	5.6
10/29/25 1:00	20.66	0.09	5.61
10/29/25 1:01	20.66	0.09	5.59
10/29/25 1:02	20.66	0.09	5.6

10/29/25 1:03	20.66	0.09	5.6
10/29/25 1:04	20.66	0.09	5.57
10/29/25 1:05	20.66	0.09	5.6
10/29/25 1:06	20.66	0.09	5.62
10/29/25 1:07	20.66	0.09	5.65
10/29/25 1:08	20.66	0.09	5.63
10/29/25 1:09	20.66	0.09	5.6
10/29/25 1:10	20.66	0.09	5.63
10/29/25 1:11	20.66	0.09	5.63
10/29/25 1:12	20.66	0.09	5.64
10/29/25 1:13	20.66	0.09	5.66
10/29/25 1:14	20.66	0.09	5.6
10/29/25 1:15	20.66	0.09	5.65
10/29/25 1:16	20.66	0.09	5.65
10/29/25 1:17	20.66	0.09	5.63
10/29/25 1:18	20.66	0.09	5.62
10/29/25 1:19	20.66	0.09	5.68
10/29/25 1:20	20.66	0.09	5.66
10/29/25 1:21	20.66	0.09	5.65
10/29/25 1:22	20.66	0.09	5.65
10/29/25 1:23	20.66	0.09	5.66
10/29/25 1:24	20.65	0.09	5.66
10/29/25 1:25	20.65	0.09	5.7
10/29/25 1:26	20.66	0.09	5.73
10/29/25 1:27	20.66	0.09	5.68
10/29/25 1:28	20.66	0.09	5.7
10/29/25 1:29	20.66	0.09	5.69
10/29/25 1:30	20.67	0.09	5.7
10/29/25 1:31	20.66	0.09	5.76
10/29/25 1:32	20.67	0.09	5.76
10/29/25 1:33	20.66	0.09	5.76
10/29/25 1:34	20.66	0.09	5.77
10/29/25 1:35	20.66	0.09	5.74
10/29/25 1:36	20.66	0.09	5.74
10/29/25 1:37	20.66	0.09	5.77
10/29/25 1:38	20.66	0.09	5.74
10/29/25 1:39	20.66	0.09	5.78
10/29/25 1:40	20.66	0.09	5.79
10/29/25 1:41	20.66	0.09	5.77
10/29/25 1:42	20.66	0.09	5.79
10/29/25 1:43	20.66	0.09	5.77
10/29/25 1:44	20.66	0.09	5.82
10/29/25 1:45	20.66	0.09	5.84
10/29/25 1:46	20.66	0.09	5.79
10/29/25 1:47	20.66	0.09	5.84
10/29/25 1:48	20.66	0.09	5.82
10/29/25 1:49	20.65	0.09	5.89
10/29/25 1:50	20.65	0.09	5.83
10/29/25 1:51	20.65	0.09	5.8
10/29/25 1:52	20.65	0.09	5.84
10/29/25 1:53	20.65	0.09	5.81
10/29/25 1:54	20.65	0.09	5.89
10/29/25 1:55	20.65	0.09	5.84
10/29/25 1:56	20.65	0.09	5.9
10/29/25 1:57	20.65	0.09	5.86

10/29/25 1:58	20.65	0.09	5.85
10/29/25 1:59	20.65	0.09	5.85
10/29/25 2:00	20.65	0.09	5.85
10/29/25 2:01	20.65	0.09	5.83
10/29/25 2:02	20.65	0.09	5.86
10/29/25 2:03	20.65	0.09	5.9
10/29/25 2:04	20.65	0.09	5.89
10/29/25 2:05	20.65	0.09	5.89
10/29/25 2:06	20.65	0.09	5.88
10/29/25 2:07	20.65	0.09	5.89
10/29/25 2:08	20.65	0.09	5.85
10/29/25 2:09	20.66	0.09	5.95
10/29/25 2:10	20.66	0.09	5.91
10/29/25 2:11	20.66	0.09	5.88
10/29/25 2:12	20.65	0.09	5.92
10/29/25 2:13	20.65	0.09	5.92
10/29/25 2:14	20.65	0.09	5.93
10/29/25 2:15	20.66	0.09	5.95
10/29/25 2:16	20.66	0.09	5.92
10/29/25 2:17	20.66	0.09	5.94
10/29/25 2:18	20.67	0.09	5.92
10/29/25 2:19	20.67	0.08	5.91
10/29/25 2:20	20.67	0.09	5.97
10/29/25 2:21	20.66	0.09	5.89
10/29/25 2:22	20.66	0.08	5.97
10/29/25 2:23	20.67	0.09	5.98
10/29/25 2:24	20.67	0.09	5.97
10/29/25 2:25	20.67	0.09	5.95
10/29/25 2:26	20.67	0.09	5.98
10/29/25 2:27	20.66	0.08	5.99
10/29/25 2:28	20.67	0.08	5.99
10/29/25 2:29	20.66	0.08	5.97
10/29/25 2:30	20.66	0.08	5.99
10/29/25 2:31	20.66	0.08	6.02
10/29/25 2:32	20.66	0.08	6.01
10/29/25 2:33	20.66	0.08	5.98
10/29/25 2:34	20.66	0.08	5.94
10/29/25 2:35	20.66	0.08	6.06
10/29/25 2:36	20.66	0.08	5.99
10/29/25 2:37	20.66	0.08	6.03
10/29/25 2:38	20.66	0.08	6.03
10/29/25 2:39	20.66	0.08	6.03
10/29/25 2:40	20.66	0.08	6
10/29/25 2:41	20.67	0.08	6.02
10/29/25 2:42	20.67	0.08	6
10/29/25 2:43	20.67	0.08	6.05
10/29/25 2:44	20.67	0.08	6.04
10/29/25 2:45	20.67	0.08	6.01
10/29/25 2:46	20.67	0.08	5.99
10/29/25 2:47	20.67	0.08	6.04
10/29/25 2:48	20.67	0.08	6.1
10/29/25 2:49	20.67	0.08	6.1
10/29/25 2:50	20.67	0.08	6.11
10/29/25 2:51	20.67	0.08	6.07
10/29/25 2:52	20.67	0.08	6.11

10/29/25 2:53	20.67	0.08	6.1
10/29/25 2:54	20.67	0.08	6.14
10/29/25 2:55	20.67	0.08	6.09
10/29/25 2:56	20.67	0.08	6.04
10/29/25 2:57	20.66	0.08	6.12
10/29/25 2:58	20.66	0.08	6.14
10/29/25 2:59	20.66	0.08	6.12
10/29/25 3:00	20.66	0.08	6.15
10/29/25 3:01	20.66	0.08	6.07
10/29/25 3:02	20.66	0.08	6.11
10/29/25 3:03	20.66	0.08	6.12
10/29/25 3:04	20.66	0.08	6.14
10/29/25 3:05	20.67	0.08	6.16
10/29/25 3:06	20.66	0.08	6.13
10/29/25 3:07	20.66	0.08	6.14
10/29/25 3:08	20.66	0.08	6.19
10/29/25 3:09	20.66	0.08	6.17
10/29/25 3:10	20.66	0.08	6.13
10/29/25 3:11	20.66	0.08	6.18
10/29/25 3:12	20.66	0.08	6.18
10/29/25 3:13	20.66	0.08	6.21
10/29/25 3:14	20.66	0.08	6.19
10/29/25 3:15	20.66	0.08	6.2
10/29/25 3:16	20.66	0.08	6.14
10/29/25 3:17	20.66	0.08	6.16
10/29/25 3:18	20.66	0.08	6.23
10/29/25 3:19	20.66	0.08	6.24
10/29/25 3:20	20.66	0.08	6.23
10/29/25 3:21	20.66	0.08	6.16
10/29/25 3:22	20.66	0.08	6.21
10/29/25 3:23	20.66	0.08	6.2
10/29/25 3:24	20.66	0.08	6.26
10/29/25 3:25	20.67	0.08	6.22
10/29/25 3:26	20.67	0.08	6.23
10/29/25 3:27	20.67	0.08	6.26
10/29/25 3:28	20.67	0.08	6.25
10/29/25 3:29	20.67	0.08	6.28
10/29/25 3:30	20.67	0.08	6.29
10/29/25 3:31	20.67	0.08	6.31
10/29/25 3:32	20.67	0.08	6.27
10/29/25 3:33	20.67	0.08	6.28
10/29/25 3:34	20.67	0.08	6.23
10/29/25 3:35	20.67	0.08	6.25
10/29/25 3:36	20.67	0.08	6.28
10/29/25 3:37	20.67	0.08	6.3
10/29/25 3:38	20.67	0.08	6.27
10/29/25 3:39	20.67	0.08	6.35
10/29/25 3:40	20.67	0.08	6.29
10/29/25 3:41	20.67	0.08	6.26
10/29/25 3:42	20.67	0.08	6.3
10/29/25 3:43	20.67	0.08	6.32
10/29/25 3:44	20.67	0.08	6.3
10/29/25 3:45	20.67	0.08	6.29
10/29/25 3:46	20.67	0.08	6.28
10/29/25 3:47	20.67	0.08	6.34

10/29/25 3:48	20.67	0.08	6.37
10/29/25 3:49	20.67	0.08	6.38
10/29/25 3:50	20.67	0.08	6.32
10/29/25 3:51	20.67	0.08	6.34
10/29/25 3:52	20.68	0.08	6.32
10/29/25 3:53	20.68	0.08	6.39
10/29/25 3:54	20.68	0.08	6.37
10/29/25 3:55	20.68	0.08	6.42
10/29/25 3:56	20.68	0.08	6.35
10/29/25 3:57	20.68	0.08	6.37
10/29/25 3:58	20.68	0.08	6.38
10/29/25 3:59	20.67	0.08	6.37
10/29/25 4:00	20.67	0.08	6.44
10/29/25 4:01	20.67	0.08	6.4
10/29/25 4:02	20.67	0.08	6.4
10/29/25 4:03	20.67	0.08	6.42
10/29/25 4:04	20.67	0.08	6.38
10/29/25 4:05	20.67	0.08	6.41
10/29/25 4:06	20.67	0.08	6.42
10/29/25 4:07	20.66	0.08	6.44
10/29/25 4:08	20.67	0.08	6.44
10/29/25 4:09	20.67	0.08	6.41
10/29/25 4:10	20.67	0.08	6.42
10/29/25 4:11	20.66	0.08	6.44
10/29/25 4:12	20.66	0.08	6.44
10/29/25 4:13	20.67	0.08	6.46
10/29/25 4:14	20.66	0.08	6.5
10/29/25 4:15	20.66	0.08	6.45
10/29/25 4:16	20.66	0.08	6.43
10/29/25 4:17	20.66	0.08	6.47
10/29/25 4:18	20.66	0.08	6.49
10/29/25 4:19	20.66	0.08	6.46
10/29/25 4:20	20.66	0.08	6.48
10/29/25 4:21	20.66	0.08	6.45
10/29/25 4:22	20.66	0.08	6.49
10/29/25 4:23	20.66	0.08	6.49
10/29/25 4:24	20.67	0.08	6.47
10/29/25 4:25	20.67	0.08	6.53
10/29/25 4:26	20.67	0.08	6.54
10/29/25 4:27	20.67	0.08	6.53
10/29/25 4:28	20.67	0.08	6.52
10/29/25 4:29	20.67	0.08	6.54
10/29/25 4:30	20.67	0.08	6.52
10/29/25 4:31	20.67	0.08	6.55
10/29/25 4:32	20.67	0.08	6.5
10/29/25 4:33	20.67	0.08	6.58
10/29/25 4:34	20.67	0.08	6.57
10/29/25 4:35	20.67	0.08	6.57
10/29/25 4:36	20.67	0.07	6.55
10/29/25 4:37	20.67	0.08	6.56
10/29/25 4:38	20.67	0.08	6.57
10/29/25 4:39	20.67	0.08	6.57
10/29/25 4:40	20.67	0.07	6.56
10/29/25 4:41	20.67	0.07	6.6
10/29/25 4:42	20.67	0.07	6.65

10/29/25 4:43	20.67	0.07	6.63
10/29/25 4:44	20.67	0.08	6.66
10/29/25 4:45	20.67	0.08	6.65
10/29/25 4:46	20.67	0.08	6.6
10/29/25 4:47	20.67	0.08	6.61
10/29/25 4:48	20.67	0.08	6.62
10/29/25 4:49	20.67	0.08	6.64
10/29/25 4:50	20.67	0.08	6.63
10/29/25 4:51	20.67	0.07	6.67
10/29/25 4:52	20.67	0.08	6.69
10/29/25 4:53	20.68	0.08	6.59
10/29/25 4:54	20.67	0.08	6.61
10/29/25 4:55	20.67	0.07	6.64
10/29/25 4:56	20.67	0.08	6.58
10/29/25 4:57	20.67	0.08	6.65
10/29/25 4:58	20.67	0.08	6.66
10/29/25 4:59	20.68	0.08	6.63
10/29/25 5:00	20.67	0.07	6.68
10/29/25 5:01	20.67	0.07	6.68
10/29/25 5:02	20.67	0.07	6.71
10/29/25 5:03	20.67	0.08	6.68
10/29/25 5:04	20.67	0.07	6.7
10/29/25 5:05	20.67	0.07	6.74
10/29/25 5:06	20.67	0.07	6.71
10/29/25 5:07	20.67	0.07	6.73
10/29/25 5:08	20.67	0.08	6.66
10/29/25 5:09	20.67	0.08	6.62
10/29/25 5:10	20.67	0.08	6.68
10/29/25 5:11	20.67	0.07	6.71
10/29/25 5:12	20.67	0.07	6.7
10/29/25 5:13	20.67	0.07	6.7
10/29/25 5:14	20.67	0.07	6.74
10/29/25 5:15	20.67	0.07	6.77
10/29/25 5:16	20.67	0.07	6.75
10/29/25 5:17	20.67	0.07	6.78
10/29/25 5:18	20.68	0.07	6.72
10/29/25 5:19	20.68	0.07	6.74
10/29/25 5:20	20.68	0.07	6.77
10/29/25 5:21	20.68	0.07	6.76
10/29/25 5:22	20.68	0.07	6.77
10/29/25 5:23	20.68	0.07	6.76
10/29/25 5:24	20.67	0.07	6.8
10/29/25 5:25	20.67	0.07	6.78
10/29/25 5:26	20.68	0.07	6.75
10/29/25 5:27	20.67	0.07	6.81
10/29/25 5:28	20.68	0.07	6.81
10/29/25 5:29	20.68	0.07	6.84
10/29/25 5:30	20.68	0.07	6.8
10/29/25 5:31	20.68	0.07	6.86
10/29/25 5:32	20.67	0.07	6.87
10/29/25 5:33	20.67	0.07	6.82
10/29/25 5:34	20.67	0.07	6.84
10/29/25 5:35	20.67	0.07	6.88
10/29/25 5:36	20.67	0.07	6.87
10/29/25 5:37	20.68	0.07	6.85

10/29/25 5:38	20.67	0.07	6.83
10/29/25 5:39	20.67	0.07	6.83
10/29/25 5:40	20.67	0.07	6.82
10/29/25 5:41	20.67	0.07	6.87
10/29/25 5:42	20.67	0.07	6.88
10/29/25 5:43	20.67	0.07	6.9
10/29/25 5:44	20.67	0.07	6.89
10/29/25 5:45	20.67	0.07	6.88
10/29/25 5:46	20.67	0.07	6.89
10/29/25 5:47	20.67	0.07	6.87
10/29/25 5:48	20.67	0.07	6.89
10/29/25 5:49	20.67	0.07	6.87
10/29/25 5:50	20.67	0.07	6.87
10/29/25 5:51	20.67	0.07	6.89
10/29/25 5:52	20.67	0.07	6.93
10/29/25 5:53	20.67	0.07	6.89
10/29/25 5:54	20.67	0.07	6.9
10/29/25 5:55	20.67	0.07	6.93
10/29/25 5:56	20.68	0.07	6.91
10/29/25 5:57	20.68	0.07	6.92
10/29/25 5:58	20.68	0.07	6.96
10/29/25 5:59	20.68	0.07	7.01
10/29/25 6:00	20.68	0.07	6.95
10/29/25 6:01	20.68	0.07	6.93
10/29/25 6:02	20.68	0.07	6.95
10/29/25 6:03	20.68	0.07	6.95
10/29/25 6:04	20.68	0.07	7.01
10/29/25 6:05	20.68	0.07	7.02
10/29/25 6:06	20.68	0.07	6.96
10/29/25 6:07	20.68	0.07	6.98
10/29/25 6:08	20.68	0.07	6.98
10/29/25 6:09	20.68	0.07	7.01
10/29/25 6:10	20.67	0.07	7
10/29/25 6:11	20.68	0.07	7.02
10/29/25 6:12	20.67	0.07	7.03
10/29/25 6:13	20.67	0.07	7.01
10/29/25 6:14	20.67	0.07	7.01
10/29/25 6:15	20.67	0.07	7
10/29/25 6:16	20.67	0.07	7.02
10/29/25 6:17	20.67	0.07	7.06
10/29/25 6:18	20.67	0.07	7.01
10/29/25 6:19	20.67	0.07	7.03
10/29/25 6:20	20.67	0.07	7.02
10/29/25 6:21	20.67	0.07	6.99
10/29/25 6:22	20.67	0.07	7.02
10/29/25 6:23	20.68	0.07	7.12
10/29/25 6:24	20.68	0.07	7.07
10/29/25 6:25	20.68	0.07	7.11
10/29/25 6:26	20.68	0.07	7.07
10/29/25 6:27	20.68	0.07	7.11
10/29/25 6:28	20.68	0.07	7.09
10/29/25 6:29	20.68	0.07	7.07
10/29/25 6:30	20.68	0.07	7.08
10/29/25 6:31	20.68	0.07	7.08
10/29/25 6:32	20.68	0.07	7.06

10/29/25 6:33	20.68	0.07	7.13
10/29/25 6:34	20.68	0.07	7.14
10/29/25 6:35	20.68	0.07	7.13
10/29/25 6:36	20.68	0.07	7.13
10/29/25 6:37	20.68	0.07	7.09
10/29/25 6:38	20.68	0.07	7.06
10/29/25 6:39	20.68	0.07	7.13
10/29/25 6:40	20.68	0.07	7.12
10/29/25 6:41	20.68	0.07	7.11
10/29/25 6:42	20.68	0.07	7.13
10/29/25 6:43	20.68	0.07	7.11
10/29/25 6:44	20.68	0.07	7.17
10/29/25 6:45	20.68	0.07	7.09
10/29/25 6:46	20.68	0.07	7.1
10/29/25 6:47	20.68	0.07	7.17
10/29/25 6:48	20.68	0.07	7.15
10/29/25 6:49	20.68	0.07	7.18
10/29/25 6:50	20.68	0.07	7.12
10/29/25 6:51	20.68	0.07	7.18
10/29/25 6:52	20.67	0.07	7.21
10/29/25 6:53	20.68	0.07	7.19
10/29/25 6:54	20.68	0.07	7.13
10/29/25 6:55	20.68	0.07	7.14
10/29/25 6:56	20.68	0.07	7.16
10/29/25 6:57	20.68	0.07	7.2
10/29/25 6:58	20.67	0.07	7.24
10/29/25 6:59	20.67	0.07	7.2
10/29/25 7:00	20.67	0.07	7.22
10/29/25 7:01	20.67	0.07	7.18
10/29/25 7:02	20.67	0.07	7.17
10/29/25 7:03	20.67	0.07	7.18
10/29/25 7:04	20.67	0.07	7.21
10/29/25 7:05	20.68	0.07	7.16
10/29/25 7:06	20.68	0.07	7.21
10/29/25 7:07	20.68	0.07	7.29
10/29/25 7:08	20.67	0.07	7.23
10/29/25 7:09	20.68	0.07	7.22
10/29/25 7:10	20.68	0.07	7.28
10/29/25 7:11	20.68	0.06	7.26
10/29/25 7:12	20.68	0.06	7.28
10/29/25 7:13	20.68	0.06	7.21
10/29/25 7:14	20.67	0.06	7.24
10/29/25 7:15	20.67	0.07	7.26
10/29/25 7:16	20.67	0.06	7.27
10/29/25 7:17	20.68	0.07	7.3
10/29/25 7:18	20.67	0.07	7.24
10/29/25 7:19	20.68	0.07	7.25
10/29/25 7:20	20.68	0.07	7.22
10/29/25 7:21	20.68	0.07	7.21
10/29/25 7:22	20.68	0.06	7.29
10/29/25 7:23	20.68	0.06	7.26
10/29/25 7:24	20.68	0.06	7.34
10/29/25 7:25	20.68	0.07	7.28
10/29/25 7:26	20.68	0.06	7.28
10/29/25 7:27	20.68	0.07	7.27

10/29/25 7:28	20.68	0.06	7.3
10/29/25 7:29	20.68	0.06	7.33
10/29/25 7:30	20.68	0.06	7.3
10/29/25 7:31	20.68	0.07	7.32
10/29/25 7:32	20.69	0.06	7.33
10/29/25 7:33	20.68	0.06	7.35
10/29/25 7:34	20.68	0.06	7.36
10/29/25 7:35	20.68	0.07	7.33
10/29/25 7:36	20.67	0.06	7.4
10/29/25 7:37	1.55	0	7
10/29/25 7:38	0.01	-0.04	0.57
10/29/25 7:39	0.64	0.62	-0.31
10/29/25 7:40	19.82	20.37	-2.23
10/29/25 7:41	19.93	20.06	-0.95
10/29/25 7:42	19.91	19.84	-1
10/29/25 7:43	19.85	18.85	-0.72
10/29/25 7:44	13.6	9.81	-0.27
10/29/25 7:45	9.96	9.9	-0.93
10/29/25 7:46	13.12	7.43	-0.51
10/29/25 7:47	4.95	0.79	374.64
10/29/25 7:48	0.01	0	508.49
10/29/25 7:49	5.45	0.01	376.72
10/29/25 7:50	0.08	0.01	245
10/29/25 7:51	0	0	250.39
10/29/25 7:52	12.62	0.02	93.49
10/29/25 7:53	4.68	0.1	0.84
10/29/25 7:54	0.14	0.07	0.75
10/29/25 7:55	0.13	0.07	0.79
10/29/25 7:56	7.09	6.93	10.06
10/29/25 7:57	9.9	9.75	0.07
10/29/25 7:58	9.91	9.8	-0.22
10/29/25 7:59	4.02	4.07	134.83
10/29/25 8:00	0.14	0.17	245.75
10/29/25 8:01	0.28	0.38	246.27
10/29/25 8:02	7.18	10.59	118.02
10/29/25 8:03	7.48	11.08	105.74
10/29/25 8:04	7.11	11.45	97.46
10/29/25 8:05	6.94	11.6	101.63
10/29/25 8:06	6.66	11.92	108.9
10/29/25 8:07	6.5	12.08	103.51
10/29/25 8:08	6.46	12.11	99.21
10/29/25 8:09	6.44	12.13	97.83
10/29/25 8:10	6.41	12.17	103.77
10/29/25 8:11	6.52	12.06	102.59
10/29/25 8:12	6.45	12.13	95.36
10/29/25 8:13	6.15	12.43	91.71
10/29/25 8:14	6.07	12.52	100.52
10/29/25 8:15	6.02	12.51	100.74
10/29/25 8:16	6.03	12.58	100.01
10/29/25 8:17	6.07	12.48	96.08
10/29/25 8:18	5.93	12.64	113.7
10/29/25 8:19	5.84	12.67	122.24
10/29/25 8:20	5.82	12.83	143.96
10/29/25 8:21	5.89	12.8	152.03
10/29/25 8:22	6.33	12.6	133.36

10/29/25 8:23	6.99	12.06	111.26
10/29/25 8:24	6.93	12.12	109.96
10/29/25 8:25	7.22	11.83	108.88
10/29/25 8:26	6.76	12.22	104.57
10/29/25 8:27	7.06	12.12	108.43
10/29/25 8:28	7.32	11.73	102.05
10/29/25 8:29	7.16	11.73	106.7
10/29/25 8:30	6.44	12.2	103.21
10/29/25 8:31	6.33	12.31	93.73
10/29/25 8:32	6.61	12.14	97.91
10/29/25 8:33	6.76	11.95	104.8
10/29/25 8:34	6.5	12.18	104.31
10/29/25 8:35	6.84	11.96	112.74
10/29/25 8:36	6.92	11.89	120.98
10/29/25 8:37	6.94	11.93	127.88
10/29/25 8:38	6.96	11.9	123.12
10/29/25 8:39	7.23	11.68	116.59
10/29/25 8:40	7.1	11.78	102.97
10/29/25 8:41	6.94	11.86	98.76
10/29/25 8:42	6.92	11.95	97.81
10/29/25 8:43	7.01	11.88	94.02
10/29/25 8:44	6.37	12.27	85.88
10/29/25 8:45	6.06	12.69	117.2
10/29/25 8:46	6.19	12.57	99.4
10/29/25 8:47	6.26	12.56	97.01
10/29/25 8:48	6.34	12.5	101.28
10/29/25 8:49	6.48	12.38	98.39
10/29/25 8:50	6.6	12.26	106.15
10/29/25 8:51	7.23	11.7	117
10/29/25 8:52	7.27	11.49	110.87
10/29/25 8:53	7.73	11.08	114.55
10/29/25 8:54	7.7	11.01	119.61
10/29/25 8:55	7.54	11.2	115.1
10/29/25 8:56	7.38	11.3	109.92
10/29/25 8:57	7.71	11.16	113.74
10/29/25 8:58	8.22	10.63	112.26
10/29/25 8:59	8.63	10.19	113.78
10/29/25 9:00	8.61	10.2	112.03
10/29/25 9:01	8.58	10.22	117.38
10/29/25 9:02	8.74	10.03	130.19
10/29/25 9:03	8.48	10.28	123.51
10/29/25 9:04	8.27	10.47	125.77
10/29/25 9:05	8.43	10.37	126.13
10/29/25 9:06	8.45	10.34	123.98
10/29/25 9:07	2.66	2.93	80.51
10/29/25 9:08	0.12	0.17	1.25
10/29/25 9:09	0.45	0.45	3.82
10/29/25 9:10	9.64	9.27	6.47
10/29/25 9:11	9.89	9.82	0.26
10/29/25 9:12	5.11	5.07	111.86
10/29/25 9:13	0.13	0.2	246.08
10/29/25 9:14	1.04	1.18	237.16
10/29/25 9:15	8.67	9.75	110.4
10/29/25 9:16	8.56	10.17	104.76
10/29/25 9:17	8.4	10.32	108.36

10/29/25 9:18	8.55	10.18	107.87
10/29/25 9:19	8.07	10.31	87.08
10/29/25 9:20	7.21	10.9	75.09
10/29/25 9:21	6.99	11.15	77.89
10/29/25 9:22	7.01	11.14	87.09
10/29/25 9:23	6.75	11.38	93.57
10/29/25 9:24	6.5	11.58	92.06
10/29/25 9:25	6.08	11.97	105.13
10/29/25 9:26	5.9	12.19	124.1
10/29/25 9:27	5.92	12.16	111.41
10/29/25 9:28	5.81	12.2	123.78
10/29/25 9:29	5.38	12.57	192.52
10/29/25 9:30	5.14	12.84	298.1
10/29/25 9:31	4.87	13.04	451.86
10/29/25 9:32	4.65	13.27	667.98
10/29/25 9:33	4.73	13.24	720.14
10/29/25 9:34	4.82	13.14	659.46
10/29/25 9:35	4.88	13.07	495.39
10/29/25 9:36	4.77	13.11	505.47
10/29/25 9:37	4.89	13.11	502.15
10/29/25 9:38	4.92	13.07	432.78
10/29/25 9:39	4.9	13.08	541.3
10/29/25 9:40	4.79	13.29	268.14
10/29/25 9:41	4.73	13.53	346.34
10/29/25 9:42	5.41	13.16	125.42
10/29/25 9:43	5.54	13.11	137.51
10/29/25 9:44	5.84	12.95	155.19
10/29/25 9:45	6.07	12.63	116.18
10/29/25 9:46	5.72	12.96	155.28
10/29/25 9:47	5.73	12.94	132.63
10/29/25 9:48	5.8	12.8	151.02
10/29/25 9:49	5.63	12.87	176.23
10/29/25 9:50	5.4	12.97	220.92
10/29/25 9:51	5.49	12.9	250.12
10/29/25 9:52	5.34	12.73	488.76
10/29/25 9:53	4.79	13.21	446.14
10/29/25 9:54	4.93	13.11	426.5
10/29/25 9:55	5.01	12.99	463.16
10/29/25 9:56	5.09	12.87	496.5
10/29/25 9:57	5.12	12.92	507.97
10/29/25 9:58	4.99	12.95	458.33
10/29/25 9:59	5.18	12.88	505.37
10/29/25 10:00	5.1	12.98	499.24
10/29/25 10:01	5.07	13.04	477.39
10/29/25 10:02	5.34	12.83	342.41
10/29/25 10:03	5.65	12.57	217.28
10/29/25 10:04	5.45	12.73	303.13
10/29/25 10:05	5.22	13.01	374.23
10/29/25 10:06	5.24	12.96	422.22
10/29/25 10:07	5.02	13.2	472.75
10/29/25 10:08	5.12	13.12	479.64
10/29/25 10:09	5.31	12.95	275.07
10/29/25 10:10	5.75	12.6	140.9
10/29/25 10:11	5.87	12.42	142.68
10/29/25 10:12	6.04	12.29	129.79

10/29/25 10:13	5.86	12.43	160.52
10/29/25 10:14	5.79	12.53	172.32
10/29/25 10:15	5.45	12.79	232.78
10/29/25 10:16	5.36	12.92	209.37
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10/29/25 10:21	5.24	13.05	285.74
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10/29/25 10:23	5.45	13.16	137.64
10/29/25 10:24	5.78	12.81	90.75
10/29/25 10:25	6.2	12.48	85.14
10/29/25 10:26	6.44	12.4	92.94
10/29/25 10:27	6.62	12.21	97.2
10/29/25 10:28	6.48	12.31	91.74
10/29/25 10:29	6.33	12.45	88.69
10/29/25 10:30	6.4	12.42	94.54
10/29/25 10:31	6.45	12.31	90.21
10/29/25 10:32	6.3	12.44	88.04
10/29/25 10:33	6.51	12.24	92.9
10/29/25 10:34	6.56	12.14	83.19
10/29/25 10:35	6.68	12.02	89.65
10/29/25 10:36	6.73	11.96	83.19
10/29/25 10:37	6.82	11.86	84.09
10/29/25 10:38	6.76	11.92	80.68
10/29/25 10:39	6.95	11.75	86.73
10/29/25 10:40	6.86	11.84	90.97
10/29/25 10:41	7.03	11.72	101.99
10/29/25 10:42	7.3	11.47	107.6
10/29/25 10:43	7.55	11.22	100.07
10/29/25 10:44	7.48	11.28	104.97
10/29/25 10:45	7.49	11.26	112.86
10/29/25 10:46	7.46	11.34	123.89
10/29/25 10:47	7.74	11.08	134.37
10/29/25 10:48	8.1	10.73	152.96
10/29/25 10:49	8.35	10.44	164.43
10/29/25 10:50	8.53	10.28	169.92
10/29/25 10:51	8.61	10.21	168.64
10/29/25 10:52	8.1	10.62	155.16
10/29/25 10:53	0.78	0.94	51.89
10/29/25 10:54	0.11	0.16	1.35
10/29/25 10:55	2.32	2.26	8.17
10/29/25 10:56	9.8	9.49	2.21
10/29/25 10:57	9.88	9.83	0.39
10/29/25 10:58	3	3	164.51
10/29/25 10:59	0.12	0.18	246.57
10/29/25 11:00	2.21	3.82	197.04
10/29/25 11:01	6.73	11.77	75.99
10/29/25 11:02	6.48	12.13	68.31
10/29/25 11:03	6.68	11.93	69.49
10/29/25 11:04	6.41	12.18	68.69
10/29/25 11:05	6.42	12.21	69.49
10/29/25 11:06	6.42	12.2	66.82
10/29/25 11:07	6.57	12.07	68.15

10/29/25 11:08	6.73	11.95	71.54
10/29/25 11:09	7.02	11.63	74.48
10/29/25 11:10	6.87	11.74	70.39
10/29/25 11:11	6.66	11.91	72.12
10/29/25 11:12	6.55	12.06	65.52
10/29/25 11:13	6.61	12.02	65.71
10/29/25 11:14	6.49	12.13	73.96
10/29/25 11:15	6.97	11.78	80.42
10/29/25 11:16	6.97	11.7	82.58
10/29/25 11:17	6.95	11.7	82.88
10/29/25 11:18	6.82	11.81	88.05
10/29/25 11:19	6.58	12.05	74.05
10/29/25 11:20	6.39	12.21	71.2
10/29/25 11:21	6.33	12.32	66.3
10/29/25 11:22	6.36	12.28	69.97
10/29/25 11:23	6.47	12.13	70.42
10/29/25 11:24	6.02	12.48	63.54
10/29/25 11:25	5.9	12.66	69.42
10/29/25 11:26	5.72	12.84	77.51
10/29/25 11:27	5.88	12.73	73.9
10/29/25 11:28	5.79	12.74	71.42
10/29/25 11:29	5.81	12.78	68.31
10/29/25 11:30	5.65	12.85	61.19
10/29/25 11:31	5.69	12.94	69.6
10/29/25 11:32	5.82	12.74	64.59
10/29/25 11:33	6.18	12.48	61.15
10/29/25 11:34	6.09	12.53	61.58
10/29/25 11:35	6.3	12.36	59.63
10/29/25 11:36	6.23	12.36	59.1
10/29/25 11:37	6.25	12.35	60.69
10/29/25 11:38	6.21	12.39	65.46
10/29/25 11:39	6.11	12.48	69.07
10/29/25 11:40	6.1	12.51	68.52
10/29/25 11:41	6.25	12.39	69.68
10/29/25 11:42	6.15	12.42	69.98
10/29/25 11:43	6.15	12.49	71.15
10/29/25 11:44	6.64	12.06	75.24
10/29/25 11:45	6.82	11.78	74.62
10/29/25 11:46	7	11.69	85.95
10/29/25 11:47	7.39	11.29	91.23
10/29/25 11:48	7.24	11.37	89.26
10/29/25 11:49	7.1	11.49	83.81
10/29/25 11:50	7.04	11.62	82.07
10/29/25 11:51	7.38	11.34	88.55
10/29/25 11:52	7.2	11.4	83.02
10/29/25 11:53	7.16	11.5	76.27
10/29/25 11:54	7.26	11.41	82.19
10/29/25 11:55	7.31	11.34	75.45
10/29/25 11:56	7.06	11.55	78.39
10/29/25 11:57	7.12	11.53	80.1
10/29/25 11:58	7.22	11.42	79.95
10/29/25 11:59	6.92	11.68	75.06
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10/29/25 12:01	6.78	11.85	71.09
10/29/25 12:02	6.87	11.77	70.75

10/29/25 12:03	6.74	11.86	70.52
10/29/25 12:04	6.64	11.98	72.06
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10/29/25 12:06	6.27	12.24	75.6
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10/29/25 12:08	5.93	12.52	62.8
10/29/25 12:09	5.82	12.7	62.04
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10/29/25 12:11	6.32	12.33	73.55
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10/29/25 12:13	6.69	11.96	81.43
10/29/25 12:14	6.87	11.76	79.58
10/29/25 12:15	6.76	11.83	76.43
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10/29/25 12:17	6.31	12.25	68.89
10/29/25 12:18	6.33	12.24	66.36
10/29/25 12:19	6.08	12.49	66.6
10/29/25 12:20	6.11	12.52	62.54
10/29/25 12:21	6.18	12.53	59.56
10/29/25 12:22	6	12.7	62.08
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10/29/25 12:24	6.15	12.81	73.16
10/29/25 12:25	6.51	12.59	80.26
10/29/25 12:26	6.63	12.42	81.18
10/29/25 12:27	6.59	12.51	82.03
10/29/25 12:28	6.85	12.3	87.4
10/29/25 12:29	6.78	12.32	89.7
10/29/25 12:30	6.92	12.17	92.66
10/29/25 12:31	6.76	12.23	92.53
10/29/25 12:32	6.84	12.1	87.96
10/29/25 12:33	6.59	12.21	70.61
10/29/25 12:34	6.5	12.17	66.5
10/29/25 12:35	1.12	2.01	48.93
10/29/25 12:36	0.11	0.19	1.06
10/29/25 12:37	1.41	1.42	6.94
10/29/25 12:38	9.75	9.39	3.01
10/29/25 12:39	9.87	9.81	0.2
10/29/25 12:40	3.78	3.8	144.62
10/29/25 12:41	0.12	0.2	245.87
10/29/25 12:42	5.17	0.16	193.14
10/29/25 12:43	20.49	0.17	2.71
10/29/25 12:44	20.58	0.17	1.32
10/29/25 12:45	20.6	0.16	1.07
10/29/25 12:46	20.6	0.16	1.06
10/29/25 12:47	14.98	0.16	37.83
10/29/25 12:48	0.06	0.1	3.81
10/29/25 12:49	1.28	1.04	20.66
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10/29/25 13:09	15.16	3.23	0.98
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10/29/25 13:11	14.48	3.61	0.48
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10/29/25 13:13	14.74	3.47	0.57
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10/29/25 13:15	14.27	3.73	0.42
10/29/25 13:16	13.83	3.98	0.37
10/29/25 13:17	13.46	4.19	0.32
10/29/25 13:18	13.77	4.01	0.3
10/29/25 13:19	13.71	4.05	0.36
10/29/25 13:20	13.5	4.17	0.29
10/29/25 13:21	13.09	4.4	0.29
10/29/25 13:22	13.06	4.41	0.24
10/29/25 13:23	12.61	4.66	0.27
10/29/25 13:24	12.52	4.71	0.24
10/29/25 13:25	12.57	4.68	0.21
10/29/25 13:26	12.63	4.65	0.26
10/29/25 13:27	12.7	4.61	0.24
10/29/25 13:28	12.72	4.61	0.24
10/29/25 13:29	12.73	4.6	0.24
10/29/25 13:30	12.68	4.63	0.23
10/29/25 13:31	12.71	4.62	0.25
10/29/25 13:32	12.6	4.67	0.23
10/29/25 13:33	12.64	4.65	0.18
10/29/25 13:34	12.68	4.63	0.17
10/29/25 13:35	12.68	4.63	0.21
10/29/25 13:36	12.68	4.62	0.17
10/29/25 13:37	12.65	4.64	0.2
10/29/25 13:38	12.81	4.55	0.18
10/29/25 13:39	12.83	4.54	0.12
10/29/25 13:40	12.69	4.62	0.07
10/29/25 13:41	12.68	4.62	0.1
10/29/25 13:42	12.65	4.64	0.09
10/29/25 13:43	12.87	4.51	0.09
10/29/25 13:44	12.94	4.48	0.05
10/29/25 13:45	12.77	4.57	0.06
10/29/25 13:46	12.7	4.61	0.03
10/29/25 13:47	12.64	4.64	0.02
10/29/25 13:48	12.65	4.63	0.07
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10/29/25 13:50	12.68	4.62	0.07
10/29/25 13:51	12.69	4.62	0.03
10/29/25 13:52	12.86	4.52	0.07

10/29/25 13:53	12.77	4.58	0.04
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10/29/25 13:57	12.62	4.66	0.03
10/29/25 13:58	12.63	4.66	0.04
10/29/25 13:59	12.63	4.66	0.04
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10/29/25 14:02	12.61	4.66	0.05
10/29/25 14:03	12.6	4.68	0.04
10/29/25 14:04	12.57	4.69	0.04
10/29/25 14:05	12.59	4.67	0
10/29/25 14:06	12.6	4.66	0
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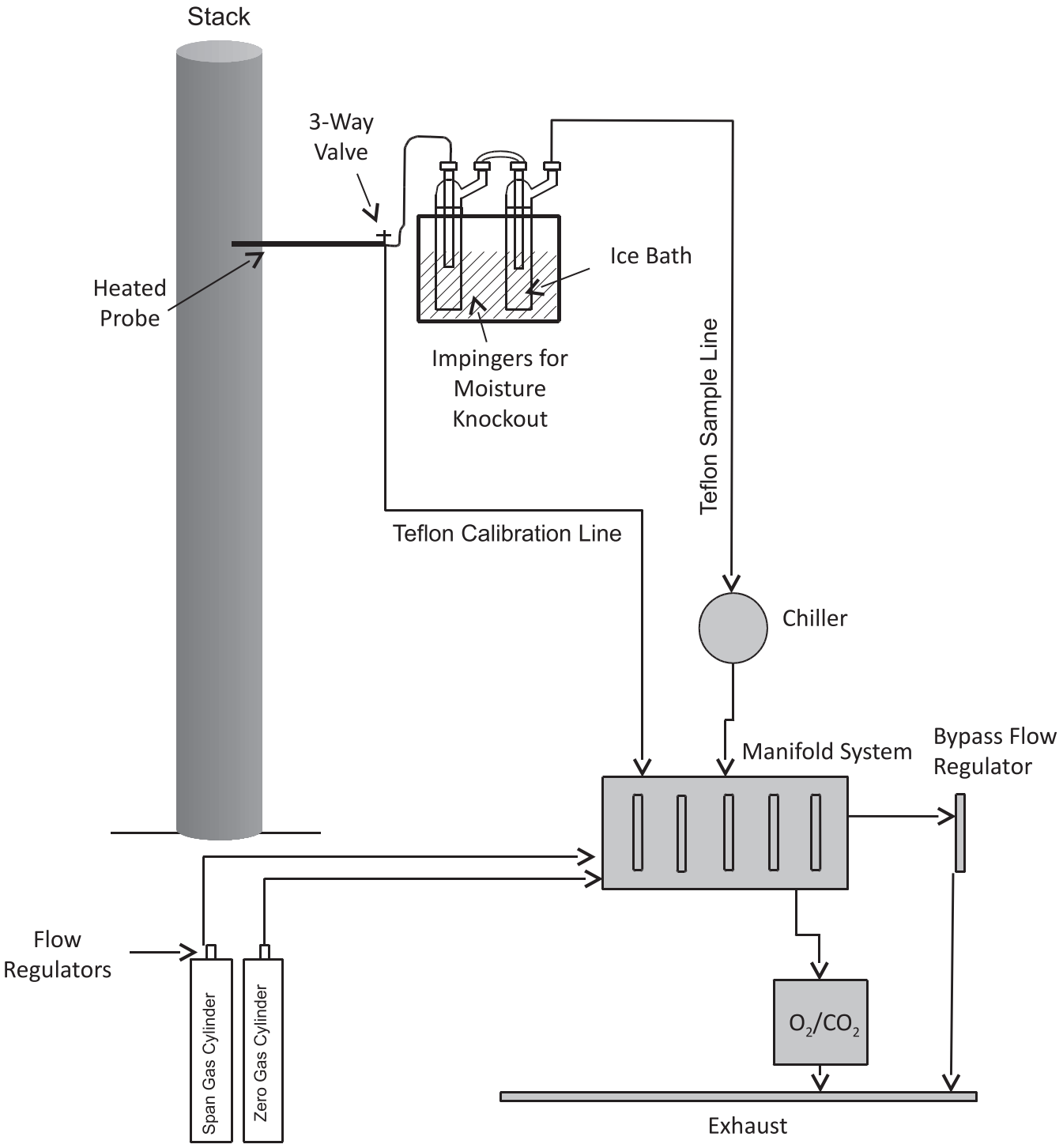
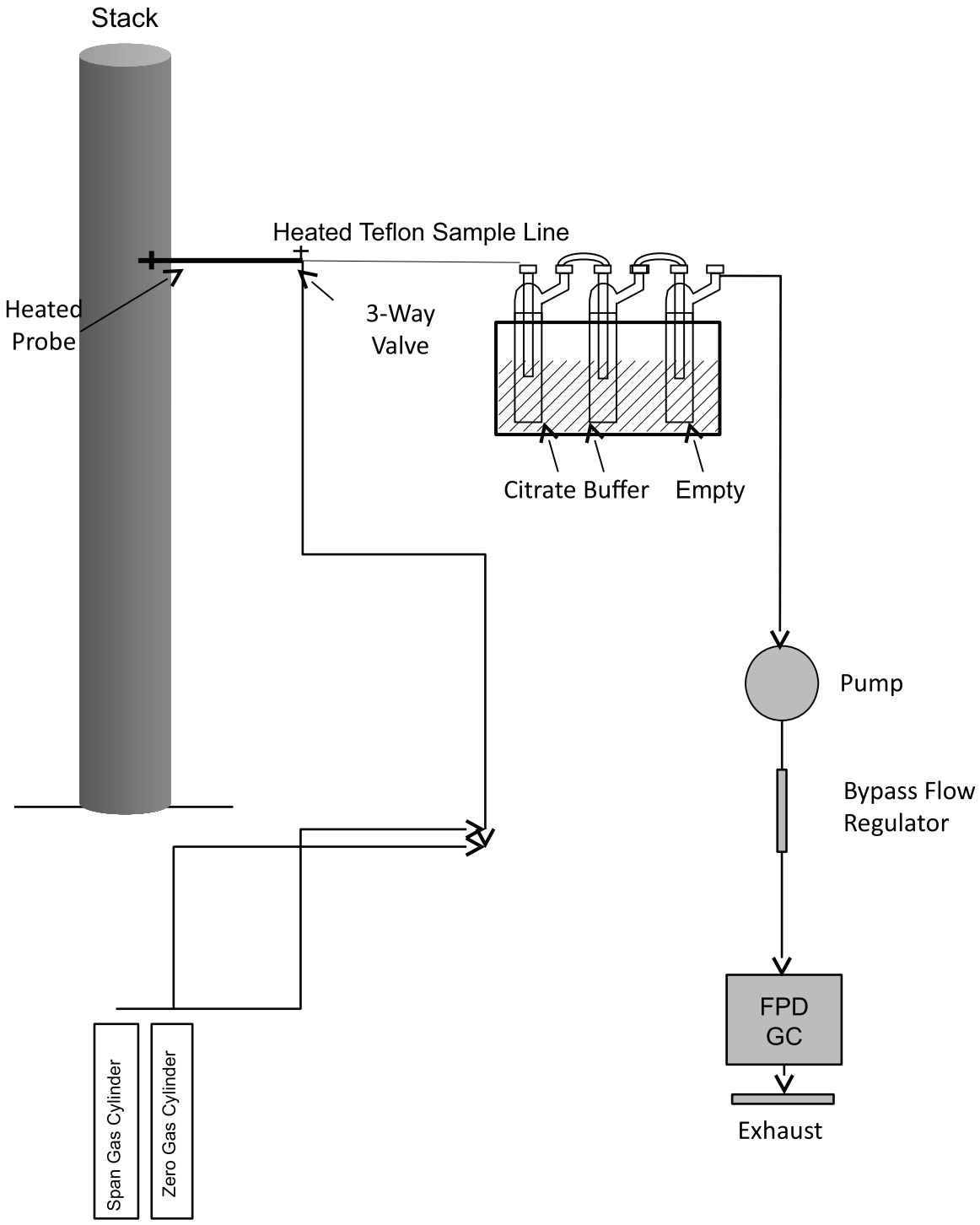
10/29/25 14:08	12.69	4.61	0
10/29/25 14:09	12.67	4.62	0.05
10/29/25 14:10	12.62	4.65	0
10/29/25 14:11	12.62	4.67	0.37
10/29/25 14:12	12.58	4.7	0.44
10/29/25 14:13	12.66	4.57	0.03
10/29/25 14:14	12.73	4.54	0.01
10/29/25 14:15	12.62	4.58	0.04
10/29/25 14:16	12.63	4.58	0
10/29/25 14:17	12.65	4.59	0
10/29/25 14:18	12.59	4.61	0.06
10/29/25 14:19	12.54	4.65	0.07
10/29/25 14:20	12.61	4.61	0.09
10/29/25 14:21	12.71	4.55	0.09
10/29/25 14:22	13.06	4.35	0.04
10/29/25 14:23	13.17	4.3	0.03
10/29/25 14:24	13.19	4.29	0.04
10/29/25 14:25	13.01	4.37	0.08
10/29/25 14:26	1.18	0.53	2.94
10/29/25 14:27	0.08	0.08	0.13
10/29/25 14:28	2.27	2.19	7.35
10/29/25 14:29	9.75	9.42	1.37
10/29/25 14:30	9.84	9.72	-0.5
10/29/25 14:31	2.9	2.88	4.67
10/29/25 14:32	0.08	0.13	11.88
10/29/25 14:33	6.19	0.09	10.72
10/29/25 14:34	20.53	0.11	0.81
10/29/25 14:35	20.6	0.1	0.41
10/29/25 14:36	20.61	0.1	0.45
10/29/25 14:37	20.6	0.1	0.57
10/29/25 14:38	18.89	0.1	0.57

Appendix G - Illustrations

Reference Method Monitors Sampling System
(EPA Method 3A)



Reference Method Monitor Sampling System
(EPA Method 16)



Appendix H - Resume of FTL

CAREER SUMMARY

Mr. Branham is a Project Scientist who has worked in the environmental fieldfor over 7 years. He has been involved with field testing activities on a broad scale and within several different industry types. Over this time, he has developed skills in several areas of emission testing including mobile laboratory operation, meter box operation, and field team supervision.

Education

BS, Parks, Recreation, and Hospitality Administration; Emphasis – Natural Resource Management

Arkansas Tech University

Russellville, AR

Certifications

Visible Emissions Evaluator

Joined Firm

2015

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

Lake City Army Ammunition – Independence, Missouri

Project included sampling for Dioxins and Furans on a hazardous waste combustor via U.S. EPA Reference Test Method 0023a, as well as a RATA to determine relative accuracy of a CO/O2 analyzer they had onsite to monitor emissions from that combustor. Testing was observed by the state regulatory agency. Responsibilities included field organization as well as general field operations.

Martin Marietta Materials – Malvern, Arkansas

Conducted and field managed EPA Method 9 testing at the Jones Mill Quarry location. Responsibilities included project coordination and field operations. Testing parameters included the determination of plume and fugitive emissions opacity.

Clean Harbors – El Dorado, Arkansas

Project included sampling for Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, Total Hydrocarbons, Particulate Matter, Metals, Chlorobenzene, and Hydrogen Cyanide on a hazardous waste incinerator in support of a Comprehensive Performance Test. This project included U.S. EPA Reference Test Methods 6C, 10, 7E, 25A, 5/202, 0030, 29, and OTM-29. Responsibilities included meter box operation, field organization, and general field operations.

Nucor Yamato Steel– Blytheville, Arkansas

Conducted annual compliance and performance specification testing on sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods and instrumental analysis including U.S. EPA Reference Test Methods 5/202 (particulate matter & condensable particulate matter), 12 (lead), 25A (volatile organic compounds), 7E (nitrogen oxides), 6C (sulfur dioxide) and 10 (carbon monoxide). Responsibilities included meter box operation, field organization, and general field operations.

Acme Brick

Conducted and assisted with BMACT testing at multiple locations in Texas and Arkansas. Responsibilities included meter box operation and field organization. Testing parameters included Oxygen, Carbon Dioxide, Nitrogen Oxides, Carbon Monoxide, Non-Methane Volatile Organic Compounds and Total Hydrocarbons, Halide testing with isokinetic train and FTIR, Metals, and Mercury. EPA Methods 3A, 7E, 10, 25A, 26, 29, 30B, and 320. Responsibilities included meter box operation, general field operations, and field organization.

Training

- TVTC Training
- CPR and First Aid
- MSHA Part 46
- Safeland

Last Page of Report

Site Operating Permit Revision Application

Graphic Packaging International, LLC

Texarkana, TX

Submitted by:

Graphic Packaging International

June 2026

Submitted to:

Graphic Packaging International, LLC
9978 FM Road 3129
Queen City, Texas 75572

Texas Commission on Environmental Quality
Air Permits Division
12100 Park 35 Circle, MC-163
Austin, Texas 78753

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Appendix A - PM and TRS Source Testing Results

1. INTRODUCTION

Graphic Packaging International, LLC (GPI) owns and operates a kraft pulp and paper mill near Texarkana, Texas (Texarkana Mill, Mill, or Facility). The Texarkana Mill is located in Cass County, Texas, which is in attainment with the National Ambient Air Quality Standards (NAAQS) for ozone and all criteria pollutants. The Texarkana Mill produces pulp and paper through the following operations: woodyard, power, chemical recovery, caustic plant, non-condensable gas system, pulping, bleaching, papermaking, wastewater treatment, miscellaneous support operations and extruders.

The Facility operates in accordance with Texas Commission on Environmental Quality (TCEQ) Site Operating Permit (SOP) No. O1378 issued December 23, 2025 (Permit). The Facility is classified as a major source with respect to the TCEQ Title V Program, as defined in Title 30 of the Texas Administrative Code (TAC) Chapter 122. The SOP, or Title V Operating Permit (TVOP), expires on December 23, 2030.

GPI conducted particulate matter (PM) testing in February of 2025 and total reduced sulfur (TRS) testing in October of 2025. GPI is requesting to update the Compliance Assurance Monitoring (CAM) deviation limit for the wet scrubbers associated with Nos. 1 and 2 Smelt Dissolving Tanks (Unit IDs SM01 and SM02) to be consistent with the most recent source testing performed. In addition, SM02 was rebuilt in 2019, making SM02 subject to New Source Performance Standards (NSPS) Subpart BBa, Standards of Performance for Kraft Pulp Mill Affected Sources for Which Construction, Reconstruction, or Modification Commenced after May 23, 2013. Permitting was not completed to incorporate the applicable standards. GPI conducted an audit in 2025 under the Texas Audit Privilege Act (TAPA) to voluntarily disclose any violations at the Facility. Findings of the audit, along with the information required under TAPA, have been submitted to the TCEQ on December 10, 2025.

GPI is submitting this minor revision application (Application) to incorporate updates to the CAM and periodic monitoring requirements for the Unit IDs SM01 and SM02 and to add positive applicability for United States Environmental Protection Agency (U.S. EPA) Title 40 Code of Federal Regulations Part 60, Subpart BBa (40 CFR Part 60, Subpart BBa) to unit ID SM02 (Project). The Unit IDs and their associated regulatory updates are summarized in **Table 1-1**.

Table 1-1
Summary of Regulatory Updates by Unit ID

Unit ID	Description	Regulation	Revision
SM01	No. 1 Smelt Dissolving Tank - Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BBa	Add positive applicability of 40 CFR Part 60, Subpart BBa.
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BB	Remove applicability of 40 CFR Part 60, Subpart BB.
SM02	No. 2 Smelt Dissolving Tank – Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).

This Application contains all required forms and supporting information for the revision of the Permit. The following forms are included in this Application: Form OP-2, Form OP-CRO1, Form OP-UA1, Form OP-REQ3, and Form OP-MON. The certification by a responsible official is included in Form OP-CRO1. Form OP-REQ3 is included to document the detailed citations associated with emissions unit that require a revision at the Facility. Tables 1a and 1b of Form OP-REQ3 show the applicable requirements for emissions units undergoing revisions.

There were no off-permit changes or operational flexibility notifications submitted since the last renewal. Therefore, there are no minor new source review (NSR) authorizations that need to be incorporated with this Application.

2. IDENTIFYING AND ADMINISTRATIVE INFORMATION

This section contains identifying and administrative information for the Mill. The following forms are included in this section:

- OP-2: Application for Permit Revision/Renewal

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1)

Date: **6/5/2026**	
Permit No.: **O1378**	
Regulated Entity No.: **RN100543115**	
Company Name: **Graphic Packaging International, LLC**	
For Submissions to EPA	
Has an electronic copy of this application been submitted (or is being submitted) to EPA?	☒ YES ☐ NO
I. Application Type	
Indicate the type of application:	
☐ Renewal	
☒ Streamlined Revision (Must include provisional terms and conditions as explained in the instructions.)	
☐ Significant Revision	
☐ Revision Requesting Prior Approval	
☐ Administrative Revision	
☐ Response to Reopening	
II. Qualification Statement	
For SOP Revisions Only	☒ YES ☐ NO
For GOP Revisions Only	☐ YES ☐ NO

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1 *continued*)

III.	**Major Source Pollutants (Complete this section if the permit revision is due to a change at the site or change in regulations.)**					
Indicate all pollutants for which the site is a major source based on the site's potential to emit: *(Check the appropriate box[es].)*						
☒ VOC	☒ NO_X	☒ SO_2	☒ PM_{10}	☒ CO	☐ Pb	☒ HAP
Other:						
IV.	**Reference Only Requirements** *(For reference only)*					
Has the applicant paid emissions fees for the most recent agency fiscal year (September 1 - August 31)?					☒ YES ☐ NO ☐ N/A	
V.	**Delinquent Fees and Penalties**					
Notice: This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ are paid in accordance with the Delinquent Fee and penalty protocol.						

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 2
Texas Commission on Environmental Quality

Date: **6/5/2026**
Permit No.: **O1378**
Regulated Entity No.: **RN100543115**
Company Name: **Graphic Packaging International, LLC**

Using the table below, provide a description of the revision.

Revision No.	Revision Code	Unit/Group Process			NSR Authorization	Description of Change and Provisional Terms and Conditions
		New Unit	ID No.	Applicable Form		
1	MS-C	NO	SM01	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM01 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
2	MS-C	NO	SM02	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM02 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
3	MS-C	NO	SM02	OP-UA1	N/A	GPI is requesting to add positive applicability for 40 CFR Part 60, Subpart BBa to SM02. In addition, GPI is requesting to remove 40 CFR Part 60, Subpart BB applicability for SM02. No additional emissions unit, emission point, or process is being added or deleted. Suggested regulations to be added to the Permit are found in Form OP-REQ3.

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 3
Texas Commission on Environmental Quality

Date: **6/5/2026**		
Permit No.: **O1378**		
Regulated Entity No.: **RN100543115**		
Company Name: **Graphic Packaging International, LLC**		
I.	**Significant Revision** *(Complete this section if you are submitting a significant revision application or a renewal application that includes a significant revision.)*	
A.	Is the site subject to bilingual requirements pursuant to 30 TAC § 122.322?	☐ YES ☐ NO
B.	Indicate the alternate language(s) in which public notice is required:	
C.	Will, there be a change in air pollutant emissions as a result of the significant revision?	☐ YES ☐ NO

Using the table below, indicate the air pollutant(s) that will be changing and include a brief description of the change in pollutant emissions for each pollutant:

Pollutant	Description of the Change in Pollutant Emissions

3. RESPONSIBLE OFFICIAL CERTIFICATION

This section contains certification requirements of this Application for the Mill. The following forms are included in this section:

- Form OP-CRO1: Certification by Responsible Official

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program

All initial permit application, revision, renewal, and reopening submittals requiring certification must be addressed using this form. Updates to site operating permit (SOP) and temporary operating permit (TOP) applications, other than public notice verification materials, must be certified prior to authorization of public notice or start of public announcement. Updates to general operating permit (GOP) applications must be certified prior to receiving an authorization to operate under a GOP.

I. Identifying Information	
RN: **RN100543115**	
CN: **CN601710460**	
Account No.: **CG-0010-G**	
Permit No.: **O1378**	
Project No.: **TBA**	
Area Name: **Texarkana Mill**	
Company Name: **Graphic Packaging International, LLC**	
II. Certification Type *(Please mark appropriate box)*	
☒ Responsible Official Representative	☐ Duly Authorized Representative
III. Submittal Type *(Please mark appropriate box) (Only one response can be accepted per form)*	
☐ SOP/TOP Initial Permit Application	☒ Permit Revision, Renewal, or Reopening
☐ GOP Initial Permit Application	☐ Update to Permit Application
☐ Other: _____	

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program
Texas Commission on Environmental Quality

All initial issuance, revision, and renewal permit application submittals requiring certification must be accompanied by this form. Updates to acid rain or CSAPR (other than public notice verification materials) must be certified prior to authorization of public notice for the draft permit.

IV. Certification of Truth
This certification does not extend to information which is designated by TCEQ as information for reference only.
I, **Jeffery Suelzer** certify that I am the **RO** *(Certifier Name printed or typed)* *(RO or DAR)* and that, based on information and belief formed after reasonable inquiry, the statements and information dated during the time period or on the specific date(s) below, are true, accurate, and complete: *Note: Enter Either a Time Period or Specific Date(s) for each certification. This section must be completed. The certification is not valid without documentation date(s).*
Time Period: From _____ to _____ *(Start Date)* *(End Date)*
Specific Dates: **6/5/2026** _____ _____ _____ *(Date 1)* *(Date 2)* *(Date 3)* *(Date 4)*
_____ _____ *(Date 5)* *(Date 6)*
Signature: _____ Signature Date: _____ Title: **Manufacturing Director**

4. PROCESS DESCRIPTION

The Texarkana Mill produces bleached kraft pulp that is used to make paperboard for packaging materials. The operations with air emissions sources at the Texarkana Mill include the following:

- Woodyard
- Power
- Chemical Recovery
- Caustic Plant
- Non-Condensable Gas System
- Pulping
- Bleaching
- Papermaking
- Wastewater Treatment
- Miscellaneous Support Operations
- Extruders

GPI woodyard operations debark logs, process chips, and intake purchased chips as raw materials to the process, which are digested under elevated temperature and pressure in an alkaline solution of sodium sulfide and sodium hydroxide, called “white liquor.” The two pulping lines process hardwood and softwood to produce a pulp slurry which is bleached and sent to the paper machines. The final product is dried and can be laminated through extruders that combine it with polyethylene.

This Application only concerns the smelt dissolving tanks used in the chemical recovery operations. There have been no additional changes to the Mill’s operations since the last renewal of the TVOP application; therefore, only a discussion of the chemical recovery operations is included.

CHEMICAL RECOVERY OPERATIONS

The Texarkana Mill operates two liquor recovery systems that process kraft black liquor from the hardwood and softwood pulping operations. Weak liquor from the pulping process is collected in separate weak black liquor storage tanks, one for the No. 1 System and one for the No. 2 System. The liquor from each system is sent to the multiple effect evaporator set associated with that system. Black liquor from these evaporators is then sent to heavy liquor storage before being further processed in the concentrators. Emissions from the No. 1 and No. 2 Multiple Effect Evaporator Sets and No. 1 and No. 2

Concentrators are collected and controlled by the non-condensable gas (NCG) system. The foul condensates are collected in the evaporator hotwells and routed to the sewer and wastewater treatment system. The combined contaminated condensate is collected and may be used as shower water in the brown stock washers or sewered.

Tall oil soap is produced as a byproduct of the evaporation process. Liquor is extracted from an intermediate stage of each evaporator system and sent to No. 2 Weak Liquor Storage Tank. The soap is then concentrated and kept in the No. 1 and No. 2 Soap Storage Tanks prior to loading into trucks for offsite processing.

The Texarkana Mill recovers cooking chemicals by firing concentrated black liquor into either of the two indirect contact recovery furnaces, No. 1 Recovery Furnace (RB01) and No. 2 Recovery Furnace (RB02). The organics from the liquor are combusted to generate heat for process steam, while the inorganic chemicals collect in the bottom of the furnaces in the form of molten smelt. The recovery furnaces are also permitted to fire natural gas, primarily during start-up operations. Each furnace operates as an independent system that includes: a smelt tank, electrostatic precipitator (ESP) for PM control, and two exhaust stacks. Ash from the ESPs is returned to the system in the Precipitator Ash Tanks (one for each recovery furnace) that are vented to the smelt dissolving tank scrubbers. The molten smelt from each recovery furnace is directed to one of two dedicated smelt tanks, where it is dissolved into weak wash or water to form green liquor, a preliminary step to regenerating white liquor in the causticizing operation. SM01 and SM02 are equipped with scrubbers. The control devices are designed to capture particulates and TRS compounds and return them to the smelt tanks. Weak wash, an aqueous solution of sodium hydroxide, sodium sulfide, and sodium carbonate, is used as the scrubbing medium.

5. PROJECT DESCRIPTION

GPI is requesting to update the CAM deviation limit for the wet scrubbers associated with SM01 and SM02 to be consistent with the most recent source testing performed. Pursuant to 40 CFR §63.864(j)(5)(i)(B)(1), "the minimum fan amperage operating limit must be set as the midpoint between the lowest of the 1-hour average fan amperage values associated with each test run demonstrating compliance with the applicable emission limit in §63.862 and the no-load amperage value." The no-load amperage value is determined using manufacturers specifications, or by performing a no-load test of the fan motor for each smelt dissolving tank scrubber. In 2025, GPI completed PM source testing of SM01 and SM02, on February 11 and 12, respectively. TRS source testing was also performed on SM02 on October 28, 2025. While both pollutants were tested under the applicable NSPS BBa requirements for SM02, the operating parameters (i.e., fan amps and scrubber flow) are established based on the PM performance tests as the operating parameter values were higher than those observed during the TRS test. Therefore, SM01 and SM02 utilize the PM source testing results for the 1-hour average fan amperages of the wet scrubber. The no-load fan amperage value for SM01 and SM02 have been obtained from no-load tests performed in 2015 and 2023, respectively. Therefore, GPI has calculated the lowest 1-hour average fan amperage, as provided in the Source Test Report, and the no-load value, and is requesting the value be used for the CAM deviation limit. Please see Table 5-1 for current Permit values and proposed values. The suggested permit revisions can be found in strikethrough and red text in Form OP-MON.

Table 5-1
Smelt Dissolving Tank Test Results and Proposed Values

Unit Name	No. 1 Smelt Dissolving Tank	No. 2 Smelt Dissolving Tank
Unit ID No.	SM01	SM02
Current Permit Average Fan Amp Value	77	36
No Load Fan Amp Values	50.2	28
Minimum 1-Hour Average Fan Amp	81.8	43.19
Proposed Average Fan Amp Value	66	36
Current Permit Weak Wash Flow to Fan (gpm)	48	75
Proposed Weak Wash Flow to Fan (gpm)	48	77
Current Permit Weak Wash Flow to Scrubber (gpm)	88	95
Proposed Weak Wash Flow to Scrubber (gpm)	87	90

In addition, SM02 was rebuilt in 2019 and is therefore subject to NSPS Subpart BBa. Permitting was not completed to incorporate the applicable Subpart BBa standards associated with SM02. Pursuant to Section 10(G) of the Environmental, Health and Safety Audit Privilege Act, which provides immunity for violations voluntarily disclosed as a result of a compliance audit, the Mill conducted an audit under the TAPA, commencing April 30, 2025, to voluntarily disclose any violations at the Facility. The audit was complete on November 18, 2025 and the audit findings were submitted on December 10, 2025. In addition, a source test for TRS was performed on SM02 on October 28, 2025 to demonstrate compliance with Subpart BBa. Since there were no additions or deletions of an emissions unit, emissions point, or process, Form OP-SUMR is not required per form instructions. However, GPI is requesting to update the Unit Summary of the Permit to include a row for 40 CFR Part 60, Subpart BBa requirements for SM02. An example of the row to include, in red, is found below.

Unit/Group/Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
SM02	KRAFT PULP MILLS	N/A	60BBa-01	40 CFR Part 60, Subpart BBa	No changing attributes.

40 CFR Part 60, Subpart BBa lists additional requirements for sources constructed, reconstructed, or modified after May 23, 2013. SM02 was reconstructed in 2019 and is now regulated by Subpart BBa, rather than Subpart BB. GPI is requesting that the Applicable Requirements Summary also be updated to include the regulations applicable to SM02 in Subpart BBa and to delete regulatory requirements of Subpart BB. The suggested regulations applicable to SM02 to include (in red) and delete (in strikethrough) in the Permit can be found in the example on the following page and in Form OP-REQ3.

Applicable Requirements Summary

Unit Group Process ID No.	Unit Group Process Type	SOP Index No.	Pollutant	State Rule or Federal Regulation Name	Emission Limitation, Standard or Equipment Specification Citation	Textual Description (See Special term and Condition 1.B.)	Monitoring and Testing Requirements	Recordkeeping Requirements (30 TAC §122.144)	Reporting Requirements (30 TAC §122.145)
~~SM02~~	~~EU~~	~~60BB-01~~	~~PM~~	~~40 CFR Part 60, Subpart BB~~	~~§60.282(a)(2)~~	~~On and after the test completion no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases containing PM > 0.1 g/kg black liquor solids (dry weight).~~	~~§ 60.285(a) [G]§ 60.285(c) § 60.285(f)(1) ** See CAM Summary~~	~~None~~	~~None~~

~~SM02~~	~~EU~~	~~60BB-01~~	~~TRS~~	~~40 CFR Part 60, Subpart BB~~	~~§60.283(a)(4)~~	~~On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.~~	~~§ 60.284(b) [G]§ 60.284(b)(2) § 60.284(c)(4) § 60.284(f) § 60.285(a) [G]§ 60.285(e) § 60.285(f)(2)~~	~~§60.284(c)(4)~~	~~None~~
SM02	EU	60BBa-01	PM	40 CFR Part 60, Subpart BBa	§60.282a(a)(3)	On and after the performance test completion no owner/operation shall discharge to the atmosphere from any new smelt dissolving tank that is not associated with a new or reconstructed	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

						recovery furnace subject to the provisions of 60.282a(a)(2) any gases which contain filterable particulate matter in excess of 0.1 gram per kilogram (g/kg) of black liquor solids (dry weight).			
SM02	EU	60BBa-01	TRS	40 CFR Part 60, Subpart BBa	§60.283a(a)(4)	On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7) §60.285a(e) §60.285a(f)(2)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

6. UNIT ATTRIBUTE INFORMATION

This section contains the applicable unit attribute forms to document regulatory applicability. The following forms are included in this section:

- OP-UA1: Miscellaneous and Generic Unit Attributes

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

General Information

Requested Information	Response
Date:	06/05/2026
Customer Reference No.:	CN601710460
Regulated Entity No.:	RN100543115
Permit No.:	O1378
Permit Area Name:	Texarkana Mill
Permit Type:	SOP
Project Type:	Revision
Submission Type:	Existing Application Update
Project Number (if available):	TBD
Form Information	**TCEQ Entry Only**
Title V Form Release Date:	10/1998
Form Number:	10044
APD ID Number:	35v1.0
Version Revised Date:	07/2025
	This form is for use by facilities subject to air quality permit requirements and may be revised periodically.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table of Contents

Table	Regulation	Page	Data Submitted
N/A	N/A	OP-SUM Table 1	Yes
N/A	N/A	OP-REQ2	Yes
Table 1	N/A	Page 1	Yes

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-SUM - Individual Unit Summary
Table 1

Unit AI	Revision No.	Unit ID No.	Group ID No.	Unit Name/Description	CAM	PCA AI	Preconstruction Authorization (PCA) Category	Authorization/ Registration Number	Permit By Rule (PBR) Number	PBR Effective Date
	1	SM01		NO. 1 SMELT TANK	Y			2975		
	1	SM01		NO. 1 SMELT TANK	Y			PSDTX778M2		
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.261	03/14/1997
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.262	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			2975		
	2	SM02		NO. 2 SMELT TANK	Y			PSDTX778M2		
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.261	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.262	03/14/1997

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-REQ2 - Negative Applicable/Superseded Requirement Determinations

Unit AI	Revision No.	Unit ID No.	Potentially Applicable Regulatory Name	Negative Applicability/Superseded Requirement Citation	Negative Applicability/Superseded Requirement Reason
	3	SM02	**40 CFR Part 60, Subpart BBa**	40 CFR Part 60, Subpart BB	SM02 has been rebuilt and is now subject to 40 CFR Part 60, Subpart BBa, which promulgates requirements for sources that have been constructed, reconstructed, or modified after May 23, 2013. 40 CFR Part 60, Subpart BB no longer applies.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table 1

Unit ID No.	SOP/GOP Index No.	Unit Type	Date Constructed/Placed in Service	Functionally Identical Replacement	Maximum Rated Capacity	Technical Information and Unit Description
SM02	60BBa-01	EU	**10/03/2019**			No. 2 Smelt Tank was rebuilt in 2019 and is therefore subject to 40 CFR Part 60, Subpart BBa.

Go to the Table of Contents

7. APPLICABLE REQUIREMENT INFORMATION

This section contains forms that document potentially applicable requirements. The following forms are included in this section:

- OP-REQ3: Applicable Requirements Summary

Applicable Requirements Summary
Form OP-REQ3
(Page 1)
Federal Operating Permit Program
Table 1a: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	Unit/Group/Process Applicable Form	SOP/GOP Index No	Pollutant	Applicable Regulatory Requirement Name	Applicable Regulatory Requirement Standard(s)
3	*SM02*	OP-UA1	*60BBa-01*	*PM & TRS*	*40 CFR Part 60, Subpart BBa*	*§ 60.280a* *§ 60.282a(a)(3)* *§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)* *§ 60.287a(a)* *§ 60.287a(b)(4)* *§ 60.287a(b)(7)* *§ 60.287a(c)* *§60.288a*

Applicable Requirements Summary
Form OP-REQ3 (Page 2)
Federal Operating Permit Program
Table 1b: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	SOP/GOP Index No.	Pollutant	Monitoring and Testing Requirements	Recordkeeping Requirements	Reporting Requirements
2	SM02	60BBa-01	PM & TRS	*§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)*	§ 60.287a(a) § 60.287a(b)(4) § 60.287a(b)(7) § 60.287a(c)	§60.288a

8. COMPLIANCE ASSURANCE MONITORING AND PERIODIC MONITORING

CAM is a Federal program established under 40 CFR Part 64 regulations. The regulatory requirements governing implementation of CAM in Texas are also established in 30 TAC Chapter 122, Subchapter G. CAM applies to an emissions unit located at a major source that meets all of the following:

- The emissions unit is subject to an emissions limitation or standard for an air pollutant in an applicable requirement;
- The emissions unit uses a control device to achieve compliance with the applicable emissions limitation or standard; and
- The emissions unit has the pre-control potential-to-emit greater than or equal to the amount in tons per year required for the site to be classified as a major source.

CAM applicability is determined on a pollutant-by-pollutant basis. Please note that 30 TAC §122.604(c) and (d) include CAM exemptions for certain emissions limitations or standards and certain utility units. For example, CAM does not apply to emissions limitations or standards proposed by U.S. EPA after November 15, 1990 under the Federal Clean Air Act Sections §111 (Standards of Performance for New Stationary Sources) or §112 (Hazardous Air Pollutants). Additionally, CAM does not apply to emissions limitations or standards for which the applicable requirement specifies a continuous compliance determination method.

CAM applicability is determined for the emissions unit, not the control device. Sites are required to address CAM as part of the Title V application process. As such, GPI has reviewed the applicable existing CAM plans for accuracy. Form OP-MON has been included with this Application for the CAM plans that require revisions.

Periodic monitoring is a Federal monitoring program established under 40 CFR Part 70 regulations. The regulatory requirements governing implementation of periodic monitoring in Texas are also established in 30 TAC Chapter 122, Subchapter G. An emissions unit will require periodic monitoring for an emissions limitation or standard when the regulation does not specify sufficient monitoring to determine compliance with the applicable requirement. Form OP-MON has been included to document revisions of the periodic monitoring at the Mill.

Pursuant to 40 CFR §64.2(b)(1), the CAM requirements under 40 CFR Part 64 do not apply to SM02. §64.2(b)(1) exempts units subject to emissions limitations or standards in NSPS promulgated after

November 15, 1990. Subpart BBa lists its own monitoring, performance testing, and compliance provisions for PM and TRS, satisfying the intent of CAM. GPI is requesting to remove CAM requirements that no longer apply to SM02 and has included the suggested strikethrough in Form OP-MON.

Texas Commission on Environmental Quality
Monitoring Requirements
Form OP-MON
(PAGE 3)
Federal Operating Permit Program
Table 1c: CAM/PM Case-By-Case Additions

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**1**		
Unit/EPN/Group/Process ID No.: **SM01**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: **30 TAC Chapter 111, Nonagricultural Processes & 30 TAC Chapter 111, Visible Emissions**		
SOP/GOP Index No.: **R1151-01 & R1111-01**		
Pollutant: **PM & Opacity**		
Main Standard: **§111.151(a) & §111.111(a)(1)(B)**		
Monitoring Type: **CAM & Periodic Monitoring**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 66 ~~77~~ amps; [ii] Minimum liquid flow rate = 87.17 ~~88~~ gpm to scrubber and 47.99 ~~48~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM01**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: **Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**		

Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:
± 2% of span; or
± 5% of design liquid flow rate

Verification Procedures:
N/A

Representative Date: **N/A**

VI. Periodic Monitoring Case-by-case: N/A - No changes to periodic monitoring

Indicator: **[I] Fan motor current; [II] Liquid flow rate**	Minimum Frequency: **Four times per hour**

Averaging Period: **3 hour**

Periodic Monitoring Text:
[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**2**		
Unit/EPN/Group/Process ID No.: **SM02**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: ~~**40 CFR Part 60, Subpart BB &**~~ **30 TAC Chapter 111, Nonagricultural Processes**		
SOP/GOP Index No.: ~~**60BB-01 &**~~ **R1111-01**		
Pollutant: ~~**PM &**~~ **Opacity**		
Main Standard: ~~**§60.282(a)(2) &**~~ **§111.11(a)(1)(B)**		
Monitoring Type: **CAM**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 35.6 ~~36~~ amps; [ii] Minimum liquid flow rate = 89.62 ~~95~~ gpm to scrubber and 76.54 ~~75~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM02**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: ~~**Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**~~ ~~**Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:**~~ ~~**± 2% of span; or**~~ ~~**± 5% of design liquid flow rate**~~		

Verification Procedures: **N/A**	
Representative Date: **N/A**	
VI. Periodic Monitoring Case-by-case	
Indicator: **Fan Amperage & Liquid Flow Rate**	Minimum Frequency: **Four times per hour**
Averaging Period: **3 hour**	
Periodic Monitoring Text: **[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.** **[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.**	

APPENDIX A -
PM AND TRS SOURCE TESTING RESULTS

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Test Dates:
February 11-13, 2025

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subparts MM & S

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Lucas Hotubbee
lucas.hotubbee@alliancetg.com
(479) 206-1157

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewer
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

COMPANY:		Graphic Packaging International		SOURCE:		LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, NCG01	
REVIEWER:				DATE OF SAMPLING:		February 11-13, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. E	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. E	Operating parameters of the pollution control equipment					
13.	App. E	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. D	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	App. C	Chain of custody of samples					
31.	App. C	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. D	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the source) tested and operating conditions for the specific test dates and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections in the test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

March 11, 2025

Riley Wilson, QSTI – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

Appendix A Sample Calculations
Appendix B Field Data
Appendix C Laboratory Data
Appendix D Quality Assurance/Quality Control Data
Appendix E Process Operating/Control System Data
Appendix F CSV Data
Appendix G Illustrations
Appendix H Resume of Field Team Leader
Appendix I Laboratory NELAP Certification
Appendix J SSTP and Associated Documentation
Appendix K TCEQ Permit Sections

Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing was conducted to determine the concentrations and emission rates of particulate matter (PM), particulate matter no more than 10 microns in diameter (PM_{10}), particulate matter no more than 2.5 microns in diameter ($PM_{2.5}$), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	$PM/PM_{10}/PM_{2.5}$
No. 2 Lime Kiln	LK02	$PM/PM_{10}/PM_{2.5}$
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	$PM/PM_{10}/PM_{2.5}$
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	$PM/PM_{10}/PM_{2.5}$
No. 1 Smelt Tank Scrubber	SM01	$PM/PM_{10}/PM_{2.5}$
No. 2 Smelt Tank Scrubber	SM02	$PM/PM_{10}/PM_{2.5}$
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John T. Fussell
Alliance Personnel	Riley Wilson Dominic Bradley Ethan Dobbs Lucas Hotubbee Joshua Moore Marcus Nichols Chris Shepard Calvin Standridge

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) developed by Alliance.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on February 11-13, 2025. Testing consisted of determining the concentration and emission rate of CH_3OH at the exhaust of NCG01 and of $PM/PM_{10}/PM_{2.5}$ at the exhausts of LK1, LK2, RB01A/RB01B, RB02A/RB02B, SM01, and SM02.

Tables 2-1 through 2-4 provide a summary of the emission testing results with comparisons to the applicable NESHAP or TCEQ permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Table 2-1: Summary of Results – Nos. 1 and 2 Lime Kilns

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
LK01 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.015	0.015	0.013	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**22**
Total PM[1] Emission Rate, lb/hr	4.7	4.6	4.4	4.5
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	27.60
Percent of Limit, %	--	--	--	**16**
LK02 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.018	0.006	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**21**
Total PM[1] Emission Rate, lb/hr	6.6	6.6	2.8	5.3
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	26.30
Percent of Limit, %	--	--	--	**20**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-2: Summary of Results – Nos. 1 and 2 Recovery Furnaces

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
RB01A (North Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0082	0.0051	0.0074	0.0069
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**16**
Total PM[1] Emission Rate, lb/hr	6.5	3.6	5.2	5.1
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**19**
RB01B (South Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0013	0.0012	0.0010	0.0011
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**3**
Total PM[1] Emission Rate, lb/hr	1.2	1.2	1.1	1.2
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**4**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
RB02A (West Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.014	0.043	0.025
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**56**
Total PM[1] Emission Rate, lb/hr	21.2	19.9	53.2	31.5
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**74**
RB02B (East Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.030	0.012	0.014	0.019
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**43**
Total PM[1] Emission Rate, lb/hr	36.2	16.2	18.4	23.6
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**55**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-3: Summary of Results – Nos. 1 and 2 Smelt Tank Scrubbers

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
SM01 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.15	0.083	0.073	0.10
NESHAP PM Limit, lb/ton	--	--	--	0.40
Percent of Limit, %	--	--	--	
Total PM[1] Emission Rate, lb/hr	7.8	4.4	3.9	5.4
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	10.9
Percent of Limit, %	--	--	--	**49**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
SM02 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.077	0.063	0.060	0.067
NESHAP PM Limit, lb/ton	--	--	--	0.20
Percent of Limit, %	--	--	--	**33**
Total PM[1] Emission Rate, lb/hr	8.0	7.4	6.4	7.3
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	19.85
Percent of Limit, %	--	--	--	**37**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-4: Summary of Results – NCG Oxidation Unit Scrubber

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
Methanol Data				
Concentration, ppmvd @ 10% O_2	1.1	1.1	0.97	1.1
NESHAP Limit, ppmvd @ 10% O_2	--	--	--	20
Percent of Limit, %	--	--	--	**5**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture	320	FTIR – Continuous Sampling

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated to equivalent diameters and compared to Figure 1-1 in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and an inclined manometer. The stack gas temperature was measured with a K-type thermocouple and a pyrometer.

The O_2 and CO_2 concentrations were assumed to be ambient for the molecular weight and volumetric flow rate calculations at the Nos. 1 and 2 Smelt Tank Scrubbers (SM01 and SM02).

Stack gas velocity pressure and temperature readings were recorded during each test run and were utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing were conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on-site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content (BWS) was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to the testing, each impinger was filled with a known quantity of water or silica gel. Each impinger was analyzed gravimetrically before and after each test run to determine the amount of condensed moisture. All gravimetric analyses were performed on the same balance.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing was conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system consisted of a stainless-steel nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, an un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and five (5) chilled impingers. The first and second impingers were initially empty, the third impinger contained 100 mL of de-ionized water, the fourth impinger was initially empty, and the fifth impinger contained 200-300 grams of silica gel. The un-weighed, 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of 248 ±25°F, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained at a temperature that was greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The nitrogen purge was omitted because the amount of condensate that was collected in the dry impingers was minimal. After the leak check, the impinger contents were measured for moisture gain.

The front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 120-minute purge was conducted at a rate of 14 liters per minute. The nitrogen purge was started within 30 minutes of the conclusion of sampling. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. Condensate was collected in the first dry impinger; therefore, the front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 60-minute purge was conducted at a rate of 14 liters per minute. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder were rinsed six (6) times with acetone to remove any adhering particulate matter, and the resulting rinses were recovered in container 2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water, then with acetone and then with hexane. The resulting water rinse was recovered in container CPM Cont. #1, and the acetone and hexane rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed sequentially

with DIUF water, acetone, and hexane. The resulting water rinse was added to container CPM Cont. #1, and the resulting acetone and hexane rinses were added to container CPM Cont. #2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for condensable particulate matter analysis. The total moles of sulfate and ammonium were determined in the sample fraction and the maximum mass adjustment factor (MMAF) was calculated to correct for residual ammonia in accordance with OTM-59.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture were determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream was extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 FTIR, which was operated with a portable computer. FTIR spectra for each calibration gas were stored on the computer's hard drive, and these single component calibration spectra were used to analyze the spectra of the measured samples. The gas components to be measured were selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio were measured and recorded to document the analyzer's performance. A leak check was performed on the sample cell. The instrument path length was verified by using ethylene as the Calibration Transfer Standard. Dynamic spiking was performed by using a certified standard of the target compound or appropriate surrogate, which was balanced in nitrogen with sulfur hexafluoride blended as a tracer, to calculate the dilution factor. All test spectra, interferograms, and analytical method information were recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at the Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) was introduced directly to the instrument sample port. The signal amplitude was recorded, a background spectra was taken, a linearity check was performed and recorded, the peak-to-peak noise and the root mean square in the spectral region of interest were measured and a screenshot was recorded, all while the nitrogen was flowing.

Following the zero gas checks, room air was pulled through the sample chamber, the line width and resolution were verified to be at 1879 cm-1, the peak position was entered and a screenshot of the FWHH was recorded. Following these checks, another background spectra was recorded, and the calibration transfer standard (CTS) was introduced directly to the instrument sample port. The CTS instrument recovery was recorded, and the instrument mechanical response time was measured.

Next, stack gas was introduced to the FTIR through the sampling system and several scans were taken until a stable reading was achieved. The native concentration of our target spiking analyte (methanol) was recorded. Spike gas was introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate, and a corresponding dilution ratio and a system response time were calculated. Matrix spike recovery spectra were recorded and were within ± 30% of the calculated value of the spike concentration in accordance with the method's requirements.

The matrix spike recovery was conducted one (1) time at the beginning of the testing, and the CTS recovery procedures were repeated following each test run. The corresponding values were recorded.

Appendix A

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	13.3	= average analyzer value during test, % dry
C_o	0.2	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	10.1	= average of pretest & posttest calibration responses, % dry
C_{O_2}	13.2	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.1	= average analyzer value during test, % dry
C_o	0.0	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.8	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	3.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
ΔH	2.158	= pressure differential of orifice, in H_2O
Pm	30.19	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
Pg	-0.48	= static pressure, in. H_2O
Ps	29.99	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Y \times Vm \times Pm}{Tm}$$

where,

Y	0.999	= meter correction factor
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Tm	523.5	= absolute meter temperature, °R
Vmstd	48.077	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	506	= weight of H_2O collected, g
Vwstd	23.863	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37} - \left(\frac{2,827}{Ts + 365}\right)}{Ps}$$

where,

Ts	363.9	= stack temperature, °F
Ps	29.99	= absolute stack gas pressure, in. Hg
BWSsat	1.000	= dimensionless

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	23.863	= standard wet volume, scf
Vmstd	48.077	= standard meter volume, dscf
BWS	0.332	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	1.000	= moisture fraction (theoretical at saturated conditions)
BWSmsd	0.332	= moisture fraction (measured)
BWS	0.332	

Excess Air (EA), %

$$EA = \frac{(\%O_2 - [0.5 \times \%CO]) \times 100}{(0.264 \times \%N_2) - \%O_2 - (0.5 \times \%CO)}$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
CO	0.0	= carbon monoxide concentration, % (assumed zero)
N_2	79.5	= nitrogen concentration, %
EA	40.97259538	= %

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
Md	30.55	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	30.55	= molecular weight (DRY), lb/lb mol
BWS	0.332	= moisture fraction, dimensionless
Ms	26.39	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.804	= pitot tube coefficient
$\Delta P^{1/2}$	0.713	= velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Ms	26.39	= molecular weight of stack gas, lb/lb mol
Vs	50.0	= ft/sec

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	50.0	= stack gas velocity, ft/sec
As	46.16	= cross-sectional area of stack, ft^2
Qa	138,543	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	138,543	= average stack gas flow at stack conditions, acfm
BWS	0.332	= moisture fraction, dimensionless
Ps	29.99	= absolute stack gas pressure, in. Hg
Ts	823.5	= absolute stack temperature, °R
Qs	59,472	= dscfm

Dry Gas Meter Calibration Check (Yqa), dimensionless

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{0.0319 \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0.999	= meter correction factor, dimensionless
Θ	60	= run time, min.
Vm	47.32	= total meter volume, dcf
Tm	523.5	= absolute meter temperature, °R
ΔH@	1.832	= orifice meter calibration coefficient, in. H_2O
Pb	30.03	= barometric pressure, in. Hg
ΔH avg	2.158	= average pressure differential of orifice, in H_2O
Md	30.55	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	1.469	= average squareroot pressure differential of orifice, $(in. H2O)^{1/2}$
Yqa	0.2	= percent

Volume of Nozzle (Vn), ft^3

$$Vn = \frac{Ts \times \left(0.002669 \times Vlc + \frac{Vm \times Pm \times Y}{Tm} \right)}{Ps}$$

where,

Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Vlc	506.0	= volume of H_2O collected, ml
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Y	0.999	= meter correction factor, unitless
Tm	523.5	= absolute meter temperature, °R
Vn	111.928	= volume of nozzle, ft^3

Isokinetic Sampling Rate (I), %

$$I = \left(\frac{Vn}{\theta \times 60 \times An \times Vs} \right) \times 100$$

where,

Vn	111.928	= nozzle volume, ft3
θ	60.0	= run time, minutes
An	0.00059	= area of nozzle, ft^2
Vs	50.0	= average velocity, ft/sec
I	104.7	= %

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Filterable PM Concentration (C_s), grain/dscf

$$C_s = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn	29.2	= filterable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_s	0.0094	= grain/dscf

Filterable PM Emission Rate (PMR), lb/hr

$$PMR = \frac{C_s \times Qs \times 60}{7.0E+03}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
PMR	4.78	= lb/hr

Condensable PM Concentration (C_{CPM}), grain/dscf

$$C_{CPM} = \frac{M_{CPM} \times 0.0154}{Vmstd}$$

where,

M_{CPM}	10.7	= condensable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_{CPM}	0.0034	= grain/dscf

Condensable PM Emission Rate (ER_{CPM}), lb/hr

$$ER_{CPM} = \frac{C_{CPM} \times Qs \times 60\frac{min}{hr}}{7.0E+03}$$

where,

C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
ER_{CPM}	1.75	= lb/hr

Total PM Concentration (C_{TPM}), grain/dscf

$$C_{TPM} = C_S + C_{CPM}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
C_{TPM}	0.0128	= grain/dscf

Total PM Emission Rate (ER_{TPM}), lb/hr

$$ER_{TPM} = PMR + ER_{CPM}$$

where,

PMR	4.78	= filterable PM emission rate, lb/hr
ER_{CPM}	1.75	= condensable PM emission rate, lb/hr
ER_{TPM}	6.53	= lb/hr

Location:	Graphic Packaging International - Queen City, TX
Source:	NCG Oxidation Unti Scrubber (NCG01)
Project No.:	AST-2024-4204
Run No. /Method	Run 1 / Method 320
Run No.	1
Target	35

Methanol - Outlet Concentration (C_{CH_3OH}), ppmvd

$$C_{CH_3OH} = \frac{C_{CH_3OHw}}{1 - BWS}$$

where,

C_{CH_3OHw}	0.5	= Methanol - Outlet Concentration, ppmvw
BWS	0.444	= moisture fraction, unitless
C_{CH_3OH}	0.8	= ppmvd

Methanol - Outlet Concentration (C_{CH_3OHw}), ppmvw

$$C_{CH_3OHw} = C_{CH_3OH} \times (1 - BWS)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
BWS	0.444	= moisture fraction, unitless
C_{CH_3OHw}	0.5	= ppmvw

Methanol - Outlet Concentration (C_{CH_3OHc10}), ppmvd @ 10% O_2

$$C_{CH_3OHc10} = C_{CH_3OH} \times \left(\frac{20.9 - 10}{20.9 - O_2}\right)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
C_{O_2}	13.2	= oxygen concentration, %
C_{CH_3OHc10}	1.1	= ppmvd @10% O_2

Methanol - Outlet Emission Rate (ER_{CH_3OH}), lb/hr

$$ER_{CH_3OH} = \frac{C_{CH_3OH} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 454 \frac{g}{lb}}$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
MW	32.04	= CH_3OH molecular weight, g/g-mole
Qs	6,235	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{CH_3OH}	2.65	= lb/hr

Location Graphic Packaging
Source(s) NCG Incinerator
Project No. AST-2024-4204
Date(s) 2/5/2025

CTS Recovery Value (CTS_R), %

$$\frac{CTS_{avg}}{CTS_{cyl}} \times 100$$

Where,

CTS_{avg}	98.17	= average of all CTS calibration gas readings, ppm
CTS_{cyl}	103	= CTS bottle certified gas value, ppm
CTS_R	95.3%	= CTS recovery value, %

Spike Dilution Factor (DF), %

$$\frac{SF6_{spike} - SF6_{nat}}{SF6_{dir}} \times 100$$

Where,

$SF6_{dir}$	12.03	= average of direct tracer gas value readings
$SF6_{nat}$	0.01	= average of native tracer gas value readings
$SF6_{spike}$	0.759135	= average of dynamic spike tracer gas value readings
DF	6.23%	= spike dilution factor, %

Calculated Spike ($Spike_{calc}$), ppm

$$(DF \times Analyte_{dir}) + (Analyte_{nat} \times (1 - DF))$$

Where,

%DF	6.23%	= spike dilution factor, %
$Analyte_{dir}$	100.07	= average of direct analyte gas values, ppm
Analyte $_{nat}$	0.49	= average of native analyte gas values, ppm
$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm

Spike Recovery Value ($Spike_R$), %

$$\frac{Analyte_{spike}}{Spike_{calc}} \times 100$$

Where,

$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm
$Analyte_{spike}$	5.39	= average of spiked analyte gas values, ppm
$Spike_R$	80.55%	= spike recovery value, %

Appendix B

LK01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

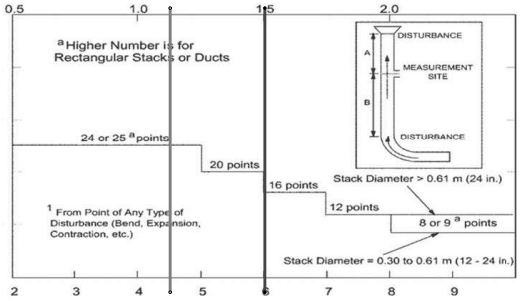
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	160.00	160.10	160.06	160.05
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	42.600	42.370	39.800	41.590
Meter Temperature, °F	(Tm)	47.5	48.5	48.3	48.1
Meter Temperature, °R	(Tm)	507.2	508.2	508.0	507.8
Meter Orifice Pressure, in. WC	(ΔH)	1.633	1.583	1.600	1.606
Volume H_2O Collected, mL	(Vlc)	190.2	195.2	196.8	194.1
Nozzle Diameter, in	(Dn)	0.247	0.247	0.247	0.247
Area of Nozzle, ft^2	(An)	0.0003	0.0003	0.0003	0.0003
Filterable PM Mass, mg	(Mn)	53.7	55.5	44.9	51.4
Condensable PM Mass, mg	(M_{CPM})	4.6	1.8	5.9	4.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.028	44.691	41.999	43.906
Standard Water Volume, ft^3	(Vwstd)	8.970	9.206	9.281	9.152
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
Meter Pressure, in Hg	(Pm)	30.46	30.46	30.46	30.46
Volume at Nozzle, ft^3	(Vn)	59.617	59.606	56.658	58.63
Isokinetic Sampling Rate, (%)	(I)	103.3	103.8	97.1	101.4
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	2.2	3.2	-3.6	0.6
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.019	0.016	0.018
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.015	0.015	0.013	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	4.3	4.5	3.8	4.2
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0016	0.0006	0.0022	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.37	0.14	0.51	0.34
Total PM Concentration, grain/dscf	(C_{TPM})	0.020	0.020	0.019	0.019
Total PM Emission Rate, lb/hr	(ER_{TPM})	4.7	4.6	4.4	4.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Lime Kiln (LK01)
Project No.: AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	56.50	in
Nipple Length:	8.50	in
Depth of Duct:	48.00	in
Cross Sectional Area of Duct:	12.57	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	1.5	(must be ≥ 0.5)
Distance B:	18.0	ft
Distance B Duct Diameters:	4.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/13/25	
Reviewer (Initial and Date):	CAL 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

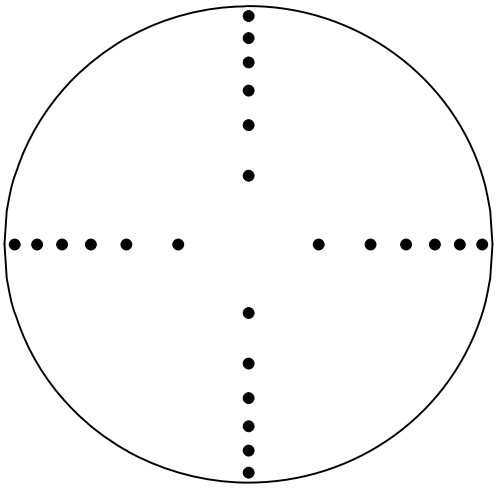
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

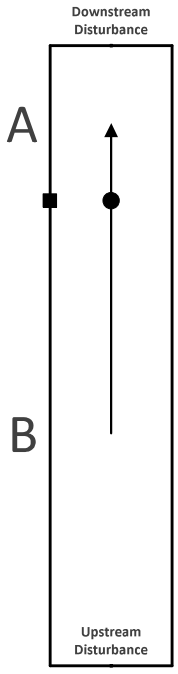
*Percent of stack diameter from inside wall to traverse point.

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.01	9 1/2
2	6.7	3.22	11 11/16
3	11.8	5.66	14 3/16
4	17.7	8.50	17
5	25.0	12.00	20 1/2
6	35.6	17.09	25 9/16
7	64.4	30.91	39 7/16
8	75.0	36.00	44 1/2
9	82.3	39.50	48
10	88.2	42.34	50 13/16
11	93.3	44.78	53 5/16
12	97.9	46.99	55 1/2

Stack Diagram
A = 6 ft.
B = 18 ft.
Depth of Duct = 48 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	6
2	4
3	3
4	5
5	5
6	3
7	2
8	0
9	5
10	2
11	6
12	8
13	2
14	10
15	6
16	5
17	0
18	6
19	6
20	8
21	2
22	3
23	3
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.44	0.42	0.43	0.43
Point 2		0.69	0.69	0.70	0.69
Point 3		0.76	0.67	0.73	0.72
Point 4		0.68	0.66	0.67	0.67
Point 5		0.70	0.70	0.69	0.70
Point 6		0.73	0.71	0.72	0.72
Point 7		0.74	0.72	0.74	0.73
Point 8		0.74	0.75	0.75	0.75
Point 9		0.66	0.66	0.67	0.66
Point 10		0.64	0.64	0.65	0.64
Point 11		0.58	0.56	0.57	0.57
Point 12		0.55	0.54	0.53	0.54
Point 13		0.45	0.45	0.44	0.45
Point 14		0.71	0.72	0.71	0.71
Point 15		0.75	0.73	0.73	0.74
Point 16		0.69	0.70	0.70	0.70
Point 17		0.70	0.70	0.69	0.70
Point 18		0.73	0.74	0.73	0.73
Point 19		0.72	0.73	0.72	0.72
Point 20		0.74	0.71	0.71	0.72
Point 21		0.65	0.66	0.66	0.66
Point 22		0.65	0.64	0.65	0.65
Point 23		0.59	0.60	0.60	0.60
Point 24		0.55	0.54	0.53	0.54
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.810	0.805	0.807	0.808
Pitot Tube Coefficient	(Cp)	0.832	0.832	0.832	0.832
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.66	-0.66	-0.65	-0.66
Stack Pressure, in. Hg	(Ps)	30.29	30.29	30.29	30.29
Stack Cross-sectional Area, ft^2	(As)	12.57	12.57	12.57	12.57
Stack Temperature, °F	(Ts)	130.3	131.3	130.8	130.8
Stack Temperature, °R	(Ts)	590.0	591.0	590.5	590.5
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
O_2 Concentration, %	(O_2)	7.3	7.1	6.9	7.10
CO_2 Concentration, %	(CO_2)	16.5	16.9	17.2	16.87
N_2 Concentration, %	(N_2)	76.2	76	75.9	76.03
Excess Air, %	(EA)	56.96	54.77	52.52	54.75
Molecular Weight, lb/lb-mole (dry)	(Md)	30.93	30.99	31.03	30.98
Molecular Weight, lb/lb-mole (wet)	(Ms)	29.00	28.99	29.06	29.02
Velocity, ft/sec	(Vs)	47.2	47.0	47.0	47.1
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	35,619	35,424	35,457	35,500
At Standard Conditions, scfm	(Qsw)	32,251	32,021	32,080	32,117
At Standard Conditions, dscfm	(Qs)	27,423	27,097	27,218	27,246

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	14:50	2/13/2025	16:38	2/13/2025	18:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	7.32	16.48	7.07	16.92	6.90	17.15
Analysis #2	7.32	16.49	7.05	16.92	6.90	17.15
Analysis #3	7.32	16.49	7.06	16.92	6.90	17.15
Average	7.3	16.5	7.1	16.9	6.9	17.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.7	815.0	689.0	654.7	1014.9	3533.3
Final Mass, g	498.0	852.6	692.8	656.7	1023.4	3723.5
Gain	138.3	37.6	3.8	2.0	8.5	190.2
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.6	641.4	687.6	557.7	939.6	3320.9
Final Mass, g	633.7	680.7	691.3	558.4	952.0	3516.1
Gain	139.1	39.3	3.7	0.7	12.4	195.2
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.4	662.6	692.8	656.7	1023.4	3533.9
Final Mass, g	631.5	701.3	706.4	657.9	1033.6	3730.7
Gain	133.1	38.7	13.6	1.2	10.2	196.8

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	13:20	**Source:** No.1 Lime Kiln (LK01)
Date:	2/13/25	Run 1 VALID	**End Time:**	14:26	**Project No.:** AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	14.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26962-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	190.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.3 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.237	in.		CO_2:	16.5 %	2.505
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- -- 8			Mid 3 (cf)	--
Ms:	28.94	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. 45	Amb. 45	Ideal	Actual		Amb. 45	Amb. 45	Amb. 45	Amb. 45		
A1	0.00	2.50	168.410	0.44	49	129	1.09	1.10	3	255	257	38	66	93.6	38.66
2	2.50	5.00	169.750	0.69	48	129	1.71	1.70	4	255	254	39	70	92.4	48.42
3	5.00	7.50	171.400	0.76	47	129	1.88	1.90	4	256	256	39	69	103.2	50.81
4	7.50	10.00	173.330	0.68	47	129	1.68	1.70	5	252	253	39	72	104.0	48.06
5	10.00	12.50	175.170	0.70	47	129	1.73	1.70	5	253	255	39	70	102.5	48.77
6	12.50	15.00	177.010	0.73	47	128	1.81	1.80	5	251	255	38	69	103.0	49.76
7	15.00	17.50	178.900	0.74	47	129	1.83	1.80	5	250	254	39	71	101.9	50.14
8	17.50	20.00	180.780	0.74	47	129	1.83	1.80	5	249	256	39	73	101.3	50.14
9	20.00	22.50	182.650	0.66	47	129	1.63	1.60	5	247	255	39	72	102.1	47.35
10	22.50	25.00	184.430	0.64	47	131	1.58	1.60	5	243	253	40	68	103.9	46.71
11	25.00	27.50	186.210	0.58	47	130	1.43	1.40	4	251	255	41	67	103.4	44.43
12	27.50	30.00	187.900	0.55	47	130	1.36	1.40	4	244	254	41	66	104.3	43.26
B1	30.00	32.50	189.560	0.45	48	131	1.11	1.10	4	252	255	41	68	105.4	39.17
2	32.50	35.00	191.080	0.71	47	131	1.75	1.80	5	250	255	41	69	102.5	49.20
3	35.00	37.50	192.930	0.75	47	131	1.85	1.90	5	250	250	42	71	103.0	50.56
4	37.50	40.00	194.840	0.69	48	131	1.70	1.70	5	254	256	42	72	101.5	48.50
5	40.00	42.50	196.650	0.70	48	132	1.72	1.70	5	257	254	42	73	102.0	48.89
6	42.50	45.00	198.480	0.73	48	131	1.80	1.80	6	251	258	43	73	100.4	49.88
7	45.00	47.50	200.320	0.72	48	132	1.77	1.80	6	250	251	42	74	101.7	49.58
8	47.50	50.00	202.170	0.74	48	131	1.82	1.80	6	244	255	43	76	101.3	50.23
9	50.00	52.50	204.040	0.65	48	132	1.60	1.60	5	243	255	43	76	102.4	47.11
10	52.50	55.00	205.810	0.65	48	132	1.60	1.60	5	245	255	43	78	101.8	47.11
11	55.00	57.50	207.570	0.59	48	132	1.45	1.50	5	249	255	43	79	106.2	44.88
12	57.50	60.00	209.320	0.55	48	131	1.36	1.40	5	253	256	44	81	106.1	43.30
	Final DGM:		211.010												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.600	ft^3	0.66	in. WC	47.5	°F	130.3	°F	6	1.633	in. WC	103.3	0.150	2.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	15:05	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	16:10	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26961-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	195.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.1 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	16.9 %	2.42
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.007	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	211.150	0.42	46	130	1.02	1.00	3	261	257	43	67	102.5	37.89
2	2.50	5.00	212.560	0.69	47	131	1.67	1.70	4	248	255	44	69	102.7	48.61
3	5.00	7.50	214.370	0.67	47	131	1.62	1.60	4	248	256	46	69	102.5	47.90
4	7.50	10.00	216.150	0.66	47	131	1.59	1.60	4	244	253	46	70	106.7	47.54
5	10.00	12.50	217.990	0.70	47	130	1.69	1.70	4	244	256	46	70	95.1	48.92
6	12.50	15.00	219.680	0.71	47	130	1.72	1.70	4	248	255	47	71	101.7	49.26
7	15.00	17.50	221.500	0.72	48	131	1.74	1.70	4	250	256	48	71	100.3	49.65
8	17.50	20.00	223.310	0.75	48	130	1.82	1.80	5	248	254	48	71	102.1	50.63
9	20.00	22.50	225.190	0.66	48	131	1.60	1.60	4	241	254	48	71	104.2	47.54
10	22.50	25.00	226.990	0.64	49	131	1.55	1.60	4	249	259	48	70	105.0	46.81
11	25.00	27.50	228.780	0.56	49	131	1.36	1.40	4	253	256	48	71	106.6	43.79
12	27.50	30.00	230.480	0.54	49	133	1.31	1.30	4	245	255	49	72	102.9	43.07
B1	30.00	32.50	232.090	0.45	49	132	1.09	1.10	3	253	257	49	74	99.3	39.29
2	32.50	35.00	233.510	0.72	49	133	1.74	1.70	5	251	255	49	75	102.5	49.74
3	35.00	37.50	235.360	0.73	49	133	1.76	1.80	5	252	255	49	76	104.1	50.08
4	37.50	40.00	237.250	0.70	49	132	1.69	1.70	5	256	254	49	78	103.3	49.00
5	40.00	42.50	239.090	0.70	49	132	1.69	1.70	5	254	255	50	78	102.8	49.00
6	42.50	45.00	240.920	0.74	49	132	1.79	1.80	5	252	252	50	77	101.1	50.38
7	45.00	47.50	242.770	0.73	49	131	1.77	1.80	5	247	252	50	74	103.3	49.99
8	47.50	50.00	244.650	0.71	49	132	1.72	1.70	5	246	256	51	72	102.0	49.35
9	50.00	52.50	246.480	0.66	50	132	1.60	1.60	5	250	256	51	69	104.5	47.58
10	52.50	55.00	248.290	0.64	50	131	1.56	1.60	5	252	256	51	69	109.5	46.81
11	55.00	57.50	250.160	0.60	50	131	1.46	1.50	5	253	255	51	70	99.8	45.33
12	57.50	60.00	251.810	0.54	51	131	1.32	1.30	5	256	255	52	70	108.7	43.00
	Final DGM:		253.520												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.370	ft^3	0.65	in. WC	48.5	°F	131.3	°F	5	1.583	in. WC	103.8	0.154	3.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	16:25	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	17:45	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	49	°F	26970-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	131	°F		Pg:	-0.65 in. WC	196.8
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.65	in. WC		O_2:	6.9 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	17.2 %	2.421
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.004	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	253.680	0.43	49	130	1.05	1.10	3	252	244	46	70	105.0	38.34
2	2.50	5.00	255.150	0.70	49	129	1.70	1.70	5	246	252	46	68	95.8	48.87
3	5.00	7.50	256.860	0.73	49	129	1.78	1.80	5	250	257	46	68	94.9	49.91
4	7.50	10.00	258.590	0.67	48	128	1.63	1.60	5	253	255	45	69	97.4	47.77
5	10.00	12.50	260.290	0.69	48	130	1.67	1.70	5	243	248	45	73	98.5	48.56
6	12.50	15.00	262.030	0.72	49	130	1.75	1.80	5	251	251	45	76	97.3	49.61
7	15.00	17.50	263.790	0.74	49	131	1.79	1.80	5	251	247	45	74	92.3	50.34
8	17.50	20.00	265.480	0.75	48	129	1.82	1.80	5	252	245	45	69	100.3	50.59
9	20.00	22.50	267.330	0.67	49	130	1.63	1.60	4	253	251	45	68	98.5	47.86
10	22.50	25.00	269.050	0.65	48	132	1.57	1.60	6	253	258	43	67	94.0	47.22
11	25.00	27.50	270.660	0.57	48	131	1.38	1.40	5	247	260	43	67	93.4	44.18
12	27.50	30.00	272.160	0.53	47	131	1.28	1.30	4	254	263	43	68	95.7	42.60
B1	30.00	32.50	273.640	0.44	47	131	1.06	1.10	3	255	259	43	68	98.6	38.81
2	32.50	35.00	275.030	0.71	47	132	1.71	1.70	5	254	262	43	68	98.5	49.35
3	35.00	37.50	276.790	0.73	48	131	1.77	1.80	6	254	260	43	69	96.4	49.99
4	37.50	40.00	278.540	0.70	48	131	1.69	1.70	5	255	254	44	69	96.7	48.96
5	40.00	42.50	280.260	0.69	48	132	1.67	1.70	5	253	260	44	70	95.8	48.65
6	42.50	45.00	281.950	0.73	48	131	1.77	1.80	6	252	263	45	71	92.0	49.99
7	45.00	47.50	283.620	0.72	48	131	1.74	1.70	5	251	259	46	72	92.6	49.65
8	47.50	50.00	285.290	0.71	49	132	1.72	1.70	5	250	259	47	72	98.7	49.35
9	50.00	52.50	287.060	0.66	49	132	1.60	1.60	5	249	258	48	73	99.5	47.58
10	52.50	55.00	288.780	0.65	49	132	1.57	1.60	5	248	259	48	75	95.6	47.22
11	55.00	57.50	290.420	0.60	49	132	1.45	1.50	4	258	261	49	78	98.8	45.36
12	57.50	60.00	292.050	0.53	49	132	1.28	1.30	4	253	258	50	83	92.2	42.64
	Final DGM:		293.480												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	39.800	ft^3	0.66	in. WC	48.3	°F	130.8	°F	6	1.600	in. WC	97.1	0.152	-3.6

LK02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

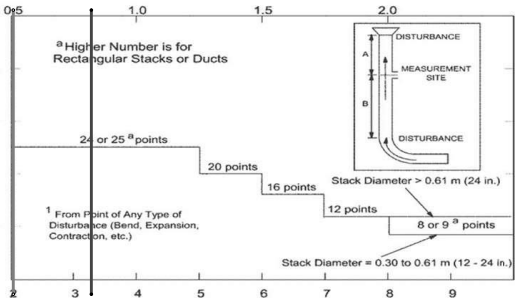
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	309.82	309.98	310.00	309.93
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.375	44.885	45.085	43.782
Meter Temperature, °F	(Tm)	53.6	54.0	57.1	54.9
Meter Temperature, °R	(Tm)	513.3	513.6	516.8	514.6
Meter Orifice Pressure, in. WC	(ΔH)	1.554	1.846	1.838	1.746
Volume H_2O Collected, mL	(Vlc)	336.8	374.0	370.4	360.4
Nozzle Diameter, in	(Dn)	0.416	0.416	0.416	0.416
Area of Nozzle, ft^2	(An)	0.0009	0.0009	0.0009	0.0009
Filterable PM Mass, mg	(Mn)	51.7	64.4	23.3	46.5
Condensable PM Mass, mg	(M_{CPM})	10.4	2.3	5.6	6.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	43.210	46.875	46.794	45.626
Standard Water Volume, ft^3	(Vwstd)	15.883	17.638	17.468	16.996
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
Meter Pressure, in Hg	(Pm)	30.45	30.48	30.48	30.47
Volume at Nozzle, ft^3	(Vn)	67.623	73.830	73.701	71.72
Isokinetic Sampling Rate, (%)	(I)	91.2	98.8	99.9	96.6
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.8	0.5	0.9	0.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.021	0.008	0.016
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.017	0.018	0.006	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	5.5	6.4	2.3	4.7
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.004	0.001	0.002	0.002
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.11	0.23	0.55	0.63
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.022	0.010	0.018
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.6	6.6	2.8	5.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	89.50	in
Nipple Length:	2.00	in
Depth of Duct:	87.50	in
Cross Sectional Area of Duct:	41.76	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	0.8	**(must be ≥ 0.5)**
Distance B:	15.0	ft
Distance B Duct Diameters:	2.1	**(must be ≥ 2)**
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/13/25	
Reviewer (Initial and Date):	EDO 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

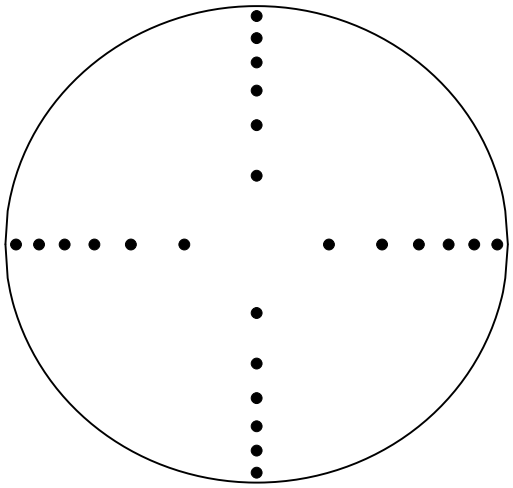
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.84	3 13/16
2	6.7	5.86	7 7/8
3	11.8	10.33	12 5/16
4	17.7	15.49	17 1/2
5	25.0	21.88	23 7/8
6	35.6	31.15	33 1/8
7	64.4	56.35	58 3/8
8	75.0	65.63	67 5/8
9	82.3	72.01	74
10	88.2	77.18	79 3/16
11	93.3	81.64	83 5/8
12	97.9	85.66	87 11/16

Stack Diagram
A = 6 ft.
B = 15 ft.
Depth of Duct = 87.5 in.

Cross Sectional Area



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	4
2	3
3	8
4	2
5	0
6	1
7	-2
8	-3
9	4
10	3
11	2
12	0
13	3
14	3
15	1
16	-3
17	3
18	4
19	2
20	1
21	0
22	0
23	3
24	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.13	0.12	0.12	0.12
Point 2		0.12	0.13	0.13	0.13
Point 3		0.14	0.14	0.12	0.13
Point 4		0.13	0.13	0.14	0.13
Point 5		0.15	0.12	0.13	0.13
Point 6		0.14	0.14	0.13	0.14
Point 7		0.13	0.13	0.13	0.13
Point 8		0.12	0.12	0.14	0.13
Point 9		0.15	0.13	0.13	0.14
Point 10		0.13	0.12	0.14	0.13
Point 11		0.11	0.14	0.12	0.12
Point 12		0.12	0.13	0.13	0.13
Point 13		0.14	0.12	0.15	0.14
Point 14		0.13	0.14	0.13	0.13
Point 15		0.12	0.14	0.14	0.13
Point 16		0.14	0.13	0.12	0.13
Point 17		0.13	0.12	0.11	0.12
Point 18		0.15	0.13	0.13	0.14
Point 19		0.14	0.13	0.12	0.13
Point 20		0.11	0.13	0.11	0.12
Point 21		0.12	0.15	0.14	0.14
Point 22		0.14	0.14	0.13	0.14
Point 23		0.12	0.15	0.15	0.14
Point 24		0.13	0.13	0.14	0.13
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.361	0.363	0.361	0.362
Pitot Tube Coefficient	(Cp)	0.819	0.819	0.819	0.819
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.08	-0.06	-0.07	-0.07
Stack Pressure, in. Hg	(Ps)	30.33	30.34	30.33	30.33
Stack Cross-sectional Area, ft^2	(As)	41.76	41.76	41.76	41.76
Stack Temperature, °F	(Ts)	152.8	152.9	154.2	153.3
Stack Temperature, °R	(Ts)	612.5	612.6	613.9	613.0
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
O_2 Concentration, %	(O_2)	8.8	7.9	8	8.23
CO_2 Concentration, %	(CO_2)	15.1	16.4	16.2	15.90
N_2 Concentration, %	(N_2)	76.1	75.7	75.8	75.87
Excess Air, %	(EA)	77.94	65.37	66.60	69.97
Molecular Weight, lb/lb-mole (dry)	(Md)	30.77	30.94	30.91	30.87
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.39	27.51	27.41	27.43
Velocity, ft/sec	(Vs)	21.7	21.8	21.7	21.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	54,429	54,507	54,393	54,443
At Standard Conditions, scfm	(Qsw)	47,539	47,604	47,403	47,515
At Standard Conditions, dscfm	(Qs)	34,943	34,965	34,517	34,809

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	9:40	2/13/2025	11:22	2/13/2025	12:45
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	8.81	15.09	7.88	16.36	7.95	16.18
Analysis #2	8.80	15.10	7.90	16.39	7.96	16.19
Analysis #3	8.80	15.10	7.89	16.39	7.96	16.19
Average	8.8	15.1	7.9	16.4	8.0	16.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.3	816.2	718.0	651.0	1012.3	3556.8
Final Mass, g	557.1	923.9	733.1	655.4	1024.1	3893.6
Gain	197.8	107.7	15.1	4.4	11.8	336.8
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.8	641.0	743.5	560.0	982.0	3421.3
Final Mass, g	685.5	741.6	787.0	578.6	1002.6	3795.3
Gain	190.7	100.6	43.5	18.6	20.6	374.0
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.7	671.0	731.0	617.3	975.2	3504.2
Final Mass, g	699.5	772.5	774.0	634.1	994.5	3874.6
Gain	189.8	101.5	43.0	16.8	19.3	370.4

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	8:15	**Source:**	No.2 Lime Kiln (LK02)	
Date:	2/13/25	Run 1 VALID	**End Time:**	9:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26973-A	Pb:	30.34	in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	148	°F		Pg:	-0.08	in. WC	336.8
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.14	in. WC		O_2:	8.8	%	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.428	in.		CO_2:	15.1	%	11.960
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	26.35	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
					50	50	Ideal	Actual		50	50	50	50		
A1	0.00	2.50	36.145	0.13	50	152	1.53	1.50	4	259	254	44	66	99.7	22.08
2	2.50	5.00	37.830	0.12	50	153	1.41	1.40	4	256	255	43	66	102.0	21.24
3	5.00	7.50	39.485	0.14	51	152	1.65	1.70	4	254	260	40	67	102.2	22.92
4	7.50	10.00	41.280	0.13	51	153	1.53	1.50	4	253	257	41	67	101.6	22.10
5	10.00	12.50	43.000	0.15	51	153	1.76	1.80	4	255	253	41	67	101.8	23.74
6	12.50	15.00	44.850	0.14	51	153	1.65	1.70	4	251	255	41	67	101.4	22.94
7	15.00	17.50	46.630	0.13	51	152	1.53	1.50	4	254	255	41	68	100.7	22.08
8	17.50	20.00	48.335	0.12	52	152	1.42	1.40	4	251	250	41	68	102.1	21.22
9	20.00	22.50	50.000	0.15	52	153	1.77	1.80	4	253	255	42	69	101.1	23.74
0	22.50	25.00	51.840	0.13	53	153	1.54	1.50	4	250	254	42	70	100.6	22.10
11	25.00	27.50	53.550	0.11	53	153	1.30	1.30	4	252	260	43	71	100.4	20.33
12	27.50	30.00	55.120	0.12	53	152	1.42	1.40	4	258	256	44	73	101.6	21.22
B1	30.00	32.50	56.780	0.14	54	153	1.66	1.70	4	251	259	45	73	101.1	22.94
2	32.50	35.00	58.565	0.13	54	154	1.54	1.50	4	255	256	45	73	101.1	22.12
3	35.00	37.50	60.285	0.12	55	153	1.42	1.40	4	255	254	45	74	100.4	21.24
4	37.50	40.00	61.930	0.14	55	153	1.66	1.70	4	254	258	46	74	100.6	22.94
5	40.00	42.50	63.710	0.13	55	152	1.54	1.60	4	251	252	46	75	101.4	22.08
6	42.50	45.00	65.440	0.15	55	153	1.78	1.80	5	253	254	47	76	101.6	23.74
7	45.00	47.50	67.300	0.14	56	153	1.66	1.70	5	255	257	47	78	101.0	22.94
8	47.50	50.00	69.090	0.11	56	154	1.31	1.30	5	255	255	47	78	101.5	20.35
9	50.00	52.50	70.685	0.12	57	153	1.43	1.40	5	250	256	47	78	102.1	21.24
10	52.50	55.00	72.365	0.14	57	154	1.66	1.70	5	256	258	46	80	101.1	22.96
11	55.00	57.50	74.160	0.12	57	153	1.43	1.40	5	258	251	46	80	100.9	21.24
12	57.50	60.00	75.820	0.13	57	152	1.55	1.60	5	256	254	47	82	99.2	22.08
	Final DGM:		77.520												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.375	ft^3	0.13	in. WC	53.6	°F	152.8	°F	5	1.554	in. WC	91.2	0.265	0.8

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	9:55	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	11:00	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26960-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.06 in. WC	374.0
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	7.9 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.419	in.		CO_2:	16.4 %	14.03
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	77.745	0.12	53	153	1.68	1.70	4	258	255	42	65	101.0	20.88
2	2.50	5.00	79.540	0.13	53	154	1.82	1.80	4	254	256	42	66	100.9	21.75
3	5.00	7.50	81.405	0.14	53	154	1.96	2.00	4	256	254	42	67	100.2	22.57
4	7.50	10.00	83.325	0.13	53	154	1.82	1.80	4	253	258	43	68	100.7	21.75
5	10.00	12.50	85.185	0.12	53	154	1.68	1.70	4	253	259	43	68	99.9	20.90
6	12.50	15.00	86.960	0.14	53	153	1.96	2.00	4	254	256	43	68	100.6	22.56
7	15.00	17.50	88.890	0.13	53	153	1.82	1.80	4	256	253	43	68	100.3	21.74
8	17.50	20.00	90.745	0.12	53	153	1.68	1.70	5	258	250	44	68	99.3	20.88
9	20.00	22.50	92.510	0.13	54	152	1.83	1.80	5	253	255	45	70	98.9	21.72
0	22.50	25.00	94.345	0.12	54	152	1.69	1.70	5	254	259	45	71	99.9	20.87
11	25.00	27.50	96.125	0.14	54	152	1.97	2.00	5	253	260	45	69	100.3	22.54
12	27.50	30.00	98.055	0.13	54	153	1.82	1.80	5	252	254	45	69	99.6	21.74
B1	30.00	32.50	99.900	0.12	54	153	1.68	1.70	5	259	257	48	72	100.0	20.88
2	32.50	35.00	101.680	0.14	54	154	1.96	2.00	5	260	255	47	73	100.0	22.57
3	35.00	37.50	103.600	0.14	54	153	1.96	2.00	5	253	255	48	73	100.4	22.56
4	37.50	40.00	105.530	0.13	54	153	1.82	1.80	5	255	256	48	75	100.9	21.74
5	40.00	42.50	107.400	0.12	54	151	1.69	1.70	5	253	255	49	75	100.9	20.85
6	42.50	45.00	109.200	0.13	55	152	1.83	1.80	5	251	255	50	75	101.4	21.72
7	45.00	47.50	111.085	0.13	55	152	1.83	1.80	5	253	255	51	75	100.9	21.72
8	47.50	50.00	112.960	0.13	55	153	1.83	1.80	5	256	254	52	75	100.7	21.74
9	50.00	52.50	114.830	0.15	55	153	2.11	2.00	5	257	251	53	75	99.8	23.35
10	52.50	55.00	116.820	0.14	55	153	1.97	2.00	5	254	250	53	77	100.7	22.56
11	55.00	57.50	118.760	0.15	55	153	2.11	2.10	5	255	253	55	77	100.9	23.35
12	57.50	60.00	120.770	0.13	55	153	1.83	1.80	5	255	259	55	79	100.2	21.74
	Final DGM:		122.630												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.885	ft^3	0.13	in. WC	54.0	°F	152.9	°F	5	1.846	in. WC	98.8	0.265	0.5

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	12:20	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26972-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.07 in. WC	370.4
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.418	in.		CO_2:	16.2 %	14.042
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	-- -- --	0.000		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	122.895	0.12	56	153	1.69	1.70	4	258	258	48	68	101.0	20.88
2	2.50	5.00	124.700	0.13	56	155	1.83	1.80	4	250	259	45	66	99.9	21.77
3	5.00	7.50	126.555	0.12	56	154	1.69	1.70	4	258	252	45	66	100.5	20.90
4	7.50	10.00	128.350	0.14	56	155	1.97	2.00	4	257	252	46	68	101.5	22.59
5	10.00	12.50	130.305	0.13	56	155	1.83	1.80	4	255	253	47	69	101.0	21.77
6	12.50	15.00	132.180	0.13	56	154	1.83	1.80	4	258	256	47	69	100.9	21.75
7	15.00	17.50	134.055	0.13	56	155	1.83	1.80	4	258	255	47	70	100.1	21.77
8	17.50	20.00	135.915	0.14	57	154	1.97	2.00	4	258	256	48	70	100.9	22.57
9	20.00	22.50	137.865	0.13	57	155	1.83	1.80	4	257	250	49	70	101.8	21.77
0	22.50	25.00	139.760	0.14	57	154	1.97	2.00	4	254	258	49	70	101.2	22.57
11	25.00	27.50	141.715	0.12	57	153	1.69	1.70	4	256	257	51	72	101.0	20.88
12	27.50	30.00	143.525	0.13	57	154	1.83	1.80	4	258	259	53	72	101.5	21.75
B1	30.00	32.50	145.415	0.15	57	155	2.11	2.00	4	258	252	54	72	100.4	23.39
2	32.50	35.00	147.420	0.13	57	154	1.83	1.80	4	257	253	55	73	100.9	21.75
3	35.00	37.50	149.300	0.14	57	154	1.97	2.00	4	256	254	55	73	100.2	22.57
4	37.50	40.00	151.235	0.12	57	155	1.69	1.70	4	255	257	58	74	98.7	20.92
5	40.00	42.50	153.000	0.11	57	155	1.55	1.60	5	257	256	57	74	100.4	20.03
6	42.50	45.00	154.720	0.13	58	154	1.84	1.80	5	255	255	58	74	101.0	21.75
7	45.00	47.50	156.605	0.12	58	154	1.70	1.70	5	257	256	59	75	101.8	20.90
8	47.50	50.00	158.430	0.11	58	154	1.55	1.60	5	258	259	59	75	101.3	20.01
9	50.00	52.50	160.170	0.14	58	154	1.98	2.00	5	256	260	59	75	101.3	22.57
10	52.50	55.00	162.130	0.13	59	153	1.84	1.90	5	252	260	59	75	100.5	21.74
11	55.00	57.50	164.010	0.15	59	154	2.12	2.10	5	250	254	60	75	101.7	23.37
12	57.50	60.00	166.050	0.14	59	154	1.98	2.00	5	251	257	60	76	99.5	22.57
	Final DGM:		167.980												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.085	ft^3	0.13	in. WC	57.1	°F	154.2	°F	5	1.838	in. WC	99.9	0.272	0.9

RB01A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

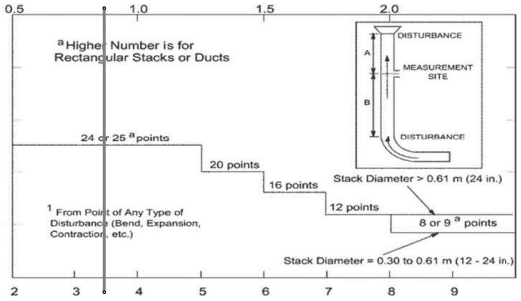
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	47.320	47.695	47.820	47.612
Meter Temperature, °F	(Tm)	63.8	65.7	68.5	66.0
Meter Temperature, °R	(Tm)	523.5	525.4	528.1	525.7
Meter Orifice Pressure, in. WC	(ΔH)	2.158	2.179	2.183	2.174
Volume H_2O Collected, mL	(Vlc)	506.0	450.5	464.3	473.6
Nozzle Diameter, in	(Dn)	0.330	0.330	0.330	0.330
Area of Nozzle, ft^2	(An)	0.0006	0.0006	0.0006	0.0006
Filterable PM Mass, mg	(Mn)	29.2	18.1	26.2	24.5
Condensable PM Mass, mg	(M_{CPM})	10.7	3.3	4.6	6.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.077	48.287	48.162	48.175
Standard Water Volume, ft^3	(Vwstd)	23.863	21.246	21.896	22.335
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
Meter Pressure, in Hg	(Pm)	30.19	30.19	30.19	30.19
Volume at Nozzle, ft^3	(Vn)	111.928	108.082	108.829	109.61
Isokinetic Sampling Rate, (%)	(I)	104.7	101.2	102.2	102.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.2	0.3	0.2	0.2
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0094	0.0058	0.0084	0.0079
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0082	0.0051	0.0074	0.0069
Filterable PM Emission Rate, lb/hr	(PMR)	4.8	3.1	4.4	4.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0034	0.0011	0.0015	0.0020
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.75	0.56	0.77	1.03
Total PM Concentration, grain/dscf	(C_{TPM})	0.013	0.007	0.010	0.010
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.5	3.6	5.2	5.1

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/24	
Reviewer (Initial and Date):	EDO 2/11/24	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

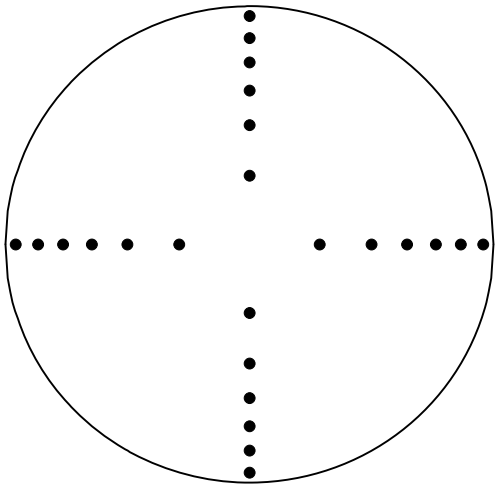
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

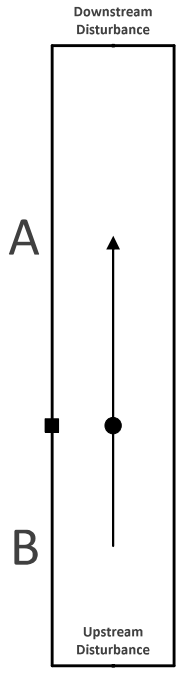
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	5
5	4
6	0
7	3
8	6
9	-2
10	0
11	4
12	1
13	5
14	4
15	2
16	9
17	7
18	4
19	5
20	2
21	3
22	6
23	5
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.51	0.52	0.50	0.51
Point 2		0.48	0.53	0.53	0.51
Point 3		0.49	0.51	0.51	0.50
Point 4		0.53	0.53	0.49	0.52
Point 5		0.52	0.52	0.52	0.52
Point 6		0.49	0.49	0.51	0.50
Point 7		0.51	0.48	0.49	0.49
Point 8		0.53	0.51	0.50	0.51
Point 9		0.51	0.52	0.48	0.50
Point 10		0.48	0.50	0.51	0.50
Point 11		0.52	0.53	0.52	0.52
Point 12		0.54	0.54	0.54	0.54
Point 13		0.52	0.54	0.50	0.52
Point 14		0.51	0.53	0.51	0.52
Point 15		0.48	0.49	0.53	0.50
Point 16		0.53	0.50	0.52	0.52
Point 17		0.51	0.48	0.48	0.49
Point 18		0.49	0.52	0.50	0.50
Point 19		0.53	0.51	0.53	0.52
Point 20		0.50	0.53	0.54	0.52
Point 21		0.53	0.55	0.55	0.54
Point 22		0.51	0.53	0.52	0.52
Point 23		0.49	0.50	0.49	0.49
Point 24		0.51	0.48	0.48	0.49
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.713	0.717	0.714	0.715
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.48	-0.45	-0.46	-0.46
Stack Pressure, in. Hg	(Ps)	29.99	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	363.9	363.1	362.6	363.2
Stack Temperature, °R	(Ts)	823.5	822.8	822.3	822.9
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
O_2 Concentration, %	(O_2)	6.1	6.2	6.2	6.17
CO_2 Concentration, %	(CO_2)	14.4	14.2	14.3	14.30
N_2 Concentration, %	(N_2)	79.5	79.6	79.5	79.53
Excess Air, %	(EA)	40.97	41.85	41.93	41.58
Molecular Weight, lb/lb-mole (dry)	(Md)	30.55	30.52	30.54	30.53
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.39	26.70	26.62	26.57
Velocity, ft/sec	(Vs)	50.0	49.9	49.8	49.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	138,543	138,342	137,991	138,292
At Standard Conditions, scfm	(Qsw)	88,990	88,949	88,779	88,906
At Standard Conditions, dscfm	(Qs)	59,472	61,771	61,032	60,758

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:25	2/11/2025	12:50	2/11/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.10	14.34	6.20	14.22	6.16	14.25
Analysis #2	6.10	14.36	6.19	14.24	6.16	14.25
Analysis #3	6.11	14.36	6.19	14.24	6.16	14.26
Average	6.1	14.4	6.2	14.2	6.2	14.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.4	640.6	698.9	644.3	934.1	3411.3
Final Mass, g	705.0	761.1	722.3	779.6	949.3	3917.3
Gain	211.6	120.5	23.4	135.3	15.2	506.0
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.6	656.8	740.2	636.0	941.0	3472.6
Final Mass, g	686.4	748.9	774.0	762.4	951.4	3923.1
Gain	187.8	92.1	33.8	126.4	10.4	450.5
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.0	639.8	722.0	648.9	942.2	3446.9
Final Mass, g	711.2	731.2	743.7	771.2	953.9	3911.2
Gain	217.2	91.4	21.7	122.3	11.7	464.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	50	°F	26987-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	350	°F		Pg:	-0.48 in. WC	506.0
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.47	in. WC		O_2:	6.1 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.333	in.		CO_2:	14.4 %	4.162
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	771.740	0.51	62	359	2.15	2.20	4	257	251	39	73	101.1	49.52
2	2.50	5.00	773.720	0.48	62	361	2.02	2.00	4	258	256	41	73	99.0	48.10
3	5.00	7.50	775.600	0.49	62	363	2.05	2.10	4	254	258	43	74	100.7	48.66
4	7.50	10.00	777.530	0.53	62	366	2.21	2.20	4	254	257	45	75	100.6	50.69
5	10.00	12.50	779.530	0.52	63	365	2.18	2.20	4	255	258	46	75	101.3	50.18
6	12.50	15.00	781.530	0.49	63	365	2.05	2.10	4	258	256	48	75	99.1	48.71
7	15.00	17.50	783.430	0.51	63	364	2.14	2.20	4	256	256	48	75	101.4	49.67
8	17.50	20.00	785.415	0.53	63	366	2.22	2.20	4	258	254	48	76	100.9	50.69
9	20.00	22.50	787.425	0.51	63	365	2.14	2.20	4	254	255	50	76	101.2	49.70
0	22.50	25.00	789.405	0.48	63	364	2.01	2.00	4	256	251	50	76	101.6	48.19
11	25.00	27.50	791.335	0.52	63	363	2.18	2.20	4	253	253	51	76	100.6	50.12
12	27.50	30.00	793.325	0.54	64	360	2.28	2.30	4	255	258	59	78	100.4	50.98
1	30.00	32.50	795.355	0.52	64	362	2.19	2.20	4	257	257	56	78	99.6	50.09
2	32.50	35.00	797.330	0.51	64	364	2.14	2.20	4	257	256	54	79	100.7	49.67
3	35.00	37.50	799.305	0.48	64	365	2.02	2.00	4	257	255	53	80	100.4	48.21
4	37.50	40.00	801.215	0.53	64	368	2.22	2.20	4	253	253	53	80	100.8	50.76
5	40.00	42.50	803.225	0.51	65	366	2.14	2.20	4	252	254	53	80	100.9	49.73
6	42.50	45.00	805.205	0.49	65	365	2.06	2.10	4	251	251	53	79	100.0	48.71
7	45.00	47.50	807.130	0.53	65	365	2.23	2.20	4	250	250	55	76	100.4	50.66
8	47.50	50.00	809.140	0.50	65	363	2.11	2.10	4	258	255	55	74	101.2	49.15
9	50.00	52.50	811.110	0.53	65	365	2.23	2.20	5	257	256	56	74	100.4	50.66
10	52.50	55.00	813.120	0.51	66	365	2.15	2.20	5	259	258	57	72	100.9	49.70
11	55.00	57.50	815.105	0.49	66	362	2.07	2.10	5	258	259	57	72	100.2	48.63
12	57.50	60.00	817.040	0.51	66	362	2.16	2.20	5	253	259	57	72	102.5	49.61
	Final DGM:		819.060												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.320	ft^3	0.51	in. WC	63.8	°F	363.9	°F	5	2.158	in. WC	104.7	0.332	0.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	11:15	**Source:**	No.1 Recovery Furnace (RB01A) North Stack	
Date:	2/11/25	Run 2 VALID	**End Time:**	12:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	64	°F	26988-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	364	°F		Pg:	-0.45 in. WC	450.5
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.323	in.		CO_2:	14.2 %	4.21
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- --	0.002		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	819.395	0.52	64	360	2.20	2.20	4	251	254	40	71	101.3	50.03
2	2.50	5.00	821.405	0.53	64	361	2.24	2.20	4	252	254	41	71	100.6	50.54
3	5.00	7.50	823.420	0.51	64	361	2.15	2.20	4	255	255	41	71	100.8	49.58
4	7.50	10.00	825.400	0.53	64	361	2.23	2.30	4	258	253	41	73	100.7	50.54
5	10.00	12.50	827.415	0.52	64	361	2.19	2.20	4	256	258	41	73	99.1	50.06
6	12.50	15.00	829.380	0.49	65	362	2.07	2.10	4	253	256	45	73	100.6	48.63
7	15.00	17.50	831.320	0.48	65	362	2.03	2.00	4	256	253	45	73	100.8	48.13
8	17.50	20.00	833.245	0.51	65	362	2.15	2.20	4	259	251	46	74	99.9	49.61
9	20.00	22.50	835.210	0.52	65	363	2.19	2.20	4	254	250	46	74	100.5	50.12
0	22.50	25.00	837.205	0.50	65	363	2.11	2.10	4	251	258	50	74	100.7	49.15
11	25.00	27.50	839.165	0.53	66	364	2.24	2.30	4	252	259	51	74	101.5	50.63
12	27.50	30.00	841.200	0.54	66	364	2.28	2.30	4	255	254	51	75	101.3	51.11
1	30.00	32.50	843.250	0.54	66	363	2.28	2.30	4	255	256	52	75	101.4	51.08
2	32.50	35.00	845.305	0.53	66	365	2.23	2.30	5	255	254	52	76	99.5	50.66
3	35.00	37.50	847.300	0.49	66	365	2.07	2.00	5	256	255	53	77	98.5	48.71
4	37.50	40.00	849.200	0.50	66	364	2.11	2.10	5	258	255	51	77	101.6	49.18
5	40.00	42.50	851.180	0.48	67	365	2.03	2.00	5	253	256	50	76	101.4	48.21
6	42.50	45.00	853.120	0.52	67	365	2.20	2.20	5	254	256	49	78	100.5	50.18
7	45.00	47.50	855.120	0.51	67	365	2.15	2.20	5	257	258	49	78	100.5	49.70
8	47.50	50.00	857.100	0.53	67	365	2.24	2.30	5	252	254	49	79	100.3	50.66
9	50.00	52.50	859.115	0.55	67	364	2.32	2.30	5	254	253	53	80	101.4	51.58
10	52.50	55.00	861.190	0.53	67	364	2.24	2.20	5	256	252	52	79	99.7	50.63
11	55.00	57.50	863.195	0.50	67	363	2.12	2.10	5	255	259	53	78	100.6	49.15
12	57.50	60.00	865.160	0.48	67	363	2.03	2.00	5	255	253	53	77	100.8	48.16
	Final DGM:		867.090												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.695	ft^3	0.51	in. WC	65.7	°F	363.1	°F	5	2.179	in. WC	101.2	0.306	0.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	66	°F	26696-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	363	°F		Pg:	-0.46	in. WC	464.3
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2	%	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.322	in.		CO_2:	14.3	%	4.224
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial	Final	Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	--	--	0.001	Mid 1 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf)			--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)			--
												Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	867.500	0.50	67	358	2.13	2.10	3	254	255	42	69	102.0	49.00
2	2.50	5.00	869.500	0.53	67	359	2.25	2.30	3	255	256	42	69	101.4	50.48
3	5.00	7.50	871.545	0.51	67	359	2.17	2.20	3	251	258	42	69	100.6	49.52
4	7.50	10.00	873.535	0.49	67	361	2.08	2.10	3	253	257	42	69	101.5	48.60
5	10.00	12.50	875.500	0.52	67	360	2.21	2.20	3	256	256	42	71	100.7	50.03
6	12.50	15.00	877.510	0.51	68	361	2.17	2.20	3	258	259	43	70	100.8	49.58
7	15.00	17.50	879.505	0.49	68	361	2.08	2.10	4	256	258	45	71	100.2	48.60
8	17.50	20.00	881.450	0.50	68	361	2.13	2.10	4	259	258	45	70	99.5	49.09
9	20.00	22.50	883.400	0.48	68	361	2.04	2.10	4	259	253	43	72	98.9	48.10
0	22.50	25.00	885.300	0.51	68	361	2.17	2.20	4	260	250	43	72	101.1	49.58
11	25.00	27.50	887.300	0.52	68	364	2.20	2.20	4	251	260	45	73	101.0	50.15
12	27.50	30.00	889.315	0.54	68	364	2.29	2.30	4	252	251	44	73	99.4	51.11
1	30.00	32.50	891.335	0.50	68	365	2.12	2.10	4	255	254	45	76	99.7	49.21
2	32.50	35.00	893.285	0.51	68	365	2.16	2.20	4	256	258	45	76	100.8	49.70
3	35.00	37.50	895.275	0.53	68	365	2.24	2.30	4	257	259	46	76	101.4	50.66
4	37.50	40.00	897.315	0.52	69	365	2.20	2.20	5	253	253	48	77	99.4	50.18
5	40.00	42.50	899.300	0.48	69	364	2.04	2.10	5	252	255	48	75	100.2	48.19
6	42.50	45.00	901.225	0.50	69	363	2.12	2.10	5	257	258	50	75	100.7	49.15
7	45.00	47.50	903.200	0.53	69	363	2.25	2.30	5	258	254	51	74	100.8	50.60
8	47.50	50.00	905.235	0.54	69	363	2.29	2.30	5	256	257	53	73	101.4	51.08
9	50.00	52.50	907.300	0.55	70	365	2.33	2.30	5	259	256	52	70	101.1	51.61
10	52.50	55.00	909.380	0.52	71	364	2.21	2.20	5	252	258	55	70	100.9	50.15
11	55.00	57.50	911.405	0.49	71	365	2.08	2.10	5	255	259	55	71	99.9	48.71
12	57.50	60.00	913.350	0.48	71	365	2.04	2.10	5	253	255	56	72	102.2	48.21
	Final DGM:		915.320												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.820	ft^3	0.51	in. WC	68.5	°F	362.6	°F	5	2.183	in. WC	102.2	0.313	0.2

RB01B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

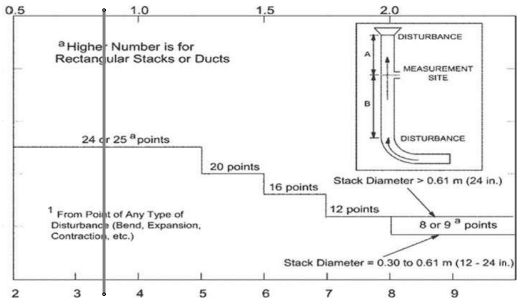
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	40.100	43.045	41.880	41.675
Meter Temperature, °F	(Tm)	62.2	68.3	63.0	64.5
Meter Temperature, °R	(Tm)	521.8	528.0	522.7	524.2
Meter Orifice Pressure, in. WC	(ΔH)	1.621	1.838	1.792	1.750
Volume H_2O Collected, mL	(Vlc)	261.9	266.2	247.8	258.6
Nozzle Diameter, in	(Dn)	0.362	0.362	0.362	0.362
Area of Nozzle, ft^2	(An)	0.0007	0.0007	0.0007	0.0007
Filterable PM Mass, mg	(Mn)	3.4	3.2	2.7	3.1
Condensable PM Mass, mg	(M_{CPM})	4.4	5.1	4.6	4.7
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	40.450	42.936	42.193	41.860
Standard Water Volume, ft^3	(Vwstd)	12.351	12.554	11.686	12.197
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
Meter Pressure, in Hg	(Pm)	30.15	30.17	30.16	30.16
Volume at Nozzle, ft^3	(Vn)	82.136	86.257	83.691	84.03
Isokinetic Sampling Rate, (%)	(I)	93.7	98.3	96.8	96.2
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.3	0.5	-0.4	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0013	0.0012	0.0010	0.0011
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0013	0.0012	0.0010	0.0011
Filterable PM Emission Rate, lb/hr	(PMR)	0.52	0.46	0.40	0.46
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0017	0.0018	0.0017	0.0017
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.67	0.74	0.68	0.69
Total PM Concentration, grain/dscf	(C_{TPM})	0.0030	0.0030	0.0027	0.0029
Total PM Emission Rate, lb/hr	(ER_{TPM})	1.2	1.2	1.1	1.2

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01B) South Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/25	
Reviewer (Initial and Date):	EDO 2/11/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

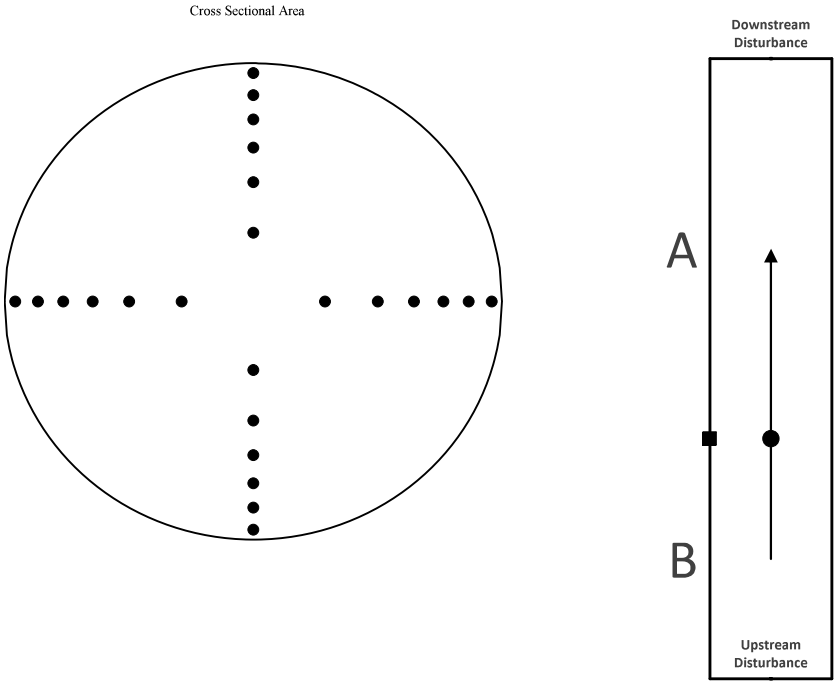
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	2
2	6
3	8
4	4
5	1
6	0
7	2
8	3
9	0
10	-2
11	1
12	8
13	4
14	2
15	6
16	3
17	2
18	3
19	4
20	7
21	5
22	9
23	5
24	2
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.21	0.21	0.20	0.21
Point 2		0.23	0.24	0.21	0.23
Point 3		0.24	0.23	0.23	0.23
Point 4		0.25	0.24	0.25	0.25
Point 5		0.23	0.22	0.24	0.23
Point 6		0.21	0.20	0.20	0.20
Point 7		0.22	0.24	0.21	0.22
Point 8		0.24	0.22	0.25	0.24
Point 9		0.21	0.25	0.23	0.23
Point 10		0.22	0.23	0.22	0.22
Point 11		0.24	0.21	0.24	0.23
Point 12		0.23	0.24	0.21	0.23
Point 13		0.22	0.23	0.23	0.23
Point 14		0.24	0.21	0.25	0.23
Point 15		0.23	0.24	0.23	0.23
Point 16		0.21	0.22	0.20	0.21
Point 17		0.25	0.24	0.21	0.23
Point 18		0.20	0.23	0.21	0.21
Point 19		0.23	0.25	0.21	0.23
Point 20		0.25	0.24	0.22	0.24
Point 21		0.23	0.24	0.25	0.24
Point 22		0.22	0.25	0.23	0.23
Point 23		0.24	0.22	0.24	0.23
Point 24		0.25	0.23	0.23	0.24
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.478	0.480	0.474	0.477
Pitot Tube Coefficient	(Cp)	0.836	0.836	0.836	0.836
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.12	-0.13	-0.12	-0.12
Stack Pressure, in. Hg	(Ps)	30.02	30.02	30.02	30.02
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	364.3	363.7	363.1	363.7
Stack Temperature, °R	(Ts)	824.0	823.3	822.8	823.4
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
O_2 Concentration, %	(O_2)	8	8	8	8.00
CO_2 Concentration, %	(CO_2)	14	14	14	14.00
N_2 Concentration, %	(N_2)	78	78	78	78.00
Excess Air, %	(EA)	63.53	63.53	63.53	63.53
Molecular Weight, lb/lb-mole (dry)	(Md)	30.56	30.56	30.56	30.56
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.63	27.72	27.84	27.73
Velocity, ft/sec	(Vs)	34.1	34.1	33.6	33.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	94,410	94,473	93,103	93,996
At Standard Conditions, scfm	(Qsw)	60,665	60,750	59,913	60,443
At Standard Conditions, dscfm	(Qs)	46,475	47,006	46,918	46,800

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:33	2/11/2025	12:58	2/11/2025	16:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.91	13.52	7.11	13.23	7.18	13.38
Analysis #2	6.92	13.55	7.11	13.25	7.19	13.39
Analysis #3	6.91	13.53	7.11	13.25	7.19	13.38
Average	6.9	13.5	7.1	13.2	7.2	13.4

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.4	670.7	716.5	642.3	942.1	3482.0
Final Mass, g	651.4	760.2	733.5	646.2	952.6	3743.9
Gain	141.0	89.5	17.0	3.9	10.5	261.9
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	507.8	644.0	779.4	644.1	933.3	3508.6
Final Mass, g	639.0	740.2	803.0	648.1	944.5	3774.8
Gain	131.2	96.2	23.6	4.0	11.2	266.2
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.5	672.4	733.4	645.7	952.0	3514.0
Final Mass, g	689.0	723.0	740.1	647.8	961.9	3761.8
Gain	178.5	50.6	6.7	2.1	9.9	247.8

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26697-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	346	°F		Pg:	-0.12 in. WC	261.9
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.27	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.376	in.		CO_2:	14 %	6.965
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	-- -- -- 0.000			Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- -- -- 5			Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	293.420	0.21	61	360	1.47	1.50	3	259	259	40	72	100.6	33.06
2	2.50	5.00	295.015	0.23	61	361	1.61	1.60	3	255	251	41	72	101.9	34.62
3	5.00	7.50	296.705	0.24	61	363	1.67	1.70	3	254	251	42	73	101.4	35.41
4	7.50	10.00	298.420	0.25	61	365	1.74	1.80	3	253	254	42	73	100.9	36.18
5	10.00	12.50	300.160	0.23	61	366	1.60	1.60	3	252	258	43	73	101.3	34.73
6	12.50	15.00	301.835	0.21	61	363	1.47	1.50	3	258	259	43	73	100.1	33.12
7	15.00	17.50	303.420	0.22	61	365	1.53	1.50	3	257	259	45	78	101.3	33.94
8	17.50	20.00	305.060	0.24	61	366	1.67	1.70	3	255	256	48	78	98.9	35.47
9	20.00	22.50	306.730	0.21	61	365	1.46	1.50	3	256	255	48	78	102.5	33.16
10	22.50	25.00	308.351	0.22	61	365	1.53	1.50	3	252	252	48	78	101.9	33.94
11	25.00	27.50	310.000	0.24	62	366	1.67	1.70	3	250	254	48	78	100.5	35.47
12	27.50	30.00	311.700	0.23	62	365	1.60	1.60	4	251	255	50	76	101.1	34.71
B1	30.00	32.50	313.375	0.22	62	366	1.53	1.50	4	255	253	51	75	101.5	33.96
2	32.50	35.00	315.020	0.24	62	364	1.68	1.70	4	256	258	51	74	100.7	35.43
3	35.00	37.50	316.725	0.23	63	363	1.61	1.60	4	253	257	50	74	101.4	34.66
4	37.50	40.00	318.410	0.21	63	365	1.47	1.50	4	255	256	51	72	101.4	33.16
5	40.00	42.50	320.020	0.25	63	366	1.74	1.80	4	258	258	52	73	98.3	36.21
6	42.50	45.00	321.720	0.20	63	365	1.40	1.40	4	252	259	56	74	100.7	32.36
7	45.00	47.50	323.280	0.23	63	364	1.61	1.60	4	259	260	56	76	100.5	34.69
8	47.50	50.00	324.950	0.25	63	363	1.75	1.80	4	256	260	55	76	101.3	36.14
9	50.00	52.50	326.705	0.23	63	365	1.61	1.60	4	252	256	54	77	101.2	34.71
10	52.50	55.00	328.385	0.22	64	364	1.54	1.70	4	254	254	52	78	105.4	33.92
11	55.00	57.50	330.100	0.24	64	364	1.68	1.70	4	255	255	52	79	100.9	35.43
12	57.50	60.00	331.815	0.25	65	364	1.75	1.80	4	255	253	52	79	98.1	36.16
	Final DGM:		333.520												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	40.100 ft^3	0.23 in. WC	62.2 °F	364.3 °F	4	1.621 in. WC	93.7	0.234	0.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	11:15	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 2	VALID	End Time:	12:20	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	62	°F	26698-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.13	in. WC	266.2
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.377	in.		CO_2:	14	%	7.82
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	334.150	0.21	66	362	1.66	1.70	4	255	253	40	68	100.1	32.72
2	2.50	5.00	335.845	0.24	66	363	1.89	1.90	4	254	258	40	68	100.4	35.00
3	5.00	7.50	337.660	0.23	67	363	1.82	1.80	4	255	254	41	68	101.2	34.27
4	7.50	10.00	339.455	0.24	67	363	1.90	1.90	4	254	256	42	70	105.7	35.00
5	10.00	12.50	341.370	0.22	67	363	1.74	1.80	4	258	258	42	70	100.0	33.51
6	12.50	15.00	343.105	0.20	67	363	1.58	1.60	4	260	259	42	71	99.7	31.95
7	15.00	17.50	344.755	0.24	67	363	1.90	1.90	4	256	254	45	71	100.8	35.00
8	17.50	20.00	346.580	0.22	68	364	1.74	1.80	4	253	257	45	70	101.6	33.53
9	20.00	22.50	348.345	0.25	68	365	1.98	2.00	4	258	256	45	71	100.9	35.77
10	22.50	25.00	350.210	0.23	68	365	1.82	1.80	4	254	251	45	72	100.9	34.31
11	25.00	27.50	352.000	0.21	68	365	1.66	1.70	4	255	257	48	71	101.4	32.78
12	27.50	30.00	353.720	0.24	68	364	1.90	1.90	5	255	254	48	73	100.4	35.02
B1	30.00	32.50	355.540	0.23	68	364	1.82	1.80	5	256	258	47	73	101.7	34.29
2	32.50	35.00	357.345	0.21	68	363	1.67	1.70	5	253	256	47	75	99.2	32.74
3	35.00	37.50	359.030	0.24	69	363	1.91	1.90	5	257	258	50	75	100.1	35.00
4	37.50	40.00	360.850	0.22	69	363	1.75	1.80	5	254	259	50	75	100.8	33.51
5	40.00	42.50	362.605	0.24	69	362	1.91	1.90	5	255	254	50	75	100.1	34.98
6	42.50	45.00	364.425	0.23	70	362	1.83	1.80	5	258	251	51	76	100.3	34.24
7	45.00	47.50	366.215	0.25	70	362	1.99	2.00	5	256	255	52	78	100.3	35.70
8	47.50	50.00	368.080	0.24	70	365	1.90	1.90	5	259	258	55	78	100.0	35.04
9	50.00	52.50	369.900	0.24	70	365	1.90	1.90	5	251	259	55	80	101.1	35.04
10	52.50	55.00	371.740	0.25	70	365	1.98	2.00	5	250	256	56	80	101.0	35.77
11	55.00	57.50	373.615	0.22	70	366	1.74	1.80	5	253	257	56	80	102.5	33.57
12	57.50	60.00	375.400	0.23	70	365	1.83	1.80	5	251	254	57	80	100.8	34.31
	Final DGM:		377.195												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.045	ft^3	0.23	in. WC	68.3	°F	363.7	°F	5	1.838	in. WC	98.3	0.226	0.5

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	68	°F	26699-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.12	in. WC	247.8
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.374	in.		CO_2:	14	%	7.923
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 / Mid 2 / Mid 3	Post	Mid 1 (cf)			--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.002	-- / -- / --	0.000	Mid 2 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- / -- / --	6	Mid 3 (cf)			--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- / -- / --	Pass	Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	377.420	0.20	60	360	1.57	1.60	4	254	255	41	75	99.7	31.89
2	2.50	5.00	379.050	0.21	60	361	1.64	1.70	4	251	252	42	75	98.5	32.70
3	5.00	7.50	380.700	0.23	60	362	1.80	1.80	4	253	251	42	75	100.5	34.24
4	7.50	10.00	382.460	0.25	61	363	1.95	2.00	4	258	254	42	76	101.3	35.72
5	10.00	12.50	384.310	0.24	61	365	1.87	1.90	4	254	252	42	76	100.7	35.04
6	12.50	15.00	386.110	0.20	61	365	1.56	1.60	4	257	256	43	76	98.6	31.99
7	15.00	17.50	387.720	0.21	61	364	1.64	1.70	4	256	259	44	76	101.2	32.76
8	17.50	20.00	389.415	0.25	61	365	1.95	2.00	4	258	258	45	76	100.6	35.77
9	20.00	22.50	391.250	0.23	61	365	1.79	1.80	4	256	257	45	76	99.9	34.31
10	22.50	25.00	393.000	0.22	61	363	1.72	1.70	4	253	255	45	77	99.1	33.51
11	25.00	27.50	394.700	0.24	62	363	1.88	1.90	4	256	255	46	77	100.9	35.00
12	27.50	30.00	396.510	0.21	62	363	1.65	1.70	4	254	253	47	78	101.3	32.74
B1	30.00	32.50	398.210	0.23	62	364	1.80	1.80	4	254	254	47	78	100.3	34.29
2	32.50	35.00	399.970	0.25	62	365	1.95	2.00	4	255	256	47	78	100.6	35.77
3	35.00	37.50	401.810	0.23	63	365	1.80	1.80	4	256	258	46	79	101.8	34.31
4	37.50	40.00	403.600	0.20	63	362	1.57	1.60	4	258	256	47	75	98.6	31.93
5	40.00	42.50	405.220	0.21	65	361	1.66	1.70	4	256	251	48	75	100.6	32.70
6	42.50	45.00	406.920	0.21	65	360	1.66	1.70	4	258	252	48	71	100.5	32.68
7	45.00	47.50	408.620	0.21	66	361	1.66	1.70	4	254	258	49	71	99.2	32.70
8	47.50	50.00	410.300	0.22	67	362	1.74	1.80	5	251	256	47	71	101.1	33.49
9	50.00	52.50	412.055	0.25	67	362	1.98	2.00	5	250	257	48	72	100.3	35.70
10	52.50	55.00	413.910	0.23	67	363	1.82	1.80	5	252	258	49	73	100.9	34.27
11	55.00	57.50	415.700	0.24	67	365	1.89	1.90	5	256	254	49	73	100.6	35.04
12	57.50	60.00	417.520	0.23	68	365	1.82	1.80	5	253	255	50	75	100.3	34.31
	Final DGM:		419.300												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.880	ft^3	0.23	in. WC	63.0	°F	363.1	°F	5	1.792	in. WC	96.8	0.217	-0.4

RB02A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

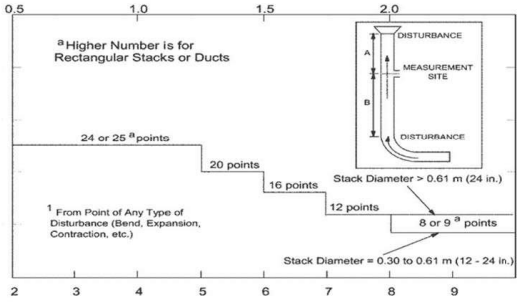
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.020	42.440	43.385	42.282
Meter Temperature, °F	(Tm)	48.3	61.7	68.3	59.4
Meter Temperature, °R	(Tm)	507.9	521.3	528.0	519.1
Meter Orifice Pressure, in. WC	(ΔH)	1.533	1.608	1.650	1.597
Volume H_2O Collected, mL	(Vlc)	251.0	250.6	288.0	263.2
Nozzle Diameter, in	(Dn)	0.292	0.292	0.292	0.292
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	57.8	51.0	152.4	87.1
Condensable PM Mass, mg	(M_{CPM})	2.9	5.9	3.7	4.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	42.463	42.810	43.215	42.829
Standard Water Volume, ft^3	(Vwstd)	11.837	11.818	13.582	12.413
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
Meter Pressure, in Hg	(Pm)	29.87	29.88	29.88	29.88
Volume at Nozzle, ft^3	(Vn)	88.809	86.910	90.386	88.70
Isokinetic Sampling Rate, (%)	(I)	96.9	96.7	99.4	97.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.2	0.1	0.0
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.021	0.018	0.054	0.031
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.017	0.014	0.043	0.025
Filterable PM Emission Rate, lb/hr	(PMR)	20.2	17.9	52.0	30.0
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0011	0.0021	0.0013	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.01	2.07	1.26	1.45
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.021	0.056	0.033
Total PM Emission Rate, lb/hr	(ER_{TPM})	21.2	19.9	53.2	31.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.2 Recovery Furnace (RB02A) West Stack
Project No.: AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	(must be ≥ 0.5)
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

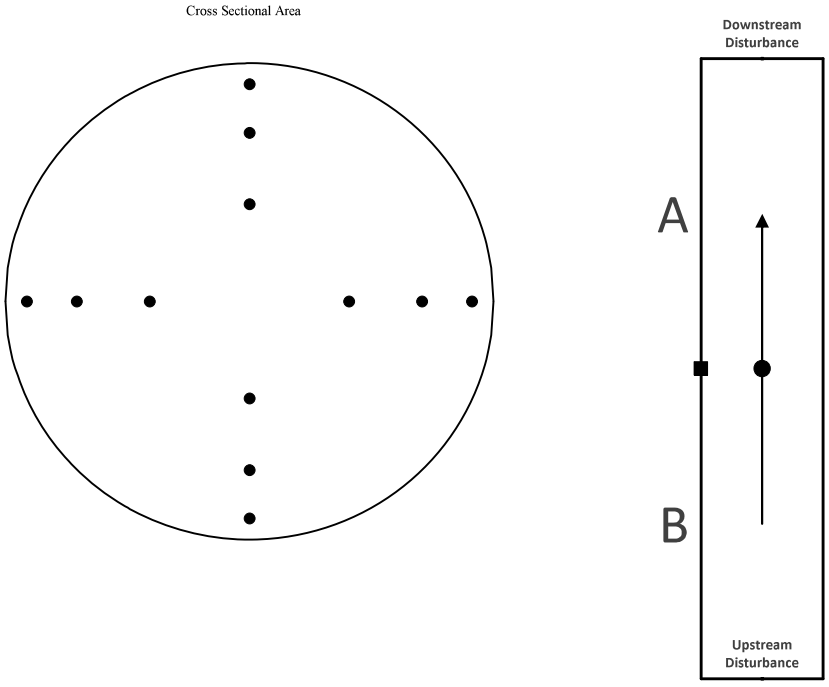
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	8
5	2
6	3
7	6
8	7
9	4
10	0
11	2
12	5
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.57	0.59	0.61	0.59
Point 2		0.59	0.63	0.63	0.62
Point 3		0.60	0.60	0.60	0.60
Point 4		0.63	0.61	0.63	0.62
Point 5		0.62	0.59	0.65	0.62
Point 6		0.64	0.61	0.61	0.62
Point 7		0.61	0.63	0.59	0.61
Point 8		0.63	0.60	0.62	0.62
Point 9		0.64	0.64	0.63	0.64
Point 10		0.60	0.61	0.61	0.61
Point 11		0.65	0.62	0.64	0.64
Point 12		0.60	0.59	0.59	0.59
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.784	0.781	0.786	0.784
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.63	-0.61	-0.62	-0.62
Stack Pressure, in. Hg	(Ps)	29.71	29.72	29.71	29.71
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	397.8	374.4	374.7	382.3
Stack Temperature, °R	(Ts)	857.4	834.1	834.3	841.9
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
O_2 Concentration, %	(O_2)	4.6	4.3	4.5	4.47
CO_2 Concentration, %	(CO_2)	16.2	16.5	16.3	16.33
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	28.21	25.89	27.42	27.17
Molecular Weight, lb/lb-mole (dry)	(Md)	30.78	30.81	30.79	30.79
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.99	28.04	27.73	27.92
Velocity, ft/sec	(Vs)	54.7	53.7	54.3	54.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	234,751	230,403	233,140	232,765
At Standard Conditions, scfm	(Qsw)	143,473	144,762	146,434	144,890
At Standard Conditions, dscfm	(Qs)	112,196	113,444	111,417	112,352

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:42	2/12/2025	14:15	2/12/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	4.58	16.15	4.25	16.51	4.46	16.22
Analysis #2	4.58	16.16	4.26	16.53	4.46	16.26
Analysis #3	4.59	16.17	4.26	16.52	4.46	16.27
Average	4.6	16.2	4.3	16.5	4.5	16.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.2	657.7	740.5	636.8	944.1	3478.3
Final Mass, g	679.7	704.2	750.9	639.5	955.0	3729.3
Gain	180.5	46.5	10.4	2.7	10.9	251.0
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	671.2	509.7	740.2	647.4	1008.0	3576.5
Final Mass, g	691.1	714.7	756.8	651.6	1012.9	3827.1
Gain	19.9	205.0	16.6	4.2	4.9	250.6
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.5	645.8	775.5	650.6	924.3	3505.7
Final Mass, g	734.8	665.7	802.7	653.5	937.0	3793.7
Gain	225.3	19.9	27.2	2.9	12.7	288.0

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02A) West Stack	
Date:	2/12/25	Run 1 VALID	End Time:	11:07	Project No.:	AST-2024-4204	Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26705-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	399	°F		Pg:	-0.63 in. WC	251.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.6 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.304	in.		CO_2:	16.2 %	2.505
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	--	-- --	0.000	Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	-- --	5	Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 55	Stack Amb. 55	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 55	Filter Amb. 55	Imp Exit Amb. 55	CPM Amb. 55	% ISO	Vs (fps)
A1	0.00	5.00	907.840	0.57	45	394	1.41	1.40	4	256	257	44	69	100.2	53.09
2	5.00	10.00	911.120	0.59	46	395	1.46	1.50	4	254	255	45	70	100.3	54.05
3	10.00	15.00	914.465	0.60	46	395	1.48	1.50	4	256	254	47	71	100.8	54.51
4	15.00	20.00	917.855	0.63	47	396	1.56	1.60	4	258	257	48	71	99.8	55.88
5	20.00	25.00	921.300	0.62	47	399	1.53	1.50	4	259	256	48	73	100.9	55.54
6	25.00	30.00	924.750	0.64	48	401	1.58	1.60	4	260	253	48	73	99.3	56.49
B1	30.00	35.00	928.200	0.61	48	400	1.51	1.50	4	260	252	50	72	100.0	55.12
2	35.00	40.00	931.595	0.63	50	400	1.56	1.60	4	254	258	50	71	99.9	56.02
3	40.00	45.00	935.055	0.64	50	399	1.59	1.60	5	256	259	49	73	100.5	56.43
4	45.00	50.00	938.565	0.60	50	398	1.49	1.50	5	258	260	49	74	100.6	54.60
5	50.00	55.00	941.970	0.65	51	398	1.62	1.60	5	255	256	51	75	100.2	56.83
6	55.00	60.00	945.505	0.60	51	398	1.49	1.50	5	254	254	53	78	98.9	54.60
	Final DGM:		948.860												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.020	ft^3	0.62	in. WC	48.3	°F	397.8	°F	5	1.533	in. WC	96.9	0.218	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26706-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	398	°F		Pg:	-0.61	in. WC	250.6
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.3	%	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.307	in.		CO_2:	16.5	%	2.48
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 / Mid 2 / Mid 3 / Post				Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	-- / -- / -- / 0.000				Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	-- / -- / -- / 5				Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	-- / -- / -- / Pass				Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	949.090	0.59	59	374	1.54	1.50	4	253	256	40	76	99.2	53.38
2	5.00	10.00	952.525	0.63	60	375	1.64	1.70	4	253	256	42	73	100.4	55.19
3	10.00	15.00	956.120	0.60	60	374	1.56	1.60	4	253	257	43	75	99.5	53.83
4	15.00	20.00	959.600	0.61	61	375	1.59	1.60	4	257	255	41	68	100.1	54.31
5	20.00	25.00	963.135	0.59	61	375	1.54	1.50	4	255	256	42	69	99.7	53.41
6	25.00	30.00	966.600	0.61	62	376	1.59	1.60	4	254	251	44	71	100.8	54.34
B1	30.00	35.00	970.165	0.63	62	375	1.65	1.70	4	255	254	46	72	100.1	55.19
2	35.00	40.00	973.765	0.60	62	374	1.57	1.60	4	254	256	46	73	100.6	53.83
3	40.00	45.00	977.300	0.64	63	375	1.68	1.70	5	256	258	45	75	100.1	55.63
4	45.00	50.00	980.935	0.61	63	374	1.60	1.60	5	256	257	48	76	100.2	54.28
5	50.00	55.00	984.490	0.62	63	373	1.63	1.60	5	259	254	49	78	99.5	54.69
6	55.00	60.00	988.050	0.59	64	373	1.55	1.60	5	260	255	51	78	99.5	53.35
	Final DGM:		991.530												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	42.440 ft^3	0.61 in. WC	61.7 °F	374.4 °F	5	1.608 in. WC	96.7	0.216	-0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	62	°F	26709-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	374	°F		Pg:	-0.62 in. WC	288.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.61	in. WC		O_2:	4.5 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.301	in.		CO_2:	16.3 %	2.613
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. --	Filter Amb. --	Imp Exit Amb. --	CPM Amb. --	% ISO	Vs (fps)
A1	0.00	5.00	992.320	0.61	67	373	1.61	1.60	3	254	252	48	70	100.3	54.25
2	5.00	10.00	995.910	0.63	67	373	1.67	1.70	3	254	258	48	71	99.7	55.13
3	10.00	15.00	999.535	0.60	67	374	1.58	1.60	3	258	256	48	71	100.5	53.83
4	15.00	20.00	1003.100	0.63	67	374	1.66	1.70	3	253	254	47	71	100.6	55.16
5	20.00	25.00	1006.755	0.65	68	374	1.72	1.70	3	256	257	46	73	99.4	56.03
6	25.00	30.00	1010.430	0.61	68	375	1.61	1.60	3	253	259	46	74	99.7	54.31
B1	30.00	35.00	1014.000	0.59	68	375	1.56	1.60	3	258	260	46	75	100.8	53.41
2	35.00	40.00	1017.550	0.62	69	376	1.64	1.70	3	256	260	49	75	100.9	54.79
3	40.00	45.00	1021.195	0.63	69	375	1.67	1.70	4	255	260	49	76	100.7	55.19
4	45.00	50.00	1024.865	0.61	70	376	1.62	1.60	4	254	258	51	78	100.4	54.34
5	50.00	55.00	1028.470	0.64	70	376	1.70	1.70	4	258	255	52	78	100.2	55.66
6	55.00	60.00	1032.155	0.59	70	375	1.57	1.60	4	256	256	52	78	100.4	53.41
	Final DGM:		1035.705												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.385	ft^3	0.62	in. WC	68.3	°F	374.7	°F	4	1.650	in. WC	99.4	0.239	0.1

RB02B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

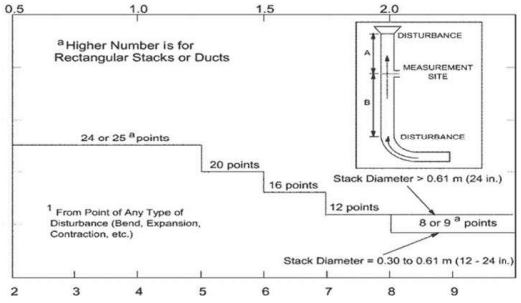
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	44.125	45.125	44.820	44.690
Meter Temperature, °F	(Tm)	53.3	72.4	62.2	62.6
Meter Temperature, °R	(Tm)	512.9	532.1	521.8	522.3
Meter Orifice Pressure, in. WC	(ΔH)	1.908	1.942	1.942	1.931
Volume H_2O Collected, mL	(Vlc)	319.2	291.3	328.1	312.9
Nozzle Diameter, in	(Dn)	0.295	0.295	0.295	0.295
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	105.1	43.2	51.4	66.6
Condensable PM Mass, mg	(M_{CPM})	4.0	4.8	4.5	4.4
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.319	44.680	45.250	45.083
Standard Water Volume, ft^3	(Vwstd)	15.053	13.738	15.473	14.755
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
Meter Pressure, in Hg	(Pm)	29.90	29.90	29.90	29.90
Volume at Nozzle, ft^3	(Vn)	96.813	95.419	99.108	97.11
Isokinetic Sampling Rate, (%)	(I)	100.1	98.4	100.8	99.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.3	0.0	-0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.036	0.015	0.018	0.023
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.030	0.012	0.014	0.019
Filterable PM Emission Rate, lb/hr	(PMR)	34.8	14.6	16.9	22.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0014	0.0017	0.0015	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.33	1.62	1.48	1.48
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.017	0.019	0.024
Total PM Emission Rate, lb/hr	(ER_{TPM})	36.2	16.2	18.4	23.6

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	**(must be ≥ 0.5)**
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

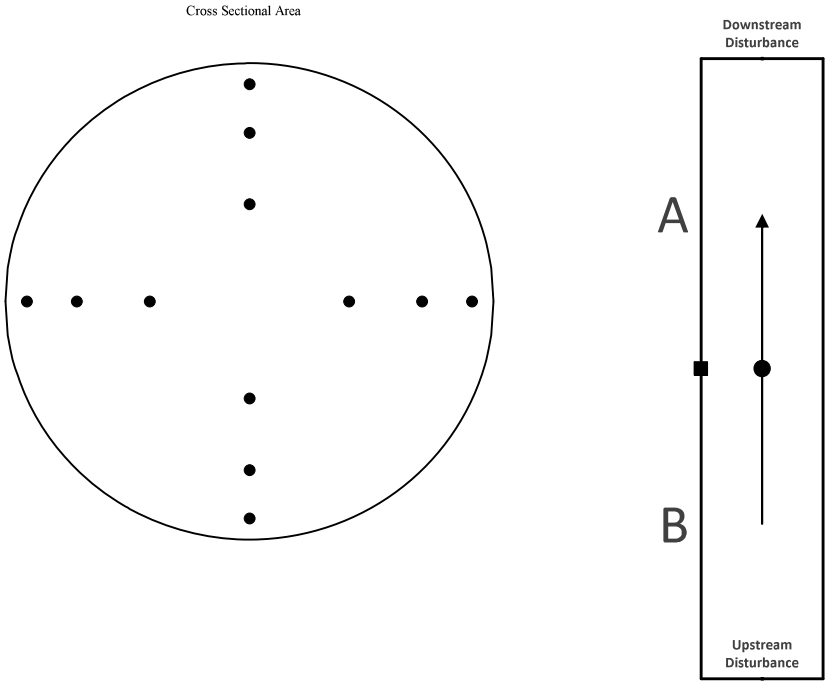
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	4
3	1
4	3
5	2
6	1
7	0
8	-2
9	-3
10	-1
11	0
12	6
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.62	0.60	0.59	0.60
Point 2		0.63	0.63	0.63	0.63
Point 3		0.65	0.61	0.65	0.64
Point 4		0.61	0.62	0.61	0.61
Point 5		0.59	0.64	0.64	0.62
Point 6		0.63	0.63	0.63	0.63
Point 7		0.61	0.59	0.61	0.60
Point 8		0.59	0.61	0.63	0.61
Point 9		0.61	0.63	0.64	0.63
Point 10		0.64	0.62	0.65	0.64
Point 11		0.65	0.59	0.61	0.62
Point 12		0.59	0.61	0.63	0.61
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.786	0.784	0.792	0.787
Pitot Tube Coefficient	(Cp)	0.830	0.830	0.830	0.830
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.54	-0.55	-0.53	-0.54
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	381.3	396.8	396.3	391.4
Stack Temperature, °R	(Ts)	840.9	856.5	855.9	851.1
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
O_2 Concentration, %	(O_2)	5.6	5.1	5.3	5.33
CO_2 Concentration, %	(CO_2)	15.2	15.7	15.5	15.47
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	36.58	32.26	33.96	34.27
Molecular Weight, lb/lb-mole (dry)	(Md)	30.66	30.72	30.69	30.69
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.50	27.73	27.46	27.56
Velocity, ft/sec	(Vs)	56.6	56.7	57.5	56.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	242,764	243,366	246,763	244,298
At Standard Conditions, scfm	(Qsw)	151,315	148,927	151,116	150,453
At Standard Conditions, dscfm	(Qs)	113,585	113,905	112,609	113,366

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:35	2/12/2025	14:07	2/12/2025	15:53
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	5.58	15.23	5.08	15.66	5.25	15.51
Analysis #2	5.59	15.23	5.10	15.67	5.25	15.49
Analysis #3	5.58	15.22	5.10	15.67	5.25	15.49
Average	5.6	15.2	5.1	15.7	5.3	15.5

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.9	645.2	748.0	647.7	933.7	3484.5
Final Mass, g	687.3	741.5	776.2	651.5	947.2	3803.7
Gain	177.4	96.3	28.2	3.8	13.5	319.2
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.7	640.3	746.6	649.0	961.2	3490.8
Final Mass, g	698.7	686.5	771.7	649.5	975.7	3782.1
Gain	205.0	46.2	25.1	0.5	14.5	291.3
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.9	658.1	750.2	639.4	952.3	3499.9
Final Mass, g	691.0	735.7	785.2	644.8	971.3	3828.0
Gain	191.1	77.6	35.0	5.4	19.0	328.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 1	VALID	End Time:	11:17	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	55	°F	26704-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	380	°F		Pg:	-0.54	in. WC	319.2
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.6	%	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.2	%	3.091
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.001	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 2 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					55	55				55	55	55	55		
A1	0.00	5.00	915.775	0.62	52	376	1.91	1.90	3	254	251	42	75	100.7	56.56
2	5.00	10.00	919.480	0.63	52	378	1.94	2.00	3	256	252	42	75	100.4	57.08
3	10.00	15.00	923.200	0.65	52	380	2.00	2.00	3	256	256	43	76	100.5	58.05
4	15.00	20.00	926.975	0.61	52	382	1.87	1.90	3	258	260	43	78	99.7	56.30
5	20.00	25.00	930.600	0.59	53	383	1.81	1.80	3	259	258	45	78	100.5	55.40
6	25.00	30.00	934.200	0.63	53	385	1.93	1.90	3	253	257	46	78	100.2	57.32
B1	30.00	35.00	937.905	0.61	53	385	1.87	1.90	3	254	256	48	78	99.7	56.40
2	35.00	40.00	941.530	0.59	54	383	1.81	1.80	4	253	253	49	81	100.4	55.40
3	40.00	45.00	945.135	0.61	54	383	1.88	1.90	4	257	252	50	81	100.5	56.33
4	45.00	50.00	948.800	0.64	54	381	1.97	2.00	4	255	255	52	83	100.1	57.63
5	50.00	55.00	952.545	0.65	55	380	2.01	2.00	4	255	254	52	83	100.3	58.05
6	55.00	60.00	956.335	0.59	55	379	1.83	1.80	4	256	251	53	82	98.9	55.27
	Final DGM:		959.900												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.125	ft^3	0.62	in. WC	53.3	°F	381.3	°F	4	1.908	in. WC	100.1	0.249	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	53	°F	26707-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	381	°F		Pg:	-0.55 in. WC	291.3
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.1 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.7 %	3.08
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.000	--	--	--	0.002	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	959.925	0.60	70	396	1.87	1.90	4	251	252	45	76	99.3	56.30
2	5.00	10.00	963.600	0.63	70	396	1.97	2.00	4	260	251	43	75	99.7	57.69
3	10.00	15.00	967.380	0.61	70	397	1.90	1.90	4	256	254	45	76	100.1	56.80
4	15.00	20.00	971.115	0.62	71	396	1.94	2.00	5	253	250	51	75	100.8	57.23
5	20.00	25.00	974.915	0.64	71	396	2.00	2.00	5	255	258	51	71	100.4	58.15
6	25.00	30.00	978.760	0.63	72	395	1.98	2.00	5	254	253	52	73	100.3	57.66
B1	30.00	35.00	982.580	0.59	73	397	1.85	1.90	5	255	258	53	75	99.6	55.86
2	35.00	40.00	986.255	0.61	74	397	1.92	1.90	5	252	253	53	76	99.6	56.80
3	40.00	45.00	990.000	0.63	74	398	1.98	1.90	5	252	255	54	78	100.8	57.76
4	45.00	50.00	993.850	0.62	74	398	1.95	2.00	5	254	254	55	80	100.7	57.30
5	50.00	55.00	997.665	0.59	75	399	1.85	1.90	5	256	257	56	80	100.5	55.93
6	55.00	60.00	1001.385	0.61	75	397	1.92	1.90	5	258	255	56	81	97.3	56.80
	Final DGM:		1005.050												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.125	ft^3	0.62	in. WC	72.4	°F	396.8	°F	5	1.942	in. WC	98.4	0.235	-0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	72	°F	26708-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	397	°F		Pg:	-0.53 in. WC	328.1
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.3 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.295	in.		CO_2:	15.5 %	3.133
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Mid 1 (cf) --
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 2 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 3 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	6.280	0.59	61	393	1.82	1.80	4	254	251	43	70	100.2	55.73
2	5.00	10.00	9.905	0.63	61	395	1.94	1.90	4	256	252	43	71	101.0	57.66
3	10.00	15.00	13.675	0.65	61	396	1.99	2.00	4	258	250	43	72	99.7	58.60
4	15.00	20.00	17.450	0.61	61	396	1.87	1.90	4	254	256	45	72	100.4	56.77
5	20.00	25.00	21.135	0.64	61	396	1.96	2.00	4	258	258	45	73	100.6	58.15
6	25.00	30.00	24.915	0.63	62	397	1.93	1.90	4	257	259	45	73	100.1	57.72
B1	30.00	35.00	28.655	0.61	62	397	1.87	1.90	4	256	260	46	74	100.7	56.80
2	35.00	40.00	32.355	0.63	63	397	1.94	2.00	4	258	254	48	75	100.5	57.72
3	40.00	45.00	36.115	0.64	63	397	1.97	2.00	4	259	257	49	78	99.7	58.18
4	45.00	50.00	39.875	0.65	63	398	2.00	2.00	5	257	255	50	79	99.8	58.67
5	50.00	55.00	43.665	0.61	64	397	1.88	1.90	5	256	255	51	79	100.2	56.80
6	55.00	60.00	47.360	0.63	64	396	1.94	2.00	5	255	256	51	82	99.7	57.69
	Final DGM:		51.100												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.820	ft^3	0.63	in. WC	62.2	°F	396.3	°F	5	1.942	in. WC	100.8	0.255	0.0

SM01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

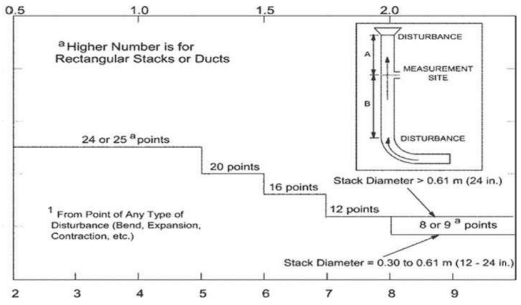
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	49.70	49.70	49.69	49.70
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	48.040	48.100	53.630	49.923
Meter Temperature, °F	(Tm)	51.4	49.9	53.6	51.6
Meter Temperature, °R	(Tm)	511.1	509.6	513.3	511.3
Meter Orifice Pressure, in. WC	(ΔH)	1.950	1.958	2.417	2.108
Volume H_2O Collected, mL	(Vlc)	806.2	438.4	456.0	566.9
Nozzle Diameter, in	(Dn)	0.382	0.382	0.382	0.382
Area of Nozzle, ft^2	(An)	0.0008	0.0008	0.0008	0.0008
Filterable PM Mass, mg	(Mn)	245.4	122.5	118.9	162.3
Condensable PM Mass, mg	(M_{CPM})	13.8	7.9	9.3	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	49.919	50.129	55.555	51.868
Standard Water Volume, ft^3	(Vwstd)	38.020	20.675	21.505	26.733
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
Meter Pressure, in Hg	(Pm)	30.17	30.17	30.21	30.19
Volume at Nozzle, ft^3	(Vn)	103.488	81.841	88.953	91.43
Isokinetic Sampling Rate, (%)	(I)	101.3	91.2	100.1	97.5
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	1.7	1.7	1.7	1.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.076	0.038	0.033	0.049
Filterable PM Emission Rate, lb/hr	(PMR)	7.4	4.1	3.6	5.1
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.15	0.083	0.073	0.10
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0043	0.0024	0.0026	0.0031
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.42	0.26	0.28	0.32
Total PM Concentration, grain/dscf	(C_{TPM})	0.080	0.040	0.036	0.052
Total PM Emission Rate, lb/hr	(ER_{TPM})	7.8	4.4	3.9	5.4

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Smelt Tank Scrubber (SM01)
Project No.: AST-2024-4204
Date: 02/10/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	54.00	in
Nipple Length:	9.00	in
Depth of Duct:	45.00	in
Cross Sectional Area of Duct:	11.04	ft^2
No. of Test Ports:	1	
Distance A:	112.0	ft
Distance A Duct Diameters:	29.9	(must be ≥ 0.5)
Distance B:	60.0	ft
Distance B Duct Diameters:	16.0	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/10/25	
Reviewer (Initial and Date):	CAL 2/10/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

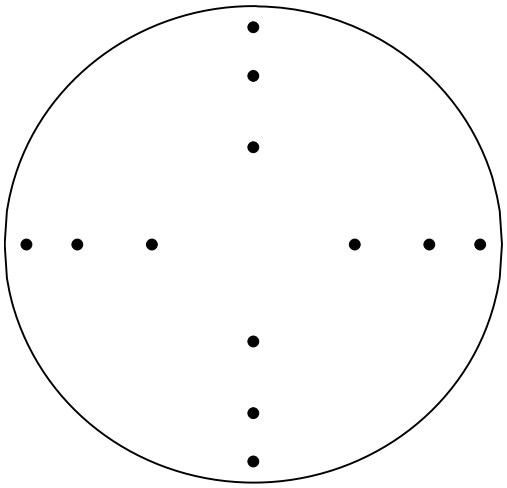
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

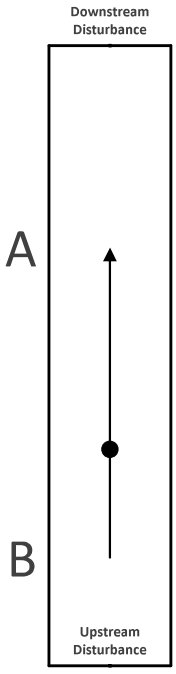
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	1.98	11
2	14.6	6.57	15 9/16
3	29.6	13.32	22 5/16
4	70.4	31.68	40 11/16
5	85.4	38.43	47 7/16
6	95.6	43.02	52
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 112 ft.
B = 60 ft.
Depth of Duct = 45 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	-4
2	-2
3	-1
4	1
5	0
6	2
7	3
8	5
9	4
10	3
11	-1
12	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.16	0.16	0.17	0.16
Point 2		0.17	0.18	0.18	0.18
Point 3		0.23	0.22	0.23	0.23
Point 4		0.32	0.31	0.30	0.31
Point 5		0.29	0.28	0.27	0.28
Point 6		0.27	0.28	0.27	0.27
Point 7		0.40	0.35	0.36	0.37
Point 8		0.29	0.34	0.33	0.32
Point 9		0.28	0.29	0.28	0.28
Point 10		0.24	0.23	0.25	0.24
Point 11		0.19	0.18	0.19	0.19
Point 12		0.16	0.17	0.17	0.17
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.495	0.495	0.496	0.495
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.39	-0.39	-0.39	-0.39
Stack Pressure, in. Hg	(Ps)	30.00	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	11.04	11.04	11.04	11.04
Stack Temperature, °F	(Ts)	163.5	152.3	151.4	155.7
Stack Temperature, °R	(Ts)	623.2	611.9	611.1	615.4
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	25.10	25.98	26.04	25.70
Velocity, ft/sec	(Vs)	31.0	30.1	30.2	30.4
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	20,517	19,971	19,993	20,160
At Standard Conditions, scfm	(Qsw)	17,420	17,268	17,310	17,333
At Standard Conditions, dscfm	(Qs)	11,402	12,707	12,830	12,313

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.2	648.2	744.6	544.8	948.7	3244.5
Final Mass, g	873.1	888.1	769.2	557.9	962.4	4050.7
Gain	514.9	239.9	24.6	13.1	13.7	806.2
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.0	799.4	763.4	637.7	942.4	3637.9
Final Mass, g	819.0	864.0	792.7	644.0	956.6	4076.3
Gain	324.0	64.6	29.3	6.3	14.2	438.4
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.9	828.8	768.8	556.4	956.3	3469.2
Final Mass, g	735.9	871.4	789.3	560.3	968.3	3925.2
Gain	377.0	42.6	20.5	3.9	12.0	456.0

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	Run 1	VALID	End Time:	9:40	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	160	°F	26974-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	163	°F		Pg:	-0.39 in. WC	806.2
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.313	in.		CO_2:	0 %	9.461
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- -- 12			Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					45	45				45	45	45	45		
1	0.00	5.00	756.890	0.16	48	167	1.23	1.20	3	254	255	43	68	100.6	25.11
2	5.00	10.00	760.060	0.17	49	163	1.32	1.30	3	256	254	35	73	101.1	25.80
3	10.00	15.00	763.360	0.23	49	167	1.77	1.80	4	254	254	35	69	99.5	30.10
4	15.00	20.00	767.120	0.32	50	168	2.46	2.50	7	256	256	36	67	99.4	35.54
5	20.00	25.00	771.550	0.29	50	168	2.24	2.20	6	255	253	38	80	101.8	33.83
6	25.00	30.00	775.870	0.27	51	164	2.10	2.10	6	255	257	40	83	102.5	32.54
7	30.00	35.00	780.090	0.40	52	162	3.12	3.10	9	255	257	41	78	99.0	39.54
8	35.00	40.00	785.060	0.29	53	163	2.27	2.30	8	256	254	41	73	103.8	33.70
9	40.00	45.00	789.510	0.28	53	162	2.19	2.20	7	255	256	41	68	100.3	33.08
10	45.00	50.00	793.740	0.24	54	160	1.89	1.90	7	256	249	40	72	103.8	30.58
11	50.00	55.00	797.810	0.19	54	159	1.50	1.50	7	255	256	39	74	105.0	27.19
12	55.00	60.00	801.480	0.16	54	159	1.26	1.30	6	253	250	40	71	107.5	24.95
	Final DGM:		804.930												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.040 ft^3	0.25 in. WC	51.4 °F	163.5 °F	9	1.950 in. WC	101.3	0.345	1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 2**	**VALID**	**End Time:**	12:15	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	51	°F	26989-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	164	°F		Pg:	-0.39 in. WC	438.4
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.345	in.		CO_2:	0 %	7.80
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.005	-- -- --	0.002		Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
1	0.00	5.00	805.210	0.16	49	146	1.28	1.30	3	254	249	46	66	102.8	24.68
2	5.00	10.00	808.510	0.18	50	153	1.42	1.40	4	255	256	37	68	99.4	26.33
3	10.00	15.00	811.880	0.22	49	152	1.74	1.70	5	254	256	39	82	100.5	29.09
4	15.00	20.00	815.640	0.31	49	153	2.44	2.40	7	253	259	40	84	101.8	34.56
5	20.00	25.00	820.150	0.28	48	151	2.21	2.20	6	256	255	40	75	102.8	32.79
6	25.00	30.00	824.480	0.28	49	148	2.23	2.20	6	255	255	42	67	100.9	32.71
7	30.00	35.00	828.750	0.35	49	147	2.78	2.80	8	255	256	43	66	101.1	36.54
8	35.00	40.00	833.530	0.34	50	147	2.71	2.70	8	256	256	46	75	100.9	36.01
9	40.00	45.00	838.240	0.29	51	149	2.31	2.30	7	255	254	49	82	101.9	33.32
10	45.00	50.00	842.640	0.23	51	158	1.81	1.80	7	256	255	49	73	103.3	29.89
11	50.00	55.00	846.590	0.18	52	160	1.41	1.40	6	255	255	48	69	101.3	26.48
12	55.00	60.00	850.020	0.17	52	163	1.33	1.30	6	256	255	46	72	100.2	25.80
	Final DGM:		853.310												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.100 ft^3	0.25 in. WC	49.9 °F	152.3 °F	8	1.958 in. WC	91.2	0.264	1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	14:05	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 3**	**VALID**	**End Time:**	15:05	**Project No.:**	AST-2024-4204 — **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	27.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	50	°F	26700-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	152	°F		Pg:	-0.39 in. WC	456.0
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.328	in.		CO_2:	0 %	9.650
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm				
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 / Mid 3	Post	Check Pt. / Initial / Final / Corr.	
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- / --	0.002	Mid 1 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	--	-- / --	9	Mid 2 (cf)	--
Ms:	25.91	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	--	-- / --	Pass	Mid 3 (cf)	--
											Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
1	0.00	5.00	853.490	0.17	52	154	1.64	1.60	4	254	254	51	67	100.8	25.18
2	5.00	10.00	857.170	0.18	50	150	1.74	1.70	4	254	254	43	69	102.9	25.83
3	10.00	15.00	861.030	0.23	51	148	2.24	2.20	5	256	256	42	68	99.5	29.14
4	15.00	20.00	865.260	0.30	52	148	2.92	2.90	6	255	255	44	70	100.7	33.29
5	20.00	25.00	870.150	0.27	53	147	2.64	2.60	5	255	256	44	66	101.9	31.55
6	25.00	30.00	874.860	0.27	54	146	2.65	2.70	6	256	255	47	65	102.1	31.53
7	30.00	35.00	879.590	0.36	55	146	3.53	3.50	8	256	255	48	72	99.4	36.40
8	35.00	40.00	884.910	0.33	55	154	3.20	3.20	8	255	256	48	69	100.5	35.08
9	40.00	45.00	890.030	0.28	55	155	2.71	2.70	8	256	256	46	73	101.2	32.34
10	45.00	50.00	894.780	0.25	55	156	2.42	2.40	7	256	254	45	68	101.9	30.59
11	50.00	55.00	899.300	0.19	55	158	1.83	1.80	7	255	254	44	76	103.2	26.71
12	55.00	60.00	903.290	0.17	56	155	1.65	1.70	6	254	256	45	78	104.3	25.20
	Final DGM:		907.120												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	53.630 ft^3	0.25 in. WC	53.6 °F	151.4 °F	8	2.417 in. WC	100.1	0.259	1.7

SM02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

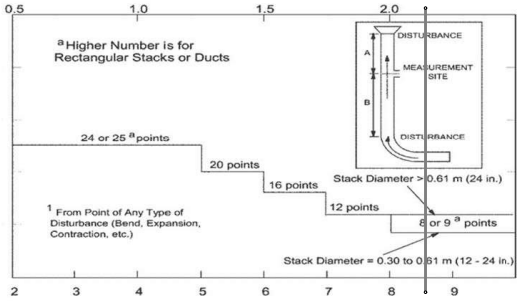
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	97.01	96.99	96.99	97.00
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	48.530	39.450	39.950	42.643
Meter Temperature, °F	(Tm)	61.0	63.1	64.0	62.7
Meter Temperature, °R	(Tm)	520.7	522.8	523.7	522.4
Meter Orifice Pressure, in. WC	(ΔH)	2.317	1.467	1.458	1.747
Volume H_2O Collected, mL	(Vlc)	467.7	380.9	370.7	406.4
Nozzle Diameter, in	(Dn)	0.344	0.305	0.305	0.318
Area of Nozzle, ft^2	(An)	0.0006	0.0005	0.0005	0.0006
Filterable PM Mass, mg	(Mn)	108.2	73.4	71.1	84.2
Condensable PM Mass, mg	(M_{CPM})	8.0	16.2	6.8	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.707	39.354	39.782	42.615
Standard Water Volume, ft^3	(Vwstd)	22.057	17.963	17.482	19.167
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
Meter Pressure, in Hg	(Pm)	29.93	29.87	29.87	29.89
Volume at Nozzle, ft^3	(Vn)	82.478	67.206	67.182	72.29
Isokinetic Sampling Rate, (%)	(I)	93.9	99.1	100.3	97.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	-1.7	0.2	1.6	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.034	0.029	0.028	0.030
Filterable PM Emission Rate, lb/hr	(PMR)	7.5	6.1	5.8	6.5
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.077	0.063	0.060	0.067
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0025	0.0064	0.0026	0.0038
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.55	1.35	0.56	0.82
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.035	0.030	0.034
Total PM Emission Rate, lb/hr	(ER_{TPM})	8.0	7.4	6.4	7.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN	
Reviewer (Initial and Date):	CAL	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

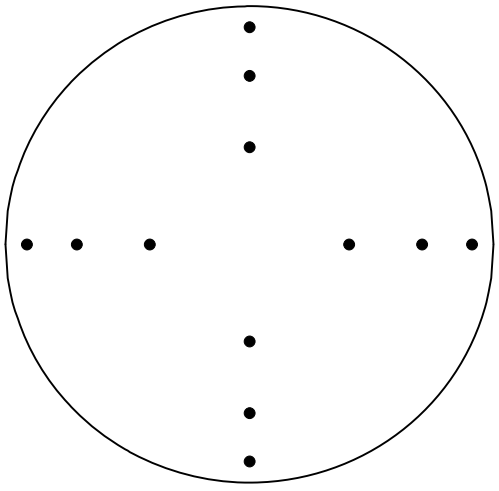
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

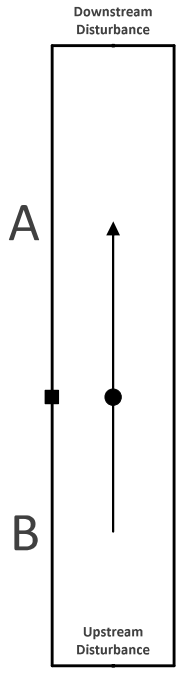
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 55 ft.
B = 42 ft.
Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	2
3	1
4	0
5	1
6	2
7	-3
8	-2
9	0
10	1
11	-1
12	3
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.36	0.35	0.34	0.35
Point 2		0.34	0.34	0.34	0.34
Point 3		0.31	0.30	0.32	0.31
Point 4		0.32	0.30	0.31	0.31
Point 5		0.34	0.33	0.35	0.34
Point 6		0.35	0.36	0.36	0.36
Point 7		0.35	0.36	0.35	0.35
Point 8		0.33	0.34	0.34	0.34
Point 9		0.32	0.33	0.31	0.32
Point 10		0.30	0.32	0.32	0.31
Point 11		0.33	0.33	0.34	0.33
Point 12		0.35	0.36	0.35	0.35
CALCULATED DATA					
Square Root of ΔP, $(in. WC)^{1/2}$	(ΔP)	0.577	0.579	0.579	0.578
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.61	-0.61	-0.61	-0.61
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	18.99	18.99	18.99	18.99
Stack Temperature, °F	(Ts)	151.5	155.2	155.5	154.1
Stack Temperature, °R	(Ts)	611.2	614.8	615.2	613.7
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.00	25.74	25.71	25.82
Velocity, ft/sec	(Vs)	35.3	35.7	35.7	35.6
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	40,191	40,629	40,702	40,507
At Standard Conditions, scfm	(Qsw)	34,462	34,630	34,673	34,589
At Standard Conditions, dscfm	(Qs)	25,439	24,719	24,670	24,942

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.9	799.9	724.0	643.3	951.8	3613.9
Final Mass, g	847.9	880.1	741.1	647.1	965.4	4081.6
Gain	353.0	80.2	17.1	3.8	13.6	467.7
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.7	829.0	790.1	560.5	971.9	3510.2
Final Mass, g	696.1	854.5	797.1	561.2	982.2	3891.1
Gain	337.4	25.5	7.0	0.7	10.3	380.9
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.2	799.1	740.3	641.5	938.2	3614.3
Final Mass, g	806.2	832.5	753.1	643.9	949.3	3985.0
Gain	311.0	33.4	12.8	2.4	11.1	370.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 1	VALID	End Time:	11:18	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26702-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	154	°F		Pg:	-0.61 in. WC	467.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.308	in.		CO_2:	0 %	6.815
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	-- --	0.002	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-344-3	SS	Vacuum (in Hg):	15	--	-- --	10	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.344		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 45	Stack Amb. 45	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 45	Filter Amb. 45	Imp Exit Amb. 45	CPM Amb. 45	% ISO	Vs (fps)
A1	0.00	5.00	420.260	0.36	55	154	2.47	2.50	6	248	246	41	68	96.9	37.04
2	5.00	10.00	424.350	0.34	54	151	2.34	2.30	6	247	257	40	72	99.8	35.91
3	10.00	15.00	428.450	0.31	54	149	2.14	2.10	5	246	256	46	70	95.2	34.23
4	15.00	20.00	432.190	0.32	60	149	2.24	2.20	6	254	257	47	68	98.1	34.78
5	20.00	25.00	436.150	0.34	63	149	2.39	2.40	6	250	252	47	67	97.8	35.85
6	25.00	30.00	440.240	0.35	64	148	2.47	2.50	7	251	248	46	69	99.6	36.35
B1	30.00	35.00	444.480	0.35	63	150	2.46	2.50	7	254	253	45	70	100.7	36.41
2	35.00	40.00	448.750	0.33	63	151	2.31	2.30	6	255	248	42	76	99.6	35.38
3	40.00	45.00	452.850	0.32	63	152	2.24	2.20	6	255	251	38	81	98.0	34.87
4	45.00	50.00	456.820	0.30	64	153	2.10	2.10	5	253	255	40	67	100.3	33.79
5	50.00	55.00	460.760	0.33	64	154	2.31	2.30	6	255	254	40	68	98.4	35.47
6	55.00	60.00	464.810	0.35	65	158	2.43	2.40	7	256	254	41	74	94.1	36.64
	Final DGM:		468.790												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	48.530	ft^3	0.33	in. WC	61.0	°F	151.5	°F	7	2.317	in. WC	93.9	0.262	-1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	61	°F	26703-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	152	°F		Pg:	-0.61 in. WC	380.9
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.33	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.307	in.		CO_2:	0 %	4.34
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- --	0.003	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	--	-- --	6	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	468.950	0.35	62	158	1.51	1.50	3	254	255	42	67	97.0	36.64
2	5.00	10.00	472.170	0.34	60	155	1.46	1.50	4	260	263	43	83	103.7	36.03
3	10.00	15.00	475.560	0.30	61	156	1.29	1.30	4	261	254	43	76	102.8	33.87
4	15.00	20.00	478.720	0.30	61	158	1.29	1.30	4	260	251	45	66	101.0	33.93
5	20.00	25.00	481.820	0.33	61	160	1.41	1.40	4	260	249	45	74	98.3	35.64
6	25.00	30.00	484.980	0.36	62	154	1.56	1.60	5	260	252	47	81	102.4	37.04
B1	30.00	35.00	488.440	0.36	63	151	1.57	1.60	4	246	244	47	73	98.7	36.95
2	35.00	40.00	491.790	0.34	64	153	1.48	1.50	4	257	252	51	68	101.5	35.97
3	40.00	45.00	495.140	0.33	64	152	1.45	1.50	4	259	250	49	72	101.3	35.57
4	45.00	50.00	498.450	0.32	66	154	1.40	1.40	4	260	241	49	72	102.1	34.92
5	50.00	55.00	501.730	0.33	66	156	1.44	1.40	4	258	246	50	69	99.8	35.52
6	55.00	60.00	504.980	0.36	67	155	1.57	1.60	5	261	254	51	67	100.4	37.07
	Final DGM:		508.400												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	39.450 ft^3	0.34 in. WC	63.1 °F	155.2 °F	5	1.467 in. WC	99.1	0.286	0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 3	VALID	End Time:	15:28	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	63	°F	26971-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	155	°F		Pg:	-0.61 in. WC	370.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.306	in.		CO_2:	0 %	4.327
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.007	-- -- --	0.009		Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	511.870	0.34	64	154	1.48	1.50	3	258	253	46	73	99.5	36.00
2	5.00	10.00	515.150	0.34	65	151	1.49	1.50	5	260	253	46	74	100.9	35.91
3	10.00	15.00	518.490	0.32	65	153	1.40	1.40	5	260	245	46	84	103.5	34.90
4	15.00	20.00	521.810	0.31	64	156	1.34	1.30	4	260	247	47	82	101.8	34.43
5	20.00	25.00	525.010	0.35	64	155	1.52	1.50	5	259	250	47	79	102.9	36.56
6	25.00	30.00	528.450	0.36	64	158	1.55	1.60	5	259	252	49	66	102.7	37.16
B1	30.00	35.00	531.920	0.35	64	158	1.51	1.50	5	259	249	47	67	102.0	36.64
2	35.00	40.00	535.320	0.34	64	158	1.47	1.50	4	261	251	47	70	103.8	36.12
3	40.00	45.00	538.730	0.31	63	156	1.34	1.30	4	260	246	48	69	100.7	34.43
4	45.00	50.00	541.890	0.32	63	155	1.39	1.40	4	263	248	47	68	101.3	34.95
5	50.00	55.00	545.120	0.34	64	156	1.47	1.50	4	257	255	47	67	99.4	36.06
6	55.00	60.00	548.390	0.35	64	156	1.52	1.50	4	261	251	46	66	102.7	36.58
	Final DGM:		551.820												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	39.950	ft^3	0.34	in. WC	64.0	°F	155.5	°F	5	1.458	in. WC	100.3	0.289	1.6

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

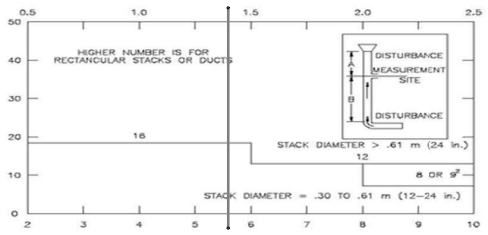
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		9:10	10:42	11:57	--
Stop Time		10:09	11:41	12:56	--
Input Data - Outlet					
Moisture Fraction, dimensionless	BWS	0.444	0.442	0.442	0.443
Volumetric Flow Rate (M1-4), dscfm	Qs	6,235	6,311	6,345	6,297
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	13.20	13.24	13.06	13.17
CO_2 Concentration, % dry	C_{CO_2}	3.13	3.20	3.19	3.17
Methanol - Outlet Concentration, ppmvd	C_{CH_3OH}	0.81	0.77	0.70	0.76
Methanol - Outlet Concentration, ppmvw	C_{CH_3OHw}	0.45	0.43	0.39	0.42
Methanol - Outlet Concentration, ppmvd @ 10 % O_2	C_{CH_3OHc15}	1.1	1.1	0.97	1.1
Methanol - Outlet Emission Rate, lb/hr	ER_{CH_3OH}	0.03	0.02	0.02	0.02

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unit Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	in
Nipple Length:	7.00	in
Depth of Duct:	29.00	in
Cross Sectional Area of Duct:	4.59	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	ft
Distance A Duct Diameters:	23.4	**(must be > 0.5)**
Distance B:	13.5	ft
Distance B Duct Diameters:	5.6	**(must be > 2)**
Actual Number of Traverse Points:	16	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	3.2	1.00	8
2	10.5	3.05	10 1/16
3	19.4	5.63	12 5/8
4	32.3	9.37	16 3/8
5	67.7	19.63	26 5/8
6	80.6	23.37	30 3/8
7	89.5	25.96	32 15/16
8	96.8	28.00	35
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

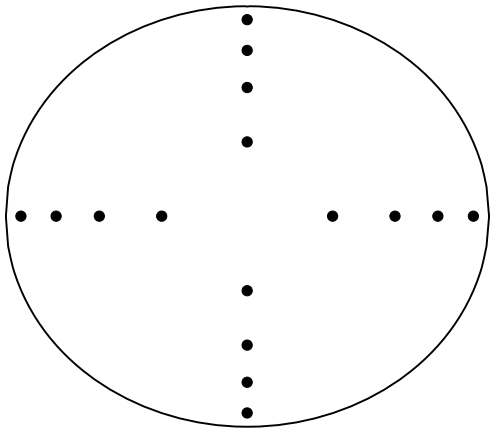
Stack Diagram

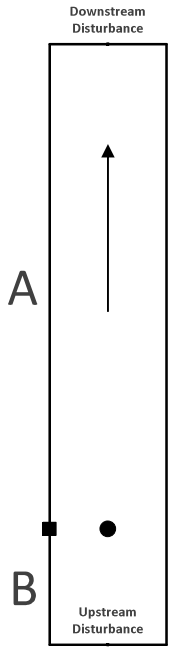
A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX

Source NCG Oxidation Unit Scrubber (NCG01)

Project No. AST-2024-4204

Date 2/13/25

Sample Point	Angle (ΔP=0)
1	3
2	5
3	2
4	6
5	5
6	2
7	8
8	5
9	10
10	5
11	12
12	8
13	8
14	2
15	2
16	5
Average	5.5

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204

Run No.	1		2		3	
Date	2/13/25		2/13/25		2/13/25	
Status	VALID		VALID		VALID	
Start Time	9:20		10:55		12:40	
Stop Time	9:30		11:05		12:50	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.54	174	0.58	176	0.55	177
2	0.53	175	0.55	176	0.54	177
3	0.51	175	0.54	176	0.55	178
4	0.46	175	0.51	177	0.56	178
5	0.46	176	0.49	177	0.52	177
6	0.45	176	0.46	178	0.51	177
7	0.46	176	0.49	178	0.48	178
8	0.43	177	0.52	178	0.45	178
B-1	0.54	176	0.55	176	0.49	176
2	0.55	177	0.58	177	0.56	177
3	0.56	177	0.56	177	0.59	178
4	0.59	178	0.54	178	0.60	178
5	0.55	178	0.54	178	0.61	177
6	0.57	177	0.57	178	0.56	178
7	0.58	178	0.54	177	0.52	177
8	0.60	178	0.51	177	0.54	177

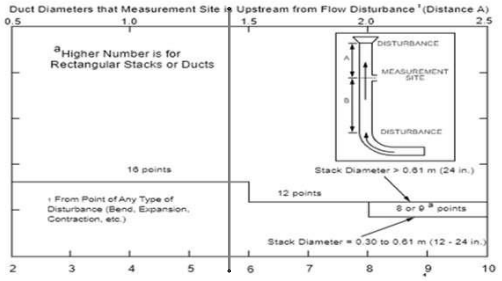
					Average
Square Root of ΔP, (in. WC)$^{1/2}$	**$(\Delta P)^{1/2}$**	0.723	0.730	0.734	0.729
Average ΔP, in. WC	**(ΔP)**	0.52	0.53	0.54	0.53
Pitot Tube Coefficient	**(Cp)**	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	**(Pb)**	30.46	30.46	30.46	30.46
Static Pressure, in. WC	**(Pg)**	-0.48	-0.45	-0.49	-0.47
Stack Pressure, in. Hg	**(Ps)**	30.42	30.43	30.42	30.43
Average Temperature, °F	**(Ts)**	176.4	177.1	177.4	177.0
Average Temperature, °R	**(Ts)**	636.1	636.8	637.0	636.6
Measured Moisture Fraction	**(BWSmsd)**	0.444	0.442	0.442	0.443
Moisture Fraction @ Saturation	**(BWSsat)**	0.457	0.464	0.467	0.463
Moisture Fraction	**(BWS)**	0.444	0.442	0.442	0.443
O2 Concentration, %	**(O2)**	13.20	13.24	13.06	13.17
CO2 Concentration, %	**(CO2)**	3.13	3.20	3.19	3.17
Molecular Weight, lb/lb-mole (dry)	**(Md)**	29.03	29.04	29.03	29.03
Molecular Weight, lb/lb-mole (wet)	**(Ms)**	24.14	24.17	24.16	24.16
Velocity, ft/sec	**(Vs)**	48.3	48.8	49.1	48.7
VFR at stack conditions, acfm	**(Qa)**	13,294	13,422	13,501	13,406
VFR at standard conditions, scfh	**(Qsw)**	672,819	678,628	682,305	677,917
VFR at standard conditions, scfm	**(Qsw)**	11,214	11,310	11,372	11,299
VFR at standard conditions, dscfm	**(Qsd)**	6,235	6,311	6,345	6,297

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unti Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date:	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	**in**
Nipple Length:	7.00	**in**
Depth of Duct:	29.00	**in**
Cross Sectional Area of Duct:	4.59	**ft²**
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	**ft**
Distance A Duct Diameters:	23.4	**(must be ≥ 0.5)**
Distance B:	13.5	**ft**
Distance B Duct Diameters:	5.6	**(must be ≥ 2)**
Minimum Number of Traverse Points:	16	
Actual Number of Traverse Points:	3	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

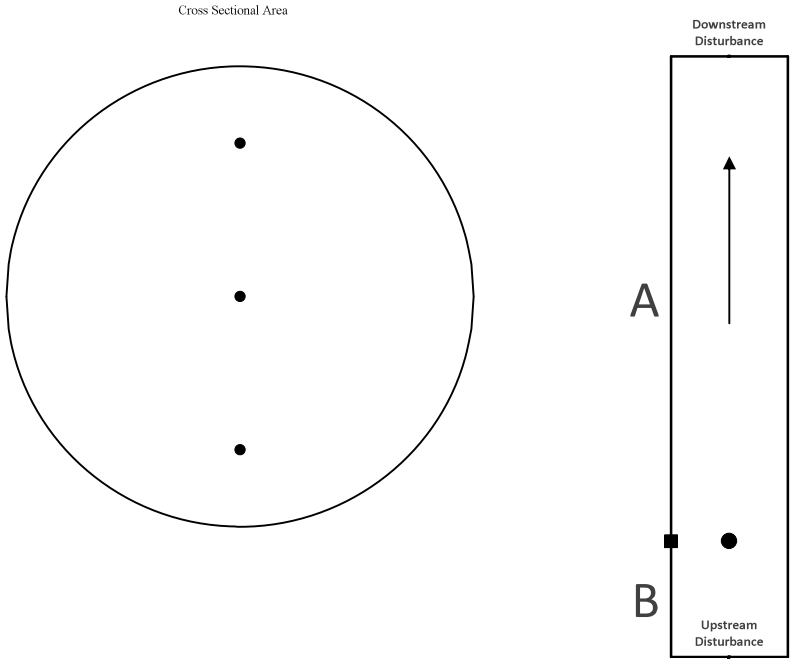
Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	4.84	11.84
2	50.0	14.50	21.50
3	83.3	24.16	31.16
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram

A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.



Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.26	3.08
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Average Zero Response (Co)	0.24	0.02
Pretest System Cal Response	10.10	9.81
Posttest System Cal Response	10.10	9.84
Average Cal Response (C_M)	10.10	9.83
Corrected Run Average (Corr)	13.20	3.13
9:10	13.46	2.95
9:11	13.66	2.75
9:12	13.34	2.77
9:13	13.13	2.98
9:14	13.70	2.72
9:15	13.11	2.92
9:16	13.41	3.01
9:17	13.39	2.88
9:18	13.33	2.91
9:19	12.86	3.11
9:20	13.58	2.83
9:21	13.71	2.67
9:22	12.94	3.14
9:23	13.04	3.23
9:24	13.54	2.92
9:25	13.17	2.91
9:26	13.11	3.07
9:27	13.40	2.93
9:28	13.23	2.87
9:29	13.28	2.97
9:30	12.74	3.15
9:31	13.00	3.24
9:32	13.55	2.90
9:33	13.89	2.64
9:34	13.33	2.94
9:35	13.43	3.07
9:36	13.43	3.05
9:37	13.65	3.07
9:38	13.28	3.13
9:39	12.98	3.54
9:40	13.29	3.31
9:41	13.01	3.64
9:42	13.10	3.53
9:43	12.76	3.54
9:44	13.11	3.51
9:45	12.67	3.43
9:46	12.19	3.68
9:47	12.61	3.60
9:48	13.24	3.12
9:49	13.73	2.71
9:50	13.53	2.80
9:51	12.98	3.19
9:52	12.80	3.23
9:53	13.65	2.74
9:54	13.86	2.61
9:55	13.79	2.60
9:56	13.81	2.67
9:57	13.77	2.73
9:58	13.85	2.86
9:59	13.48	3.05
10:00	12.71	3.50
10:01	13.43	3.36
10:02	13.28	3.26
10:03	12.38	3.78
10:04	12.85	3.65
10:05	13.83	2.98
10:06	13.98	2.74
10:07	13.30	2.97
10:08	12.74	3.27
10:09	12.11	3.76

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.32	3.17
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Average Zero Response (Co)	0.21	0.03
Pretest System Cal Response	10.10	9.84
Posttest System Cal Response	10.13	9.84
Average Cal Response (C_M)	10.12	9.84
Corrected Run Average (Corr)	13.24	3.20
10:42	12.69	3.47
10:43	13.78	2.68
10:44	13.66	2.62
10:45	13.75	2.57
10:46	13.10	3.07
10:47	13.52	2.74
10:48	13.38	2.78
10:49	13.02	3.03
10:50	12.91	3.28
10:51	13.26	3.25
10:52	13.68	3.02
10:53	13.83	2.85
10:54	13.60	2.88
10:55	13.23	3.33
10:56	13.45	3.19
10:57	13.25	3.16
10:58	13.22	3.28
10:59	13.88	3.08
11:00	13.21	3.20
11:01	13.20	3.44
11:02	13.43	3.29
11:03	12.83	3.41
11:04	12.73	3.61
11:05	12.85	3.60
11:06	13.26	3.37
11:07	13.69	3.11
11:08	13.44	3.10
11:09	13.39	3.21
11:10	13.04	3.26
11:11	12.95	3.49
11:12	12.91	3.34
11:13	13.32	3.25
11:14	12.83	3.26
11:15	13.00	3.40
11:16	13.42	3.21
11:17	13.64	3.06
11:18	13.64	2.93
11:19	13.56	2.96
11:20	13.54	3.01
11:21	13.22	3.11
11:22	13.45	3.23
11:23	13.22	3.17
11:24	13.30	3.28
11:25	12.88	3.27
11:26	13.28	3.31
11:27	13.22	3.15
11:28	14.05	2.80
11:29	13.66	2.79
11:30	13.79	3.02
11:31	13.38	3.04
11:32	13.49	3.30
11:33	13.57	3.06
11:34	13.08	3.44
11:35	13.44	3.27
11:36	13.02	3.37
11:37	13.56	3.30
11:38	13.06	3.29
11:39	12.69	3.60
11:40	13.41	3.23
11:41	13.54	3.11

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.16	3.15
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Average Zero Response (Co)	0.22	0.03
Pretest System Cal Response	10.13	9.84
Posttest System Cal Response	10.12	9.81
Average Cal Response (C_M)	10.13	9.83
Corrected Run Average (Corr)	13.06	3.19
11:57	13.24	2.94
11:58	12.96	3.17
11:59	13.51	2.85
12:00	13.07	3.00
12:01	13.43	3.13
12:02	13.15	3.06
12:03	13.55	3.05
12:04	13.64	2.82
12:05	13.53	3.01
12:06	12.69	3.36
12:07	12.85	3.57
12:08	13.00	3.45
12:09	12.44	3.56
12:10	12.67	3.72
12:11	12.83	3.56
12:12	13.24	3.26
12:13	13.12	3.08
12:14	13.17	3.10
12:15	13.37	2.92
12:16	13.30	2.90
12:17	13.01	3.07
12:18	12.88	3.21
12:19	13.43	3.04
12:20	13.60	2.73
12:21	13.35	3.03
12:22	13.23	3.04
12:23	13.02	3.33
12:24	13.43	3.03
12:25	12.54	3.45
12:26	12.79	3.63
12:27	12.54	3.44
12:28	12.82	3.53
12:29	13.21	3.10
12:30	12.76	3.50
12:31	13.11	3.21
12:32	13.04	3.18
12:33	13.14	3.10
12:34	12.97	3.04
12:35	13.14	3.05
12:36	13.33	2.95
12:37	13.49	2.83
12:38	13.59	2.79
12:39	13.45	2.80
12:40	13.72	2.88
12:41	13.64	2.86
12:42	13.58	2.98
12:43	13.07	3.26
12:44	13.05	3.59
12:45	12.84	3.48
12:46	12.54	3.60
12:47	13.55	3.18
12:48	12.87	3.29
12:49	13.38	3.18
12:50	13.09	3.09
12:51	13.50	2.99
12:52	13.36	2.87
12:53	12.84	3.09
12:54	13.22	3.10
12:55	13.38	2.89
12:56	13.18	2.95

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
9:10	191.0	1.037	0.4	45.0
9:11	191.0	1.036	0.5	45.8
9:12	191.0	1.036	0.5	44.7
9:13	191.0	1.036	0.6	45.2
9:14	191.0	1.035	0.5	46.0
9:15	191.0	1.036	0.5	45.8
9:16	191.0	1.036	0.4	45.1
9:17	191.0	1.036	0.5	45.7
9:18	191.0	1.036	0.5	45.8
9:20	190.9	1.037	0.4	44.5
9:21	191.1	1.036	0.5	45.3
9:22	191.1	1.037	0.5	44.5
9:23	191.0	1.036	0.5	44.0
9:24	191.0	1.036	0.5	44.0
9:25	191.0	1.036	0.4	44.1
9:26	191.0	1.037	0.4	45.4
9:27	191.0	1.036	0.4	45.4
9:28	191.1	1.036	0.4	44.6
9:29	191.0	1.036	0.4	45.2
9:30	190.9	1.036	0.4	44.9
9:31	190.9	1.036	0.4	45.5
9:32	191.0	1.036	0.4	46.4
9:33	190.9	1.037	0.4	44.6
9:34	190.9	1.038	0.5	43.1
9:35	191.0	1.036	0.5	43.6
9:36	191.2	1.037	0.5	44.0
9:37	191.1	1.037	0.5	43.8
9:38	191.0	1.037	0.4	43.4
9:39	191.0	1.037	0.4	42.9
9:40	191.0	1.037	0.4	43.0
9:41	191.0	1.037	0.3	42.9
9:43	191.0	1.037	0.3	43.7
9:44	191.0	1.037	0.3	43.0
9:45	191.0	1.037	0.4	45.2
9:46	191.0	1.037	0.3	43.4
9:47	191.0	1.037	0.3	44.3
9:48	191.0	1.037	0.4	45.1
9:49	190.9	1.037	0.4	44.7
9:50	191.0	1.037	0.5	44.1
9:51	191.0	1.037	0.5	43.8
9:52	191.0	1.036	0.5	44.3
9:53	191.0	1.037	0.4	45.6
9:54	191.0	1.037	0.4	45.5
9:55	191.0	1.037	0.5	45.2
9:56	191.0	1.038	0.6	44.4
9:57	191.0	1.037	0.8	43.6
9:58	191.0	1.038	0.7	42.7
9:59	191.0	1.038	0.6	42.6
10:00	191.0	1.038	0.5	43.1
10:01	191.0	1.037	0.5	43.4
10:02	191.0	1.037	0.4	43.4
10:03	191.0	1.037	0.4	42.6
10:05	191.0	1.037	0.3	44.1
10:06	191.0	1.037	0.4	45.6
10:07	191.0	1.037	0.5	43.4
10:08	191.0	1.038	0.6	43.4
10:09	190.9	1.037	0.5	43.9

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.037	0.5	44.4

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
10:42	191.0	1.040	0.5	43.3
10:43	191.0	1.040	0.4	44.8
10:44	191.0	1.039	0.5	45.1
10:45	191.0	1.040	0.6	44.5
10:46	191.0	1.040	0.7	43.6
10:47	191.0	1.040	0.7	43.8
10:48	191.0	1.040	0.6	44.6
10:49	191.0	1.040	0.6	43.9
10:50	191.0	1.040	0.5	44.1
10:51	191.0	1.039	0.4	45.4
10:52	191.0	1.039	0.4	44.9
10:53	191.0	1.040	0.5	43.9
10:54	191.0	1.040	0.5	43.9
10:55	191.0	1.039	0.5	43.4
10:56	191.0	1.039	0.5	44.4
10:57	191.0	1.040	0.3	42.9
10:58	191.0	1.040	0.4	44.0
10:59	191.0	1.040	0.5	43.1
11:00	191.0	1.040	0.4	43.1
11:01	191.0	1.040	0.4	44.1
11:03	190.9	1.040	0.4	44.0
11:04	190.9	1.040	0.5	44.7
11:05	191.0	1.040	0.3	43.5
11:06	191.0	1.040	0.3	43.8
11:07	191.0	1.039	0.3	44.9
11:08	191.0	1.040	0.3	43.8
11:09	191.0	1.040	0.4	43.5
11:10	191.0	1.039	0.4	45.0
11:11	191.0	1.039	0.4	44.6
11:12	191.0	1.039	0.4	45.4
11:13	191.0	1.040	0.4	45.7
11:14	191.0	1.040	0.3	44.5
11:15	191.0	1.039	0.3	45.7
11:16	191.0	1.039	0.3	45.6
11:17	191.0	1.039	0.3	44.4
11:18	190.9	1.040	0.4	43.2
11:19	190.9	1.039	0.4	44.4
11:20	190.9	1.040	0.5	43.0
11:21	190.9	1.040	0.4	43.1
11:22	190.9	1.039	0.5	43.1
11:23	191.0	1.040	0.4	43.3
11:25	191.1	1.039	0.4	43.1
11:26	191.1	1.039	0.4	45.0
11:27	191.0	1.039	0.3	45.4
11:28	191.0	1.039	0.4	45.2
11:29	191.0	1.039	0.4	44.6
11:30	191.0	1.039	0.5	44.8
11:31	191.0	1.040	0.7	43.0
11:32	191.0	1.039	0.5	43.5
11:33	190.9	1.039	0.5	43.9
11:34	190.9	1.039	0.4	43.8
11:35	190.9	1.039	0.4	44.5
11:36	190.9	1.039	0.4	44.7
11:37	190.9	1.038	0.4	44.8
11:38	190.9	1.040	0.3	44.5
11:39	191.0	1.039	0.4	44.5
11:40	191.0	1.039	0.4	45.6
11:41	191.0	1.039	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
11:57	190.9	1.039	0.3	43.3
11:58	190.9	1.039	0.3	43.6
11:59	190.9	1.039	0.4	43.8
12:00	190.9	1.040	0.4	43.5
12:01	190.9	1.039	0.4	43.4
12:02	191.0	1.039	0.4	42.8
12:03	191.0	1.040	0.5	42.8
12:04	191.0	1.040	0.5	43.1
12:05	191.1	1.039	0.5	44.3
12:06	191.1	1.040	0.4	42.2
12:07	191.1	1.040	0.3	41.7
12:09	191.0	1.040	0.3	43.0
12:10	190.9	1.039	0.4	44.6
12:11	190.9	1.039	0.4	44.5
12:12	191.0	1.039	0.3	44.6
12:13	191.1	1.039	0.3	43.5
12:14	191.1	1.040	0.4	43.4
12:15	191.1	1.039	0.3	43.5
12:16	191.0	1.040	0.3	44.2
12:17	191.0	1.039	0.4	43.4
12:18	191.0	1.040	0.3	43.3
12:19	191.0	1.039	0.3	45.1
12:20	190.9	1.039	0.4	44.5
12:21	190.9	1.039	0.4	44.0
12:22	190.8	1.039	0.5	44.1
12:23	190.9	1.039	0.4	43.0
12:24	191.0	1.040	0.4	42.5
12:25	191.1	1.039	0.4	43.6
12:26	191.1	1.039	0.3	45.6
12:27	191.1	1.039	0.4	44.8
12:28	191.0	1.039	0.3	44.6
12:29	191.0	1.039	0.3	44.0
12:31	191.0	1.039	0.3	45.0
12:32	191.0	1.038	0.3	44.7
12:33	191.0	1.038	0.3	46.1
12:34	191.0	1.038	0.4	45.3
12:35	191.0	1.039	0.3	44.7
12:36	191.0	1.038	0.4	45.8
12:37	191.0	1.038	0.4	45.3
12:38	191.0	1.039	0.6	44.8
12:39	190.9	1.038	0.5	44.0
12:40	190.9	1.039	0.5	44.1
12:41	190.9	1.039	0.5	43.1
12:42	190.9	1.039	0.5	44.7
12:43	191.0	1.039	0.5	43.6
12:44	191.1	1.039	0.5	44.3
12:45	191.0	1.038	0.4	45.1
12:46	191.0	1.038	0.3	45.1
12:47	191.0	1.038	0.4	45.9
12:48	191.0	1.039	0.3	44.5
12:49	191.1	1.038	0.4	44.9
12:50	191.0	1.039	0.4	44.5
12:51	191.0	1.038	0.4	46.0
12:53	191.0	1.038	0.3	45.4
12:54	191.0	1.038	0.4	44.7
12:55	191.0	1.038	0.4	45.8
12:56	190.9	1.038	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Appendix C

Alliance Technical Group, LLC
Analytical Services
214 Central Circle
Decatur, AL 35603
(256) 274-4488
www.alliancetg.com

Analytical Laboratory Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, Texas 75572

Project No. AST-2024-4204LS

Version No. LT 2022-00_24.4

Certification Statement

Alliance Technical Group, LLC (ATG) has completed the analysis as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and ATG is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Any deviations or problems are detailed in the relevant sections on the test report.

This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Validation Signature

The analytical data and all QC contained within this report was reviewed and validated by the following individual.

Rebecca Pope

Digitally signed by Rebecca Pope
Reason: I have reviewed this document
Location:
Date: 2025.03.06 12:42:30-06'00'
Foxit PDF Editor Version: 12.1.4

Rebecca Pope
Laboratory Quality Analyst

Date

Project Narrative

Analytical Method(s):	*Method 5 - Determination of Particulate Matter Emissions From Stationary Sources* *Method 202 - Dry Impinger Method for Determining Condensable Particulate Matter Emissions From Stationary Sources*
Filterable	The filter(s) were oven dried and desiccated per the method until a final weight was obtained. The liquid fractions were extracted if required, evaporated and cooled until a final weight was obtained. These fractions were summed together to provide the total Filterable Particulate Matter collected.
Condensable	The filter(s) were cut up and extracted per the method. The organic extract was added to the organic rinse, and the inorganic extract was added to the inorganic rinse. The inorganic fraction was extracted with solvent per the method. Extracts were combined with the organic rinse. The organic and inorganic fractions were evaporated and desiccated until a final weight was obtained.
MDL	The Minimum Detection Level (MDL) is 0.5 mg per fraction. If the measured result for a fraction is less than the MDL, the MDL was used in ensuing calculations.
Blank Correction	If blank correction is performed, only blank values returned higher than the MDL are used. If a blank returns a value less than the MDL, no correction is included. Method 202 Recovery Blank corrections are applied by fraction (inorganic subtracted from inorganic; organic subtracted from organic).
Custody:	The samples were received by Madilyn Golembeck on 02/24/25 in Decatur, AL. The samples were received in good condition with proper Chain-of-Custody documentation. No apparent container problems were noted upon receipt. Prior to analysis, the samples were kept secure with access limited to authorized personnel of ATG.
Number of Samples:	129
Labeling:	Acceptable
Analyst:	Evan Marth-Laboratory Analyst
Equipment:	Ohaus Balance PX224, S/N B919636400. This scale was used for analytical determinations. A&D Weighing AND EJ-1500, S/N 5A2845843. This scale was only used to measure the total mass of rinse collected. Analysis was performed on the same balance as the associated tare. Quincy Lab Inc oven, 40CG, SN G4-007640. Desiccator Number: 2 contained M5 rinse petri dishes.. Desiccator Number: 3 contained M5 filters. Desiccator Number: 4 contained organic rinse tins & inorganic rinse petri dishes. Desiccator Number: 5 contained M5 rinse petri dishes & organic rinse tins.
Lab Reagents:	Acetone Lot Number: 240513 Hexane Lot Number: 240648
QC Notes:	The samples met the minimum criteria established by the relevant method.
Reporting Notes:	The M5 samples were collected in the field using DI water in place of acetone for the rinse. The M202 DI water, hexane, and acetone reagent blanks were HELD. No. 1 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 2 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-E M5 rinse run 3 contains visibly more and darker PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-W M5 rinse run 1 contains visibly more PM than runs 2 and 3. No. 2 Smelt Tank Scrubber M5 rinse run 1 contains visbly more PM than runs 2 and 3.
Certifications:	Primary Accreditation: Louisiana Environmental Laboratory Accreditation Program (LELAP) Agency Interest (AI) No. 194891 Certificate: 05054, Expiration Date: 6/30/25 Secondary Accreditation: Texas Commission on Environmental Quality Certificate: T104704540-TX-C25-00047, Expiration Date: 2/28/26 Virginia Environmental Laboratory Accreditation Program (VELAP) VA Laboratory ID: 460299, Certificate: 13081 Expiration Date: 9/14/2025
State Registrations:	PADEP # 68-04598 NYDOH # 12146

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2294		2295		2296	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Filter ID	26987-A		26988-A		26696-A	
Filter Tare Weight, g	0.4609		0.4591		0.4504	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:00		8:01		8:02	
Filter Weight, g	0.4817		0.4711		0.4723	
Filter PM Mass, mg*	**20.8**		**12.0**		**21.9**	
Front Half Rinse						
Lab ID	2318		2319		2320	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5853		G5854		G5855	
Beaker tare, g	44.4445		46.9315		47.1823	
Field Vessel with DI Water, g	197.0		233.2		170.1	
Empty Field Vessel,g	28.6		28.2		27.4	
DI Water Mass, g	168.4		205.0		142.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:01	8:00	15:02	8:01	15:03	8:02
Weight, g	44.4531	44.4526	46.9378	46.9374	47.1868	47.1864
Rinse PM Mass, mg*	**8.4**		**6.1**		**4.3**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**29.2**		**18.1**		**26.2**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2297		2298		2299	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Filter ID	26697-A		26698-A		26699-A	
Filter Tare Weight, g	0.4586		0.4665		0.4639	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:03		8:04		8:05	
Filter Weight, g	0.4596		0.4688		0.4647	
Filter PM Mass, mg*	**1.0**		**2.3**		**0.8**	
Front Half Rinse						
Lab ID	2321		2322		2323	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5856		G5857		G5858	
Beaker tare, g	40.4982		42.8656		46.6289	
Field Vessel with DI Water, g	192.0		211.2		204.2	
Empty Field Vessel,g	28.1		28.1		28.5	
DI Water Mass, g	163.9		183.1		175.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:04	8:03	15:05	8:04	15:06	8:05
Weight, g	40.5008	40.5003	42.8667	42.8663	46.6309	46.6307
Rinse PM Mass, mg*	**2.4**		**0.9**		**1.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**3.4**		**3.2**		**2.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2300		2301		2302	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Filter ID	26974-A		26989-A		26700-A	
Filter Tare Weight, g	0.4583		0.4533		0.4701	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:06		8:07		8:08	
Filter Weight, g	0.6305		0.5645		0.5783	
Filter PM Mass, mg*	**172.2**		**111.2**		**108.2**	
Front Half Rinse						
Lab ID	2324		2325		2326	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5859		G5860		G5861	
Beaker tare, g	42.6719		40.4452		41.3230	
Field Vessel with DI Water, g	158.0		204.4		141.5	
Empty Field Vessel,g	29.1		28.5		29.0	
DI Water Mass, g	128.9		175.9		112.5	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:07	8:06	15:08	8:07	15:09	8:08
Weight, g	42.7452	42.7450	40.4567	40.4563	41.3338	41.3337
Rinse PM Mass, mg*	**73.2**		**11.3**		**10.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**245.4**		**122.5**		**118.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2303		2304		2305	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Filter ID	26704-A		26707-A		26708-A	
Filter Tare Weight, g	0.4591		0.4513		0.4611	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:09		8:10		8:11	
Filter Weight, g	0.4943		0.4947		0.5073	
Filter PM Mass, mg*	**35.2**		**43.4**		**46.2**	
Front Half Rinse						
Lab ID	2327		2328		2329	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5862		G5863		G5864	
Beaker tare, g	46.6607		33.1419		43.5493	
Field Vessel with DI Water, g	152.5		109.7		148.9	
Empty Field Vessel,g	27.3		27.8		27.0	
DI Water Mass, g	125.2		81.9		121.9	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:10	8:09	15:11	8:10	15:12	8:11
Weight, g	46.6834	46.6832	33.1496	33.1493	43.6557	43.6553
Rinse PM Mass, mg*	**22.6**		**7.6**		**106.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**57.8**		**51.0**		**152.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2306		2307		2308	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Filter ID	26705-A		26706-A		26709-A	
Filter Tare Weight, g	0.4641		0.4546		0.4555	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:12		8:13		8:14	
Filter Weight, g	0.5186		0.4899		0.4912	
Filter PM Mass, mg*	**54.5**		**35.3**		**35.7**	
Front Half Rinse						
Lab ID	2330		2331		2332	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5865		G5866		G5867	
Beaker tare, g	41.4498		46.8473		41.7306	
Field Vessel with DI Water, g	161.9		174.0		175.3	
Empty Field Vessel,g	26.9		28.3		27.2	
DI Water Mass, g	135.0		145.7		148.1	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:13	8:12	15:14	8:13	15:15	8:14
Weight, g	41.5004	41.5005	46.8552	46.8551	41.7462	41.7463
Rinse PM Mass, mg*	**50.6**		**7.9**		**15.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**105.1**		**43.2**		**51.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2309		2310		2311	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Filter ID	26702-A		26703-A		26971-A	
Filter Tare Weight, g	0.4583		0.4611		0.4626	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:15		8:16		8:17	
Filter Weight, g	0.5226		0.5186		0.5168	
Filter PM Mass, mg*	**64.3**		**57.5**		**54.2**	
Front Half Rinse						
Lab ID	2333		2334		2335	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5868		G5869		G5870	
Beaker tare, g	46.0004		38.3894		47.8755	
Field Vessel with DI Water, g	122.8		104.6		118.2	
Empty Field Vessel,g	29.4		27.7		27.9	
DI Water Mass, g	93.4		76.9		90.3	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:16	8:15	15:17	8:16	15:18	8:17
Weight, g	46.0441	46.0444	38.4051	38.4055	47.8925	47.8923
Rinse PM Mass, mg*	**43.9**		**15.9**		**16.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**108.2**		**73.4**		**71.1**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2312		2313		2314	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Filter ID	26962-A		26961-A		26970-A	
Filter Tare Weight, g	0.4713		0.4648		0.4520	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:18		8:19		8:20	
Filter Weight, g	0.5219		0.5158		0.4907	
Filter PM Mass, mg*	**50.6**		**51.0**		**38.7**	
Front Half Rinse						
Lab ID	2336		2337		2338	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5871		G5872		G5873	
Beaker tare, g	43.1226		42.5851		44.9883	
Field Vessel with DI Water, g	108.9		92.3		98.7	
Empty Field Vessel,g	28.2		27.2		28.1	
DI Water Mass, g	80.7		65.1		70.6	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:19	8:18	15:20	8:19	15:21	8:20
Weight, g	43.1258	43.1255	42.5898	42.5894	44.9947	44.9943
Rinse PM Mass, mg*	**3.1**		**4.5**		**6.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**53.7**		**55.5**		**44.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2315		2316		2317	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Filter ID	26973-A		26960-A		26972-A	
Filter Tare Weight, g	0.4544		0.4476		0.4644	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:21		8:22		8:23	
Filter Weight, g	0.4880		0.4856		0.4698	
Filter PM Mass, mg*	**33.6**		**38.0**		**5.4**	
Front Half Rinse						
Lab ID	2339		2340		2341	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5874		G5875		G5876	
Beaker tare, g	45.9829		40.9130		47.1276	
Field Vessel with DI Water, g	123.5		102.2		179.3	
Empty Field Vessel,g	29.2		28.2		27.9	
DI Water Mass, g	94.3		74.0		151.4	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:22	8:21	15:23	8:22	15:24	8:23
Weight, g	46.0011	46.0008	40.9396	40.9391	47.1458	47.1453
Rinse PM Mass, mg*	**18.1**		**26.4**		**17.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**51.7**		**64.4**		**23.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Blank Rinse		
Lab ID	2342	
Field ID	DI Water Blank	
Beaker ID	G5877	
Beaker tare, g	45.4094	
Field Vessel with DI Water, g	386.7	
Empty Field Vessel, g	178.6	
DI Water Mass, g	208.1	
Date - Desiccator	2/25/25	
Time - Desiccator	15:00	
Date of Weighing	2/26/25	2/27/25
Time of Weighing	15:25	8:24
Weight, g	45.4097	45.4097
Measured Blank Mass, mg	**0.3**	
Blank Mass, mg*	**0.3**	
Blank Mass, mg/g	**0.0014**	

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2343		2344		2345	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Organic Fraction						
Lab ID	2367		2368		2369	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	2367		2368		2369	
Beaker tare, g	4.1481		4.1697		4.1752	
Field Vessel w/ Solvent, g	301.0		277.6		261.7	
Empty Field Vessel, g	176.9		176.8		176.8	
Solvent Mass, g	124.1		100.8		84.9	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	4.1533	4.1537	4.1728	4.1731	4.1780	4.1784
Organic Condensable Mass, mg*	**5.4**		**3.3**		**3.0**	
Inorganic Fraction						
Lab ID	2391		2392		2393	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5878		G5879		G5880	
Beaker tare, g	42.8783		39.7638		46.7558	
Field Vessel w/ Water, g	677.1		575.1		654.6	
Empty Field Vessel, g	286.2		286.6		285.8	
Water Mass, g	390.9		288.5		368.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	42.8857	42.8855	39.7660	39.7657	46.7596	46.7592
Inorganic Condensable Mass, mg*	**7.3**		**2.0**		**3.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.7**		**3.3**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2346		2347		2348	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Organic Fraction						
Lab ID	2370		2371		2372	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	2370		2371		2372	
Beaker tare, g	4.1708		4.1859		4.1780	
Field Vessel w/ Solvent, g	292.3		272.5		278.4	
Empty Field Vessel, g	177.5		176.3		176.9	
Solvent Mass, g	114.8		96.2		101.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	4.1753	4.1755	4.1892	4.1891	4.1811	4.1810
Organic Condensable Mass, mg*	**4.6**		**3.2**		**3.1**	
Inorganic Fraction						
Lab ID	2394		2395		2396	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5881		G5882		G5883	
Beaker tare, g	41.1547		42.8616		31.5071	
Field Vessel w/ Water, g	640.1		606.9		636.0	
Empty Field Vessel, g	286.2		286.4		286.1	
Water Mass, g	353.9		320.5		349.9	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	41.1568	41.1563	42.8653	42.8657	31.5107	31.5106
Inorganic Condensable Mass, mg*	**1.8**		**3.9**		**3.5**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.4**		**5.1**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2349		2350		2351	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Organic Fraction						
Lab ID	2373		2374		2375	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	2373		2374		2375	
Beaker tare, g	4.2438		4.2125		4.2150	
Field Vessel w/ Solvent, g	298.4		291.4		220.1	
Empty Field Vessel, g	176.7		176.5		177.7	
Solvent Mass, g	121.7		114.9		42.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	4.2482	4.2485	4.2162	4.2165	4.2184	4.2187
Organic Condensable Mass, mg*	**4.6**		**3.8**		**3.6**	
Inorganic Fraction						
Lab ID	2397		2398		2399	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5884		G5885		G5886	
Beaker tare, g	50.4549		33.9860		42.7755	
Field Vessel w/ Water, g	1135.0		994.8		957.7	
Empty Field Vessel, g	441.2		441.6		439.7	
Water Mass, g	693.8		553.2		518.0	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	50.4661	50.4662	33.9919	33.9922	42.7833	42.7833
Inorganic Condensable Mass, mg*	**11.2**		**6.1**		**7.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**13.8**		**7.9**		**9.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2352		2353		2354	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Organic Fraction						
Lab ID	2376		2377		2378	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	2376		2377		2378	
Beaker tare, g	4.2256		4.2210		4.2251	
Field Vessel w/ Solvent, g	268.5		269.3		261.8	
Empty Field Vessel, g	178.0		178.3		177.5	
Solvent Mass, g	90.5		91.0		84.3	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	4.2289	4.2289	4.2243	4.2245	4.2278	4.2281
Organic Condensable Mass, mg*	**3.3**		**3.4**		**2.8**	
Inorganic Fraction						
Lab ID	2400		2401		2402	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5887		G5888		G5889	
Beaker tare, g	39.6069		45.8132		42.3755	
Field Vessel w/ Water, g	555.9		607.3		602.0	
Empty Field Vessel, g	286.0		286.2		286.3	
Water Mass, g	269.9		321.1		315.7	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	39.6085	39.6086	45.8175	45.8179	42.3783	42.3785
Inorganic Condensable Mass, mg*	**1.6**		**4.5**		**2.9**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**2.9**		**5.9**		**3.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2355		2356		2357	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Organic Fraction						
Lab ID	2379		2380		2381	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	2379		2380		2381	
Beaker tare, g	4.2316		4.2100		4.2438	
Field Vessel w/ Solvent, g	257.7		272.3		295.6	
Empty Field Vessel, g	177.0		177.7		177.2	
Solvent Mass, g	80.7		94.6		118.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	4.2352	4.2352	4.2142	4.2140	4.2464	4.2465
Organic Condensable Mass, mg*	**3.6**		**4.1**		**2.7**	
Inorganic Fraction						
Lab ID	2403		2404		2405	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5890		G5891		G5892	
Beaker tare, g	46.8411		33.4643		41.8922	
Field Vessel w/ Water, g	582.1		593.0		634.4	
Empty Field Vessel, g	286.0		285.9		285.9	
Water Mass, g	296.1		307.1		348.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	46.8433	46.8437	33.4670	33.4670	41.8960	41.8961
Inorganic Condensable Mass, mg*	**2.4**		**2.7**		**3.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.0**		**4.8**		**4.5**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2358		2359		2360	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Organic Fraction						
Lab ID	2382		2383		2384	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	2382		2383		2384	
Beaker tare, g	4.2097		4.2193		4.2603	
Field Vessel w/ Solvent, g	256.4		268.9		265.7	
Empty Field Vessel, g	178.7		177.1		177.3	
Solvent Mass, g	77.7		91.8		88.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	4.2135	4.2132	4.2261	4.2260	4.2634	4.2634
Organic Condensable Mass, mg*	**3.7**		**6.8**		**3.1**	
Inorganic Fraction						
Lab ID	2406		2407		2408	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5893		G5894		G5895	
Beaker tare, g	38.9202		45.5879		41.7805	
Field Vessel w/ Water, g	945.0		956.2		863.2	
Empty Field Vessel, g	440.0		441.8		441.4	
Water Mass, g	505.0		514.4		421.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	38.9267	38.9264	45.5993	45.5994	41.7863	41.7861
Inorganic Condensable Mass, mg*	**6.3**		**11.5**		**5.7**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**8.0**		**16.2**		**6.8**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2361		2362		2363	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Organic Fraction						
Lab ID	2385		2386		2387	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	2385		2386		2387	
Beaker tare, g	4.1945		4.2061		4.2093	
Field Vessel w/ Solvent, g	433.2		399.7		423.8	
Empty Field Vessel, g	285.6		285.0		285.6	
Solvent Mass, g	147.6		114.7		138.2	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	4.1982	4.1982	4.2092	4.2092	4.2125	4.2127
Organic Condensable Mass, mg*	**3.7**		**3.1**		**3.3**	
Inorganic Fraction						
Lab ID	2409		2410		2411	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5896		G5897		G5898	
Beaker tare, g	39.9904		38.9263		47.8517	
Field Vessel w/ Water, g	569.3		575.6		607.9	
Empty Field Vessel, g	285.7		286.1		285.3	
Water Mass, g	283.6		289.5		322.6	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	39.9933	39.9933	38.9268	38.9272	47.8564	47.8563
Inorganic Condensable Mass, mg*	**2.9**		**0.7**		**4.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.6**		**1.8**		**5.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2364		2365		2366	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Organic Fraction						
Lab ID	2388		2389		2390	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	2388		2389		2390	
Beaker tare, g	4.2001		4.2214		4.1849	
Field Vessel w/ Solvent, g	434.2		412.2		432.4	
Empty Field Vessel, g	285.1		284.9		284.9	
Solvent Mass, g	149.1		127.3		147.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	4.2073	4.2077	4.2241	4.2241	4.1891	4.1891
Organic Condensable Mass, mg*	**7.4**		**2.7**		**4.2**	
Inorganic Fraction						
Lab ID	2412		2413		2414	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5899		G5900		G5901	
Beaker tare, g	37.9457		41.3364		44.6145	
Field Vessel w/ Water, g	678.5		673.6		638.3	
Empty Field Vessel, g	285.8		285.7		285.8	
Water Mass, g	392.7		387.9		352.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	37.9508	37.9505	41.3381	41.3380	44.6181	44.6177
Inorganic Condensable Mass, mg*	**4.9**		**1.6**		**3.4**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.4**		**2.3**		**5.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2415		N/A	
Field ID	Field Train Blank		N/A	
Organic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2416		2418	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	2416		2418	
Beaker tare, g	4.2179		4.2326	
Field Vessel w/ Solvent, g	351.6		350.2	
Empty Field Vessel, g	177.2		176.5	
Solvent Mass, g	174.4		173.7	
Date - Desiccator	2/26/25		2/26/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	4.2204	4.2207	4.2328	4.2331
Measured Organic Mass, mg	**2.6**		**0.4**	
Organic Mass, mg*	**2.0**		**0.5**	
Inorganic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2417		2419	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	G5902		G5903	
Beaker tare, g	48.0627		39.1195	
Field Vessel w/ Water, g	321.9		329.5	
Empty Field Vessel, g	177.1		177.2	
Water Mass, g	144.8		152.3	
Date - Desiccator	3/3/25		3/3/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	48.0640	48.0641	39.1200	39.1195
Measured Inorganic Mass, mg	**1.4**		**0.2**	
Inorganic Mass, mg*	**1.4**		**0.5**	

The total results have been calculated based on MDL values for any sample fractions which were below the MDL.

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL
City, State: QUEEN CITY, TX
Source: RB01A-N, RB01B-S, SM01
Project No: AST-2024-4204

Turn Around Time: [✓] Standard [ ] Expedited ____ days
Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079
Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5 — Filter Number - 83mm Quartz	Method 5 — Filter Number - 83mm Teflon	Method 5 — Probe Nozzle Rinse - DIUF	Method 5 — Probe Nozzle Rinse - 1-bromopropane	Method 17 — Filter Number - 47mm Quartz	Method 17 — Nozzle Rinse - Acetone	Method 201A — PM 2.5 Filter Number- 47mm Quartz	Method 201A — PM 2.5 Rinse - Acetone	Method 201A — PM 10 Filter Number- 47mm Quartz	Method 201A — PM 10 Rinse - Acetone	Method 202 — CPM Filter - 83mm Tefon	Method 202 — Condensate Catch - DIUF	Method 202 — Solvent Rinse - DIUF/Hexane
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 1	5	2/11/25	11:30	RW		26987-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 2	5	2/11/25	13:55	RW		26988-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 3	5	2/11/25	17:30	RW		26696-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 1	5	2/11/25	11:40	RW		26697-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 2	5	2/11/25	13:40	RW		26698-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 3	5	2/11/25	17:10	RW		26699-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 1	5	2/11/25	11:20	RW		26974-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 2	5	2/11/25	13:45	RW		26989-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 3	5	2/11/25	17:00	RW		26700-A		✓								✓	✓	✓
M5 ~~ACETONE~~ BLANK DIUF	1	2/11/25	11:00	RW				✓										
M202 FT PROOF BLANK	2	2/11/25	11:15	RW													✓	✓
M202 FT RECOVERY BLANK	3	2/11/25	14:30	RW												✓	✓	✓
M202 ACETONE BLANK	1	2/11/25	11:00	RW														
M202 WATER BLANK	1	2/11/25	11:00	RW														
M202 HEXANE BLANK	1	2/11/25	11:00	RW														

Relinquished By _____ Date 2-14-25 Received By Madilyn Galenbeck Date 2/28/25

Relinquished By _____ Date _____ Received By _____ Date _____

Relinquished By _____ Date _____ Received By _____ Date _____

Sample Container Recieved Temperature (°F) 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL

City, State: QUEEN CITY, TX

Source: RB02A-E, RB02B-W, SM02), LK01, LK02

Project No.: AST-2024-4204

Turn Around Time: [✔] Standard [ ] Expedited ____ days

Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079

Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5: Filter Number - 83mm Quartz	Method 5: Filter Number - 83mm Teflon	Method 5: Probe Nozzle Rinse - DIUF	Method 5: Probe Nozzle Rinse - 1-bromopropane	Method 17: Filter Number - 47mm Quartz	Method 17: Nozzle Rinse - Acetone	Method 201A: PM 2.5 Filter Number - 47mm Quartz	Method 201A: PM 2.5 Rinse - Acetone	Method 201A: PM 10 Filter Number - 47mm Quartz	Method 201A: PM 10 Rinse - Acetone	Method 202: CPM Filter - 83mm Teflon	Method 202: Condensate Catch - DIUF	Method 202: Solvent Rinse - DIUF/Hexane
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 1	5	2/12/25	12:45	RW		26704-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 2	5	2/12/25	15:00	RW		26707-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 3	5	2/12/25	17:00	RW		26708-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 1	5	2/12/25	12:45	RW		26705-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 2	5	2/12/25	15:00	RW		26706-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 3	5	2/12/25	17:00	RW		26709-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 1	5	2/12/25	12:45	RW		26702-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 2	5	2/12/25	15:00	RW		26703-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 3	5	2/12/25	17:00	RW		26971-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 1	5	2/13/25	15:50	RW		26962-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 2	5	2/13/25	17:30	RW		26961-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 3	5	2/13/25	19:00	RW		26970-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 1	5	2/13/25	10:35	RW		26973-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 2	5	2/13/25	12:15	RW		26960-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 3	5	2/13/25	13:45	RW		26972-A		✔								✔	✔	✔

Relinquished By: [signature] Date: 2-14-25 Received By: madelyn Galenkeed Date: 2/24/25

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Sample Container Recieved Temperature (°F): 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-001

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	Ohaus	PA214	B919636400	Balance Room	210 g	0.0001g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000
5	0.0001	5.0000	0.0000	5	0.0001	5.0000	0.0000
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0.2	0.0001	0.2000	0.0000	0.2	0.0001	0.2000	0.0000
1	0.0001	1.0000	0.0000	1	0.0001	1.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
50	0.0003	49.9998	-0.0002	50	0.0003	49.9998	-0.0002
150	0.0003	149.9998	-0.0002	150	0.0003	149.9998	-0.0002

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	YES	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED		*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.00011g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-003

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	A&D	EJ-1500	5A2845843	LAB	1500 g	0.1g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0	0.0	0.0	0	0.0	0.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
0	0.0	0.0	0.0	0	0.0	0.0	0.0

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
100	0.1	100.0	0.0	100	0.1	100.0	0.0
200	0.1	200.0	0.0	200	0.1	200.0	0.0
500	0.1	500.0	0.0	500	0.1	500.0	0.0
1000	0.1	1000.0	0.0	1000	0.1	1000.0	0.0

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB-44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	**YES**	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED			*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.11g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26680-A	0.4978	11/14/24	MEG	S/N G4-007640	105° C	379990
26681-A	0.4918	11/14/24	MEG	S/N G4-007640	105° C	379990
26682-A	0.4955	11/14/24	MEG	S/N G4-007640	105° C	379990
26683-A	0.4954	11/14/24	MEG	S/N G4-007640	105° C	379990
26684-A	0.4894	11/14/24	MEG	S/N G4-007640	105° C	379990
26685-A	0.4901	11/14/24	MEG	S/N G4-007640	105° C	379990
26686-A	0.4930	11/14/24	MEG	S/N G4-007640	105° C	379990
26687-A	0.4940	11/14/24	MEG	S/N G4-007640	105° C	379990
26688-A	0.4948	11/14/24	MEG	S/N G4-007640	105° C	379990
26689-A	0.4879	11/14/24	MEG	S/N G4-007640	105° C	379990
26690-A	0.4676	11/27/24	MEG	S/N G4-007640	105° C	379990
26691-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26692-A	0.4628	11/27/24	MEG	S/N G4-007640	105° C	379990
26693-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26694-A	0.4669	11/27/24	MEG	S/N G4-007640	105° C	379990
26695-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26696-A	0.4504	11/27/24	MEG	S/N G4-007640	105° C	379990
26697-A	0.4586	11/27/24	MEG	S/N G4-007640	105° C	379990
26698-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26699-A	0.4639	11/27/24	MEG	S/N G4-007640	105° C	379990
26700-A	0.4701	11/27/24	MEG	S/N G4-007640	105° C	379990
26701-A	0.4645	11/27/24	MEG	S/N G4-007640	105° C	379990
26702-A	0.4583	11/27/24	MEG	S/N G4-007640	105° C	379990
26703-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26704-A	0.4591	11/27/24	MEG	S/N G4-007640	105° C	379990
26705-A	0.4641	11/27/24	MEG	S/N G4-007640	105° C	379990
26706-A	0.4546	11/27/24	MEG	S/N G4-007640	105° C	379990
26707-A	0.4513	11/27/24	MEG	S/N G4-007640	105° C	379990
26708-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26709-A	0.4555	11/27/24	MEG	S/N G4-007640	105° C	379990
26710-A	0.4571	11/27/24	MEG	S/N G4-007640	105° C	379990
26711-A	0.4452	11/27/24	MEG	S/N G4-007640	105° C	379990
26712-A	0.4487	11/27/24	MEG	S/N G4-007640	105° C	379990
26713-A	0.4460	11/27/24	MEG	S/N G4-007640	105° C	379990
26714-A	0.4481	11/27/24	MEG	S/N G4-007640	105° C	379990
26715-A	0.4502	11/27/24	MEG	S/N G4-007640	105° C	379990
26716-A	0.4512	11/27/24	MEG	S/N G4-007640	105° C	379990
26717-A	0.4510	11/27/24	MEG	S/N G4-007640	105° C	379990
26718-A	0.4406	11/27/24	MEG	S/N G4-007640	105° C	379990
26719-A	0.4459	11/27/24	MEG	S/N G4-007640	105° C	379990

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26960-A	0.4476	12/09/24	MEG	S/N G4-007640	105° C	379990
26961-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26962-A	0.4713	12/09/24	MEG	S/N G4-007640	105° C	379990
26963-A	0.4658	12/09/24	MEG	S/N G4-007640	105° C	379990
26964-A	0.4577	12/09/24	MEG	S/N G4-007640	105° C	379990
26965-A	0.4503	12/09/24	MEG	S/N G4-007640	105° C	379990
26966-A	0.4683	12/09/24	MEG	S/N G4-007640	105° C	379990
26967-A	0.4473	12/09/24	MEG	S/N G4-007640	105° C	379990
26968-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26969-A	0.4585	12/09/24	MEG	S/N G4-007640	105° C	379990
26970-A	0.4520	12/10/24	MEG	S/N G4-007640	105° C	379990
26971-A	0.4626	12/10/24	MEG	S/N G4-007640	105° C	379990
26972-A	0.4644	12/10/24	MEG	S/N G4-007640	105° C	379990
26973-A	0.4544	12/10/24	MEG	S/N G4-007640	105° C	379990
26974-A	0.4583	12/10/24	MEG	S/N G4-007640	105° C	379990
26975-A	0.4575	12/10/24	MEG	S/N G4-007640	105° C	379990
26976-A	0.4632	12/10/24	MEG	S/N G4-007640	105° C	379990
26977-A	0.4587	12/10/24	MEG	S/N G4-007640	105° C	379990
26978-A	0.4639	12/10/24	MEG	S/N G4-007640	105° C	379990
26979-A	0.4622	12/10/24	MEG	S/N G4-007640	105° C	379990
26980-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26981-A	0.4647	12/10/24	MEG	S/N G4-007640	105° C	379990
26982-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26983-A	0.4535	12/10/24	MEG	S/N G4-007640	105° C	379990
26984-A	0.4513	12/10/24	MEG	S/N G4-007640	105° C	379990
26985-A	0.4568	12/10/24	MEG	S/N G4-007640	105° C	379990
26986-A	0.4582	12/10/24	MEG	S/N G4-007640	105° C	379990
26987-A	0.4609	12/10/24	MEG	S/N G4-007640	105° C	379990
26988-A	0.4591	12/10/24	MEG	S/N G4-007640	105° C	379990
26989-A	0.4533	12/10/24	MEG	S/N G4-007640	105° C	379990
26990-A	0.4506	12/10/24	MEG	S/N G4-007640	105° C	379990
26991-A	0.4612	12/10/24	MEG	S/N G4-007640	105° C	379990
26992-A	0.4482	12/10/24	MEG	S/N G4-007640	105° C	379990
26993-A	0.4480	12/10/24	MEG	S/N G4-007640	105° C	379990
26994-A	0.4560	12/10/24	MEG	S/N G4-007640	105° C	379990
26995-A	0.4564	12/10/24	MEG	S/N G4-007640	105° C	379990
26996-A	0.4534	12/10/24	MEG	S/N G4-007640	105° C	379990
26997-A	0.4525	12/10/24	MEG	S/N G4-007640	105° C	379990
26998-A	0.4501	12/10/24	MEG	S/N G4-007640	105° C	379990
26999-A	0.4491	12/10/24	MEG	S/N G4-007640	105° C	379990

This is the last page of the report.

Appendix D

LK01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-247-1	0.247	0.248	0.247	0.247	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-203-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	P-205-3	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
14:45	70.0	16:30	68.0	18:00	73.0
15:00	70.0	16:45	68.0	18:15	73.0
15:15	70.0	17:00	69.0	18:30	74.0
15:30	70.0	17:15	69.0	18:45	74.0
15:45	71.0	17:30	69.0	19:00	75.0

LK02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-7	0.416	0.416	0.416	0.416	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-206-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	PR-208-3	150.0	150.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
9:40	70.0	11:20	73.0	12:40	73.0
9:55	70.0	11:35	73.0	12:55	73.0
10:10	70.0	11:50	73.0	13:10	74.0
10:25	70.0	12:05	74.0	13:25	74.0
10:40	70.0	12:20	73.0	13:40	74.0

RB01A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS07	0.330	0.330	0.330	0.330	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-2	365.0	365.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	68.0
10:30	73.0	12:55	70.0	16:00	68.0
10:45	73.0	13:10	70.0	16:15	67.0
11:00	74.0	13:25	69.0	16:30	67.0
11:15	74.0	13:40	69.0	16:45	66.0

RB01B

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-36	0.362	0.362	0.362	0.362	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-309-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-0	355.0	355.0	0.0%	± 1.5 % (absolute)	10'

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	66.0	12:40	72.0	15:45	75.0
10:30	66.0	12:55	72.0	16:00	74.0
10:45	67.0	13:10	72.0	16:15	74.0
11:00	67.0	13:25	72.0	16:30	75.0
11:15	68.0	13:40	71.0	16:45	75.0

RB02A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-07	0.292	0.292	0.292	0.292	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-209-2	385.0	384.0	0.1%	± 1.5 % (absolute)	9'

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

RB02B

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-7	0.295	0.295	0.295	0.295	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-202-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-210-2	395.0	395.0	0.0%	± 1.5 % (absolute)	10 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

SM01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-382-2	0.382	0.381	0.382	0.382	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-205-2	160.0	161.0	0.2%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	71.0
10:30	73.0	12:55	69.0	16:00	72.0
10:45	73.0	13:10	68.0	16:15	72.0
11:00	74.0	13:25	68.0	16:30	72.0
11:15	74.0	13:40	69.0	16:45	73.0

SM02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-344-3	0.344	0.344	0.345	0.344	0.001	≤ 0.004 in.	SS
2/12/25	SS-305-2	0.305	0.306	0.305	0.305	0.001		SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-205-2	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
2/13/25	P-203-1	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
2/13/25	P-203-1	176.0	178.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
2/13/25	Weather Station	NA	NA	NA	

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Make	Servomex	Servomex
Model	4900	4900
S/N	653218	653218
Operating Range	25	25
Cylinder ID		
Zero	NA	NA
Low	NA	NA
Mid	EB0096121	EB0096121
High	CC737073	CC737073
Cylinder Certified Values		
Zero	NA	NA
Mid	10	10
High	19.93	19.8
Cylinder Expiration Date		
Zero	NA	NA
Mid	8/18/32	8/18/32
High	9/15/32	9/15/32
Type of Sample Line	Heated Sample Line	

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	9:05	12.85	3.41
2	9:07	13.33	3.29
3	9:09	13.22	3.16
Average		13.1	3.3
Criteria Met		Single Point	Single Point

Alliance TECHNICAL GROUP

Calibration Data

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Parameter	O_2 - Outlet	CO_2 - Outlet
Expected Average Concentration	10.00	10.00
Span Between		
Low	10.00	10.00
High	50.00	50.00
Desired Span	19.93	19.80
Low Range Gas		
Low	NA	NA
High	NA	NA
Mid Range Gas		
Low	7.97	7.92
High	11.96	11.88
High Range Gas		
Low	NA	NA
High	NA	NA
Actual Concentration (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.00	10.00
High	19.93	19.80
Response Time (seconds)	35.00	35.00
Upscale Calibration Gas (C_{MA})	Mid	Mid
Instrument Response (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.10	10.04
High	19.92	19.84
Performance (% of Span or Cal. Gas Conc.)		
Zero	0.00	0.00
Low	NA	NA
Mid	0.50	0.20
High	0.05	0.20
Status		
Zero	PASS	PASS
Low	NA	NA
Mid	PASS	PASS
High	PASS	PASS

Bias/Drift Determinations

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1		
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Run 2		
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Run 3		
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 2/13/25		
Span Value	19.93	19.80
Initial Instrument Zero Cal Response	0.00	0.00
Initial Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Bias (%)		
Pretest Zero	1.30	0.00
Posttest Zero	1.05	0.20
Pretest Span	0.00	-1.16
Posttest Span	0.00	-1.01
Drift (%)		
Zero	-0.25	0.20
Mid	0.00	0.15
Run 2 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Bias (%)		
Pretest Zero	1.05	0.20
Posttest Zero	1.05	0.10
Pretest Span	0.00	-1.01
Posttest Span	0.15	-1.01
Drift (%)		
Zero	0.00	-0.10
Mid	0.15	0.00
Run 3 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81
Bias (%)		
Pretest Zero	1.05	0.10
Posttest Zero	1.15	0.15
Pretest Span	0.15	-1.01
Posttest Span	0.10	-1.16
Drift (%)		
Zero	0.10	0.05
Mid	-0.05	-0.15

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Response Times, seconds		
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**
Zero	35	35
Low	NA	NA
Mid	35	35

Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Date(s)	2/5/2025
Ethylene Cylinder ID	CC768666
Concentration (ppmv)	103.0
Instrument Outlet	MKS 20 (Serial #111455302)

CTS 1	98.03
CTS 2	98.31
CTS 3	98.14
CTS 4	98.19
CTS 5	--
CTS 6	--

CTS 7	--
CTS 8	--
CTS 9	--
CTS 10	--
CTS 11	--
CTS 12	--

AVERAGE	98.17
MAX	98.31
deviation	0.14
MIN	98.03
deviation	0.14

Greatest Deviation from average
0.14%

Agreement with Assumed Pathlength
95.31%
within 5% no correction required

CTS 1

Date	Time	File	Temperature (C	Pressure	Ethylene
2/12/25	17:51:48	24-4204_000007.LAB	191.0	1.002	98.15
2/12/25	17:52:51	24-4204_000008.LAB	191.0	1.002	97.88
2/12/25	17:53:54	24-4204_000009.LAB	191.0	1.002	98.07

CTS 2

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	7:41:32	24-4204_000785.LAB	190.9	1.020	98.26
2/13/25	7:42:35	24-4204_000786.LAB	191.0	1.020	98.36
2/13/25	7:43:38	24-4204_000787.LAB	191.0	1.020	98.31

CTS 3

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	10:32:36	24-4204_000947.LAB	191.0	1.025	97.92
2/13/25	10:33:38	24-4204_000948.LAB	191.0	1.025	98.10
2/13/25	10:34:41	24-4204_000949.LAB	191.0	1.025	98.40

CTS 4

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	13:25:54	24-4204_001111.LAB	191.0	1.026	98.21
2/13/25	13:26:57	24-4204_001112.LAB	191.0	1.026	98.22
2/13/25	13:28:00	24-4204_001113.LAB	191.1	1.025	98.14

CTS 5

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 6

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 7

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 8

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 9

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 10

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 11

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 12

Date	Time	File	Temperature (C	Pressure	Ethylene

Location	Graphic Packaging
Source	NCG Incinerator
Project No.	AST-2024-4204
Date	2/5/2025

Spike Cylinder ID	CC774584	Component
Spike Gas concentration	96.8	Methanol
Tracer Cylinder ID	CC774584	Component
Tracer Gas concentration	10.1	SF6
Instrument ID Outlet	MKS 20 (Serial #111455302)	

Direct Spike Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/12/25	18:06:28	24-4204_000021.LAB	191.0	1.030	98.62	12.006
02/12/25	18:07:30	24-4204_000022.LAB	190.9	1.030	99.29	12.015
02/12/25	18:08:33	24-4204_000023.LAB	190.9	1.030	99.83	12.021
02/12/25	18:09:36	24-4204_000024.LAB	190.9	1.030	100.33	12.027
02/12/25	18:10:39	24-4204_000025.LAB	191.0	1.031	100.46	12.029
02/12/25	18:11:42	24-4204_000026.LAB	190.9	1.031	100.82	12.037
02/12/25	18:12:45	24-4204_000027.LAB	191.0	1.031	101.13	12.049
				Average	**100.07**	**12.026**

Native Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	9:10:34	24-4204_000870.LAB	191.0	1.037	0.44	0.010
02/13/25	9:11:37	24-4204_000871.LAB	191.0	1.036	0.48	0.010
02/13/25	9:12:40	24-4204_000872.LAB	191.0	1.036	0.46	0.010
02/13/25	9:13:42	24-4204_000873.LAB	191.0	1.036	0.56	0.010
02/13/25	9:14:45	24-4204_000874.LAB	191.0	1.035	0.53	0.010
02/13/25	9:15:48	24-4204_000875.LAB	191.0	1.036	0.52	0.010
02/13/25	9:16:51	24-4204_000876.LAB	191.0	1.036	0.43	0.010
				Average	**0.49**	**0.010**

Spiked values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	8:42:17	24-4204_000843.LAB	191.0	1.036	5.14	0.757
02/13/25	8:43:20	24-4204_000844.LAB	191.1	1.035	5.25	0.766
02/13/25	8:44:23	24-4204_000845.LAB	191.1	1.036	5.17	0.757
02/13/25	8:45:26	24-4204_000846.LAB	191.0	1.035	5.38	0.764
02/13/25	8:46:28	24-4204_000847.LAB	191.0	1.034	5.72	0.758
02/13/25	8:47:31	24-4204_000848.LAB	191.0	1.036	5.58	0.763
02/13/25	8:48:34	24-4204_000849.LAB	191.0	1.035	5.50	0.751
				Average	**5.39**	**0.759**

Dilution Factor

6.2%

Calculated Spike

6.69

Spike Recovery

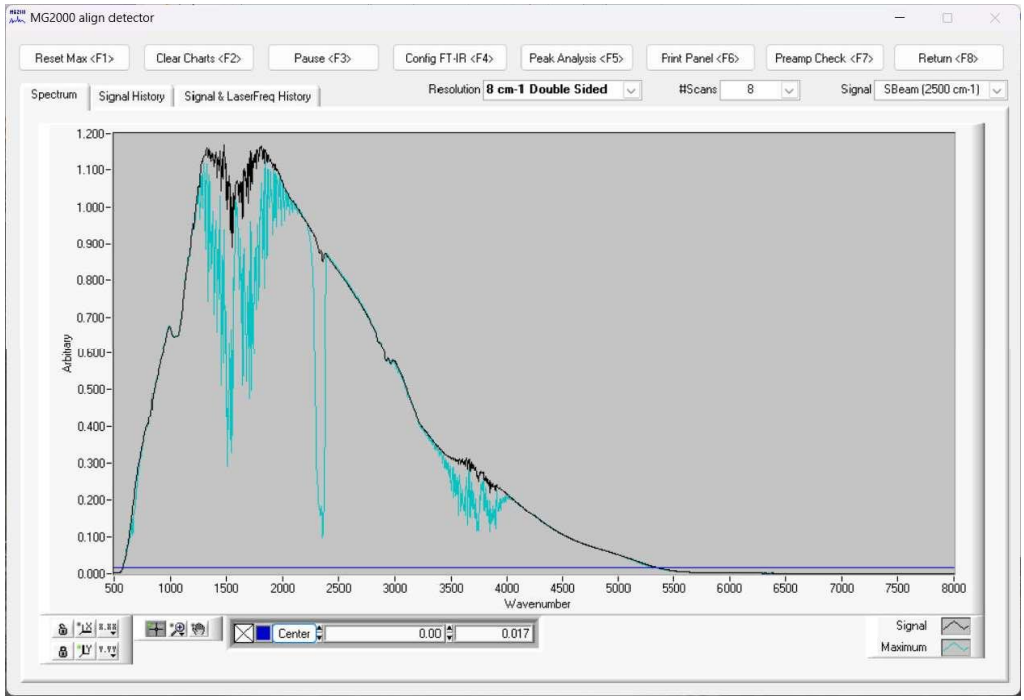
80.55%

Location	Graphic Packaging
Project No.	AST-2024-4204
Instrument	MKS 20 (Serial #111455302)

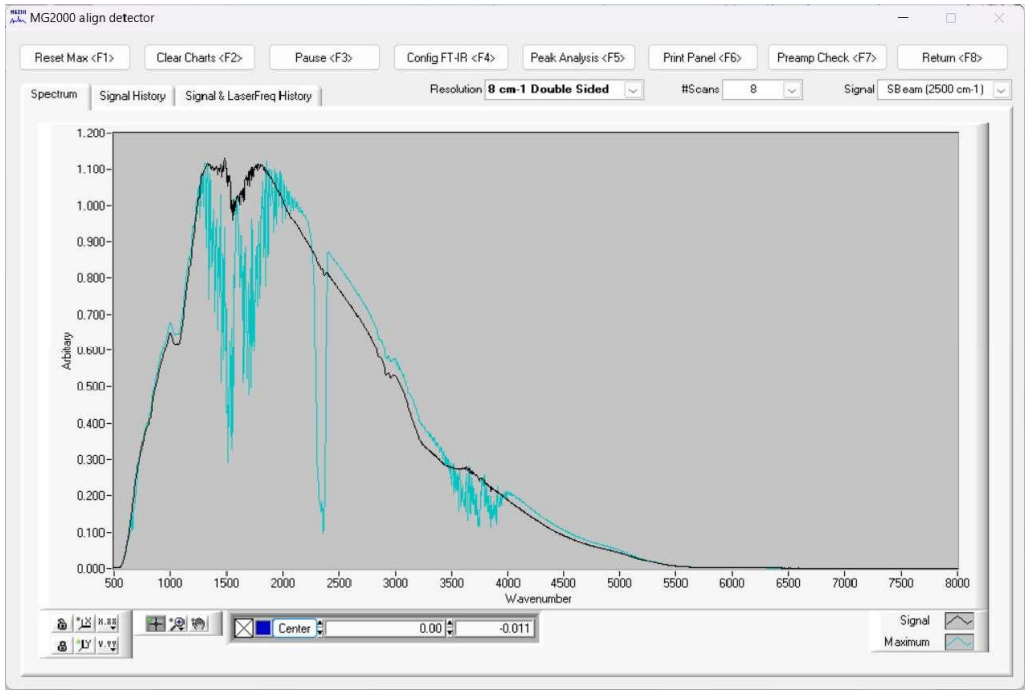
Summary of Spikes

Source	NCG Incinerator
Date	2/5/25
Time	8:42
Analyte	Methanol
Direct	100.07
Native	0.49
Spiked	5.39
Dilution	6.2%
Recovery	81%
Result	PASS

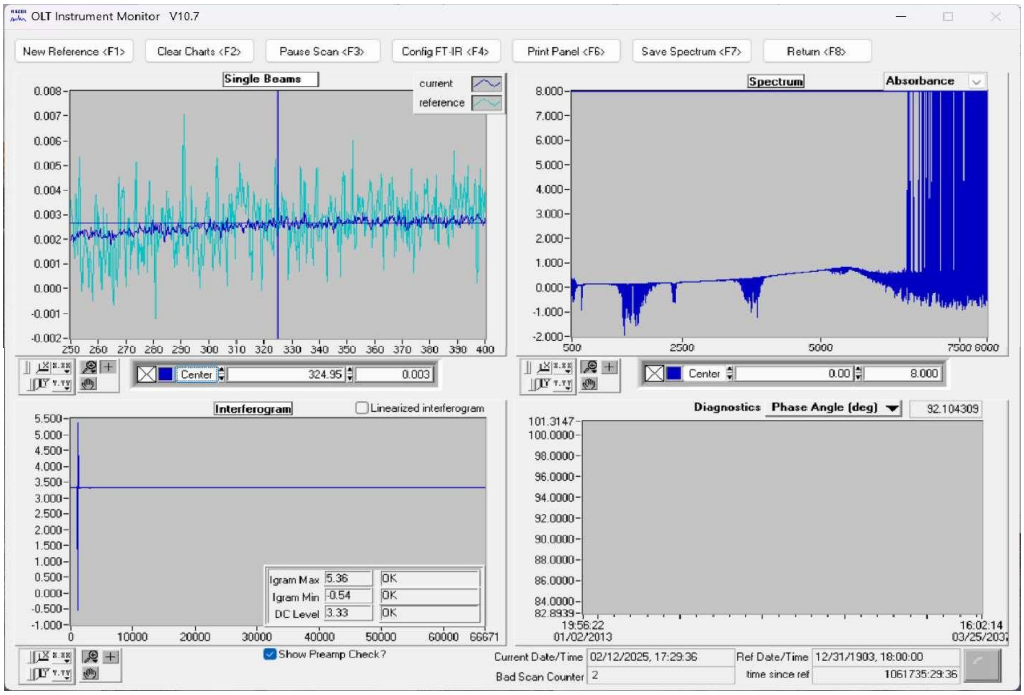
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Pre-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



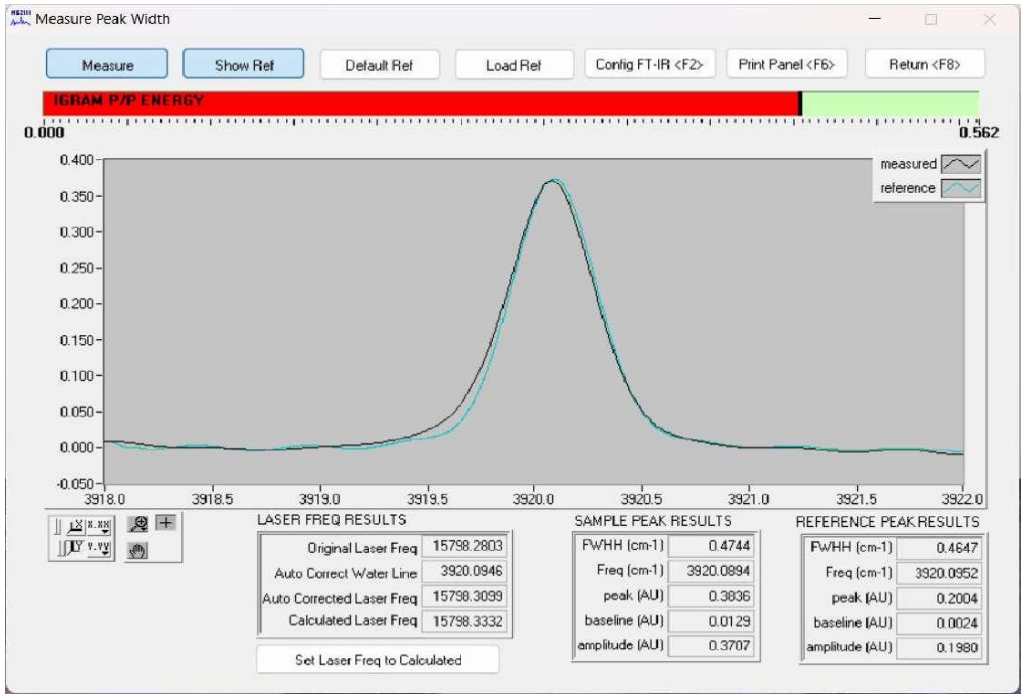
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Post-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/13/2025



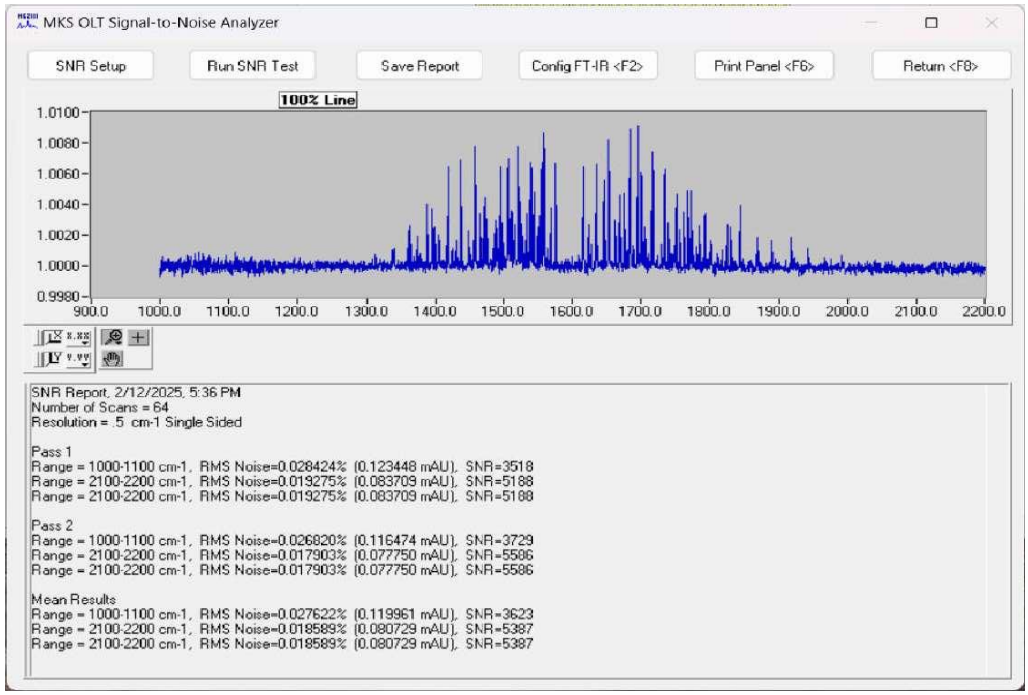
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Detector Linearity
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Peak Analysis
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Signal to Noise Ratio
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Analysis Validation Utility
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025

Analysis Validation Report

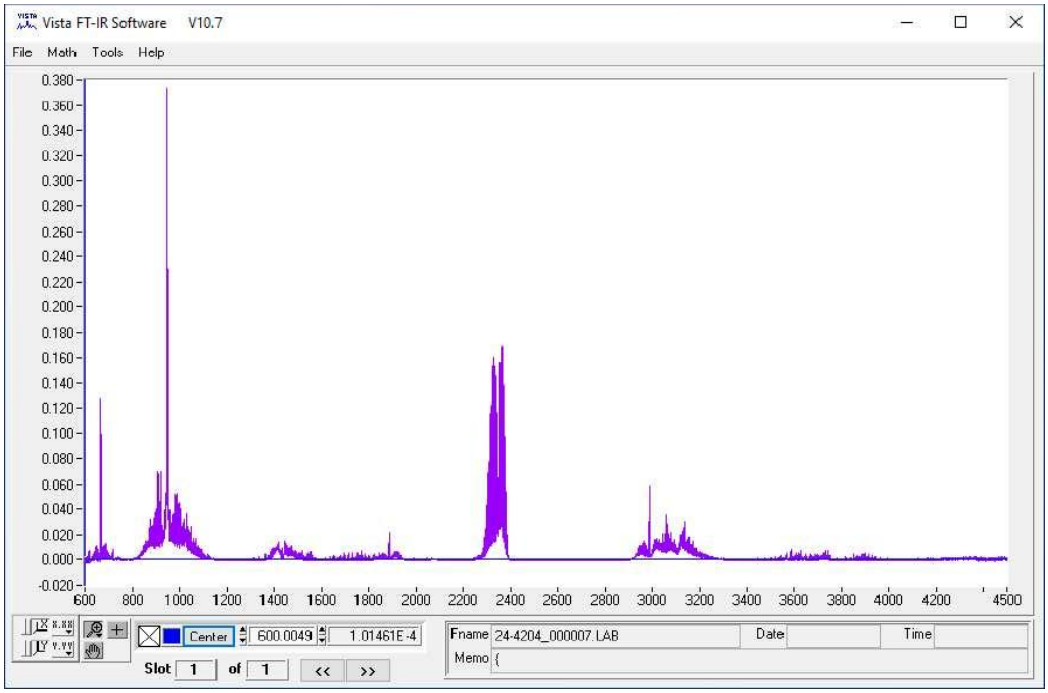
Sample Filename: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_001011.LAB

Filename for noise: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_000945.LAB
Interferences Filenames: C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2C
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #

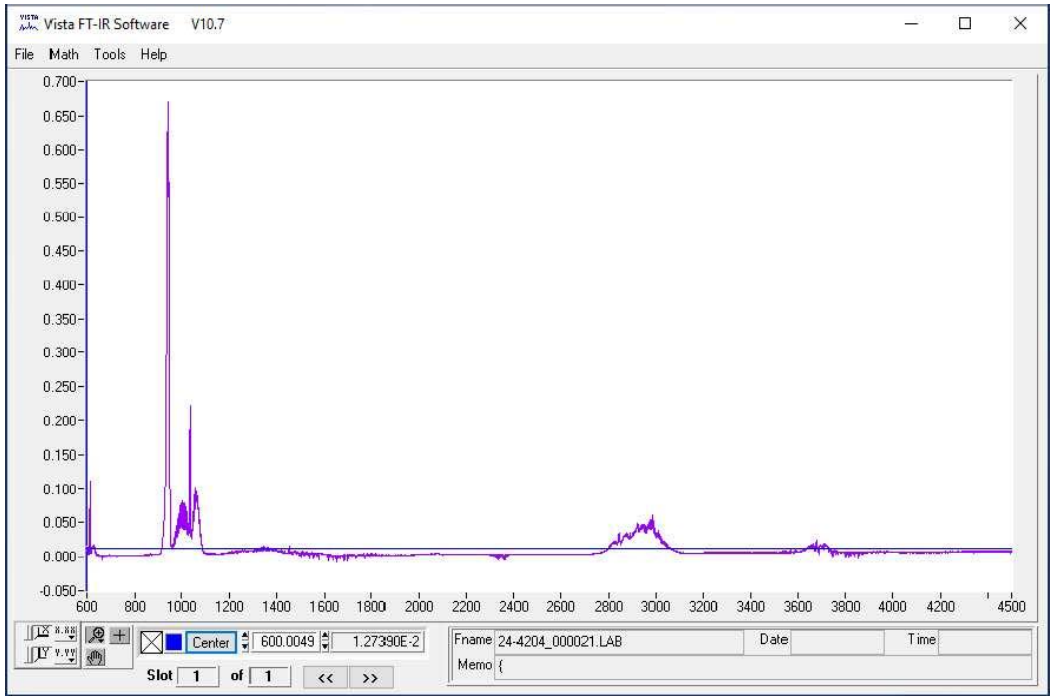
Recipe path: C:\OLT\RECIPES\Coal EGU Testing R3 - Copy DO NOT USE.MGRCP

Gas calibration Name	Conc	MDC3	**MDC2**	MDC1	MAU	FMU*R	OCU
NO (350,3000) 191C	19.47	5.27	**0.17**	0.26	0.36	7.19	7.19
NO2 (150) 191C (1OF2)	1.58	1.46	**0.16**	0.05	0.05	1.52	1.52
NO2 (2000) 191C (2OF2)	1.64	10.16	**0.5**	1.15	1.46	12.94	12.94
N2O (100,200,300) 191C	0.44	0.45	**0.05**	0.05	0.06	0.52	0.52
NH3 (300) 191C (1OF2)	0.07	1.38	**0.04**	0.15	0.25	2.34	2.34
NH3 (3000) 191C (2OF2)	6.47	33.8	**0.58**	1.37	2.59	63.76	63.76
CO (500) 191C (1OF2)	149.62	8.29	**0.1**	0.14	0.31	16.87	16.87
CO% (1) 191C (2OF2)	0.01	0	**0**	0	0	0.01	0.01
H2O% (40) 191C	44.5	0.44	-	0.01	0.02	0.75	0.75
CO2% (40) 191C	1.94	0.16	-	0.01	0.02	0.23	0.23
CH4 (250) 191C (1OF2)	-0.49	2.67	**0.05**	0.49	1.29	7.05	7.05
CH4 (3000) 191C (2OF2)	0.55	18.41	**0.6**	1.36	2.24	30.32	30.32
FORMALDEHYDE (70) 191C	-0.1	0.29	**0.09**	0.24	0.29	0.35	0.35
PROPYLENE (200,1000) 191(	-0.95	4.24	**0.25**	0.55	0.64	4.97	4.97
ETHYLENE (100,3000) 191C	-0.47	1.76	**0.11**	0.21	0.36	3.07	3.07
ACETYLENE (1000) 191C	0.43	4.8	**0.26**	0.83	1	5.78	5.78
PROPANE (100) 191C	0.15	1.01	**0.09**	0.16	0.19	1.2	1.2
ETHANE (500) 191C	-0.27	2.08	**0.16**	0.27	0.3	2.32	2.32
ACETALDEHYDE (1000) 191(	-0.85	1.18	**0.12**	0.42	0.46	1.28	1.28
HCL PPM (100) 191C	0.05	0.32	**0.08**	0.16	0.29	0.59	0.59
HF PPM (10) 191C	0.32	0.95	**0.04**	0.09	0.17	1.7	1.7
HCN (100) 191C	0.28	7.31	**0.13**	0.87	1.49	12.51	12.51
HBR (100) 180C	0.08	1.33	**0.27**	0.73	1.48	2.71	2.71
SO2 (1000) 191C	-1.9	3.46	**0.24**	0.2	0.38	6.66	6.66
SO3 (150) 191C	-749.83	0	-	0.07	0.07	0	0.07
COS (100) 150C	0.42	0.19	**0.01**	0.02	0.02	0.25	0.25
H2SO4 (50) 150C	-0.13	0.2	**0.05**	0.06	0.07	0.22	0.22
SF6 (10) 191C	-0.01	0.02	**0.01**	0.01	0.01	0.02	0.02
MEOH (10) 191C	0.37	0.56	**0.24**	0.15	0.17	0.65	0.65

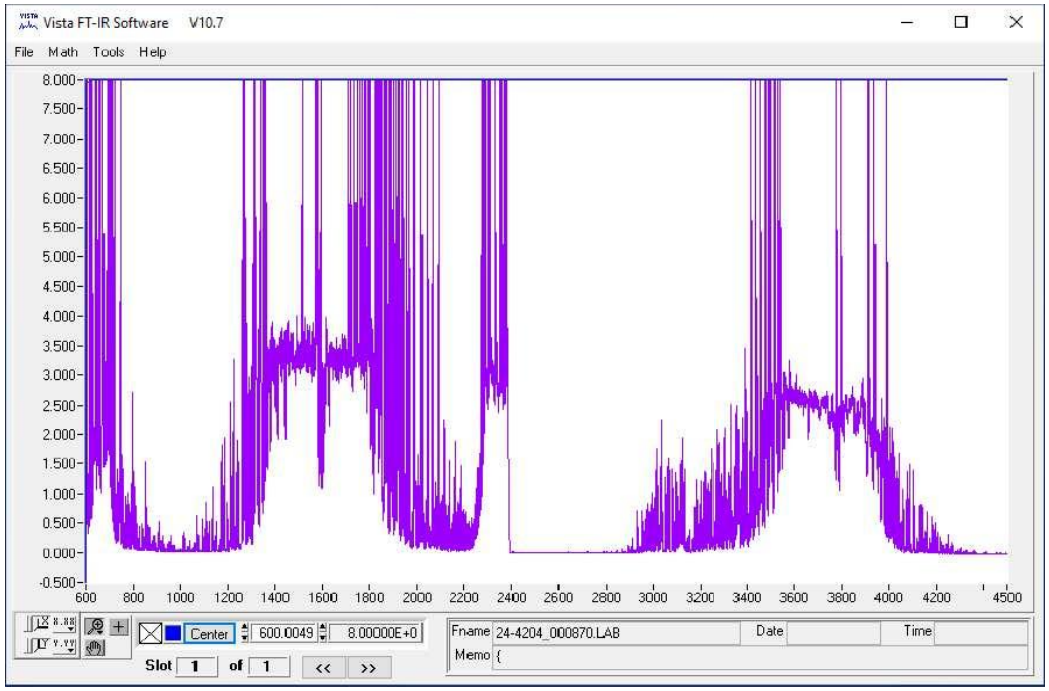
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (CTS)	24-4204_000007.LAB
Date	2/12/2025
Time	5:51:48 PM



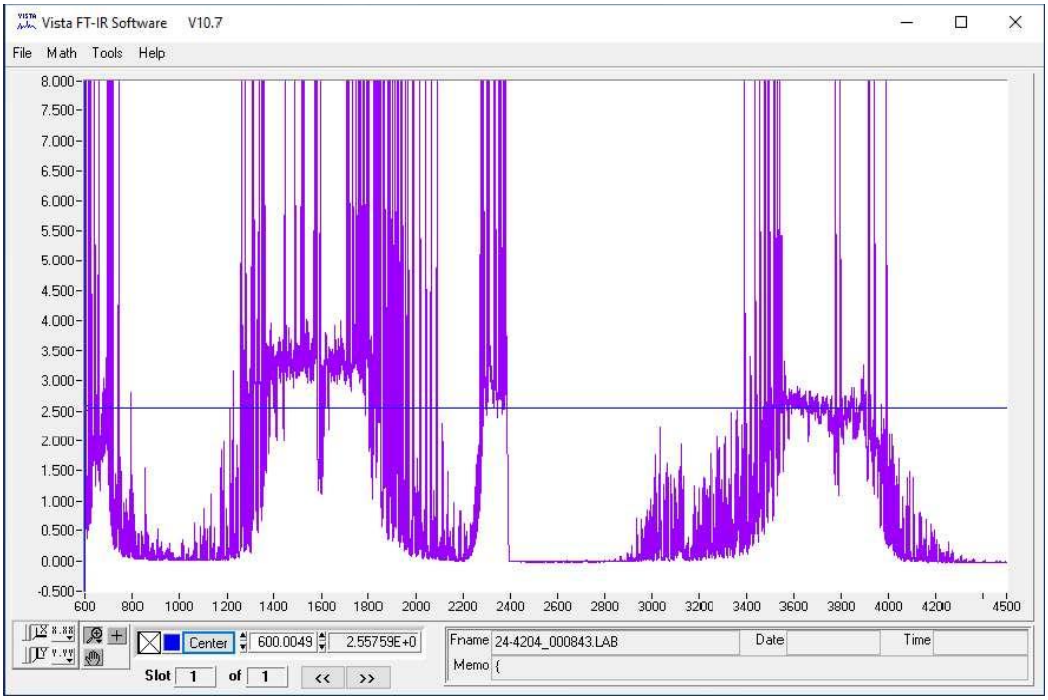
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Analyte Direct)	24-4204_000021.LAB
Date	2/12/2025
Time	6:06:28 PM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Native)	24-4204_000870.LAB
Date	2/13/2025
Time	9:10:34 AM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Spike)	24-4204_000843.LAB
Date	2/13/2025
Time	8:42:17 AM



Certifications & Calibrations

Equipment Detail - Dry Gas Meter

Console ID: MB-210-2447
Meter S/N: 20035533
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	30.17					
Final Barometric Pressure, in. Hg	(Pb_F)	30.20					
Average Barometric Pressure, in. Hg	(Pb)	30.19					
Critifcal Orifice ID	(Y)	29	29	19	19	6	6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	21.0	21.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	738.100	713.100	730.000	705.500	749.350	724.000
Final DGM Volume, ft^3	(Vm_F)	748.955	723.620	736.700	712.200	754.500	729.210
Total DGM Volume, ft^3	(Vm)	10.855	10.520	6.700	6.700	5.150	5.210
Ambient Temperature, °F	(Ta)	64	64	64	64	64	64
Initial DGM Temperature, °F	(Tm_I)	62	62	63	61	62	62
Final DGM Temperature, °F	(Tm_F)	63	63	64	63	63	62
Average DGM Temperature, °F	(Tm)	63	63	64	62	63	62
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.50	3.40	1.40	1.40	0.13	0.13
Standard Meter volume, ft^3	(Vmstd)	11.1629	10.8158	6.8420	6.8617	5.2530	5.3193
Standard Critical Orifice Volume, ft^3	(Vcr)	11.0047	11.0047	6.8537	6.8537	5.2497	5.2497
Meter Correction Factor	(Y)	0.986	1.017	1.002	0.999	0.999	0.987
Tolerance	--	0.013	0.019	0.003	0.000	0.001	0.011
Orifice Calibration Value	(ΔH @)	1.672	1.624	1.712	1.717	1.691	1.693
Tolerance	--	0.013	0.061	0.027	0.032	0.007	0.008
Orifice Cal Check	--	0.85		0.72		0.85	
Meter Correction Factor	**(Y)**	**0.998**					
Orifice Calibration Value	**(ΔH @)**	**1.685**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	99	559	0.2	1
223	683	224	684	-0.1	1
248	708	249	709	-0.1	1
273	733	274	734	-0.1	1
300	760	300	760	0.0	0
400	860	399	859	0.1	1
500	960	498	958	0.2	2
600	1,060	600	1,060	0.0	0
700	1,160	703	1,163	-0.3	3
800	1,260	802	1,262	-0.2	2
900	1,360	903	1,363	-0.2	3
1,000	1,460	1,003	1,463	-0.2	3
1,100	1,560	1,103	1,563	-0.2	3
1,200	1,660	1,203	1,663	-0.2	3

Personnel

Calibration By: EDO
Calibration Date: 2/4/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-211-2613
Meter S/N: MB-211-2613
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.89					
Final Barometric Pressure, in. Hg	(Pb_F)	29.89					
Average Barometric Pressure, in. Hg	(Pb)	29.89					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647s-6	1647s-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	22.0	22.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	59.700	71.250	83.820	91.100	98.000	103.400
Final DGM Volume, ft^3	(Vm_F)	70.545	82.082	90.650	97.904	103.241	108.615
Total DGM Volume, ft^3	(Vm)	10.845	10.832	6.830	6.804	5.241	5.215
Ambient Temperature, °F	(Ta)	55	55	55	55	55	55
Initial DGM Temperature, °F	(Tm_I)	56	56	60	60	67	67
Final DGM Temperature, °F	(Tm_F)	56	56	60	60	67	67
Average DGM Temperature, °F	(Tm)	56	56	60	60	67	67
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	4.10	4.10	1.60	1.60	0.15	0.15
Standard Meter volume, ft^3	(Vmstd)	11.2001	11.1867	6.9568	6.9303	5.2486	5.2226
Standard Critical Orifice Volume, ft^3	(Vcr)	10.9920	10.9920	6.8458	6.8458	5.2437	5.2437
Meter Correction Factor	(Y)	0.981	0.983	0.984	0.988	0.999	1.004
Tolerance	--	0.008	0.007	0.006	0.002	0.009	0.014
Orifice Calibration Value	(ΔH @)	1.971	1.971	1.956	1.956	1.921	1.921
Tolerance	--	0.022	0.022	0.007	0.007	0.029	0.029
Orifice Cal Check	--	1.95		1.56		1.99	
Meter Correction Factor	**(Y)**	**0.990**					
Orifice Calibration Value	**(ΔH @)**	**1.949**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIE
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	66	526	0.4	2
100	560	98	558	0.4	2
223	683	221	681	0.3	2
248	708	246	706	0.3	2
273	733	271	731	0.3	2
300	760	298	758	0.3	2
400	860	395	855	0.6	5
500	960	494	954	0.6	6
600	1,060	595	1,055	0.5	5
700	1,160	696	1,156	0.3	4
800	1,260	795	1,255	0.4	5
900	1,360	895	1,355	0.4	5
1,000	1,460	994	1,454	0.4	6
1,100	1,560	1,094	1,554	0.4	6
1,200	1,660	1,193	1,653	0.4	7

Personnel

Calibration By: David Larru
Calibration Date: 1/3/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-214-2990
Meter S/N: 18392990
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.66					
Final Barometric Pressure, in. Hg	(Pb_F)	29.66					
Average Barometric Pressure, in. Hg	(Pb)	29.66					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647-6	1647-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	16.0	16.0	20.0	20.0	24.0	23.0
Initial DGM Volume, ft^3	(Vm_I)	733.400	721.100	745.400	752.400	759.200	764.600
Final DGM Volume, ft^3	(Vm_F)	744.442	732.054	752.170	759.180	764.418	769.813
Total DGM Volume, ft^3	(Vm)	11.042	10.954	6.770	6.780	5.218	5.213
Ambient Temperature, °F	(Ta)	67	67	67	67	67	67
Initial DGM Temperature, °F	(Tm_I)	73	73	73	73	73	73
Final DGM Temperature, °F	(Tm_F)	73	73	73	73	73	73
Average DGM Temperature, °F	(Tm)	73	73	73	73	73	73
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.80	3.80	1.50	1.50	0.14	0.14
Standard Meter volume, ft^3	(Vmstd)	10.9475	10.8603	6.6741	6.6840	5.1268	5.1219
Standard Critical Orifice Volume, ft^3	(Vcr)	10.7824	10.7824	6.7153	6.7153	5.1437	5.1437
Meter Correction Factor	(Y)	0.985	0.993	1.006	1.005	1.003	1.004
Tolerance	--	0.014	0.007	0.007	0.005	0.004	0.005
Orifice Calibration Value	(ΔH @)	1.823	1.823	1.845	1.845	1.828	1.828
Tolerance	--	0.009	0.009	0.013	0.013	0.004	0.004
Orifice Cal Check	--	1.65		1.67		1.51	
Meter Correction Factor	**(Y)**	**0.999**					
Orifice Calibration Value	**(ΔH @)**	**1.832**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	100	560	0.0	0
223	683	228	688	-0.7	5
248	708	253	713	-0.7	5
273	733	278	738	-0.7	5
300	760	306	766	-0.8	6
400	860	407	867	-0.8	7
500	960	508	968	-0.8	8
600	1,060	612	1,072	-1.1	12
700	1,160	716	1,176	-1.4	16
800	1,260	817	1,277	-1.3	17
900	1,360	920	1,380	-1.5	20
1,000	1,460	1,021	1,481	-1.4	21
1,100	1,560	1,122	1,582	-1.4	22
1,200	1,660	1,224	1,684	-1.4	24

Personnel

Calibration By: David Larru
Calibration Date: 2/7/2025
Reviewed By: Timothy Branham

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE

Blend Type:	GAS	MOL	
Pressure:	2000	psia	**Sales Order: 1354918**
Volume:	138.9	cf	
Dew Point:	0 C		**RBTGS Part No.:** 304930

Cylinder Size: I-150
Valve Outlet: CGA 350
Cylinder No.: **CC774584**
Bar Code No.: 107623038

Lot No.: NV2411081526
Analysis Date: November 13, 2024
Date Issued: November 15, 2024
Expiration Date: November 15, 2028

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Sulfur Hexafluoride	2551-62-4	10.0	ppm	10.1	59.2	10.1	ppm	5%	M
Methanol	67-56-1	100.0	ppm	96.8	110.7	96.8	ppm	2%	B
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical Oxygen Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0096121	**Certification Date:**	08/20/2024
Product ID Number:	124300	**Expiration Date:**	08/18/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0096121.20240814-0	**Lot Number:**	EB0096121.20240814
Customer PO. NO.:		**Tracking Number:**	095703714
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.00 %**	±0.08 %	NDIR	08/20/2024
Oxygen	**10.00 %**	±0.03 %	MPA	08/19/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726207	CC726207.20230109	07/09/2031	GMIS	N2	O2	12.01 %	0.122	SRM 2659a
CC749195	CC749195.20230228	07/09/2031	GMIS	N2	O2	20.01 %	0.112	SRM 2659a
EB0006119	EB0006119.20210412	01/03/2032	GMIS	N2	CO2	19.58 %	0.375	C2190301.03
EB0016852	EB0016852.20210412	01/03/2032	GMIS	N2	CO2	11.92 %	0.235	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	07/29/2024
CO2	NDIR	Thermo	410i	1162980025	08/13/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC737073	**Certification Date:**	09/17/2024
Product ID Number:	124240	**Expiration Date:**	09/15/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC737073.20240903-0	**Lot Number:**	CC737073.20240903
Customer PO. NO.:		**Tracking Number:**	103890438
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.8 %**	±0.13 %	FTIR	09/17/2024
Oxygen	**19.93 %**	±0.03 %	MPA	09/10/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
CC769424	CC769424.20240512	08/05/2032	GMIS	N2	O2	19.98 %	0.155	SRM 2659a
EB0010822	EB0010822.20230816	07/09/2032	GMIS	N2	CO2	24.84 %	0.292	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/21/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	09/17/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

CERTIFIED GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC768666	**Certification Date:**	06/19/2024
Product ID Number:	124838	**Expiration Date:**	06/17/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC768666.20240618-0	**Lot Number:**	CC768666.20240618
Customer PO. NO.:		**Tracking Number:**	108819146
Customer:		**Previous Certification Dates:**	

This mixture is for laboratory use only, not for drug, household or other use.
This mixture is certified in Mole % to be within ±2% of the actual number reported with a confidence of 95%.
This mixture was manufactured by scale; weights traceable to N.I.S.T. Certificate #822/266926-02.
Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Ethylene	**103 PPM**	± 2% NIST	FTIR
Nitrogen	Balance		

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC734580	CC734580	07/26/2024	PS	N2	C2H4	1005 PPM	2	4034426

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
C2H4	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-G, Revised on 2017-07-02

Appendix E

LK01

#1 Lime Kiln Process Data

	Start Time:		2/13/25 16:25	2/13/25 15:05	2/13/25 13:20	
	End Time:		2/13/25 17:46	2/13/25 16:10	2/13/25 14:26	
Run #			3	2	1	Avgs
Tag						
FIC0262G.pv	Mud Flow	gpm	161.25	160.4	160.0	160.5
FYC0262G.pv	Lime Production	tons/day	160.06	160.1	160.0	160.0
FIC0275G.pv	Natural Gas Flow	cfm	832.71	835.0	822.8	830.2
AT0267G.pv	Kiln O2	%	1.96	2.0	2.0	2.0
AM0273BG.pv	Hot End Temp (oil)	°F	1313.76	1326.4	1247.3	1295.8
TT0273G.pv	Hot End Temp (gas)	°F	NA	NA	NA	
TT0269G.pv	Wet End Temp	°F	439.63	438.1	452.9	443.5
FT0296G.pv	Scrubber Recirc Flow	gpm	404.15	403.7	403.6	403.8
DPT0297G.pv	Scrubber delta P	in. H2O	17.16	17.2	17.3	17.2
DIC0260G.pv	Precoat Filter Solids	%	31.86	32.0	32.0	31.9
	Scrubber solids	%	NA	NA	NA	
CAUS-#1kiln.CARE	Carbonate Test	% CaCO3	4.40	4.4	13.0	7.3
H_LK01_TRS.avg	TRS/O2	ppm	8.27	8.2	5.9	7.5
I_LK01_o2.avg.filt	Excess stack O2	%	6.72	6.8	6.8	6.7

LK02

#2 Lime Kiln Process Data

		Start Time:	2/13/2025 11:15	2/13/2025 9:55	2/13/2025 8:15	
		End Time:	2/13/2025 12:20	2/13/2025 11:00	2/13/2025 9:20	
Run #		Units	3	2	1	AVG
Tag						
FIC0035G.pv	Mud Flow	gpm	287.16	287.09	287.02	287.2
FYC0035G.pv	Lime Production	tons/day	310.00	309.98	309.82	310.0
FIC0057G.pv	Natural Gas Flow	cfm	1241.62	1265.10	1175.79	1241.6
FIC3102G.pv	Fuel Oil Flow	gpm	0.00	0.00	0.00	0.0
AT0045G.pv	Excess O2	%	4.00	3.91	5.00	4.0
AM0047BG.pv	Hot End Temp (oil)	°F	1357.95	1226.80	1279.54	1357.9
TT0047G.pv	Hot End Temp (gas)	°F	1357.49	1228.54	1280.14	1357.5
TT0044G.pv	Wet End Temperature	°F	620.79	614.41	599.04	620.8
FT0066G.pv	Scrubber Recirc Flow	gpm	742.60	744.03	743.38	742.6
DPT0065G.pv	Scrubber delta P	in. H2O	32.29	32.57	32.73	32.3
DIC0036G.pv	Precoat Filter Solids	%	34.01	34.01	34.00	34.0
CAUS-#2kiln.CARB	Carbonate Test	% CaCO3	2.20	13.00	12.31	2.2
h_lk02_trs.avg	TRS/O2	ppm	0.30	0.40	0.40	0.3
i_lk02_o2.avg.filt	O2	%	8.12	8.13	9.13	8.1

RB01

#1 Recovery Boiler Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40 AM	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46 AM	
	Run	3	2	1	
Tag					Averages
FT0170E.pv	Steam load (kpph)	354.13	354.04	356.26	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.68	212.46	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.93	201.70	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.77	119.98	120.7
AIC0066E.pv	Excess O2	2.99	3.03	2.92	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.19	0.20	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.78	79.71	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.08	83.90	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.78	211.15	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	
TIC786E.PV	Bl. Liq. Nozzle temp. (F)	[-11059] No Good Data For Calculation	] No Good Data For Cal	] No Good Data For Cal	#DIV/0!
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.69	49.70	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
H_RB1N_TRS.AVG	TRS/O2 -- North (ppm)	1.18	1.46	1.44	1.4
H_RB1S_TRS.AVG	TRS/O2 -- South (ppm)	0.62	0.63	0.07	0.4
H_RB1N_SO2.AVG	SO2/O2 -- North (ppm)	0.05	19.56	3.11	7.6
H_RB1S_SO2.AVG	SO2/O2 -- South (ppm)	-0.17	24.73	4.34	9.6
I_RB1N_O2.FILT	O2 -- North %	5.88	5.92	5.76	5.9
I_RB1S_O2.FILT	O2 -- South %	7.20	7.27	6.75	7.1
AT0421BE.PV	Opacity -- North %	4.85	5.31	4.52	4.9
AT0421CE.PV	Opacity -- South %	4.01	4.21	4.10	4.1

RB02

#2 Recovery Boiler West Stack -- Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.9	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.1	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.7	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.1	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.2	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.2	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.6	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.5	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.2	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.4	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.2	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.0	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.0	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.5	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.1	90.3
H_RB2E_TRS.AVG	TRS/O2 -- East (ppm)	0.66	0.76	0.6	0.7
H_RB2W_TRS.AVG	TRS/O2 -- West (ppm)	0.32	0.26	#VALUE!	#VALUE!
H_RB2E_SO2.AVG	SO2/O2 -- East (ppm)	0.00	0.10	0.2	0.1
H_RB2W_SO2.AVG	SO2/O2 -- West (ppm)	0.00	0.00	0.1	0.0
I_RB2E_O2.FILT	O2 -- East %	4.25	3.90	4.4	4.2
I_RB2W_O2.FILT	O2 -- West %	4.98	4.79	5.3	5.0
AT2083E.PV	Opacity -- East %	9.71	9.61	10.0	9.8
AT2082E.PV	Opacity -- West %	10.90	10.75	11.6	11.1

SM01

#1 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46	
	Run #	3	2	1	**Averages**
Tag					
FT0170E.pv	Steam load (kpph)	354.13	354.0	356.3	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.7	212.5	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.9	201.7	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.8	120.0	120.7
AIC0066E.pv	Excess O2	2.99	3.0	2.9	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.2	0.2	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.8	79.7	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.1	83.9	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.8	211.2	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	Tag not found
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.7	49.7	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.0	0.0	0.0
Ft1024e.pv	Weak Wash flow to fan (gpm)	47.99	48.14	48.32	48.1
FT1030E.pv	Weak Wash flow to scrubber (gpm)	87.37	87.17	87.88	87.5
TIC786E.PV	Precip. Ash Tank Temp. (F)	59] No Good Data For Calcu	o Good Data For C	No Good Data For C	#DIV/0!
IT3025e.pv	Scrubber Fan Amps	83.46	83.5	81.8	82.9

SM02

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.91	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.12	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.72	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.08	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.21	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.19	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.60	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.49	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.22	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.35	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.20	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.01	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.54	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.09	90.3
TT2268E.PV	Precip. Ash Tank Temp. (F)	228.03	228.01	227.36	227.8
IT3028e.pv	Scrubber fan amps	43.19	43.19548758	43.70370315	43.4

NCG01

GRAPHIC PACKAGING INTERNATIONAL - TEXARKANA MILL
INCINERATOR EXHAUST STACK (NCG01)
PROCESS DATA

	Start Time:	2/13/25 11:57	2/13/25 10:42	2/13/25 9:10	
	End Time:	2/13/25 12:57	2/13/25 11:42	2/13/25 10:10	
					Avg
PI Tag No.	**Parameter Description**	**Run 3**	**Run 2**	**Run 1**	
TIC3076H.PV	Incinerator chamber temperature, F	1448.68	1449.0	1446.9	1448.20
AIC3112H.PV	Incinerator SO2 scrubber pH	9.82	9.8	9.6	9.74
FT3104H.PV	Incinerator SO2 scrubber recirc flow, gpm	405.99	405.9	412.0	407.97
	Hardwood blow rate	48	48	48	48.00
	Pine blow rate	67	67	67	67.00
FIC3387C.pv	A-line brown stock flow, gpm	2898.79	2900.7	2697.0	2832.17
FQC3377C.pv	B-line brown stock flow, gpm	4101.42	4036.0	4014.9	4050.79

Notes:
This testing for methanol at the incinerator stack was conducted due to the 40 CFR 63 requirement to retest certain MACT I sources.
The port tested was on west side of stack, approximately 20 feet above the 10th floor of #2 Power Boiler.
Pine and hardwood digesters were blown during the testing.
Several periods of digester double blows occurred during the testing.

Appendix F

Data Log

DAQ #	1.00	2.00
DasyLab #	0.00	1.00
Time	O2	CO2
2/13/2025 7:30	0.03	0.00
2/13/2025 7:31	0.00	0.00
2/13/2025 7:32	0.00	0.00
2/13/2025 7:33	0.00	0.00
2/13/2025 7:34	0.00	0.00
2/13/2025 7:35	7.79	7.03
2/13/2025 7:36	19.92	19.84
2/13/2025 7:37	16.14	16.33
2/13/2025 7:38	10.10	10.04
2/13/2025 7:39	6.34	6.47
2/13/2025 7:40	0.00	0.02
2/13/2025 7:41	0.00	0.01
2/13/2025 7:42	0.00	0.01
2/13/2025 7:43	0.00	0.00
2/13/2025 7:44	0.00	0.00
2/13/2025 7:45	0.00	0.01
2/13/2025 7:46	0.00	0.02
2/13/2025 7:47	2.36	0.04
2/13/2025 7:48	20.59	0.06
2/13/2025 7:49	20.77	0.06
2/13/2025 7:50	6.39	0.06
2/13/2025 7:51	0.36	0.01
2/13/2025 7:52	0.26	0.00
2/13/2025 7:53	5.48	4.91
2/13/2025 7:54	10.10	9.76
2/13/2025 7:55	10.10	9.79
2/13/2025 7:56	10.10	9.81
2/13/2025 7:57	12.21	7.97
2/13/2025 7:58	20.78	0.17
2/13/2025 7:59	20.85	0.08
2/13/2025 8:00	20.86	0.07
2/13/2025 8:01	20.87	0.06
2/13/2025 8:02	20.87	0.06
2/13/2025 8:03	20.87	0.05
2/13/2025 8:04	20.88	0.05
2/13/2025 8:05	20.88	0.05
2/13/2025 8:06	20.88	0.05
2/13/2025 8:07	20.09	0.44
2/13/2025 8:08	12.18	4.21
2/13/2025 8:09	12.22	4.17
2/13/2025 8:10	11.85	4.24
2/13/2025 8:11	11.14	4.55
2/13/2025 8:12	12.16	4.06
2/13/2025 8:13	12.03	3.97
2/13/2025 8:14	12.56	3.94
2/13/2025 8:15	12.66	3.69
2/13/2025 8:16	12.26	3.79
2/13/2025 8:17	11.42	4.21

Data Log

Time	O2	CO2
2/13/2025 8:18	10.55	4.51
2/13/2025 8:19	10.93	4.39
2/13/2025 8:20	12.03	3.71
2/13/2025 8:21	11.74	3.76
2/13/2025 8:22	12.08	3.69
2/13/2025 8:23	12.74	3.29
2/13/2025 8:24	12.54	3.32
2/13/2025 8:25	12.26	3.46
2/13/2025 8:26	11.69	3.75
2/13/2025 8:27	11.75	3.80
2/13/2025 8:28	10.96	4.10
2/13/2025 8:29	11.05	4.13
2/13/2025 8:30	11.35	4.42
2/13/2025 8:31	11.26	3.12
2/13/2025 8:32	10.39	3.27
2/13/2025 8:33	9.55	3.76
2/13/2025 8:34	10.03	3.58
2/13/2025 8:35	10.35	3.35
2/13/2025 8:36	10.20	3.38
2/13/2025 8:37	9.75	3.69
2/13/2025 8:38	9.98	3.69
2/13/2025 8:39	9.60	3.63
2/13/2025 8:40	9.61	3.74
2/13/2025 8:41	9.76	3.66
2/13/2025 8:42	10.02	3.56
2/13/2025 8:43	10.22	3.43
2/13/2025 8:44	10.06	3.31
2/13/2025 8:45	10.29	3.33
2/13/2025 8:46	10.14	3.24
2/13/2025 8:47	9.99	3.31
2/13/2025 8:48	9.83	3.38
2/13/2025 8:49	10.33	3.61
2/13/2025 8:50	11.03	3.86
2/13/2025 8:51	11.51	3.86
2/13/2025 8:52	11.72	3.74
2/13/2025 8:53	11.51	3.87
2/13/2025 8:54	11.71	3.81
2/13/2025 8:55	11.61	3.85
2/13/2025 8:56	11.79	3.89
2/13/2025 8:57	11.57	3.90
2/13/2025 8:58	11.66	3.99
2/13/2025 8:59	12.02	4.04
2/13/2025 9:00	12.52	3.89
2/13/2025 9:01	12.95	3.61
2/13/2025 9:02	12.98	3.57
2/13/2025 9:03	13.49	3.13
2/13/2025 9:04	13.06	3.16
2/13/2025 9:05	12.85	3.41
2/13/2025 9:06	12.94	3.42
2/13/2025 9:07	13.33	3.29
2/13/2025 9:08	13.16	3.17

Data Log

Time	O2	CO2
2/13/2025 9:09	13.22	3.16
2/13/2025 9:10	13.46	2.95
2/13/2025 9:11	13.66	2.75
2/13/2025 9:12	13.34	2.77
2/13/2025 9:13	13.13	2.98
2/13/2025 9:14	13.70	2.72
2/13/2025 9:15	13.11	2.92
2/13/2025 9:16	13.41	3.01
2/13/2025 9:17	13.39	2.88
2/13/2025 9:18	13.33	2.91
2/13/2025 9:19	12.86	3.11
2/13/2025 9:20	13.58	2.83
2/13/2025 9:21	13.71	2.67
2/13/2025 9:22	12.94	3.14
2/13/2025 9:23	13.04	3.23
2/13/2025 9:24	13.54	2.92
2/13/2025 9:25	13.17	2.91
2/13/2025 9:26	13.11	3.07
2/13/2025 9:27	13.40	2.93
2/13/2025 9:28	13.23	2.87
2/13/2025 9:29	13.28	2.97
2/13/2025 9:30	12.74	3.15
2/13/2025 9:31	13.00	3.24
2/13/2025 9:32	13.55	2.90
2/13/2025 9:33	13.89	2.64
2/13/2025 9:34	13.33	2.94
2/13/2025 9:35	13.43	3.07
2/13/2025 9:36	13.43	3.05
2/13/2025 9:37	13.65	3.07
2/13/2025 9:38	13.28	3.13
2/13/2025 9:39	12.98	3.54
2/13/2025 9:40	13.29	3.31
2/13/2025 9:41	13.01	3.64
2/13/2025 9:42	13.10	3.53
2/13/2025 9:43	12.76	3.54
2/13/2025 9:44	13.11	3.51
2/13/2025 9:45	12.67	3.43
2/13/2025 9:46	12.19	3.68
2/13/2025 9:47	12.61	3.60
2/13/2025 9:48	13.24	3.12
2/13/2025 9:49	13.73	2.71
2/13/2025 9:50	13.53	2.80
2/13/2025 9:51	12.98	3.19
2/13/2025 9:52	12.80	3.23
2/13/2025 9:53	13.65	2.74
2/13/2025 9:54	13.86	2.61
2/13/2025 9:55	13.79	2.60
2/13/2025 9:56	13.81	2.67
2/13/2025 9:57	13.77	2.73
2/13/2025 9:58	13.85	2.86
2/13/2025 9:59	13.48	3.05

Data Log

Time	O2	CO2
2/13/2025 10:00	12.71	3.50
2/13/2025 10:01	13.43	3.36
2/13/2025 10:02	13.28	3.26
2/13/2025 10:03	12.38	3.78
2/13/2025 10:04	12.85	3.65
2/13/2025 10:05	13.83	2.98
2/13/2025 10:06	13.98	2.74
2/13/2025 10:07	13.30	2.97
2/13/2025 10:08	12.74	3.27
2/13/2025 10:09	12.11	3.76
2/13/2025 10:10	12.28	3.74
2/13/2025 10:11	13.04	3.36
2/13/2025 10:12	13.47	3.04
2/13/2025 10:13	13.10	3.09
2/13/2025 10:14	13.29	3.22
2/13/2025 10:15	4.55	1.05
2/13/2025 10:16	0.21	0.04
2/13/2025 10:17	0.31	0.14
2/13/2025 10:18	9.35	8.93
2/13/2025 10:19	10.09	9.84
2/13/2025 10:20	10.10	9.84
2/13/2025 10:21	7.54	2.79
2/13/2025 10:22	0.02	0.02
2/13/2025 10:23	0.00	0.02
2/13/2025 10:24	0.00	0.02
2/13/2025 10:25	0.00	0.02
2/13/2025 10:26	0.00	0.02
2/13/2025 10:27	0.00	0.02
2/13/2025 10:28	0.00	0.02
2/13/2025 10:29	0.00	0.02
2/13/2025 10:30	0.05	0.28
2/13/2025 10:31	0.01	0.16
2/13/2025 10:32	0.00	0.03
2/13/2025 10:33	0.00	0.02
2/13/2025 10:34	0.00	0.02
2/13/2025 10:35	0.00	0.02
2/13/2025 10:36	3.68	0.84
2/13/2025 10:37	13.44	3.26
2/13/2025 10:38	13.62	2.92
2/13/2025 10:39	12.79	3.36
2/13/2025 10:40	13.76	2.89
2/13/2025 10:41	13.23	2.98
2/13/2025 10:42	12.69	3.47
2/13/2025 10:43	13.78	2.68
2/13/2025 10:44	13.66	2.62
2/13/2025 10:45	13.75	2.57
2/13/2025 10:46	13.10	3.07
2/13/2025 10:47	13.52	2.74
2/13/2025 10:48	13.38	2.78
2/13/2025 10:49	13.02	3.03
2/13/2025 10:50	12.91	3.28

Data Log

Time	O2	CO2
2/13/2025 10:51	13.26	3.25
2/13/2025 10:52	13.68	3.02
2/13/2025 10:53	13.83	2.85
2/13/2025 10:54	13.60	2.88
2/13/2025 10:55	13.23	3.33
2/13/2025 10:56	13.45	3.19
2/13/2025 10:57	13.25	3.16
2/13/2025 10:58	13.22	3.28
2/13/2025 10:59	13.88	3.08
2/13/2025 11:00	13.21	3.20
2/13/2025 11:01	13.20	3.44
2/13/2025 11:02	13.43	3.29
2/13/2025 11:03	12.83	3.41
2/13/2025 11:04	12.73	3.61
2/13/2025 11:05	12.85	3.60
2/13/2025 11:06	13.26	3.37
2/13/2025 11:07	13.69	3.11
2/13/2025 11:08	13.44	3.10
2/13/2025 11:09	13.39	3.21
2/13/2025 11:10	13.04	3.26
2/13/2025 11:11	12.95	3.49
2/13/2025 11:12	12.91	3.34
2/13/2025 11:13	13.32	3.25
2/13/2025 11:14	12.83	3.26
2/13/2025 11:15	13.00	3.40
2/13/2025 11:16	13.42	3.21
2/13/2025 11:17	13.64	3.06
2/13/2025 11:18	13.64	2.93
2/13/2025 11:19	13.56	2.96
2/13/2025 11:20	13.54	3.01
2/13/2025 11:21	13.22	3.11
2/13/2025 11:22	13.45	3.23
2/13/2025 11:23	13.22	3.17
2/13/2025 11:24	13.30	3.28
2/13/2025 11:25	12.88	3.27
2/13/2025 11:26	13.28	3.31
2/13/2025 11:27	13.22	3.15
2/13/2025 11:28	14.05	2.80
2/13/2025 11:29	13.66	2.79
2/13/2025 11:30	13.79	3.02
2/13/2025 11:31	13.38	3.04
2/13/2025 11:32	13.49	3.30
2/13/2025 11:33	13.57	3.06
2/13/2025 11:34	13.08	3.44
2/13/2025 11:35	13.44	3.27
2/13/2025 11:36	13.02	3.37
2/13/2025 11:37	13.56	3.30
2/13/2025 11:38	13.06	3.29
2/13/2025 11:39	12.69	3.60
2/13/2025 11:40	13.41	3.23
2/13/2025 11:41	13.54	3.11

Data Log

Time	O2	CO2
2/13/2025 11:42	13.67	3.01
2/13/2025 11:43	13.60	2.99
2/13/2025 11:44	3.47	1.05
2/13/2025 11:45	0.21	0.02
2/13/2025 11:46	1.56	1.13
2/13/2025 11:47	10.12	9.83
2/13/2025 11:48	10.13	9.84
2/13/2025 11:49	12.20	5.78
2/13/2025 11:50	13.28	2.93
2/13/2025 11:51	13.24	2.92
2/13/2025 11:52	13.22	2.83
2/13/2025 11:53	13.14	2.85
2/13/2025 11:54	13.31	2.91
2/13/2025 11:55	13.04	2.98
2/13/2025 11:56	13.15	3.19
2/13/2025 11:57	13.24	2.94
2/13/2025 11:58	12.96	3.17
2/13/2025 11:59	13.51	2.85
2/13/2025 12:00	13.07	3.00
2/13/2025 12:01	13.43	3.13
2/13/2025 12:02	13.15	3.06
2/13/2025 12:03	13.55	3.05
2/13/2025 12:04	13.64	2.82
2/13/2025 12:05	13.53	3.01
2/13/2025 12:06	12.69	3.36
2/13/2025 12:07	12.85	3.57
2/13/2025 12:08	13.00	3.45
2/13/2025 12:09	12.44	3.56
2/13/2025 12:10	12.67	3.72
2/13/2025 12:11	12.83	3.56
2/13/2025 12:12	13.24	3.26
2/13/2025 12:13	13.12	3.08
2/13/2025 12:14	13.17	3.10
2/13/2025 12:15	13.37	2.92
2/13/2025 12:16	13.30	2.90
2/13/2025 12:17	13.01	3.07
2/13/2025 12:18	12.88	3.21
2/13/2025 12:19	13.43	3.04
2/13/2025 12:20	13.60	2.73
2/13/2025 12:21	13.35	3.03
2/13/2025 12:22	13.23	3.04
2/13/2025 12:23	13.02	3.33
2/13/2025 12:24	13.43	3.03
2/13/2025 12:25	12.54	3.45
2/13/2025 12:26	12.79	3.63
2/13/2025 12:27	12.54	3.44
2/13/2025 12:28	12.82	3.53
2/13/2025 12:29	13.21	3.10
2/13/2025 12:30	12.76	3.50
2/13/2025 12:31	13.11	3.21
2/13/2025 12:32	13.04	3.18

Data Log

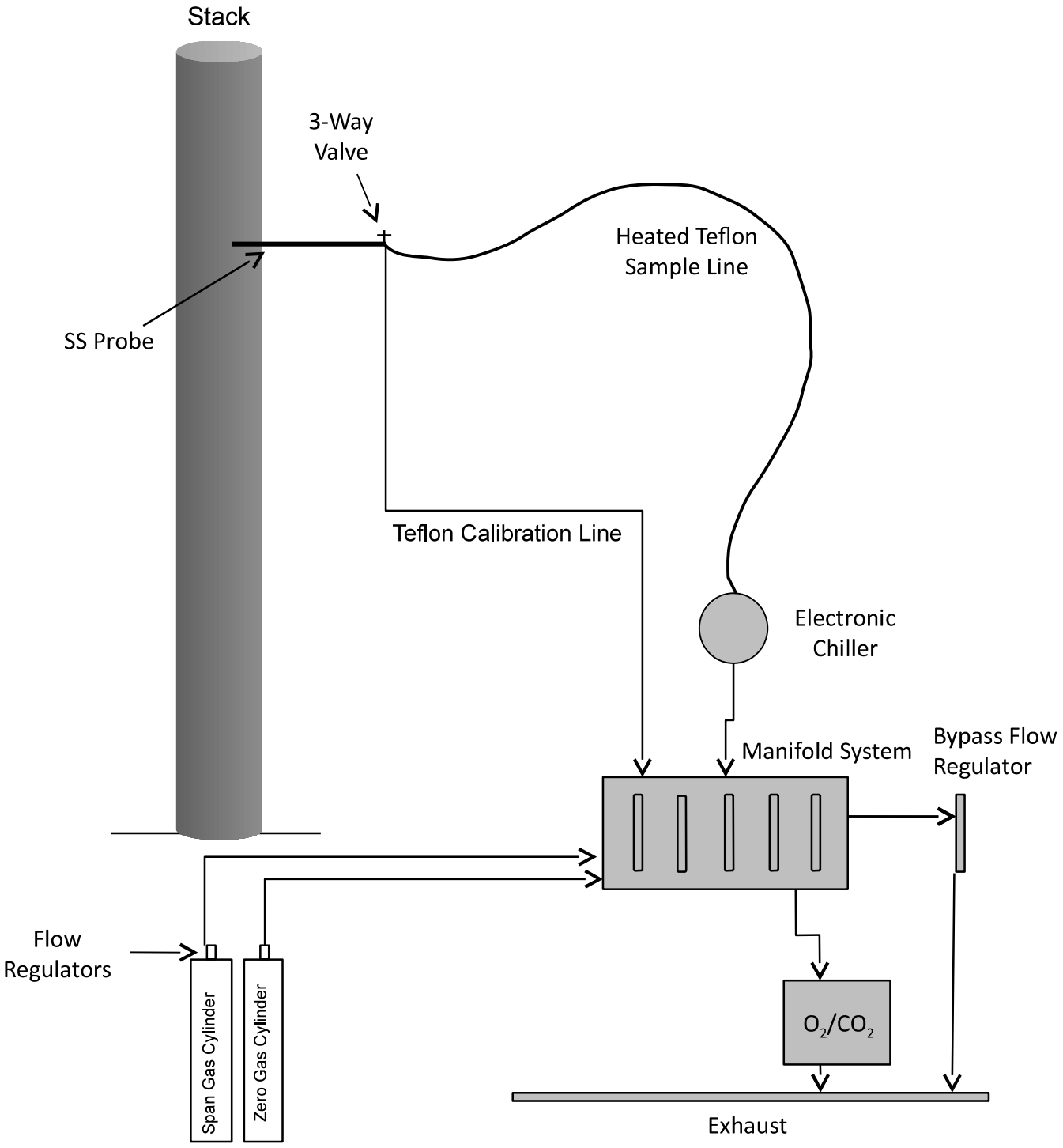
Time	O2	CO2
2/13/2025 12:33	13.14	3.10
2/13/2025 12:34	12.97	3.04
2/13/2025 12:35	13.14	3.05
2/13/2025 12:36	13.33	2.95
2/13/2025 12:37	13.49	2.83
2/13/2025 12:38	13.59	2.79
2/13/2025 12:39	13.45	2.80
2/13/2025 12:40	13.72	2.88
2/13/2025 12:41	13.64	2.86
2/13/2025 12:42	13.58	2.98
2/13/2025 12:43	13.07	3.26
2/13/2025 12:44	13.05	3.59
2/13/2025 12:45	12.84	3.48
2/13/2025 12:46	12.54	3.60
2/13/2025 12:47	13.55	3.18
2/13/2025 12:48	12.87	3.29
2/13/2025 12:49	13.38	3.18
2/13/2025 12:50	13.09	3.09
2/13/2025 12:51	13.50	2.99
2/13/2025 12:52	13.36	2.87
2/13/2025 12:53	12.84	3.09
2/13/2025 12:54	13.22	3.10
2/13/2025 12:55	13.38	2.89
2/13/2025 12:56	13.18	2.95
2/13/2025 12:57	13.44	3.04
2/13/2025 12:58	13.53	3.03
2/13/2025 12:59	13.52	3.05
2/13/2025 13:00	4.47	1.66
2/13/2025 13:01	0.23	0.03
2/13/2025 13:02	1.76	1.36
2/13/2025 13:03	10.12	9.80
2/13/2025 13:04	10.12	9.81
2/13/2025 13:05	11.99	5.97
2/13/2025 13:06	10.57	4.46
2/13/2025 13:07	10.41	4.66
2/13/2025 13:08	10.80	4.42
2/13/2025 13:09	11.56	4.06
2/13/2025 13:10	11.63	3.84
2/13/2025 13:11	9.24	3.35
2/13/2025 13:12	0.05	0.02
2/13/2025 13:13	0.02	0.00
2/13/2025 13:14	0.02	0.00
2/13/2025 13:15	0.01	0.00
2/13/2025 13:16	0.01	0.00
2/13/2025 13:17	0.00	0.00
2/13/2025 13:18	0.00	0.00
2/13/2025 13:19	0.00	0.00
2/13/2025 13:20	0.00	0.00
2/13/2025 13:21	0.00	0.00
2/13/2025 13:22	0.00	0.00
2/13/2025 13:23	0.02	0.28

Data Log

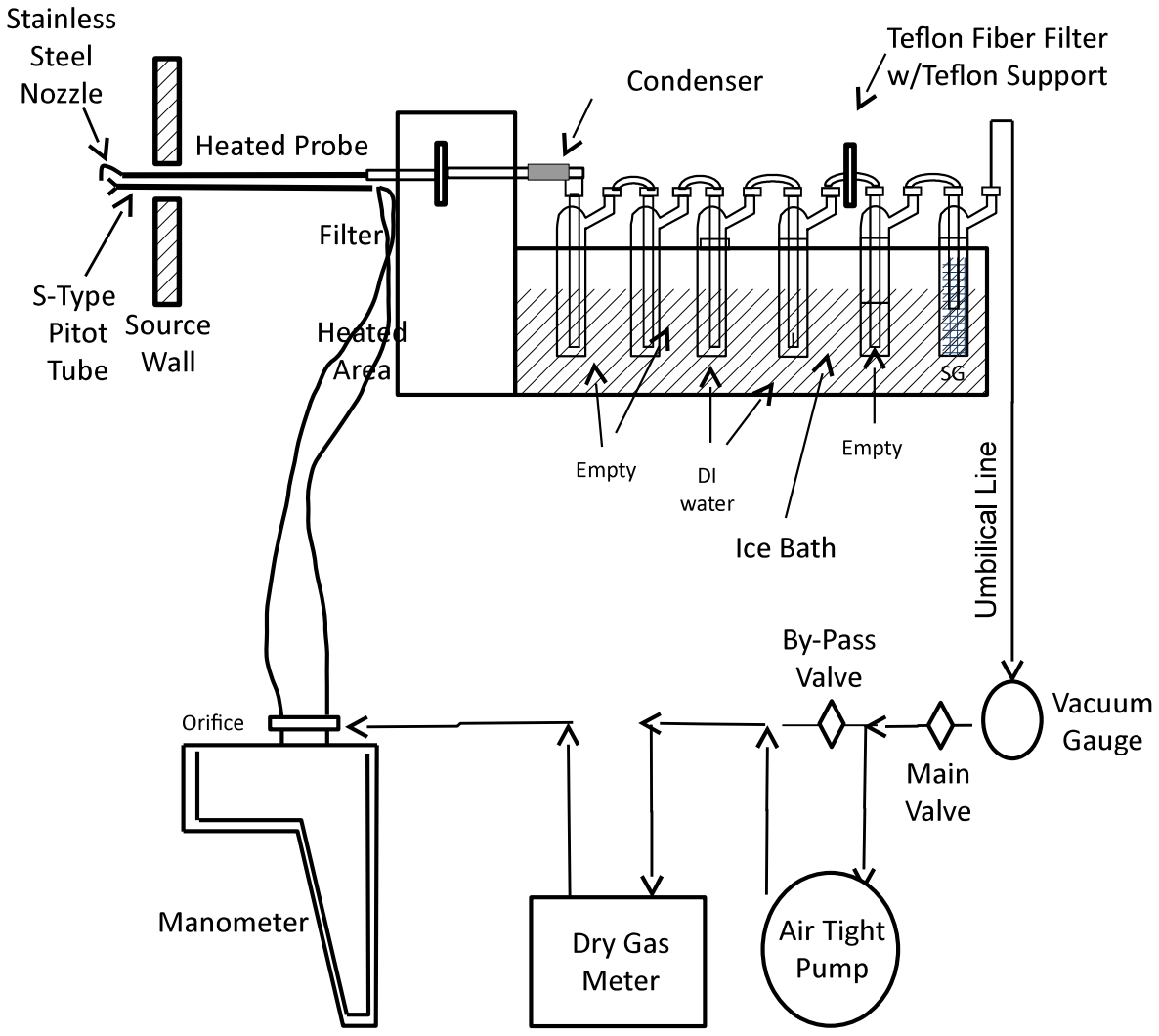
Time	O2	CO2
2/13/2025 13:24	0.02	0.11
2/13/2025 13:25	0.00	0.01
2/13/2025 13:26	0.00	0.00
2/13/2025 13:27	0.00	0.00
2/13/2025 13:28	0.00	0.00
2/13/2025 13:29	0.00	0.00
2/13/2025 13:30	0.00	0.00
2/13/2025 13:31	0.00	0.00
2/13/2025 13:32	0.00	0.00
2/13/2025 13:33	0.00	0.00
2/13/2025 13:34	0.00	0.00
2/13/2025 13:35	0.00	0.00
2/13/2025 13:36	0.00	0.00
2/13/2025 13:37	0.00	0.00
2/13/2025 13:38	0.00	0.00
2/13/2025 13:39	0.00	0.00
2/13/2025 13:40	0.00	0.00
2/13/2025 13:41	0.00	0.00
2/13/2025 13:42	0.00	0.00
2/13/2025 13:43	0.00	0.00
2/13/2025 13:44	0.00	0.00
2/13/2025 13:45	0.00	0.00
2/13/2025 13:46	0.00	0.00
2/13/2025 13:47	0.00	0.00

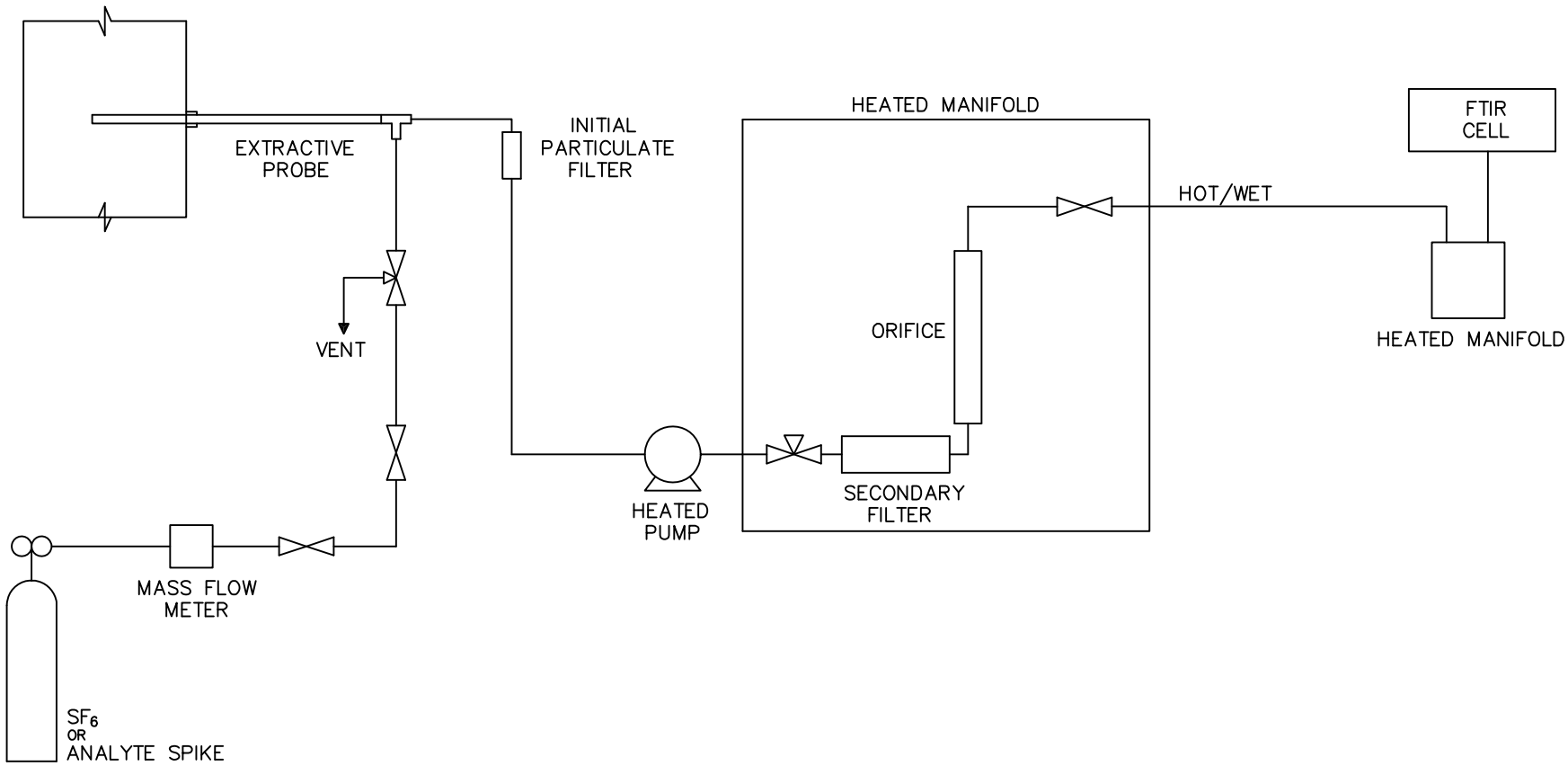
Appendix G

Reference Method Monitors Sampling System
(EPA Method 3A)



Schematic Diagram of the EPA Combined Methods 5/202 Sampling Train for Particulate Matter





EPA METHOD 320 FTIR SAMPLING/SPIKING SYSTEM

DRAWN BY:	KWB	JOB NO.:	2007-0308	REVISION:	1	SCALE:	NTS

E. ROBERTS Alley & Associates INCORPORATED
Environmental Engineering & Consulting
1931 Central Parkway SW Suite S
Decatur, AL 35601
Phone: (615) 351-0121
Fax: (615) 351-0151
www.eralley.com

Appendix H

CAREER SUMMARY

Mr. Wilson is a Project Scientist who has worked in the environmental field approximately four years. He has been involved with field testing activities on a broad scale and within several different industry types. Over the past four years, he has developed skills in several areas of emission testing including mobile laboratory operation and field team supervision.

Education
BS, Emergency Management
Arkansas Tech University
Russellville, AR

Joined Firm
2013

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

DeSoto Gathering Company – Arkansas

Conducted and field managed multiple NSPS, Subpart JJJJ and state permit compliance tests on natural gas-fired compressor engines at multiple stations throughout Arkansas. Responsibilities included project coordination and mobile laboratory and meter box console operation. Testing parameters included nitrogen oxides, carbon monoxide and non-methane volatile organic compounds. EPA Methods 3A, 7E, 10, 19 and 25A.

Saint Gobain – Bryant, Arkansas

Conducted and field managed compliance testing to determine the emission rates of multiple pollutants to demonstrate compliance with federal and state regulations. Testing involved wet chemistry (filterable and condensable particulate matter) and other isokinetic applications. Testing also involved instrumental analysis of sulfur dioxide, carbon monoxide, nitrogen oxides and volatile organic compounds. Mr. Wilson was responsible for operating the dry gas meter consoles and the mobile laboratory equipment as well as coordinating activities with the facility on site contact.

El Dorado Chemical – El Dorado, Arkansas

Conducted compliance testing on multiple sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods, instrumental, and FTIR analysis including U.S. EPA Reference Test Methods 5, 201A/202 (particulate matter & condensable particulate matter), 3A (oxygen and carbon dioxide), 6C (sulfur dioxide) 25A (volatile organic compounds), 7E (nitrogen oxides), 10 (carbon monoxide), and 320 (FTIR). Mr. Wilson was a member of the AST field team for this testing project.

Training

- TVTC Training
- CPR and First Aid
- Safeland
- MSHA Part 46 & Part 48

Appendix I

Brooke T. Paup, *Chairwoman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 13, 2025

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW,
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2025
Expiration Date: 02/28/2026
Certificate ID: TX-C25-00047

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation (FoA) specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Note: For the attached FoA table, matrices may include DW (drinking water), NPW (non-potable water), S (solid and chemical materials), A (air), and/ or BT (biological tissue).

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2025

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix J

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources to be Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Proposed Test Dates:
December 3-5, 2024

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subpart MM and 40 CFR 63, Subpart S

Source Information

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146
(subject to change)

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing will be conducted to determine the emission rates of particulate matter (PM), condensable particulate matter (CPM), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	PM, CPM
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NESHAP.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NESHAP, the facility will conduct a performance test program to determine the compliance status of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01.

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3/3A, 4, 5/202, and 320. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the facility TCEQ Permits, 40 CFR 63, Subpart MM, and 40 CFR 63, Subpart S.
- Emissions testing will be conducted on the exhaust of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01. The No. 1 and No. 2 Recovery Furnaces each exhaust to two (2) stacks: The No. 1 Recovery Furnace to the North (RB01A) and South (RB01B) Stacks, and the No. 2 Recovery Furnace to the West (RB02A) and East (RB02B) Stacks.
- Performance testing will be conducted at the maximum normal operation load for each source.
- Each of the three (3) test runs per source will be approximately 1 hour in duration.
- A minimum of 0.90 dscm (31.8 dscf) will be collected during each PM test run.
- Per Subpart MM, DI water will be used as the sample recovery solvent during PM testing.
- PM sample analysis will be conducted at Alliance's Decatur, AL laboratory.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

LK01 and LK02:

- Lime Production Rate, tons/day
- Scrubber Recirculation Flow, gph
- Scrubber Delta P, WC

RB01A/RB01B and RB02A/RB02B:

- Steam Load, kPPH
- Fuel Data

SM01 and SM02:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

NCG01:

- Chamber Temperature, °F
- Scrubber pH
- Scrubber Recirculation Flow, gph

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – December 2, 2024					
Equipment Setup & Pretest QA/QC Checks					6 hr
DAY 2 – December 3, 2024					
RB01A/RB01B & SM01	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 3 – December 4, 2024					
RB02A/RB02B & SM02	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 4 – December 5, 2024					
All Sources	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
LK01 & LK02	BWS	4			
	PM/CPM	5/202			
NCG01	BWS/CH_3OH	320			
DAY 5 – December 6, 2024					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
LK01	PM, CPM – 27.60 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
LK02	PM, CPM – 26.30 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
RB01A/RB01B	PM, CPM – 26.58 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
RB02A/RB02B	PM, CPM – 42.59 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
SM01	PM, CPM – 10.90 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
SM02	PM, CPM – 19.85 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
NCG01	CH_3OH – 20 ppmvd @ 10% O_2	63, Subpart S

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Laboratory Data* – Copies of laboratory report(s) and chain of custody(s).
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.
- *Photos* – Include stacks being tested and must include all ports and the nearest upstream and downstream disturbances, as well as all equipment being used to conduct the testing (e.g., glassware, meter box, gas cylinders, probe assembly, etc.).

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture Content	320	FTIR – Continuous Sampling

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with an EPA Method 1 verification measurement provided by the Field Team Leader. These measurements will be included in the test report.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample will be collected during each test run. The bags will be collected from the positive pressure side of the sample pump and conditioner. They will be collected through a manifold with a restriction (either rotameter or critical orifice) to ensure even filling throughout the course of the run. Samples will be concurrent with the test runs. The bag samples will be analyzed on site with a gas analyzer. The remaining stack gas constituent will be assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing will be conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system will consist of a glass nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train will consist of a coiled condenser and four (4) chilled impingers. The first and second impingers will be initially empty, the third will contain 100 mL of de-ionized water and the last impinger will contain 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter will be placed between the second and third impingers. The probe liner heating system will be maintained at a temperature of 248 ±25°F, and the impinger temperature will be maintained at 68°F or less throughout testing. The temperature of the Teflon filter will be maintained greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. If condensate is collected in the first dry impinger, then the front-half of the sample train (the nozzle, probe, and heated pre-weighed filter) will be removed in order to purge the back-half of the sample train (coil condenser, first and second impingers and CPM filter). A glass bubbler will be inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water will be added to the first impinger to raise the water level above the bubbler, then the coil condenser will be replaced. Zero nitrogen will be connected to the condenser, and a 60-minute purge at 14 liters per minute will be conducted. After the completion of the nitrogen purge the impinger contents will be measured for moisture gain. The nitrogen purge will be omitted if minimal condensate is collected in the dry impingers.

The pre-weighed quartz filter will be carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder will be rinsed three (3) times with DI water to remove any adhering particulate matter and these rinses will be recovered in container 2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 will be recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, the coil condenser, impingers 1 and 2 and all connecting glassware will be rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses will be added to container CPM Cont. #1 while the solvent rinses will be recovered in container CPM Cont. #2. The Teflon filter will be removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder will be rinsed with DIUF water and then with acetone, followed by hexane. The water rinse will be added to container CPM Cont. #1 while the solvent rinses will be added to container CPM Cont. #2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture will be determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream will be extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 or CAI 600 FTIR operated by a portable computer. The computer has FTIR spectra of calibration gases stored on the hard drive. These single component calibration spectra are used to analyze the measured sample spectra. The gas components to be measured will be selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio will be measured and recorded to document analyzer performance. A leak check will be performed on the sample cell. The instrument path length will be verified using ethylene as the Calibration Transfer Standard. Dynamic spiking will be performed using a certified standard of the target compound or appropriate surrogate in nitrogen with sulfur hexafluoride blended as a tracer to calculate the dilution factor. All test spectra, interferograms, and analytical method information are recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Low Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

EPA Protocol 1 Calibration Gases – Cylinder calibration gases used will meet EPA Protocol 1 (+/- 2%) standards or will be certified standards.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) will be introduced directly to the instrument sample port. While flowing nitrogen the signal amplitude will be recorded, a background spectra will be taken, a linearity check will be performed and recorded, the peak to peak noise and the root mean square in the spectral region of interest will be measured and a screenshot will be recorded.

Following the zero gas checks, room air will be pulled through the sample chamber and the line width and resolution will be verified to be at 1879 cm-1, the peak position will be entered and the FWHH will be recorded (screenshot). Following these checks, another background spectra will be recorded and the calibration transfer standard (CTS) will be introduced directly to the instrument sample port. The CTS instrument recovery will be recorded and the instrument mechanical response time will be measured.

Next, stack gas will be introduced to the FTIR through the sampling system and several scans will be taken until a stable reading will be achieved. The native concentration of our surrogate or target spiking analyte will be recorded. Spike gas will be introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate and a corresponding dilution ratio will be calculated along with a system response time. Matrix spike recovery spectra will be recorded and will be within the ± 30% of the calculated value of the spike concentration that the method requires.

The matrix spike recovery will be conducted once at the beginning of the testing and the CTS recovery procedures will be repeated following each test run. The corresponding values will be recorded.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Nozzles. Nozzles are measured three (3) times prior to initiating sampling with a caliper. The maximum difference between any two (2) dimensions is 0.004 in.
- Digital Calipers. Calipers are calibrated annually by Alliance by using gage blocks that are calibrated annually by an outside laboratory.

- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.
- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. A mass flow controller calibration is conducted on each Environics system annually following the procedures in the Manufacturer's Operation manual. A methane/ethane penetration factor check is conducted on the total hydrocarbon analyzers equipped with non-methane cutters every six (6) months following the procedures in 40 CFR 60, Subpart JJJJ. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- An isokinetic sampling rate of 90-110% will be maintained, as applicable.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

4.3 Analytical Laboratory

Analytical laboratory selection for sample analyses is based on the capabilities, certifications and accreditations that the laboratory possesses. An approved analytical laboratory subcontractor list is maintained with a copy of the certificate and analyte list as evidence of compliance. Alliance assumes responsibility to the client for the subcontractor's work. Alliance maintains a verifiable copy of the results with chain of custody documentation.

Jon Niermann, *Chairman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 14, 2024

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2024
Expiration Date: 02/28/2025
Document ID: TX-C24-00053

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2024

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix K

Special Conditions

Permit Numbers 2975 and PSDTX778M2

Emission Standards

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates," and those sources are limited to the emission limits and other conditions specified in the attached table including emissions from maintenance, startup, and shutdown (MSS) activities represented on pages B-1 and B-2 of the February 11, 2005, amendment application for Recovery Furnace Nos. 1 and 2.

   In addition, this permit authorizes all emissions from planned startup and shutdown activities associated with facilities or groups of facilities that are authorized by this permit.

Fuel Specifications

2. Fuel for mill combustion sources shall be limited as follows:

   A. Fuel for No. 2 Power Boiler (Emission Point Number [PN PB02]) shall be limited to bark and wood materials (defined as any uncontaminated wood materials including but not limited to sawdust, pallets, size-reduced limbs, and any other wood material from a tree such as nut shells); pipeline-quality, sweet natural gas as defined in the General Rules; Nos. 2, 4, and 6 fuel oil containing less than 3 percent sulfur by weight; primary clarifier underflow fiber cake (sludge from the wastewater treatment plant) as defined in the file by correspondence dated October 21, 1994, or used railroad crossties (26.2 tons per hour [tph] based on a 30-day average). All railroad crossties used as fuel in the No. 2 Power Boiler shall meet the specifications of Title 40 Code of Federal Regulations (40 CFR) Part 241, Subpart B, § 241.4(a). **(11/22)**

   The burning rate for bark is limited to 75 tph. Compliance with this rate shall be determined by a 30-day average. Records shall be maintained on-site for a rolling 24-month period and made available to personnel from the TCEQ upon request.

   B. Fuel for the No. 1 Power Boiler (EPN PB01) shall be limited to natural gas. Nos. 2, 4, and 6 fuel oils containing no more than 3 percent sulfur by weight. If the sulfur content of the fuel oil will exceed 3 weight percent, the permit holder must notify the TCEQ Regional Office and propose a fuel mixing plan that will not cause an exceedance of the maximum allowable emission rates; otherwise, the permit holder must obtain approval from the Executive Director.

   Annual fuel firing rates (MMBtu/yr, HHV) are limited as follows: Natural Gas - 5,725,625; No. 6 Fuel Oil - 681,120; Total Fuel Oils (Nos. 2, 4, and 6 Fuel Oils) - 3,300,910; Total - All Fuels (Natural Gas and Fuel Oils) - 5,725,625.

   While firing only No. 6 fuel oil, the total hours of operation for the No. 1 Power Boiler over any consecutive 12-month period shall not exceed a maximum of 720 hours.

   C. The Nos. 1 and 2 Lime Kilns (EPNs LK01 and LK02) shall burn only pipeline-quality, sweet natural gas as defined in the General Rule and Nos. 2, 4, and 6 fuel oils containing less than 3 percent sulfur by weight.

   D. Auxiliary fuel for the Recovery Furnace Nos. 1 and 2 shall be only pipeline-quality, sweet natural gas as defined in the General Rules.

   E. Auxiliary fuel for the NCG Oxidation Unit shall be sweet natural gas. This fuel shall be used, as necessary, to maintain the required minimum temperature in the NCG Oxidation Unit.

Use of any other fuel shall require prior approval from the Executive Director of the Texas Commission on Environmental Quality (TCEQ).

Federal Applicability

3. These facilities shall comply with all applicable requirements of the U.S. Environmental Protection Agency (EPA) regulations on Standards of Performance for New Stationary Sources in 40 CFR Part 60, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart BB - Kraft Paper Mills (The Smelt Dissolving Tank No. 2, the non-condensable gas (NCG) oxidation unit, the Recovery Furnace Nos. 1 and 2, and all affected facilities);

   C. Subpart D - Commercial Steam Generating Units (Power Boiler No. 2 [EPN PB02]); and

   D. Subparts A and BB, § 60.283 (a)(1)(iii) only - Kraft Pulp Mills (Power Boiler No. 2 [EPN PB02]).

4. These facilities shall comply with all applicable requirements of the EPA regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 63, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart S – Pulp and Paper Industry;

   C. Subpart MM - Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (Lime Kiln Nos. 1 and 2 (Emission Point Nos. [EPN] LK01 and LK02), Recovery Furnace Nos. 1 and 2 (EPNs RB01 and RB02), and Smelt Dissolving Tank Nos. 1 and 2 (EPNs SM01 and SM02); and

   D. Subpart DDDDD - Industrial, Commercial, and Institutional Boilers (Power Boiler No. 1 [EPN PB01] and Power Boiler No. 2 [EPN PB02], and all affected facilities).

5. These facilities shall comply with all applicable requirements of the EPA Regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 61, specifically the following:

   A. Subpart A - General Provisions; and

   B. Subpart E – Mercury (Power Boiler No. 2 [EPN PB02]).

Opacity/Visible Emission Limitations

6. Opacity of emissions from Power Boiler No. 1, the Smelt Tank Scrubber Nos. 1 and 2, the Lime Kiln Stack Nos. 1 and 2, the NCG oxidation unit scrubber, and the Recovery Furnace Stack Nos. 1 and 2 shall not exceed 20 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in Title 30 Texas Administrative Code (30 TAC) §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

7. Opacity of emissions from any uncontrolled stationary vent shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS. If this condition is violated, further controls may be required to be installed and/or implemented to limit visible emissions.

8. Opacity of emissions from the A-Line and B-Line Bleach Plant Scrubbers shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

Operational Limitations, Work Practice, and Plant Design

9. Power Boiler No. 1 (EPN PB01) emission concentrations are limited as follows during production operations:

   A. Nitrogen oxides (NO_x): 0.6 lb/ million British Thermal Unit (MMBtu) (24-hour average).

   B. Carbon monoxide (CO): 400 parts per million dry volume (ppmv), corrected to 3 percent dry oxygen. (24-hour average).

   C. Sulfur dioxide (SO_2): 440 ppmv (3-hour average) for fuel oil firing.

10. In-stack concentration of sulfur dioxide (SO_2) from Recovery Furnace Nos. 1 and 2 shall not exceed 300 parts per million by volume (ppmv) and 100 ppmv during production operations, averaged over a three-hour and a yearly period, respectively, and corrected to a dry 8 percent oxygen (O_2) basis. Compliance with the SO_2 concentrations provided in this condition may be determined by the use of continuous monitoring data.

11. The No. 1 Lime Kiln shall comply with the following limitations during production operations:

   A. The maximum total reduced sulfur (TRS) shall be 20 parts per million by volume (ppmv) corrected to 10 percent oxygen (O_2) (measured as hydrogen sulfide, 12-hour average).

   B. The maximum total carbon monoxide shall be 0.064lb/MMBtu (short term)(24-hr average) and 0.051 lb/MMBtu (annual).

   C. The maximum nitrogen oxides shall be 0.17 lb/MMBtu (fuel oil) (24-hour average) and 0.18 lb/MMBtu (natural gas) (24-hour average).

12. PB01 shall be equipped with multi-cyclones to control emissions of PM, and shall be equipped with at least a 218.9-foot tall stack, as measured from the ground level, to provide adequate dispersion of the boiler exhaust and shall have no raincaps or other similar devices that will prevent adequate dispersion of the boiler exhaust. The permit holder shall install stack testing port in the boiler stack.

13. The EPN PB02 shall be equipped with multi-cyclones and a scrubber with the following control efficiencies: 95 percent removal efficiency for hydrogen chloride, 98.5 percent for total particulate matter (PM) and 90 percent for SO_2.

14. Maximum hourly emission rates (ER) for EPN PB02 shall be based on 24-hour averages (except for SO_2 when firing fuel oil, which shall be based on a three-hour averaging time according to 30 TAC §112.9 and NO_x, which shall also be based on a three-hour averaging time according to 40 CFR Part 60, Subpart D).

    The mill is authorized to operate:

    24 hours/day, 7 days/week, 52 weeks/year, and 8,760 hours /year and 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

15. Emissions of chlorine (Cl_2) and chlorine dioxide (ClO2) from the bleaching plant shall be minimized by the use of weak wash (sodium sulfide solution) scrubbers equipped with a pH monitor and control system. The solution of the scrubbers shall be maintained at a minimum pH of eight in order to insure that the emission control efficiencies are maintained at the following values:

Scrubber and Emission Point No.	Emission Control Efficiencies
B-line (BP14)	95 percent (Cl_2/ClO2)
B-line (BP15)	95 percent (Cl_2/ClO2)
A-line (BP16)	95 percent (Cl_2/ClO2)

    The bleach plant lines are also authorized to operate as follows:

    A. When both the A- and B-lines are operating, the B-line bleach plant vents can be routed to the A-line bleach plant scrubber (EPN BP16).

    B. When the B-line is not operating, the A-line bleach plant vents can be routed to the B-line bleach plant scrubbers (EPNs BP14 and BP15).

        This is in line with MAERT statement that emissions from all three scrubbers shall be summed for compliance.

16. In order to maintain the maximum combustion efficiency for TRS compounds and NCGs, the NCG oxidation unit shall be operated as shown in Special Condition No. 21 with a residence time of 0.11 seconds (minimum) and a TRS removal efficiency of 99.9 percent. Immediate corrective action shall be taken when the O_2 deviates below 4 percent per (3-hour rolling average).

17. The SO_2 packed tower scrubber on the NCG oxidation unit shall use a recirculating sodium hydroxide solution. The solution shall be maintained at the minimum pH to ensure good SO_2 removal.

18. Recovery Furnace No. 1 (EPNs RB01A and RB01B) shall be limited to 54.5 tph of black liquor solids and a natural gas firing rate of 375 MMBtu/per hour (hr). Recovery Furnace No. 2 (EPNs RB02A and RB02B) is limited to 99.25 tph of black liquor solids and a natural gas firing rate of 750 MMBtu/hr. The maximum hourly ER for most pollutants from Recovery Furnace Nos.1 and 2 are based on a 24-hour averaging time except for TRS (as hydrogen sulfide [H_2S]) which is based on a 12-hour averaging time while PM and SO_2 are based on a 3-hour averaging time.

    The maximum ER for the Recovery Furnace Nos. 1 and 2 shall be split between the two stacks in the MAERT for accounting purposes only. To determine compliance with the MAERT, the

emission rates listed for each stack shall be summed since each furnace is a single facility and the individual stack emissions may vary.

In order to comply with the PM/PM_{10} MSS emission limits represented in the MAERT for the four Recovery Furnace Stacks (EPNs RB01A, RB01B, RB02A, and RB02B) during planned MSS activities, the planned MSS activities shall be limited to 25 hours per year for each of the four Recovery Furnace Stacks.

19. Lime Kiln No. 1 (LK01) is limited to 228 tons per day and 68,620 tons per year. The maximum firing rate for LK01 using either Nos. 2, 4, or 6 fuel oils shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 420,480 MMBtu/yr. The maximum firing rate for LK01 using natural gas shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 550,000 MMBtu/yr.

20. Lime Kiln No. 2 (LK02) shall be limited to 400 tons per day of lime with a burner rating of 132.3 MMBtu/hr for short-term oil firing or 113.3 MMBtu/hr for sustained oil firing, and 113.3 MMBtu/hr for both short-term and sustained firing for natural gas. The maximum hourly ER for most pollutants from EPN LK02 shall be based on a 24-hour averaging time except for TRS (as H_2S) which is based on a 12-hour averaging time while PM and SO_2 shall be based on a three-hour averaging time.

Demonstration of Continuous Compliance

21. The following parameters shall be monitored and recorded:

Table 1: Monitoring Parameters and Limits

Unit	Parameter	Limit
Smelt Tank Scrubber No. 1	PM - Fan motor current	Title V Compliance Assurance
	PM - Liquid flow rate to scrubber	Monitoring (CAM)*
	PM - Liquid flow rate to fan	Title V CAM*
	PM (Opacity) - Fan motor current	Title V CAM*
	PM (Opacity) - Liquid flow rate to scrubber	Title V Periodic Monitoring*
	PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring*
		Title V Periodic Monitoring*

Unit	Parameter	Limit
Smelt Tank Scrubber No. 2[H]	PM - Fan motor current PM - Liquid flow rate to scrubber PM - Liquid flow rate to fan PM (Opacity) - Fan motor current	Title V CAM * Title V CAM* Title V CAM* TitleV Periodic Monitoring*
Smelt Tank Scrubber No. 2[H]	PM (Opacity) - Liquid flow rate to scrubber PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring* Title V Periodic Monitoring*
Precipitator Ash Tank No. 2	Temperature	235^{O}F maximum, daily average
No. 2 Recovery Boiler Ash Tank	Temperature	235^{O}F maximum, daily average
Power Boiler No. 1	Opacity SO_2 - Fuel sulfur content	20 percent Title V Periodic Monitoring*
Power Boiler No. 2[I]	PM - Liquid flow rate PM - Pressure drop PM (Opacity) - Liquid flow rate PM (Opacity) - Pressure drop SO_2 NO_x O_2	Title V CAM* Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring* MAERT MAERT
Lime Kiln No. 1 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop	Title V CAM * Title V CAM* Title V Periodic Monitoring*

Unit	Parameter	Limit
	PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring*
Lime Kiln No. 2 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop PM (Opacity) - Liquid flow rate	Title V CAM * Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring*
A-Line Bleach Plant Scrubber	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber North	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber South	PM (opacity) -pH of scrubbing liquid PM (opacity) - Fan motor current PM(Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*

Unit	Parameter	Limit
Recovery Furnace No. 1 Stack[H]	PM - Opacity TRS SO_2 Black liquor solids Opacity	Title V CAM* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 54.5 ton/hr (24-hr average) 20% maximum
Recovery Furnace No. 2 Stack[H]	PM - Opacity PM (Opacity) - Opacity TRS SO_2 Black liquor solids	Title V CAM* Title V Periodic Monitoring* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 99.25 ton/hr (24-hr average)
NCG Oxidation Unit	TRS - Combustion Chamber temperature Excess O_2 in exhaust SO_2 - pH of scrubbing liquid SO_2 - Liquid flow rate	Title V CAM* with a minimum temperature of 1579^{O}F. <20 ppmv of Methanol (3-hour rolling averaging period) 4% minimum 7.0 minimum# 150 gpm minimum#

* The specific limit is included in the “Additional Monitoring Requirements Section” in the Title V permit (Permit No. O-01378).

H-see NSPS BB for recordkeeping requirements.

I-see NSPS D for recordkeeping requirements.

CAM Requirements for SO_2 emissions from NCGO1: In order to maintain adequate SO_2 control for the emissions associated with the NCG Oxidation Unit, the control device associated with this source shall be monitored according to the following:

Table 2: Monitoring Parameters for NCG Oxidation Unit

Control Device	Monitoring Parameter	Minimum Monitoring Frequency**	Deviation limit
NCG Oxidation Unit Scrubber (NCGO1)	pH	once per day	7.0 minimum
	Liquid flow rate	once per day	150 gpm

** International Paper may elect to collect monitoring data on a more frequent basis than is required by the minimum frequency and calculate a daily average for purposes of determining whether a deviation has occurred. However, the additional points must be collected on a regular basis and shall not be collected and used in particular instances in order to avoid reporting deviations.

pH: Each monitoring devices shall be cleaned with an automatic cleaning system, or cleaned weekly using hydraulic, chemical, or mechanical cleaning. Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least weekly, whichever is more frequent, and shall be accurate to within +0.5 pH unit.

Liquid flow rate: Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within one of the following:

- ±2% of span; or
- ±5% of design liquid flow rate

The monitoring parameter must be measured and recorded at the frequency indicated above. Immediate corrective action should be taken if the monitoring parameter falls outside of the range specified in this condition.

22. Disposal of particulate collected in all control devices shall be accomplished in such a manner which will prevent PM from becoming airborne.

23. The permit holder shall install, calibrate, and maintain a continuous emission monitoring system (CEMS) to measure and record the in-stack concentration of NO_x and SO_2 from Power Boiler No. 2 (EPN PBO2), TRS, and SO_2 from Recovery Furnace No. 1 (EPNs RBO1A and RBO1B) and Recovery Furnace No. 2 (EPNs RBO2A and RBO2B), and TRS from Lime Kiln Nos. 1 and 2 (EPNs LKO1 and LKO2).

    A. The CEMS shall meet the design and performance specifications, pass the field tests, and meet the installation requirements and the data analysis and reporting requirements specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B. If there are no applicable performance specifications in 40 CFR Part 60, Appendix B, contact

the TCEQ Office of Permitting, and Registration, Air Permits Division for requirements to be met.

B. Section 1 below applies to sources subject to the quality-assurance requirements of 40 CFR Part 60, Appendix F; section 2 applies to all other sources:

(1) The permit holder shall assure that the CEMS meets the applicable quality-assurance requirements specified in 40 CFR Part 60, Appendix F, Procedure 1. Relative accuracy exceedances, as specified in 40 CFR Part 60, Appendix F, § 5.2.3 and any CEMS downtime shall be reported to the appropriate TCEQ Regional Director, and necessary corrective action shall be taken. Supplemental stack concentration measurements may be required at the discretion of the appropriate TCEQ Tyler Regional Director. Downtime is not considered to include periods when the CEMS is operational but the 24-hour span drift exceeds the allowable amounts.

(2) The system shall be zeroed and spanned daily and corrective action taken when the 24-hour span drift exceeds two times the amounts specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B, or as specified by the TCEQ if not specified in Appendix B. Zero and span are not required on weekends and plant holidays if instrument technicians are not normally scheduled on those days, unless the monitor is required by a subpart of NSPS or NESHAPS in which case zero and span shall be done daily without exception.

Each monitor shall be quality-assured at least quarterly using cylinder gas audits (CGA) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.2, with the following exception: RATAs are not required for these systems. For non-NSPS sources, an equivalent quality-assurance method approved by the TCEQ may also be used and an annual RATA is not required.

C. The monitoring data shall be reduced to hourly average concentrations at least weekly, using a minimum of four equally-spaced data points from each one-hour period. The individual average concentrations shall be reduced to units of the permit allowable ER in pounds per hour (lb/hr) at least once every calendar quarter (except for O_2) as follows:

The measured hourly average concentration from the CEMS shall be multiplied by the gas flow rate (either as measured according to 40 CFR Part 60, Appendix A, Methods 1 through 4, or as calculated by appropriate F factor according to 40 CFR Part 60, Appendix A, Method 19) to determine the hourly ER.

D. All monitoring data and quality-assurance data shall be maintained for a period of 60 months. The data from the CEMS may, at the discretion of the TCEQ, be used to determine compliance with the conditions of this permit.

E. For SO_2 from EPNs RBO1A & RBO1B and EPNs RBO2A & RBO2B, and TRS from EPNs LKO1 and LKO2, up to 5 percent invalid monitoring data on a rolling 12-month basis is acceptable provided it is only generated when the monitor is broken down, out-of-control (producing inaccurate data); being repaired, having maintenance performed, or being calibrated (data not obtained during any daily zero and span performed is not considered invalid data).

The data availability shall be calculated as the total fired unit operating hours for which quality-assured data was recorded divided by the total fired unit operating hours. The measurements missed shall be estimated using engineering judgment and the methods used recorded. Options to increase system reliability to an acceptable value, including a redundant CEMS, may be required by the TCEQ Tyler Regional Director.

24. The holder of this permit shall install, calibrate, and maintain a continuous opacity monitoring system (COMS) to measure and record the in-stack concentration of opacity from PB01. The COMS shall be operated in accordance with 40 CFR § 60.13. This special condition shall only apply when fuel oil is being fired in PB01. **(01/18)**

25. Upon request by the TCEQ Executive Director, the holder of this permit shall be required to perform stack sampling analysis for PM, total volatile organic compounds (VOC), NO_x, CO, SO_2, methanol, and formaldehyde and/or other testing as required to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere from the facilities covered by this permit. Sampling must be conducted in accordance with appropriate procedures of the TCEQ Sampling Procedures Manual or in accordance with applicable U.S. Environmental Protection Agency Code of Federal Regulations procedures. Any deviations from those procedures must be approved by the TCEQ Executive Director prior to sampling. The holder of this permit is responsible for providing sampling and testing facilities and conducting the sampling and testing operations at his expense.

    The facilities shall operate at the maximum achievable fuel-firing rate during stack emission testing. Primary operating parameters that enable determination of fuel-firing rate shall be monitored and recorded during the stack test. These parameters are to be determined at the pretest meeting. If the facilities are unable to operate at maximum fuel-firing rate during testing, then future fuel-firing rate may be limited to the rate established during testing. Additional stack testing may be required when higher fuel-firing rates are achieved.

26. Upon request by the Executive Director of the TCEQ or any local air pollution control program having jurisdiction, the holder of this permit shall provide a sample and/or an analysis of the fuel utilized in this facility or shall allow air pollution control agency representatives to obtain a sample for analysis.

27. Due to the high moisture content in the gas stream exiting the scrubber, a continuous opacity monitor as specified in NSPS D is not feasible. To verify the particulate emissions are within NSPS limits, the Power Boiler No. 2 shall be tested once a year for total suspended particulate and any other pollutant at the request of the TCEQ Regional Office.

Recordkeeping Requirements

28. Records shall be maintained at this facility site and made available at the request of personnel from the TCEQ or any other air pollution control program having jurisdiction to demonstrate compliance with permit limitations. These records shall be totaled for each calendar month, retained for a rolling 60-month period, and include the following:

    A. Records of all production rates, ERs, and operating parameters necessary to demonstrate compliance with this permit on-site for a rolling five-year period. Records shall include certification from all suppliers of used railroad crossties that all railroad crossties received at the site meet the specifications of 40 CFR Part 241, Subpart B, § 241.4(a). The holder shall provide access and/or copies of these records to the Executive Director of the TCEQ and/or his representatives and any local air pollution control program upon request. **(11/22)**

    B. The quantity of each fuel (MMBtu/hr basis) fired per month (PB01 only).

    C. The quantity of calcium oxide (tons) produced per day.

D. Annual report from the natural gas supplier identifying total H_2S content and from the fuel oil supplier identifying total sulfur content of Nos. 2, 4, and 6 fuel oils sold to permit holder to demonstrate compliance with this permit.

E. Copies of stack sampling reports conducted on the facilities covered by this permit. The stack sampling reports shall be kept at the site for a period of at least five years from the time sampling was completed.

F. Preventive maintenance, schedule maintenance, and repairs performed on any abatement devices shall be recorded as they occur.

29. All the records required by this condition shall be maintained for at least five years and made available to representatives of the TCEQ or any local air pollution control program having jurisdiction upon request.

Date: November 15, 2022

Emission Sources - Maximum Allowable Emission Rates

Permit Numbers 2975 and PSDTX778M2

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SM01	No. 1 Smelt Tank Scrubber	PM	10.90	47.74
		PM_{10}	10.90	47.74
		$PM_{2.5}$	10.90	47.74
		VOC (note a)	1.37	6.02
		SO_2	3.28	14.37
		H_2SO_4	0.15	0.66
		TRS (note b)	1.80	7.88
		NO_X	1.80	7.88
		NH_3	2.51	8.99
SM02	No. 2 Smelt Tank Scrubber	PM	19.85	86.94
		PM_{10}	19.85	86.94
		$PM_{2.5}$	19.85	86.94
		VOC	2.50	10.95
		SO_2	6.78	29.70
		H_2SO_4	0.31	1.36
		TRS	3.28	14.35
		NO_X	3.28	14.35
		NH_3	4.57	16.37
LK01** (A^1)	Lime Kiln No. 1	PM	27.60	99.80
		PM_{10}	27.60	99.80
		$PM_{2.5}$	27.60	99.80

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	2.20	8.10
		SO_2	2.30	8.40
		H_2SO_4	0.06	0.13
		TRS	2.60	9.30
		NO_X	18.90	49.50
		CO	6.80	14.20
PB01*** (A^1, A^2)	No. 1 Power Boiler (Natural Gas and Fuel Oil Firing)	PM	61.21	185.22
		PM_{10}	61.21	185.22
		$PM_{2.5}$	61.21	185.22
		VOC	8.26	16.70
		NO_X	567.60	1717.69
		SO_2	841.20	1328.25
		CO	264.88	801.59
		H_2SO_4	4.03	4.43
		TRS	0.67	0.26
LK02** (A^1)	Lime Kiln No. 2	PM	26.30	115.19
		PM_{10}	26.30	115.19
		$PM_{2.5}$	26.30	115.19
		NO_X	38.91	145.90
		SO_2	1.20	5.26
		H_2SO_4	0.25	1.07
		CO	4.44	19.45
		TRS	2.50	10.95
		VOC	4.00	17.52

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
PB02**** (A^1, A^2, A^3)	Power Boiler No. 2 (including MSS) (note c)	PM	108.70	466.58
		PM_{10}	108.70	466.58
		$PM_{2.5}$	108.70	466.58
		VOC	54.81	237.80
		NO_X	326.10	1399.75
		SO_2	770.00	780.66
		CO	1102.55	4732.57
		H_2SO_4	16.57	71.02
		TRS	1.66	6.74
RB01A** (A^1, A^2)	No. 1 Recovery Furnace North Stack (Normal ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01A** (A^4)	No. 1 Recovery Furnace North Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB01B** (A^1, A^2)	No. 1 Recovery Furnace South Stack (Normal Ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01B** (A^4)	No. 1 Recovery Furnace South Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB02A** (A^1, A^2)	No. 2 Recovery Furnace West Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02A** (A^4)	No. 2 Recovery Furnace West Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
RB02B** (A^1, A^2)	No. 2 Recovery Furnace East Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02B** (A^4)	No. 2 Recovery Furnace East Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
BG01 (A^1)	Lime System Baghouse No. 1	PM	0.06	0.21
		PM_{10}	0.06	0.21
		$PM_{2.5}$	0.06	0.21
BG02 (A^1)	Lime System Baghouse No. 2	PM	0.10	0.44
		PM_{10}	0.10	0.44
		$PM_{2.5}$	0.10	0.44
LS01	No. 1 Lime Slaker	PM	0.02	0.08
		PM_{10}	0.02	0.08
		$PM_{2.5}$	0.02	0.08
		VOC	0.39	1.41
		NH_3	9.39	33.63
LS02	No. 2 Lime Slaker	PM	0.02	0.10
		PM_{10}	0.02	0.10
		$PM_{2.5}$	0.02	0.10
		VOC	0.68	2.99

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		NH_3	17.10	61.24
BP0351 (A^5)	Methanol Storage Tank	CH_3OH	19.03	0.73
BP0368 (A^5)	Hydrogen Peroxide Tank	H_2O_2	2.21	0.09
NCG01 (A^1, A^3)	NCG Oxidation Unit Scrubber	PM	2.57	9.19
		PM_{10}	2.57	9.19
		$PM_{2.5}$	2.57	9.19
		VOC (note a)	1.10	3.95
		NO_X	5.57	19.96
		SO_2	15.84	69.37
		CO	9.94	35.61
		H_2SO_4	6.01	26.28
		TRS	0.99	4.36
NCG02 (A^5)	Combined Contaminated Condensate Tank	TRS	<0.10	0.40
NCGF1	NCG Fugitives (4)	TRS	0.36	1.56
DIG1	Batch Digester Fugitives (4)	VOC	4.80	19.19
		TRS	0.87	3.46
WWTS1 (A^6, A^7)	Waste Water Treatment Fugitives (4)	VOC	348.16	740.78
		TRS	22.82	81.72
BP14#	B-Line Bleach Plant Scrubber (North)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BP15#	B-Line Bleach Plant Scrubber (South)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37
BP16#	A-Line Bleach Plant Scrubber (5)	Cl_2	0.20	0.86
		ClO_2	11.31	49.51
		CO	39.00	117.37
		VOC	4.17	12.28
		TRS	0.12	0.37
BP01	Bleach Plant Fugitives (4)	Cl_2	0.20	1.00
		ClO_2	0.20	1.00
CLT01 (A^5)	No. 1 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
CLT02 (A^5)	No. 2 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
WLT01 (A^5)	No. 1 Weak Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLT02 (A^5)	No. 2 Weak Liquor Storage Tank (5)	VOC	0.54	2.34
		TRS	0.12	0.51
HLT01 (A^5)	No. 1 Strong/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
HLT02 (A^5)	No. 2 Storage/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SCT01 (A[5])	No. 1 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SCT02 (A[5])	No. 2 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS01 (A[5])	No. 1 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS02 (A[5])	No. 2 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST01 (A[5])	No. 1 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST02 (A[5])	No. 2 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
BLDF01 (A[5])	Black Liquor Digester Fill Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
CT01 (A[5])	Spill Collection Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
ST01 (A[5])	Swing Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST01 (A[5])	No. 1 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST02 (A[5])	No. 2 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST03 (A[5])	No. 3 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BOT01 (A^5)	Evaporator Boil Out Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
DT01 (A^5)	Black Liquor Dump Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLSC01 (A^5)	Weak Liquor Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
FOT (A^5)	Fuel Oil Tank (5)	VOC	1.52	6.64
		TRS	0.19	0.84
CPFUG (note d)	Caustic Plant Fugitives (4)	NH_3	7.31	26.17
		VOC	16.25	68.30
		TRS	3.18	13.91
CP01 (A^5)	No. 1 Causticizer Tanks (5)	NH_3	2.59	9.28
		VOC	0.01	0.03
CP02 (A^5)	No. 2 Causticizer Tank (5)	NH_3	4.72	16.89
		VOC	0.01	0.06
WLOXT1 (A^5)	White Liquor Oxidation Tank (5)	NH_3	0.10	0.44
		VOC	0.26	1.16
		TRS	0.56	2.45
KNCONV	A-and B-Line Knotter Conveyor (4)	VOC	0.01	0.04
AQS	A-Line Quaternary Screen (4)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
BQS	B-Line Quaternary Screen (4)	VOC	0.01	0.03
		TRS	<0.01	<0.01
ASDT (A^5)	A-Line Screen Dilution	VOC	0.01	0.02

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Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
	Tank (5)	TRS	<0.01	<0.01
BSDT (A^5)	B-Line Screen Dilution Tank (5)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
ADHV1/ADSP1	A-Line Decker Hood Vent and A-Line Decker Seal Pit Vent (5)	VOC	9.24	27.20
		TRS	4.06	11.95
BDHV1/BDSP1	B-Line Decker Hood Vent and B-Line Decker Seal Pit Vent (5)	VOC	13.55	54.41
		TRS	5.95	23.89
CPS1 (note e)	Chip/Bark Handling Fugitives (4)	PM	3.35	13.59
		PM_{10}	1.58	6.43
		$PM_{2.5}$	1.58	6.43
REJBIN2	Reject Bin	CH_3OH	0.03	0.10
LOG-1A	Log Processing 1A (4)	PM	0.73	3.20
		PM_{10}	0.22	0.96
		$PM_{2.5}$	0.22	0.96
HDST1 (A^5)	No. 1 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
HDST2 (A^5)	No. 2 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
ALDST (A^5)	A-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
BLDST (A^5)	B-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
AWTST (A^5)	A-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94

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Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BWTST (A[5])	B-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
(note f)	Extruder No. 5 Vents and Fugitives (4)	PM	3.18	13.91
		PM_{10}	3.18	13.91
		$PM_{2.5}$	3.18	13.91
		VOC	2.07	9.05
		NO_X	0.29	1.29
		CO	0.25	1.08
		SO_2	<0.01	0.01
(note f)	Extruder No. 7 Vents and Fugitives (4)	PM	3.18	13.92
		PM_{10}	3.18	13.92
		$PM_{2.5}$	3.18	13.92
		VOC	2.07	9.05
		NO_X	0.30	1.33
		CO	0.26	1.12
		SO_2	<0.01	0.01
(note g)	Nos. 1 and 3 Paper Machines and Dryer Exhaust (5)	PM	0.19	0.83
		PM_{10}	0.19	0.83
		$PM_{2.5}$	0.19	0.83
		VOC	8.74	38.27
		NO_X	2.50	10.93
		CO	2.10	9.18
		SO_2	0.01	0.07
TNK0115, TNK0116,	Starch Silo Nos. 1 -3	PM	0.02	0.02

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
and TNK0175 (A[1])		PM_{10}	0.02	0.02
		$PM_{2.5}$	0.02	0.02
PAINTYD (A[8])	Sitewide Painting Activities (4)	PM	70.31	32.72
		PM_{10}	70.31	32.72
		$PM_{2.5}$	70.31	32.72
		VOC	96.05	28.94
BSS1 – BSS5 (A[5])	Nos. 1-5 Bleached Stock Storage Tanks (4)	VOC	0.04	0.17
(note h)	Paper Machine Tanks and Chests (4)	VOC	0.16	0.68
HVLC-1	HVLC Vent	VOC	157.78	23.09
		CO	3.19	0.51
		TRS	33.30	4.77
AWSST (A[5])	A-Line Washed Stock Chest (5)	VOC	0.72	3.16
		TRS	0.28	1.21
BWSST (A[5])	B-Line Washed Stock Chest (5)	VOC	0.74	3.26
		TRS	0.28	1.21

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) PM - particulate matter, suspended in the atmosphere, including PM_{10}
PM_{10} - total particulate matter equal to or less than 10 microns in diameter, including $PM_{2.5}$, as represented
$PM_{2.5}$ - particulate matter equal to or less than 2.5 microns in diameter
Emissions of $PM_{2.5}$ is added to the Maximum Allowable Emission Rates Table (MAERT) upon issuance of the permit. These emissions were previously quantified and authorized as PM or PM_{10}, but were not speciated in the MAERT.
VOC - volatile organic compounds as defined in Title 30 Texas Administrative Code §101.1
SO_2 - sulfur dioxide
H_2SO_4 - sulfuric acid
TRS - total reduced sulfur
NO_x - nitrogen oxides
NH_3 - ammonia
Cl_2 - chlorine
ClO_2 - chlorine dioxide (chlorine peroxide)

Emission Sources - Maximum Allowable Emission Rates

CO - carbon monoxide
H_2S - hydrogen sulfide
CH_3OH - methanol
H_2O_2 - hydrogen peroxide
$CHCl_3$ - chloroform
$CHBrCl_2$ - bromodichloromethane

(4) Fugitive emissions are an estimate only and should not be considered as a maximum allowable emission rate.
(5) The VOC and TRS emission rates for this point are considered to be estimates only and are not intended to be enforceable limits.
(6) Planned startup and shutdown emissions are included, as well as planned maintenance activities identified as part of permit alteration issued on April 24, 2013.
A^1 Emissions from planned startup and shutdown activities included.
A^2 Emissions from soot blowing included.
A^3 Emissions from control device for evaporator and concentrators boil outs included.
A^4 Emissions from planned MSS activities included.
A^5 Emissions from draining/degassing included.
A^6 Emissions from dredging and other maintenance (e.g., ponds and collection system) included.
A^7 Emissions from maintenance throughout the mill included.
A^8 Emissions from maintenance painting included.

* Unless otherwise specified, emission rates are based on operating 8,760 hours per year or 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

** Pound per hour rates, TRS emissions based on a 12-hour averaging time, PM/PM_{10} and SO_2 based on a 3-hour averaging time, all other pollutants are based on a 24-hour averaging time.

*** Pound per hour rates, SO_2 and NO_x emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

**** Pounds per hour rates, SO_2 emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

Emissions from the Bleach Plant Scrubbers (EPNs BP14, BP15, and BP16) should be summed up when determining compliance since individual emissions may vary.

Notes:

(a) All VOCs are reported as carbon unless otherwise specified.
(b) All TRS emission rates are reported as H_2S unless otherwise specified.
(c) The SO_2 hourly rates for the Power Boiler No. 2 include combustion of total reduced sulfur compounds during periods when the NCG oxidizer is inoperable.
(d) Green liquor clarifiers (2), green liquor storage tanks (3), weak wash storage tanks (2), white liquor clarifiers (2), white liquor storage tanks (4), white liquor/digestor fill tank, mud washers (2), mud storage tanks (2), mud precoat filters (2), and dregs filter.
(e) These fugitives occur from the chip and RDF handling operations.
(f) Includes the pre-treater stacks (EX5PRE1, EX5PRE2, EX7PRE1, EX7PRE2), the laminator stack (EX5LAM1, EX5LAM2, EX7LAM1, EX7LAM2), the post-treater stack (EX5POSTTR, EX7POSTTR), and fugitives (EXFUG5, EXFUG7) for each extruder.
(g) The Paper Machine Nos.1 and 3 consist of 18 exhaust vents and fugitive emissions.
(h) Includes pine tanks (PINETK3, PINETK1S, PINETK1), hardwood tanks (HDWD1, HDWD3), machine chests (MACHCH1, MACHCH3), and broke storage tanks (BRST1A, BRST1B, BRST3A).

Date: August 10, 2017

Last Page of Report

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source Tested:
No. 2 Smelt Tank Scrubber (SM02)

Test Date:
October 28, 2025

Project No. AST-2025-3989

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citations	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
W Graphic Packaging International Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Timothy Branham
timothy.branham@alliancetg.com
(479) 206-1993

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewers
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

COMPANY:		Graphic Packaging International		SOURCE:		SM02	
REVIEWER:				DATE OF SAMPLING:		October 28, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. D	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. D	Operating parameters of the pollution control equipment					
13.	App. D	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. C	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	N.A.	Chain of custody of samples					
31.	N.A.	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. C	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the sources and operating conditions that were tested during the specific test date and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections of this test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

November 17, 2025

Riley Wilson – Operations Manager
Alliance Technical Group, LLC

Date

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Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to the provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing was conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Tested Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-2: Project Team

Facility Personnel	John Fussell
Alliance Personnel	Riley Wilson Timothy Branham

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) that was developed by Alliance and approved by GPI. The SSTP is presented in Appendix E.

1.3 Technical Discussion

No operational or sampling pauses were recorded, and no technical difficulties or protocol deviations were encountered during this test program.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on October 28, 2025. Testing consisted of determining the concentration and emission rate of TRS at the exhaust of SM02.

Table 2-1 provides a summary of the emission testing results with comparisons to the applicable NSPS or TCEQ permit limits. Any difference between the summary of results listed in the following table and the detailed results contained in the appendices is due to rounding for presentation.

Table 2-1: Summary of Results

Run Number	Run 1	Run 2	Run 3	Average
Date	**10/28/25**	**10/28/25**	**10/28/25**	**--**
Total Reduced Sulfur (as H_2S) Data				
Emission Rate, lb/hr	0.70	0.91	0.91	0.84
Permit Limit, lb/hr	--	--	--	3.28
Percent of Limit, %	--	--	--	**26**
Emission Factor, lb/ton of black liquor solids	0.0075	0.0097	0.0097	0.0089
NSPS Limit, lb/ton of black liquor solids	--	--	--	0.033
Percent of Limit, %				**27**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods that are listed in Table 3-1. Method descriptions are provided below, and quality assurance/quality control data is provided in Appendix C.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Total Reduced Sulfur	16	Instrumental Analysis
Gas Dilution System Certification	205	---

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1 requirements. The inside diameter of the stack was determined. The upstream and downstream distances between the sampling point and the nearest flow disturbance were measured. The distance between each flow disturbance and the sampling point was expressed in units of stack diameters or stack equivalent diameter. In order to determine the minimum number of traverse points, the upstream and downstream distances were compared to Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas pressure differential (impact pressure vs. static pressure), static pressure and temperature at each measurement point. Pressure differential and static pressure were determined using an S-type pitot tube, an inclined manometer and flexible tubing used to connect both parts of the system. Stack gas temperature was determined using a K-type thermocouple and a pyrometer. The sensor tip of the K-type thermocouple was aligned with the nozzles of the S-type pitot tube in accordance with method requirements.

Stack gas pressure differential, static pressure and temperature measurements were recorded during each test run and were utilized to calculate stack gas velocity in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A –Oxygen and Carbon Dioxide Concentrations – Instrumental

The oxygen (O_2) and carbon dioxide (CO_2) concentrations were determined in accordance with U.S. EPA Reference Test Method 3A. Data was continuously collected and reported as one-minute averages. The sampling system consisted of a stainless-steel probe, unheated Teflon sample line(s), a gas conditioning system and the identified gas analyzer. The gas conditioning system consisted of a filter to remove particulate matter, and a non-contact condenser used to remove moisture from the stack gas. A portable non-contact condenser was placed in the system directly after the probe. A single-point sampling location was used for the determination of the stack gas molecular weight. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 16 – Total Reduced Sulfur

The total reduced sulfur testing was conducted in accordance with U.S. EPA Reference Test Method 16. The total reduced sulfur compounds consisted of hydrogen sulfide (H_2S), methyl mercaptan (MeSH), dimethyl sulfide (DMS), and dimethyl disulfide (DMDS).

The sampling system consisted of a heated Teflon probe, heated Teflon sample line, gas conditioning system, leak-free pump, unheated Teflon sample line, and a gas chromatograph (GC), which was equipped with a flame photometric detector (FPD). The gas conditioning system consisted of three (3) Teflon impingers. The first two (2) impingers each contained 100 mL of citrate buffer (for SO_2 removal), and the third impinger was empty. Each test run consisted of 16 injections, which were performed over a period of at least 3 hours.

The GC/FPD was calibrated for each reduced sulfur compound (H_2S, COS and CS_2) with a certified calibration gas, which was diluted with a dilution system. The dilution system was validated in accordance with EPA Method 205 to produce three (3) or more concentration levels, which spanned the linear range of the FPD. Calibration precision and calibration drift test values were maintained in accordance with EPA Method 16 requirements.

3.4 U.S. EPA Reference Test Method 205 – Gas Dilution System Certification

A calibration gas dilution system field check was conducted in accordance with U.S. EPA Reference Test Method 205. An initial three-point calibration was conducted with individual Protocol 1 gases on the analyzer used to complete the dilution system field check. Multiple dilution rates and total gas flow rates were utilized to force the dilution system to perform two (2) dilutions on each mass flow controller. The diluted calibration gases were sent directly to the analyzer, and the analyzer's response was recorded in an electronic field data sheet. A mid-level supply gas, which was certified to a concentration that was within 10% of one of the gas divider settings described above, was introduced directly to the analyzer, and the analyzer response was recorded in an electronic field data sheet. The analyzer's response was within 2% of the cylinder's concentration. These steps were repeated three (3) times. The average analyzer response was within 2% of the predicted gas concentration. No single injection differed by more than 2% from the average instrument response for its corresponding dilution. The Method 205 data is included in the Quality Assurance/Quality Control Appendix.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Direct Calibration & Calibration Error Test

Direct calibration consisted of introducing Low-Level gas directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration, and once the analyzer reading was stabilized, the analyzer value was recorded. This process was repeated with the High-Level gas. The Calibration Error Test consisted of sequentially introducing Low, Mid, and High-Level calibration gases directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

The system bias and response time were determined by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe, and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it

reached a stable value, and this value was recorded. Next, Low-Level gas was introduced at the probe, and the time that was required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) was recorded. If the Low-Level gas was zero gas, the response was 0.5% or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and the initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

Post test system bias checks were conducted by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe. Once the analyzer reading stabilized, the analyzer value was recorded. Next, Low-Level gas was introduced at the probe, and the analyzer response was recorded once it stabilized. If the System Bias was not within 5.0 percent of the Calibration Span or 0.5% absolute difference, the data was invalidated, and the Calibration Error Test and System Bias were repeated.

Post Test Drift Checks

Drift between pre- and post-run System Bias was within 3 percent of the Calibration Span or 0.5% absolute difference. If the drift exceeded 3 percent or 0.5%, the Calibration Error Test and System Bias were repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check was conducted prior to initiating testing. The pollutant concentrations were measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point was sampled for a minimum of twice the system response time.

The pollutant concentration at each traverse point did not differ more than 5 percent or 0.5 ppmv/0.3% (whichever was less restrictive) of the average pollutant concentration. A single point was sampled during the test runs. Copies of stratification check data can be found in the Quality Assurance/Quality Control Appendix.

Data Collection

A Data Acquisition System equipped with a battery backup was used to record the instrument response as one (1) minute averages. This data was continuously stored as a *.CSV file in Excel format, which was saved to the computer's hard drive. At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

Appendix A - Example Calculations

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	--	= barometric pressure, in. Hg
ΔH	--	= pressure differential of orifice, in H_2O
Pm	--	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	29.63	= barometric pressure, in. Hg
Pg	-0.50	= static pressure, in. H_2O
Ps	29.59	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Vm \times Pm \times Y}{Tm}$$

where,

Y	0.000	= meter correction factor
Vm	--	= meter volume, cf
Pm	--	= absolute meter pressure, in. Hg
Tm	--	= absolute meter temperature, °R
Vmstd	--	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	--	= weight of H_2O collected, g
Vwstd	--	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{\wedge}\left(6.37 - \left(\frac{2{,}827}{Ts + 364.47}\right)\right)}{Ps}$$

where,

Ts	146.6	= stack temperature, °F
Ps	29.6	= absolute stack gas pressure, in. Hg
BWSsat	0.233	= dimensionless

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	--	= standard wet volume, scf
Vmstd	--	= standard meter volume, dscf
BWS	--	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	0.233	= moisture fraction (theoretical at saturated conditions)
BWSmsd	--	= moisture fraction (measured)
BWS	0.233	

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	0.1	= carbon dioxide concentration, %
O_2	20.5	= oxygen concentration, %
Md	28.84	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	28.84	= molecular weight (DRY), lb/lb mol
BWS	0.233	= moisture fraction, dimensionless
Ms	26.32	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.84	= pitot tube coefficient
$\Delta P^{1/2}$	0.619	= average pre/post test velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	606.3	= average pre/post test absolute stack temperature, °R
Ps	29.59	= absolute stack gas pressure, in. Hg
Ms	26.32	= molecular weight of stack gas, lb/lb mol
Vs	39.1	= ft/sec

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	39.1	= stack gas velocity, ft/sec
As	18.99	= cross-sectional area of stack, ft^2
Qa	44,542	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	44,542	= average stack gas flow at stack conditions, acfm
BWS	0.233	= moisture fraction, dimensionless
Ps	29.59	= absolute stack gas pressure, in. Hg
Ts	606.3	= average pre/post test absolute stack temperature, °R
Qs	29,416	= dscfm

Dry Gas Meter Calibration Check (Yqa), percent

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{K \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0	= meter correction factor, dimensionless
Θ	0	= run time, min.
Vm	--	= total meter volume, dcf
K	0.0319	= K-factor, (in. Hg/°R) * cfm^2
Tm	--	= absolute meter temperature, °R
ΔH@	0	= orifice meter calibration coefficient, in. H_2O
Pb	--	= barometric pressure, in. Hg
ΔH avg	--	= average pressure differential of orifice, in H_2O
Md	--	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	#VALUE!	= average square root pressure differential of orifice, $(\text{in. } H_2O)^{1/2}$
Yqa	--	= percent

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	20.1	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.9	= average of pretest & posttest calibration responses, % dry
C_{O_2}	20.5	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	0.2	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.1	= actual concentration of calibration gas, % dry
C_M	9.7	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	0.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 16

TRS - Outlet Concentration (C_{TRS}), ppmvd

$$C_{TRS} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.8	= average analyzer value during test, ppmvd
C_o	NA	= average of pretest & posttest zero responses, ppmvd
C_{MA}	NA	= actual concentration of calibration gas, ppmvd
C_M	NA	= average of pretest & posttest calibration responses, ppmvd
C_{TRS}	4.5	= TRS Concentration, ppmvd

TRS - Outlet Emission Rate (ER_{TRS}), lb/hr

$$ER_{TRS} = \frac{C_{TRS} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 453.592 \frac{g}{lb}}$$

where,

C_{TRSc}	4.5	= TRS - Outlet Concentration, ppmvd
MW	34.081	= TRS molecular weight, g/g-mole
Qs	29,416	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{TRS}	0.70	= lb/hr as H_2S

TRS - Outlet Emission Factor (EF_{TRSPPT}), lb/ton

$$EF_{TRS} = \frac{ER_{TRS} \times 2{,}000 \ \frac{lb}{ton}}{FR}$$

where,

ER_{TRS}	0.70	= TRS - Outlet Emission Rate, lb/hr as H_2S
FR	188,000	= Feed Rate, lb/hr
EF_{TRS}	0.007	= lb/ton

Appendix B - Field Data

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

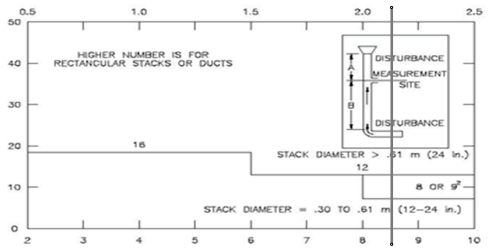
Run Number		Run 1	Run 2	Run 3	Average
Date		10/28/25	10/28/25	10/28/25	--
Start Time		8:15	11:35	14:58	--
Stop Time		11:14	14:34	17:57	--
Source Data					
Feed Rate, ton/hr BLS	FR	94	94	94	94
Input Data - Outlet					
Volumetric Flow Rate (M1-4), dscfm	Qs	29,416	29,913	29,037	29,455
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	20.46	20.48	20.50	20.48
CO_2 Concentration, % dry	C_{CO_2}	0.12	0.09	0.08	0.10
TRS (as SO_2) Concentration, ppmvd	C_{TRS}	4.5	5.7	5.9	5.4
TRS (as H_2S) Emission Rate, lb/hr	ER_{TRSc}	0.70	0.91	0.91	0.84
TRS (as H_2S) Emission Factor, lb/ton BLS	EF_{TRSc}	0.0075	0.0097	0.0097	0.0089

Method 1 Data

Location	Graphic Packaging International Texarkana Mill - Queen City, TX
Source	No. 2 Smelt Tank Scrubber (SM02)
Project No.	AST-2025-4218
Date	10/28/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Measurer (Initial and Date):	TJB 10/28/25	
Reviewer (Initial and Date):	RW 10/28/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall (in)	Distance from outside of port (in)
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

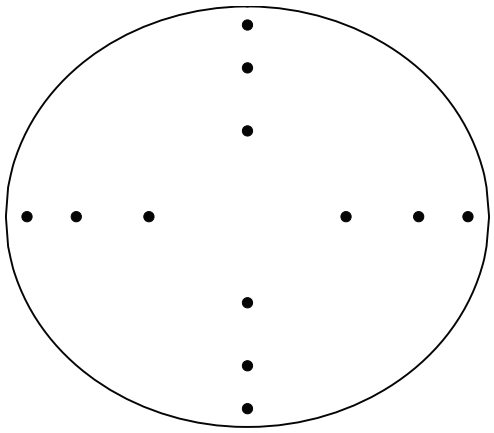
Stack Diagram

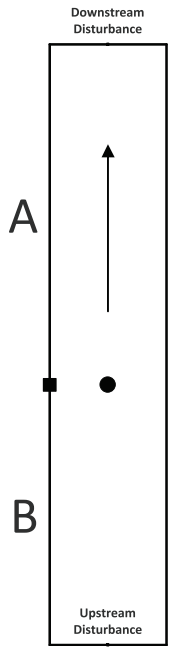
A = 55 ft.

B = 42 ft.

Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Date 10/28/25

Sample Point	Angle (ΔP=0)
1	2
2	5
3	5
4	1
5	6
6	8
7	5
8	2
9	2
10	0
11	8
12	5
Average	4.1

Field Data
Method 2 Data

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Run No.	1		2		3	
Date	10/28/25		10/28/25		10/28/25	
Status	VALID		VALID		VALID	
Start Time	10:45		11:50		16:20	
Stop Time	10:55		12:00		16:32	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.25	146	0.24	145	0.26	145
2	0.29	146	0.33	145	0.28	146
3	0.37	147	0.39	146	0.35	146
4	0.52	147	0.55	147	0.51	147
5	0.48	147	0.47	147	0.45	147
6	0.45	146	0.42	147	0.40	148
B-1	0.36	145	0.38	146	0.35	145
2	0.31	146	0.33	146	0.33	147
3	0.35	147	0.36	147	0.35	148
4	0.39	147	0.42	147	0.38	148
5	0.45	148	0.47	145	0.45	149
6	0.42	147	0.40	145	0.43	148

					Average
Square Root of ΔP, (in. WC)$^{1/2}$	$(\Delta P)^{1/2}$	0.619	0.627	0.612	0.619
Average ΔP, in. WC	(ΔP)	0.39	0.40	0.38	0.39
Pitot Tube Coefficient	(Cp)	0.838	0.838	0.838	0.838
Barometric Pressure, in. Hg	(Pb)	29.63	29.63	29.63	29.63
Static Pressure, in. WC	(Pg)	-0.50	-0.48	-0.45	-0.48
Stack Pressure, in. Hg	(Ps)	29.59	29.59	29.60	29.59
Average Temperature, °F	(Ts)	146.6	146.1	147.0	146.6
Average Temperature, °R	(Ts)	606.3	605.8	606.7	606.2
Moisture Fraction @ Saturation	(BWSsat)	0.233	0.230	0.235	0.233
Moisture Fraction	(BWS)	0.233	0.230	0.235	0.233
O2 Concentration, %	(O_2)	20.46	20.48	20.50	20.5
CO2 Concentration, %	(CO_2)	0.12	0.09	0.08	0.1
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.83	28.83	28.83
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.32	26.35	26.29	26.32
Velocity, ft/sec	(Vs)	39.1	39.6	38.7	39.1
VFR at stack conditions, acfm	(Qa)	44,542	45,085	44,132	44,586
VFR at standard conditions, scfh	(Qsw)	2,300,688	2,330,761	2,278,220	2,303,223
VFR at standard conditions, scfm	(Qsw)	38,345	38,846	37,970	38,387
VFR at standard conditions, dscfm	(Qsd)	29,416	29,913	29,037	29,455

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.10	0.19	3.83
Cal Gas Concentration (C_{MA})	10.02	10.09	NA
Pretest System Zero Response	0.13	0.07	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.14	0.08	NA
Pretest System Cal Response	9.91	9.78	NA
Posttest System Cal Response	9.92	9.69	NA
Average Cal Response (C_M)	9.92	9.74	NA
Corrected Run Average (Corr)	20.46	0.12	4.49
8:15	20.27	0.19	2.90
8:16	20.27	0.18	2.98
8:17	20.25	0.18	3.06
8:18	20.23	0.18	3.01
8:19	20.19	0.19	3.11
8:20	20.18	0.19	3.10
8:21	20.16	0.19	3.19
8:22	20.13	0.19	3.27
8:23	20.09	0.20	3.35
8:24	20.08	0.20	3.46
8:25	20.07	0.20	3.55
8:26	20.05	0.20	3.64
8:27	20.02	0.20	3.59
8:28	19.97	0.20	3.69
8:29	20.00	0.20	3.97
8:30	20.06	0.19	3.98
8:31	20.07	0.19	3.97
8:32	20.09	0.19	3.90
8:33	20.11	0.19	3.80
8:34	20.12	0.18	3.60
8:35	20.14	0.18	3.38
8:36	20.14	0.18	3.33
8:37	20.15	0.18	3.45
8:38	20.14	0.19	3.33
8:39	20.12	0.19	3.26
8:40	20.09	0.19	3.38
8:41	20.09	0.20	3.48
8:42	20.05	0.20	3.35
8:43	20.04	0.21	3.24
8:44	20.07	0.19	3.17
8:45	20.09	0.18	3.15
8:46	20.09	0.18	3.09
8:47	20.10	0.18	3.04
8:48	20.14	0.17	3.12
8:49	20.16	0.17	3.13

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
8:50	20.15	0.17	3.02
8:51	20.17	0.17	2.96
8:52	20.13	0.18	3.02
8:53	20.13	0.18	3.04
8:54	20.13	0.18	3.05
8:55	20.14	0.18	3.06
8:56	20.15	0.18	3.08
8:57	20.13	0.18	3.04
8:58	20.14	0.18	3.02
8:59	20.14	0.18	3.07
9:00	20.13	0.18	3.12
9:01	20.15	0.18	3.24
9:02	20.15	0.18	3.20
9:03	20.17	0.18	3.12
9:04	20.15	0.18	3.20
9:05	20.15	0.18	3.17
9:06	20.12	0.18	3.17
9:07	20.12	0.18	3.19
9:08	20.13	0.18	3.26
9:09	20.13	0.18	3.21
9:10	20.11	0.18	3.26
9:11	20.06	0.19	3.32
9:12	20.03	0.19	3.34
9:13	20.07	0.19	3.44
9:14	20.07	0.19	3.47
9:15	20.03	0.20	3.49
9:16	20.03	0.20	3.42
9:17	20.09	0.19	3.49
9:18	20.10	0.19	3.48
9:19	20.15	0.18	3.49
9:20	20.18	0.18	3.46
9:21	20.15	0.19	3.47
9:22	20.10	0.19	3.49
9:23	20.12	0.19	3.41
9:24	20.15	0.19	3.40
9:25	20.13	0.19	3.52
9:26	20.15	0.19	3.58
9:27	20.08	0.20	3.54
9:28	19.93	0.22	3.61
9:29	19.90	0.22	3.73
9:30	19.93	0.22	3.78
9:31	19.82	0.24	3.90
9:32	19.80	0.24	4.04
9:33	19.81	0.24	4.04
9:34	19.93	0.22	3.97

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
9:35	20.02	0.21	3.86
9:36	20.06	0.20	3.76
9:37	20.10	0.19	3.72
9:38	20.11	0.19	3.65
9:39	20.10	0.19	3.58
9:40	20.09	0.19	3.58
9:41	20.13	0.18	3.60
9:42	20.14	0.18	3.54
9:43	20.15	0.18	3.53
9:44	20.11	0.19	3.51
9:45	20.11	0.19	3.59
9:46	20.12	0.18	3.68
9:47	20.07	0.19	3.66
9:48	20.03	0.20	3.71
9:49	20.09	0.19	3.71
9:50	20.11	0.19	3.76
9:51	20.16	0.18	3.78
9:52	20.15	0.18	3.81
9:53	20.14	0.18	3.78
9:54	20.11	0.19	3.76
9:55	20.14	0.19	3.75
9:56	20.16	0.19	3.68
9:57	20.14	0.20	3.76
9:58	20.11	0.20	3.80
9:59	20.13	0.20	3.76
10:00	20.17	0.19	3.71
10:01	20.16	0.20	3.73
10:02	20.14	0.22	3.75
10:03	20.16	0.20	3.91
10:04	20.08	0.22	4.02
10:05	20.07	0.23	4.08
10:06	20.09	0.23	4.12
10:07	20.13	0.21	4.14
10:08	20.15	0.19	4.23
10:09	20.15	0.20	4.21
10:10	20.12	0.21	4.29
10:11	20.11	0.22	4.29
10:12	20.10	0.22	4.28
10:13	20.11	0.20	4.31
10:14	20.11	0.21	4.28
10:15	20.05	0.23	4.28
10:16	20.05	0.21	4.33
10:17	20.12	0.20	4.25
10:18	20.10	0.22	4.23
10:19	20.10	0.20	4.25

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
10:20	20.09	0.20	4.26
10:21	20.11	0.20	4.36
10:22	20.15	0.18	4.38
10:23	20.11	0.18	4.34
10:24	20.09	0.19	4.30
10:25	20.09	0.19	4.37
10:26	20.12	0.18	4.49
10:27	20.16	0.18	4.39
10:28	20.16	0.18	4.29
10:29	20.10	0.18	4.25
10:30	20.05	0.19	4.32
10:31	20.02	0.19	4.37
10:32	20.02	0.19	4.43
10:33	20.02	0.20	4.46
10:34	20.03	0.20	4.55
10:35	20.06	0.20	4.61
10:36	20.08	0.19	4.65
10:37	20.11	0.18	4.64
10:38	20.07	0.19	4.61
10:39	20.06	0.18	4.58
10:40	20.10	0.18	4.56
10:41	20.11	0.19	4.60
10:42	20.13	0.18	4.55
10:43	20.12	0.18	4.53
10:44	20.10	0.18	4.51
10:45	20.07	0.19	4.49
10:46	20.08	0.18	4.48
10:47	20.10	0.18	4.56
10:48	20.10	0.18	4.50
10:49	20.12	0.18	4.50
10:50	20.15	0.19	4.37
10:51	20.14	0.19	4.29
10:52	20.11	0.19	4.19
10:53	20.10	0.19	4.34
10:54	20.02	0.20	4.34
10:55	20.04	0.21	4.40
10:56	20.07	0.21	4.41
10:57	20.17	0.19	4.47
10:58	20.11	0.19	4.51
10:59	20.11	0.18	4.41
11:00	20.08	0.20	4.43
11:01	20.08	0.21	4.61
11:02	20.03	0.22	4.64
11:03	20.05	0.20	4.62
11:04	20.10	0.19	4.66

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
11:05	20.11	0.18	4.65
11:06	20.14	0.18	4.58
11:07	20.12	0.20	4.58
11:08	20.14	0.19	4.49
11:09	20.20	0.20	4.44
11:10	20.17	0.19	4.51
11:11	20.20	0.17	4.50
11:12	20.24	0.16	4.47
11:13	20.23	0.17	4.43
11:14	20.23	0.17	4.42

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.12	0.17	4.95
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.08	NA
Posttest System Zero Response	0.15	0.09	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.69	NA
Posttest System Cal Response	9.92	9.68	NA
Average Cal Response (C_M)	9.92	9.69	NA
Corrected Run Average (Corr)	20.48	0.09	5.72
11:35	20.16	0.20	4.78
11:36	20.21	0.20	4.72
11:37	20.21	0.18	4.64
11:38	20.19	0.18	4.57
11:39	20.19	0.18	4.55
11:40	20.19	0.18	4.62
11:41	20.24	0.17	4.52
11:42	20.20	0.19	4.52
11:43	20.20	0.18	4.49
11:44	20.21	0.17	4.46
11:45	20.21	0.17	4.49
11:46	20.23	0.16	4.51
11:47	20.22	0.17	4.52
11:48	20.17	0.18	4.43
11:49	20.07	0.20	4.53
11:50	20.13	0.19	4.48
11:51	20.14	0.20	4.52
11:52	20.15	0.20	4.54
11:53	20.20	0.17	4.54
11:54	20.27	0.16	4.53
11:55	20.26	0.16	4.58
11:56	20.22	0.16	4.56
11:57	20.18	0.16	4.57
11:58	20.16	0.17	4.59
11:59	20.19	0.16	4.63
12:00	20.21	0.16	4.64
12:01	20.23	0.17	4.68
12:02	20.21	0.18	4.70
12:03	20.21	0.17	4.74
12:04	20.21	0.17	4.65
12:05	20.21	0.18	4.60
12:06	20.16	0.20	4.58
12:07	19.99	0.23	4.72
12:08	20.01	0.20	4.81
12:09	20.05	0.19	4.87

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:10	20.06	0.19	5.00
12:11	20.10	0.18	5.06
12:12	20.17	0.17	5.01
12:13	20.22	0.17	4.93
12:14	20.20	0.17	4.87
12:15	20.20	0.17	4.95
12:16	20.23	0.16	4.82
12:17	20.24	0.16	4.73
12:18	20.24	0.16	4.66
12:19	20.27	0.16	4.69
12:20	20.25	0.16	4.68
12:21	20.18	0.17	4.74
12:22	20.20	0.16	4.79
12:23	20.14	0.17	4.67
12:24	20.15	0.17	4.75
12:25	20.19	0.16	4.75
12:26	20.19	0.16	4.78
12:27	20.18	0.17	4.91
12:28	20.17	0.17	4.94
12:29	20.17	0.16	4.90
12:30	20.18	0.16	4.87
12:31	20.16	0.17	4.87
12:32	20.19	0.16	4.95
12:33	20.22	0.16	4.93
12:34	20.23	0.16	4.94
12:35	20.23	0.16	4.91
12:36	20.21	0.16	4.87
12:37	20.22	0.15	4.65
12:38	20.25	0.15	4.35
12:39	20.23	0.15	4.31
12:40	20.22	0.15	4.43
12:41	20.16	0.16	4.53
12:42	20.05	0.18	4.59
12:43	19.92	0.19	4.76
12:44	19.90	0.19	4.86
12:45	19.97	0.18	4.97
12:46	20.06	0.17	4.92
12:47	20.11	0.16	4.93
12:48	20.12	0.16	4.97
12:49	20.18	0.15	4.94
12:50	20.22	0.15	4.96
12:51	20.23	0.15	4.89
12:52	20.21	0.15	4.80
12:53	20.18	0.16	4.72
12:54	20.13	0.16	4.72

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:55	20.11	0.17	4.68
12:56	20.07	0.17	4.74
12:57	20.08	0.17	4.76
12:58	20.02	0.17	4.83
12:59	19.94	0.18	4.96
13:00	19.97	0.18	5.01
13:01	19.94	0.18	4.99
13:02	19.97	0.18	5.08
13:03	20.01	0.17	5.21
13:04	20.05	0.17	5.33
13:05	20.09	0.16	5.35
13:06	20.11	0.16	5.40
13:07	20.11	0.16	5.39
13:08	20.11	0.16	5.35
13:09	20.09	0.16	5.30
13:10	20.07	0.17	5.25
13:11	20.08	0.17	5.24
13:12	20.02	0.18	5.32
13:13	19.98	0.18	5.37
13:14	20.01	0.17	5.39
13:15	19.98	0.18	5.51
13:16	19.95	0.18	5.59
13:17	20.00	0.18	5.53
13:18	20.06	0.17	5.50
13:19	20.06	0.17	5.51
13:20	20.03	0.18	5.42
13:21	20.08	0.18	5.37
13:22	20.08	0.17	5.37
13:23	20.05	0.18	5.35
13:24	20.11	0.17	5.16
13:25	20.15	0.17	5.14
13:26	20.17	0.17	5.14
13:27	20.18	0.17	5.10
13:28	20.18	0.17	5.13
13:29	20.20	0.17	5.22
13:30	20.20	0.17	5.14
13:31	20.17	0.17	5.13
13:32	20.14	0.17	5.16
13:33	20.16	0.18	5.17
13:34	20.17	0.17	5.11
13:35	20.14	0.18	5.15
13:36	20.13	0.18	5.06
13:37	20.10	0.19	5.06
13:38	20.15	0.18	5.10
13:39	20.20	0.17	5.10

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
13:40	20.22	0.16	5.02
13:41	20.21	0.17	4.90
13:42	20.18	0.17	4.88
13:43	20.18	0.17	4.86
13:44	20.13	0.17	4.86
13:45	20.11	0.18	4.87
13:46	20.14	0.18	4.93
13:47	20.12	0.18	4.90
13:48	20.15	0.18	4.87
13:49	20.15	0.17	4.92
13:50	20.16	0.17	4.86
13:51	20.16	0.17	4.86
13:52	20.14	0.17	4.95
13:53	20.13	0.17	4.97
13:54	20.08	0.18	5.00
13:55	20.00	0.19	4.97
13:56	19.97	0.19	5.02
13:57	19.96	0.19	5.07
13:58	19.94	0.19	5.01
13:59	19.96	0.19	5.08
14:00	19.99	0.18	5.17
14:01	20.01	0.18	5.26
14:02	20.01	0.18	5.34
14:03	19.96	0.19	5.33
14:04	19.91	0.19	5.45
14:05	19.97	0.18	5.53
14:06	20.00	0.18	5.32
14:07	19.99	0.18	5.28
14:08	20.02	0.18	5.25
14:09	19.98	0.18	5.25
14:10	20.00	0.18	5.31
14:11	20.03	0.18	5.29
14:12	19.98	0.19	5.24
14:13	20.04	0.18	5.23
14:14	19.97	0.19	5.16
14:15	19.97	0.19	5.25
14:16	20.02	0.18	5.28
14:17	20.01	0.18	5.22
14:18	20.05	0.17	5.17
14:19	20.07	0.17	5.14
14:20	20.06	0.17	5.10
14:21	20.07	0.17	5.18
14:22	20.08	0.17	5.25
14:23	20.07	0.17	5.23
14:24	20.03	0.17	5.07

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
14:25	20.03	0.17	4.96
14:26	20.05	0.17	4.98
14:27	20.13	0.16	4.94
14:28	20.15	0.16	4.93
14:29	20.16	0.16	4.95
14:30	20.19	0.16	4.95
14:31	20.21	0.15	4.90
14:32	20.20	0.16	4.87
14:33	20.22	0.15	4.85
14:34	20.22	0.15	4.70

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.16	0.16	5.31
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.09	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.68	NA
Posttest System Cal Response	9.95	9.65	NA
Average Cal Response (C_M)	9.94	9.67	NA
Corrected Run Average (Corr)	20.50	0.08	5.91
14:58	20.01	0.20	4.79
14:59	19.99	0.20	4.82
15:00	20.00	0.20	4.85
15:01	20.01	0.19	4.81
15:02	20.04	0.19	4.80
15:03	20.06	0.18	4.78
15:04	20.06	0.18	4.78
15:05	20.07	0.18	4.84
15:06	20.12	0.17	4.86
15:07	20.14	0.17	4.96
15:08	20.16	0.17	4.99
15:09	20.13	0.17	4.90
15:10	20.12	0.17	4.93
15:11	20.14	0.17	4.91
15:12	20.18	0.16	4.83
15:13	20.23	0.16	4.77
15:14	20.22	0.16	4.73
15:15	20.26	0.15	4.72
15:16	20.25	0.16	4.59
15:17	20.26	0.15	4.48
15:18	20.28	0.15	4.42
15:19	20.24	0.15	4.41
15:20	20.27	0.14	4.35
15:21	20.28	0.15	4.39
15:22	20.23	0.15	4.53
15:23	20.31	0.14	4.50
15:24	20.18	0.16	4.53
15:25	20.09	0.17	4.67
15:26	20.05	0.18	4.71
15:27	19.95	0.19	4.80
15:28	19.96	0.18	4.93
15:29	19.94	0.19	5.02
15:30	19.96	0.18	5.31
15:31	20.00	0.17	5.56
15:32	20.05	0.17	5.58

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
15:33	20.10	0.16	5.51
15:34	20.16	0.16	5.41
15:35	20.19	0.15	5.40
15:36	20.20	0.15	5.37
15:37	20.21	0.15	5.28
15:38	20.24	0.15	5.17
15:39	20.21	0.15	5.15
15:40	20.20	0.15	5.20
15:41	20.17	0.15	5.15
15:42	20.17	0.15	5.16
15:43	20.19	0.15	5.05
15:44	20.20	0.14	4.97
15:45	20.20	0.14	5.00
15:46	20.21	0.14	4.90
15:47	20.19	0.15	4.92
15:48	20.24	0.14	4.68
15:49	20.22	0.15	4.60
15:50	20.20	0.15	4.63
15:51	20.16	0.16	4.63
15:52	20.15	0.16	4.63
15:53	20.17	0.16	4.66
15:54	20.19	0.15	5.06
15:55	20.22	0.15	5.10
15:56	20.22	0.15	5.13
15:57	20.21	0.15	5.09
15:58	20.20	0.15	4.92
15:59	20.18	0.16	4.91
16:00	20.17	0.16	5.00
16:01	20.19	0.15	4.98
16:02	20.18	0.16	4.89
16:03	20.19	0.15	4.87
16:04	20.21	0.15	4.89
16:05	20.23	0.15	4.84
16:06	20.25	0.15	4.81
16:07	20.27	0.14	4.85
16:08	20.29	0.14	4.91
16:09	20.28	0.14	4.83
16:10	20.28	0.14	4.76
16:11	20.30	0.14	4.85
16:12	20.31	0.14	4.89
16:13	20.28	0.14	4.79
16:14	20.27	0.14	4.70
16:15	20.24	0.15	4.69
16:16	20.24	0.15	4.73
16:17	20.24	0.15	4.93

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
16:18	20.16	0.16	5.01
16:19	20.13	0.16	4.93
16:20	20.15	0.16	4.95
16:21	20.11	0.17	4.98
16:22	20.09	0.17	5.06
16:23	20.04	0.17	5.23
16:24	19.93	0.19	5.39
16:25	19.91	0.20	5.53
16:26	19.96	0.19	5.63
16:27	20.00	0.19	5.72
16:28	20.06	0.18	5.89
16:29	20.12	0.17	6.01
16:30	20.10	0.17	5.94
16:31	20.13	0.17	5.88
16:32	20.11	0.18	5.78
16:33	19.99	0.19	5.78
16:34	19.89	0.21	5.95
16:35	19.91	0.21	6.06
16:36	19.96	0.19	6.07
16:37	20.02	0.18	6.04
16:38	20.07	0.18	6.15
16:39	20.09	0.17	6.07
16:40	20.11	0.16	5.95
16:41	20.17	0.16	5.92
16:42	20.19	0.15	5.79
16:43	20.17	0.16	5.66
16:44	20.21	0.15	5.57
16:45	20.23	0.15	5.43
16:46	20.26	0.15	5.31
16:47	20.26	0.15	5.16
16:48	20.27	0.15	5.07
16:49	20.28	0.15	5.03
16:50	20.26	0.15	4.97
16:51	20.26	0.15	5.08
16:52	20.28	0.15	5.16
16:53	20.28	0.15	5.10
16:54	20.29	0.15	5.06
16:55	20.31	0.15	5.10
16:56	20.30	0.16	5.05
16:57	20.24	0.16	4.98
16:58	20.10	0.18	4.92
16:59	19.97	0.20	4.88
17:00	19.91	0.20	5.33
17:01	19.92	0.20	5.99
17:02	19.96	0.19	6.20

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:03	20.01	0.17	6.25
17:04	20.06	0.17	6.23
17:05	20.07	0.16	6.12
17:06	20.05	0.16	6.12
17:07	20.01	0.17	6.20
17:08	20.09	0.16	6.22
17:09	20.13	0.16	6.13
17:10	20.18	0.15	6.07
17:11	20.19	0.15	6.08
17:12	20.18	0.15	5.96
17:13	20.19	0.15	5.93
17:14	20.17	0.16	5.90
17:15	20.15	0.16	5.90
17:16	20.13	0.16	5.87
17:17	20.17	0.16	5.95
17:18	20.13	0.16	5.84
17:19	20.13	0.16	5.85
17:20	20.14	0.17	6.02
17:21	20.13	0.17	6.18
17:22	20.15	0.17	6.14
17:23	20.16	0.16	6.02
17:24	20.16	0.16	6.00
17:25	20.13	0.17	5.95
17:26	20.15	0.16	5.87
17:27	20.15	0.16	5.84
17:28	20.17	0.16	5.89
17:29	20.23	0.15	5.91
17:30	20.23	0.15	5.89
17:31	20.25	0.14	5.91
17:32	20.24	0.15	5.83
17:33	20.20	0.15	5.74
17:34	20.19	0.15	5.65
17:35	20.18	0.15	5.72
17:36	20.20	0.15	5.73
17:37	20.17	0.16	5.69
17:38	20.15	0.16	5.72
17:39	20.22	0.15	5.71
17:40	20.26	0.15	5.67
17:41	20.27	0.15	5.74
17:42	20.26	0.15	5.72
17:43	20.28	0.15	5.62
17:44	20.30	0.15	5.69
17:45	20.29	0.15	5.61
17:46	20.28	0.15	5.49
17:47	20.29	0.15	5.31

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:48	20.28	0.15	5.42
17:49	20.29	0.15	5.47
17:50	20.27	0.15	5.54
17:51	20.28	0.15	5.25
17:52	20.28	0.15	5.11
17:53	20.28	0.15	5.20
17:54	20.28	0.15	5.17
17:55	20.27	0.15	5.20
17:56	20.26	0.15	5.35
17:57	20.26	0.15	5.40

Appendix C - QA/QC

M205 QA Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date

Method Criteria	EPA
Parameter	O_2
Make	Servomex
Model	4900
S/N	900006
Span	19.9
Cylinder Number ID	
Zero	NA
Mid	CC780763
High	EB0074264
Cylinder Certified Values	
Zero	0.00
Mid	10.02
High	19.90
Instrument Response (% or ppm)	
Zero	0.00
Mid	10.04
High	19.91
Calibration Gas Selection (% of Span)	
Mid	50.4
High	100.0
Calibration Error Performance (% of Span)	
Zero	0.0
Mid	0.1
High	0.1
Linearity (% of Range)	
	0.1

Environics ID:	8033
Environics MFC Configuration:	10L, 10L, 1L
Component/Balance Gas:	O_2/N_2
Cylinder Gas ID (Dilution):	EB0074264
Cylinder Gas Concentration (Dilution), %:	19.90
Cylinder Gas ID (Mid-Level):	CC780763
Cylinder Gas Concentration (Mid-Level), %:	10.02

Target Mass Flow Contollers	Target Dilution (%)	Target Flow Rate lpm	Target Concentration (%)	Actual Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)
10L/10L*	90.0	7.0	17.9	17.9	17.95	18.04	18.08	18.02	0.12
10L/10L*	50.0	7.0	10.0	10.0	10.01	10.06	10.04	10.04	0.04
10L/1L	20.0	4.0	4.0	4.0	3.98	3.98	3.95	3.97	-0.03
10L/1L	10.0	4.0	2.0	2.0	1.99	2.05	2.04	2.03	0.03

*Not all AST Environics Units have 2-10L Mass Flow Controllers. For these units the 90% @ 7lpm and 80% @ 7lpm injections will not be conducted.

Average Analyzer Concentration (%)	Injection 1 Error (±2%)	Injection 2 Error (±2%)	Injection 3 Error (±2%)
18.02	-0.4%	0.1%	0.3%
10.04	-0.3%	0.2%	0.0%
3.97	0.3%	0.3%	-0.5%
2.03	-1.8%	1.2%	0.7%

Mid-Level Supply Gas Calibration Direct to Analyzer

Calibration Gas Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)	Average Error (±2%)
10.02	10.05	10.07	10.04	10.05	0.03	0.3%

Location Graphic Packaging International Texarkana Mill - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
10/28/25	PT-201-7	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
10/28/25	PR-208-1	145.0	147.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
10/28/25	Weather Station	NA	NA	NA	Texarkana, TX

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Make	Servomex	Servomex	Ametek
Model	4900	4900	9900
S/N	900006	900006	S13821
Operating Range	0-25	0-25	0-100
Cylinder ID			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	CC780763	CC780763	CC331726
High	EB0074264	EB0074264	CC331726
Cylinder Certified Values			
Zero	0.0	0.0	0.0
Low	NA	NA	NA
Mid	10.02	10.09	125.6
High	19.9	19.83	125.6
Cylinder Expiration Date			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	9/16/33	9/16/33	3/7/27
High	8/12/32	8/12/32	3/7/27
Type of Sample Line	Unheated Sample Line		

Stratification Check

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	8:15	20.27	0.19
2	8:17	20.25	0.18
3	8:19	20.19	0.19
Average		20.2	0.2
Criteria Met		Single Point	Single Point

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Expected Average Concentration	19.00	1.00	7.00
Span Between			
Low	19.00	1.00	7.00
High	95.00	20.00	35.00
Desired Span	19.90	19.83	30.00
Low Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Mid Range Gas			
Low	7.96	7.93	12.00
High	11.94	11.90	18.00
High Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Actual Concentration (% or ppm)			
Zero	0.00	0.00	0.00
Low	NA	NA	NA
Mid	10.02	10.09	15.00
High	19.90	19.83	30.00
Response Time (seconds)	45.00	45.00	45.00
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid
Instrument Response (% or ppm)			
Zero	-0.03	0.01	0.15
Low	NA	NA	NA
Mid	9.96	9.90	15.61
High	19.88	19.74	30.22
Performance (% of Span or Cal. Gas Conc.)			
Zero	0.15	0.05	0.50
Low	NA	NA	NA
Mid	0.30	0.96	2.03
High	0.10	0.45	0.73
Status			
Zero	PASS	PASS	PASS
Low	NA	NA	NA
Mid	PASS	PASS	PASS
High	PASS	PASS	PASS

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 10/28/25		
Span Value	19.90	19.83
Initial Instrument Zero Cal Response	-0.03	0.01
Initial Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.13	0.07
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.91	9.78
Posttest System Upscale Response	9.92	9.69
Bias (%)		
Pretest Zero	0.80	0.30
Posttest Zero	0.90	0.35
Pretest Span	-0.25	-0.61
Posttest Span	-0.20	-1.06
Drift (%)		
Zero	0.10	0.05
Mid	0.05	-0.45
Run 2 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.08
Posttest System Zero Response	0.15	0.09
Pretest System Upscale Response	9.92	9.69
Posttest System Upscale Response	9.92	9.68
Bias (%)		
Pretest Zero	0.90	0.35
Posttest Zero	0.90	0.40
Pretest Span	-0.20	-1.06
Posttest Span	-0.20	-1.11
Drift (%)		
Zero	0.00	0.05
Mid	0.00	-0.05
Run 3 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.09
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.92	9.68
Posttest System Upscale Response	9.95	9.65
Bias (%)		
Pretest Zero	0.90	0.40
Posttest Zero	0.90	0.35
Pretest Span	-0.20	-1.11
Posttest Span	-0.05	-1.26
Drift (%)		
Zero	0.00	-0.05
Mid	0.15	-0.15

Post Test Calibration Drift Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter		TRS (w SO2 gas) - Outlet
Actual Concentration (ppm)		
Mid		15.0
Instrument Response (ppm)		
Mid	**Initial**	15.6
	Post Test	15.7
Performance (% of Calibration Gas)		
Mid		0.3
Status		
Mid		PASS

Note: TRS calibrations were conducted using SO2/N2 calibration gas. Analyzer calibration drift was calculated by evaluating the initial instrument response versus the final instrument response. Performance is acceptable if this value is less than or equal to 3% or 0.5 ppmv.

System Performance Determinations

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	TRS - Outlet
H2S Gas Concentration, ppm	26
Cylinder Certification Number	CC194342
Run 1	
Pretest System Response, ppm	24.67
Posttest System Response, ppm	22.18
Pretest System Performance (%)	94.9
Posttest System Performance (%)	85.3
Run 2	
Posttest System Response, ppm	22.47
Posttest System Performance (%)	86.4
Run 3	
Posttest System Response, ppm	23.36
Posttest System Performance (%)	89.8

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Response Times, seconds			
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**	**TRS - Outlet**
Zero	35	35	45
Low	NA	NA	NA
Mid	35	35	45
Average	35.0	35.0	45.0

Alliance
SOURCE TESTING

Mass Flow Controller Calibration

Dilution System Make:	Environics
Dilution System Model:	4040
Dilution System S/N:	8033
Calibration Equipment Make:	Alicat Scientific
Calibration Equipment Model:	M-10SLPD/5MM-D/5M, M-1SLPM-D/5
Calibration Equipment S/N:	NC00075907 / NC0007908
Flow Cell S/N:	272121
Flow Cell S/N:	272120
Calibration Gas:	Nitrogen
Barometric Pressure, mmHg:	29.94
Ambient Temperature, °F:	68

Mass Flow Controller ID	#1			# 2			# 3		
Size, ccm:	10,000			10,000			1,000		
Make:	Environics			Environics			Environics		
Model:	EFC 202			EFC 202			EFC 202		
S/N:	455242005			455242006			455238003		
	Set Flow cc/min	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**
5%	500	494	1.2%	500	490	2.0%	50	48	4.0%
10%	1,000	1,006	0.6%	1,000	1,004	0.4%	100	97	3.0%
20%	2,000	2,025	1.3%	2,000	2,025	1.3%	200	195	2.5%
30%	3,000	3,046	1.5%	3,000	3,040	1.3%	300	294	2.0%
40%	4,000	4,050	1.3%	4,000	4,050	1.3%	400	391	2.3%
50%	5,000	5,066	1.3%	5,000	5,070	1.4%	500	490	2.0%
60%	6,000	6,086	1.4%	6,000	6,088	1.5%	600	589	1.8%
70%	7,000	7,103	1.5%	7,000	7,111	1.6%	700	691	1.3%
80%	8,000	8,133	1.7%	8,000	8,130	1.6%	800	795	0.6%
90%	9,000	9,167	1.9%	9,000	9,170	1.9%	900	904	0.4%
100%	10,000	10,202	2.0%	10,000	10,193	1.9%	1,000	1,016	1.6%

Note: The mass flow controller's calibration values are used by the dilution system's operating software to improve accuracy. These calibrations are not necessarily indicative of the systems overall performance. Performance is verified by conducting a Method 205 prior to each field use.

Calibration Performed By Timothy Branham

Date 2/21/25

Equipment Detail

Model: Type S
ID: 201-7

Calibration Detail

Time: 9:18
T_s: 69 °F
Pb: 29.47 in. Hg
Std Pitot ID: DAL 1
C_{pstd}: 0.990

Flow	ΔPstd			High Side - "A"			Low Side - 'B"		
	Standard	Start	End	ΔPs		σ	ΔPs		σ
fps	in. WC	in. WC	in. WC	in. WC	Cp(a)	Deviation	in. WC	Cp(b)	Deviation
20	0.09	0.09	0.09	0.13	0.840	0.002	0.13	0.840	0.007
30	0.20	0.20	0.20	0.29	0.829	-0.009	0.29	0.822	-0.011
40	0.36	0.36	0.36	0.51	0.832	-0.006	0.51	0.832	-0.001
50	0.56	0.56	0.56	0.78	0.839	0.001	0.79	0.834	0.001
60	0.81	0.81	0.81	1.15	0.831	-0.007	1.15	0.831	-0.002
70	1.10	1.10	1.10	1.50	0.848	0.010	1.55	0.834	0.001
80	1.44	1.44	1.44	2.00	0.840	0.002	2.00	0.840	0.007
90	1.82	1.82	1.83	2.50	0.846	0.008	2.60	0.829	-0.004
EPA Method 2 Section 10.1.3 QA/QC									
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.826	-0.007
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.829	-0.004
				Average	0.838	0.006		0.833	0.004
				Acceptability Criteria	--	≤ 0.01		--	≤ 0.01
					|Cp(a)-Cp(b)|≤ 0.01			|Cp(a)-Cp(b)|=	0.005

Personnel

Calibrated By: Alaina Drouin
Calibration Date: 12/30/24
Reviewed By: Timothy Branham

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12025

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC780763	**Certification Date:**	09/18/2025
Product ID Number:	124300	**Expiration Date:**	09/16/2033
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC780763.20250911-0	**Lot Number:**	CC780763.20250911
Customer PO. NO.:		**Tracking Number:**	113447110
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.09 %**	±0.08 %	NDIR	09/18/2025
Oxygen	**10.02 %**	±0.03 %	MPA	09/18/2025
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726840	CC726840.20211123	04/18/2031	GMIS	N2	O2	9.35 %	0.163	SRM 2659a
CC770488	CC770488.20240512	02/02/2033	GMIS	N2	O2	24.01 %	0.145	C2459101.03
EB0073532	EB0073532.20230816	09/17/2032	GMIS	N2	CO2	9.47 %	0.176	C2281801.04
EB0078951	EB0078951.20230816	09/17/2032	GMIS	N2	CO2	12.44 %	0.227	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i-HL	1162980025	09/08/2025
CO2	NDIR	Thermo	410i-HL	1162980025	09/10/2025

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0074264	**Certification Date:**	08/14/2024
Product ID Number:	124240	**Expiration Date:**	08/12/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0074264.20240730-0	**Lot Number:**	EB0074264.20240730
Customer PO. NO.:		**Tracking Number:**	084251978
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.83 %**	±0.08 %	FTIR	08/14/2024
Oxygen	**19.90 %**	±0.04 %	MPA	08/08/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
EB0022009	EB0022009.20201022	04/05/2030	GMIS	N2	CO2	24.76 %	0.237	C1847810.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/07/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	08/14/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Airgas Specialty Gases
Airgas USA LLC
9810 BAY AREA BLVD
Pasadena, TX 77507
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	GRAPHIC PACKAGING INTERNATIONAL		
Part Number:	E02NI99E15A0005	Reference Number:	163-401487138-1
Cylinder Number:	CC331726	Cylinder Volume:	144.4 CF
Laboratory:	124 - Pasadena (SG06) - TX	Cylinder Pressure:	2015 PSIG
PGVP Number:	A32019	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	May 07, 2019

Expiration Date: May 07, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	125.0 PPM	125.6 PPM	G1	+/- 0.8% NIST Traceable	04/30/2019, 05/07/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11010402	KAL004739	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Jul 28, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SO2-L-NICOLET iS50 AUP2010248	FTIR	Apr 13, 2019

Triad Data Available Upon Request

Signature on file

Approved for Release

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE
NORTH LITTLE ROCK, AR

Blend Type:	GAS	MOL	
Pressure:	1800	psia	**Sales Order: 1394449**
Volume:	125.0	cf	
Dew Point:	0 C		**RBTGS Part No.:** 130254

Cylinder Size: I-150
Valve Outlet: CGA 330 SS
Cylinder No.: **CC194342**
Bar Code No.: 040319029

Lot No.: RR2503141153
Analysis Date: March 24, 2025
Date Issued: March 24, 2025
Expiration Date: March 24, 2026

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Hydrogen Sulfide	7783-06-4	25.0	ppm	26.0	31.4	26.0	ppm	2%	G
Oxygen	7782-44-7	5.0	%	5.10	5.78	5.10	%	2%	H
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical H2S Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Appendix D - Facility Data

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	10/28/2025 14:58:00 PM	10/28/25 11:35	10/28/25 8:15	
	End Time:	10/28/25 17:58	10/28/25 14:35	10/28/25 11:15	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	657.19	656.52	663.25	659.0
FIC2037E.pv	Pri. Air load -- Total (kpph)	372.32	377.74	372.32	374.1
FIC2038E.pv	Sec. Air load (kpph)	332.76	331.01	331.99	331.9
FIC2039E.pv	Tertiary Air load (kpph)	195.07	195.46	197.83	196.1
AT2197E.pv	Excess O2	2.64	2.47	2.48	2.5
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.20	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	75.33	75.54	74.73	75.2
SIC2085E.pv	"B" I.D. fan speed (rpm)	76.15	76.37	75.54	76.0
FY2103E.pv	Bl. Liq. Burn flow (gpm)	408.46	408.93	413.13	410.2
NM2102E.pv	Bl. Liq. % density (%)	71.92	71.85	71.32	71.7
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	259.22	258.75	259.05	259.0
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	95.05	95.04	95.07	95.1
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	81.72	78.89	73.06	77.9
FT2004E.pv	Weak Wash flow to scrubber (gpm)	94.46	87.14	87.83	89.8
TT2268E.PV	Precip. Ash Tank Temp. (F)	224.93	224.46	224.04	224.5
IT3028e.pv	Scrubber fan amps	45.79	45.62	45.26	45.6

Appendix E - Test Plan

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source to be Tested:
No. 2 Smelt Tank Scrubber (SM02)

Proposed Test Dates:
October 29, 2025

Project No. AST-2025-4218

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citation	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameter*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Test Plan/Report Reviewer
Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing will be conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NSPS.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NSPS, the facility will conduct a performance test program to determine the compliance status of the No. 2 Smelt Tank Scrubber (SM02).

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3A, 4, and 16C. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the TCEQ Air Permit Nos. 2975 and PSDTX778M2 and 40 CFR 60, Subpart BBa.
- Emissions testing will be conducted on the exhaust of the No. 2 Smelt Tank Scrubber (SM02).
- Performance testing will be conducted at the maximum normal operation load.
- Each of the three (3) test runs will be approximately 3 hours in duration.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – October 29, 2025					
Equipment Setup & Pretest QA/QC Checks					12 hr
No. 2 Smelt Tank Scrubber (SM02)	VFR	1-2	3	180 min	
	O_2/CO_2	3A			
	BWS	4			
	TRS	16C			
DAY 2 – October 30, 2025					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
No. 2 Smelt Tank Scrubber (SM02)	TRS – 0.033 lb/ton of black liquor solids (BLS) as hydrogen sulfide (H_2S)	60, Subpart BBa
	TRS – 3.28 lb/hr	TCEQ Permit Nos. 2975 and PSDTX778M2

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Total Reduced Sulfur	16C	Instrumental Analysis

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with a verification measurement provided by the Field Team Leader.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3A. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line is used, then a portable non-contact condenser will be placed in the system directly after the probe. Otherwise, a heated Teflon sample line will be used. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a

known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Method 16C – Total Reduced Sulfur

The total reduced sulfur testing will be conducted in accordance with U.S. EPA Reference Test Method 16C. Data will be collected online and reported in one-minute averages during each test run. The sampling system will consist of a heated Teflon-lined probe, gas conditioning system, Teflon sample line(s), tube furnace and the identified analyzer. The gas conditioning system will consist of three (3) chilled Teflon impingers. The first and second impingers will contain 100 mL of citrate buffer solution while the third impinger will be empty. The citrate buffer solution will be used to remove any sulfur dioxide that will be present in the stack gas. The tube furnace will be operated at 800°C ±100°C. The quality control measures are described in Section 3.6.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Direct Calibration & Calibration Error Test

Low-Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. Next, Low-Level gas will be introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) will be recorded. If the Low-Level gas is zero gas, the acceptable response must be 5.0 percent of the upscale gas concentration or 0.5% (whichever was less restrictive). The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. The measurement system response time and initial system bias will be determined from these data. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe. After the analyzer response is stable, the value will be recorded. Next, Low-Level gas will be introduced at the probe, and the analyzer value will be recorded once it reaches a stable response. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference or the data is invalidated, and the Calibration Error Test and System Bias must be repeated.

Post Test Drift Checks

The Drift between pre- and post-run System Bias must be within 3 percent of the Calibration Span or 0.5% absolute difference or the Calibration Error Test and System Bias must be repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check will be conducted prior to initiating testing. The pollutant concentrations will be measured at twelve traverse points (as described in Method 1) or three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point will be sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point do not differ more than 5% or 0.3% (whichever is less restrictive) of the average pollutant concentration, then single point sampling will be conducted during the test runs. If the pollutant concentration does not meet these specifications but differs less than 10% or 0.5% from the average concentration, then three (3) point sampling will be conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differs by more than 10% or 0.5% from the average concentration, then sampling will be conducted at a minimum of twelve (12) traverse points. Copies of stratification check data will be included in the Quality Assurance/Quality Control Appendix of the report.

Data Collection

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 16C

EPA Protocol 1 Calibration Gases

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Direct Calibration

Low-Level sulfur dioxide (SO_2) gas will be introduced directly to analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading will be stable, the analyzer value will be recorded. This process will be repeated for the Mid-Level gas. Next, High-Level gas will be introduced directly to the analyzer, and the response recorded when it will be stable. All values will be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

System Performance Check

A system performance check will be completed prior to sample collection and after each run. The post-test system performance check will be conducted prior to making any sampling system modifications. The SO_2 scrubber system will be pre-conditioned with stack gas for approximately 10 minutes at 2 liters/min. Prior to starting the test run, Hydrogen Sulfide calibration gas ($\leq$ 100 ppmv) will be introduced at the probe tip and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever will be less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The system performance check will be repeated after the conclusion of each test run. The system performance must be within 80 and 120 percent of the calibration gas concentration. The raw run data will be corrected using the post-test system performance values.

Post-Test Direct Calibration Drift Check

Following the completion testing, a post-test calibration drift check will be performed. Mid-level SO_2 calibration gas will be introduced directly to the analyzer. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The drift value did not differ from the certified calibration gas value by more than 3% or 0.5 ppmv.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.

- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

Appendix F - Field Raw Data

Scaling	0-25	0-25	0-1000
Daisy Lab Channel	0	1	2
DAQ Channel	1	2	3
Time	O2 A	CO2 A	CO A
10/28/25 18:45	20.63	0.14	5.55
10/28/25 18:46	20.63	0.14	5.52
10/28/25 18:47	20.63	0.15	5.63
10/28/25 18:48	20.63	0.15	5.58
10/28/25 18:49	20.63	0.14	5.69
10/28/25 18:50	20.63	0.14	5.69
10/28/25 18:51	20.63	0.14	5.7
10/28/25 18:52	20.63	0.14	5.48
10/28/25 18:53	20.63	0.14	5.52
10/28/25 18:54	20.63	0.14	5.5
10/28/25 18:55	20.63	0.14	5.46
10/28/25 18:56	20.63	0.14	5.47
10/28/25 18:57	20.63	0.14	5.57
10/28/25 18:58	20.63	0.14	5.53
10/28/25 18:59	20.63	0.14	5.51
10/28/25 19:00	20.63	0.14	5.47
10/28/25 19:01	20.63	0.14	5.76
10/28/25 19:02	20.63	0.14	5.8
10/28/25 19:03	20.63	0.14	5.59
10/28/25 19:04	20.63	0.14	5.8
10/28/25 19:05	20.63	0.14	5.72
10/28/25 19:06	20.63	0.14	5.39
10/28/25 19:07	20.63	0.13	5.42
10/28/25 19:08	20.63	0.14	5.63
10/28/25 19:09	20.63	0.13	5.4
10/28/25 19:10	20.63	0.13	5.52
10/28/25 19:11	20.63	0.13	5.49
10/28/25 19:12	20.63	0.13	5.5
10/28/25 19:13	20.62	0.13	5.31
10/28/25 19:14	20.62	0.13	5.3
10/28/25 19:15	20.62	0.13	5.45
10/28/25 19:16	20.62	0.13	5.61
10/28/25 19:17	20.62	0.13	5.44
10/28/25 19:18	20.62	0.13	5.27
10/28/25 19:19	20.62	0.13	5.28
10/28/25 19:20	20.62	0.13	5.26
10/28/25 19:21	20.62	0.13	5.41
10/28/25 19:22	20.62	0.13	5.45
10/28/25 19:23	20.62	0.13	5.46
10/28/25 19:24	20.63	0.13	5.33
10/28/25 19:25	20.62	0.13	5.25
10/28/25 19:26	20.62	0.13	5.18
10/28/25 19:27	20.62	0.13	5.26
10/28/25 19:28	20.62	0.13	5.18
10/28/25 19:29	20.62	0.13	5.18
10/28/25 19:30	20.62	0.13	5.17
10/28/25 19:31	20.62	0.13	5.2
10/28/25 19:32	20.62	0.13	5.25

10/28/25 19:33	20.62	0.13	5.24
10/28/25 19:34	20.62	0.13	5.23
10/28/25 19:35	20.63	0.13	5.19
10/28/25 19:36	20.62	0.13	5.19
10/28/25 19:37	20.62	0.13	5.07
10/28/25 19:38	20.62	0.12	5.1
10/28/25 19:39	20.62	0.13	5.1
10/28/25 19:40	20.62	0.13	5.07
10/28/25 19:41	20.62	0.13	5.06
10/28/25 19:42	20.62	0.13	5.01
10/28/25 19:43	20.62	0.12	5.02
10/28/25 19:44	20.62	0.13	5.14
10/28/25 19:45	20.63	0.12	5.04
10/28/25 19:46	20.63	0.12	5.01
10/28/25 19:47	20.63	0.12	5.03
10/28/25 19:48	20.63	0.12	5.05
10/28/25 19:49	20.63	0.12	5.06
10/28/25 19:50	20.63	0.12	5.01
10/28/25 19:51	20.63	0.12	5.18
10/28/25 19:52	20.63	0.12	5.22
10/28/25 19:53	20.63	0.12	5.35
10/28/25 19:54	20.63	0.12	5.09
10/28/25 19:55	20.64	0.12	5.16
10/28/25 19:56	20.64	0.12	5.09
10/28/25 19:57	20.64	0.12	5.06
10/28/25 19:58	20.64	0.12	5.04
10/28/25 19:59	20.64	0.12	5.31
10/28/25 20:00	20.64	0.12	5.11
10/28/25 20:01	20.64	0.12	5.21
10/28/25 20:02	20.63	0.12	5.12
10/28/25 20:03	20.63	0.12	5.08
10/28/25 20:04	20.64	0.12	5.46
10/28/25 20:05	20.64	0.12	5.02
10/28/25 20:06	20.64	0.12	4.91
10/28/25 20:07	20.64	0.12	5.04
10/28/25 20:08	20.63	0.12	5.32
10/28/25 20:09	20.64	0.12	5
10/28/25 20:10	20.64	0.12	4.93
10/28/25 20:11	20.63	0.12	4.98
10/28/25 20:12	20.63	0.12	5.05
10/28/25 20:13	20.63	0.12	5.09
10/28/25 20:14	20.63	0.12	5
10/28/25 20:15	20.63	0.12	5.18
10/28/25 20:16	20.63	0.12	5.05
10/28/25 20:17	20.63	0.12	4.89
10/28/25 20:18	20.63	0.12	4.92
10/28/25 20:19	20.63	0.12	4.86
10/28/25 20:20	20.63	0.12	5.13
10/28/25 20:21	20.63	0.12	5.12
10/28/25 20:22	20.63	0.12	5.23
10/28/25 20:23	20.63	0.12	5.12
10/28/25 20:24	20.63	0.12	5.22
10/28/25 20:25	20.63	0.12	4.93
10/28/25 20:26	20.64	0.12	4.95
10/28/25 20:27	20.64	0.12	5.25

10/28/25 20:28	20.63	0.12	4.93
10/28/25 20:29	20.64	0.12	4.96
10/28/25 20:30	20.64	0.11	4.88
10/28/25 20:31	20.64	0.12	4.92
10/28/25 20:32	20.64	0.11	4.91
10/28/25 20:33	20.64	0.12	5.02
10/28/25 20:34	20.64	0.12	4.85
10/28/25 20:35	20.64	0.12	4.89
10/28/25 20:36	20.64	0.12	4.94
10/28/25 20:37	20.64	0.11	4.91
10/28/25 20:38	20.64	0.11	5.16
10/28/25 20:39	20.64	0.11	4.94
10/28/25 20:40	20.64	0.11	4.82
10/28/25 20:41	20.64	0.11	4.86
10/28/25 20:42	20.64	0.12	4.88
10/28/25 20:43	20.64	0.11	4.86
10/28/25 20:44	20.64	0.11	4.87
10/28/25 20:45	20.64	0.11	4.83
10/28/25 20:46	20.64	0.11	4.83
10/28/25 20:47	20.64	0.11	4.81
10/28/25 20:48	20.64	0.11	4.86
10/28/25 20:49	20.64	0.11	4.82
10/28/25 20:50	20.64	0.11	4.84
10/28/25 20:51	20.64	0.11	4.83
10/28/25 20:52	20.63	0.11	4.92
10/28/25 20:53	20.63	0.11	4.84
10/28/25 20:54	20.64	0.11	4.83
10/28/25 20:55	20.63	0.11	4.84
10/28/25 20:56	20.63	0.11	4.86
10/28/25 20:57	20.64	0.11	4.86
10/28/25 20:58	20.64	0.11	4.85
10/28/25 20:59	20.64	0.11	4.83
10/28/25 21:00	20.64	0.11	4.86
10/28/25 21:01	20.64	0.11	4.9
10/28/25 21:02	20.64	0.11	4.85
10/28/25 21:03	20.64	0.11	4.87
10/28/25 21:04	20.64	0.11	4.88
10/28/25 21:05	20.64	0.11	4.86
10/28/25 21:06	20.64	0.11	4.9
10/28/25 21:07	20.64	0.11	4.87
10/28/25 21:08	20.64	0.11	4.85
10/28/25 21:09	20.64	0.11	4.88
10/28/25 21:10	20.64	0.11	4.87
10/28/25 21:11	20.64	0.11	4.84
10/28/25 21:12	20.64	0.11	4.88
10/28/25 21:13	20.64	0.11	4.89
10/28/25 21:14	20.63	0.11	4.86
10/28/25 21:15	20.63	0.11	4.88
10/28/25 21:16	20.63	0.11	4.87
10/28/25 21:17	20.64	0.11	4.89
10/28/25 21:18	20.63	0.11	4.9
10/28/25 21:19	20.63	0.11	4.88
10/28/25 21:20	20.63	0.11	4.88
10/28/25 21:21	20.63	0.11	4.89
10/28/25 21:22	20.63	0.11	4.85

10/28/25 21:23	20.63	0.11	4.89
10/28/25 21:24	20.63	0.11	4.93
10/28/25 21:25	20.63	0.11	4.93
10/28/25 21:26	20.63	0.11	4.95
10/28/25 21:27	20.63	0.11	4.89
10/28/25 21:28	20.64	0.11	4.88
10/28/25 21:29	20.64	0.11	4.96
10/28/25 21:30	20.64	0.11	4.94
10/28/25 21:31	20.64	0.11	4.92
10/28/25 21:32	20.64	0.11	4.85
10/28/25 21:33	20.64	0.11	4.89
10/28/25 21:34	20.64	0.11	4.91
10/28/25 21:35	20.64	0.11	4.93
10/28/25 21:36	20.64	0.11	4.9
10/28/25 21:37	20.64	0.11	4.96
10/28/25 21:38	20.64	0.11	4.93
10/28/25 21:39	20.64	0.11	4.9
10/28/25 21:40	20.64	0.11	4.94
10/28/25 21:41	20.64	0.11	5.06
10/28/25 21:42	20.64	0.11	4.98
10/28/25 21:43	20.64	0.11	4.99
10/28/25 21:44	20.64	0.11	5.02
10/28/25 21:45	20.64	0.11	4.99
10/28/25 21:46	20.64	0.11	4.96
10/28/25 21:47	20.64	0.11	4.98
10/28/25 21:48	20.64	0.11	5.03
10/28/25 21:49	20.64	0.11	5
10/28/25 21:50	20.64	0.11	5.03
10/28/25 21:51	20.64	0.11	4.97
10/28/25 21:52	20.64	0.11	5.06
10/28/25 21:53	20.64	0.11	5.01
10/28/25 21:54	20.63	0.11	5.03
10/28/25 21:55	20.63	0.11	5.03
10/28/25 21:56	20.63	0.11	5.04
10/28/25 21:57	20.63	0.11	5.06
10/28/25 21:58	20.63	0.11	5.04
10/28/25 21:59	20.63	0.11	5.04
10/28/25 22:00	20.64	0.11	5.04
10/28/25 22:01	20.64	0.11	5.09
10/28/25 22:02	20.64	0.11	5.06
10/28/25 22:03	20.65	0.11	5.07
10/28/25 22:04	20.64	0.11	5.08
10/28/25 22:05	20.65	0.11	5.06
10/28/25 22:06	20.64	0.11	5.05
10/28/25 22:07	20.64	0.11	5.07
10/28/25 22:08	20.64	0.11	5.06
10/28/25 22:09	20.64	0.11	5.05
10/28/25 22:10	20.64	0.11	5.02
10/28/25 22:11	20.64	0.11	5.07
10/28/25 22:12	20.64	0.11	5.06
10/28/25 22:13	20.64	0.11	5.07
10/28/25 22:14	20.64	0.11	5.09
10/28/25 22:15	20.64	0.11	5.07
10/28/25 22:16	20.64	0.11	5.06
10/28/25 22:17	20.64	0.11	5.09

10/28/25 22:18	20.64	0.11	5.25
10/28/25 22:19	20.64	0.11	5.06
10/28/25 22:20	20.64	0.11	5.07
10/28/25 22:21	20.64	0.11	5.08
10/28/25 22:22	20.64	0.11	5.1
10/28/25 22:23	20.64	0.11	5.12
10/28/25 22:24	20.64	0.11	5.11
10/28/25 22:25	20.64	0.11	5.09
10/28/25 22:26	20.64	0.11	5.05
10/28/25 22:27	20.64	0.11	5.11
10/28/25 22:28	20.65	0.11	5.28
10/28/25 22:29	20.64	0.11	5.17
10/28/25 22:30	20.65	0.11	5.16
10/28/25 22:31	20.64	0.11	5.23
10/28/25 22:32	20.64	0.11	5.16
10/28/25 22:33	20.64	0.11	5.15
10/28/25 22:34	20.64	0.11	5.12
10/28/25 22:35	20.64	0.11	5.16
10/28/25 22:36	20.64	0.11	5.23
10/28/25 22:37	20.64	0.11	5.09
10/28/25 22:38	20.64	0.1	5.29
10/28/25 22:39	20.64	0.1	5.15
10/28/25 22:40	20.64	0.1	5.17
10/28/25 22:41	20.64	0.11	5.25
10/28/25 22:42	20.64	0.11	5.26
10/28/25 22:43	20.64	0.1	5.18
10/28/25 22:44	20.64	0.1	5.1
10/28/25 22:45	20.64	0.1	5.17
10/28/25 22:46	20.64	0.1	5.13
10/28/25 22:47	20.64	0.1	5.28
10/28/25 22:48	20.64	0.1	5.18
10/28/25 22:49	20.64	0.1	5.26
10/28/25 22:50	20.64	0.1	5.21
10/28/25 22:51	20.64	0.1	5.37
10/28/25 22:52	20.64	0.1	5.47
10/28/25 22:53	20.64	0.1	5.36
10/28/25 22:54	20.64	0.1	5.43
10/28/25 22:55	20.64	0.1	5.45
10/28/25 22:56	20.65	0.1	5.35
10/28/25 22:57	20.65	0.1	5.23
10/28/25 22:58	20.65	0.1	5.33
10/28/25 22:59	20.65	0.1	5.23
10/28/25 23:00	20.65	0.1	5.27
10/28/25 23:01	20.65	0.1	5.22
10/28/25 23:02	20.65	0.1	5.13
10/28/25 23:03	20.65	0.1	5.19
10/28/25 23:04	20.65	0.1	5.4
10/28/25 23:05	20.65	0.1	5.47
10/28/25 23:06	20.65	0.1	5.19
10/28/25 23:07	20.64	0.1	5.13
10/28/25 23:08	20.64	0.1	5.2
10/28/25 23:09	20.64	0.1	5.26
10/28/25 23:10	20.64	0.1	5.4
10/28/25 23:11	20.64	0.1	5.66
10/28/25 23:12	20.64	0.1	5.41

10/28/25 23:13	20.64	0.1	5.27
10/28/25 23:14	20.64	0.1	5.26
10/28/25 23:15	20.64	0.1	5.41
10/28/25 23:16	20.64	0.1	5.47
10/28/25 23:17	20.64	0.1	5.36
10/28/25 23:18	20.64	0.1	5.19
10/28/25 23:19	20.64	0.1	5.18
10/28/25 23:20	20.64	0.1	5.27
10/28/25 23:21	20.64	0.09	5.25
10/28/25 23:22	20.64	0.09	5.18
10/28/25 23:23	20.64	0.09	5.24
10/28/25 23:24	20.64	0.09	5.24
10/28/25 23:25	20.64	0.09	5.19
10/28/25 23:26	20.64	0.1	5.22
10/28/25 23:27	20.64	0.09	5.19
10/28/25 23:28	20.64	0.09	5.34
10/28/25 23:29	20.64	0.09	5.22
10/28/25 23:30	20.65	0.09	5.29
10/28/25 23:31	20.65	0.09	5.25
10/28/25 23:32	20.65	0.09	5.25
10/28/25 23:33	20.65	0.1	5.3
10/28/25 23:34	20.65	0.1	5.27
10/28/25 23:35	20.65	0.1	5.29
10/28/25 23:36	20.65	0.1	5.34
10/28/25 23:37	20.65	0.1	5.33
10/28/25 23:38	20.65	0.1	5.43
10/28/25 23:39	20.65	0.1	5.36
10/28/25 23:40	20.65	0.1	5.34
10/28/25 23:41	20.65	0.1	5.33
10/28/25 23:42	20.65	0.1	5.52
10/28/25 23:43	20.65	0.1	5.38
10/28/25 23:44	20.65	0.1	5.45
10/28/25 23:45	20.65	0.1	5.35
10/28/25 23:46	20.64	0.1	5.36
10/28/25 23:47	20.64	0.1	5.41
10/28/25 23:48	20.65	0.1	5.49
10/28/25 23:49	20.64	0.1	5.51
10/28/25 23:50	20.64	0.1	5.65
10/28/25 23:51	20.65	0.1	5.59
10/28/25 23:52	20.65	0.1	5.56
10/28/25 23:53	20.65	0.1	5.52
10/28/25 23:54	20.65	0.1	5.6
10/28/25 23:55	20.65	0.1	5.57
10/28/25 23:56	20.65	0.1	5.55
10/28/25 23:57	20.66	0.09	5.37
10/28/25 23:58	20.66	0.1	5.51
10/28/25 23:59	20.65	0.09	5.47
10/29/25 0:00	20.65	0.09	5.43
10/29/25 0:01	20.65	0.09	5.37
10/29/25 0:02	20.65	0.09	5.63
10/29/25 0:03	20.65	0.09	5.4
10/29/25 0:04	20.65	0.09	5.55
10/29/25 0:05	20.65	0.1	5.76
10/29/25 0:06	20.65	0.1	5.89
10/29/25 0:07	20.65	0.1	5.52

10/29/25 0:08	20.65	0.09	5.71
10/29/25 0:09	20.65	0.1	6
10/29/25 0:10	20.65	0.1	5.65
10/29/25 0:11	20.65	0.09	5.43
10/29/25 0:12	20.65	0.1	5.51
10/29/25 0:13	20.65	0.1	5.7
10/29/25 0:14	20.65	0.1	6.08
10/29/25 0:15	20.65	0.1	5.57
10/29/25 0:16	20.65	0.09	5.58
10/29/25 0:17	20.65	0.09	5.58
10/29/25 0:18	20.65	0.09	5.74
10/29/25 0:19	20.65	0.09	5.52
10/29/25 0:20	20.65	0.09	5.48
10/29/25 0:21	20.65	0.09	5.47
10/29/25 0:22	20.65	0.09	5.47
10/29/25 0:23	20.65	0.09	5.48
10/29/25 0:24	20.65	0.09	5.48
10/29/25 0:25	20.65	0.09	5.47
10/29/25 0:26	20.65	0.09	5.43
10/29/25 0:27	20.65	0.09	5.46
10/29/25 0:28	20.65	0.09	5.49
10/29/25 0:29	20.65	0.09	5.45
10/29/25 0:30	20.65	0.09	5.56
10/29/25 0:31	20.65	0.09	5.51
10/29/25 0:32	20.64	0.09	5.48
10/29/25 0:33	20.65	0.09	5.53
10/29/25 0:34	20.65	0.09	5.52
10/29/25 0:35	20.65	0.09	5.49
10/29/25 0:36	20.65	0.09	5.54
10/29/25 0:37	20.65	0.09	5.56
10/29/25 0:38	20.65	0.09	5.54
10/29/25 0:39	20.65	0.09	5.5
10/29/25 0:40	20.65	0.09	5.54
10/29/25 0:41	20.65	0.09	5.53
10/29/25 0:42	20.65	0.09	5.53
10/29/25 0:43	20.65	0.09	5.53
10/29/25 0:44	20.65	0.09	5.6
10/29/25 0:45	20.65	0.09	5.56
10/29/25 0:46	20.65	0.09	5.58
10/29/25 0:47	20.65	0.09	5.62
10/29/25 0:48	20.65	0.09	5.54
10/29/25 0:49	20.65	0.09	5.54
10/29/25 0:50	20.65	0.09	5.57
10/29/25 0:51	20.65	0.09	5.63
10/29/25 0:52	20.65	0.09	5.56
10/29/25 0:53	20.65	0.09	5.55
10/29/25 0:54	20.65	0.09	5.6
10/29/25 0:55	20.65	0.09	5.6
10/29/25 0:56	20.65	0.09	5.6
10/29/25 0:57	20.65	0.09	5.58
10/29/25 0:58	20.65	0.09	5.62
10/29/25 0:59	20.66	0.09	5.6
10/29/25 1:00	20.66	0.09	5.61
10/29/25 1:01	20.66	0.09	5.59
10/29/25 1:02	20.66	0.09	5.6

10/29/25 1:03	20.66	0.09	5.6
10/29/25 1:04	20.66	0.09	5.57
10/29/25 1:05	20.66	0.09	5.6
10/29/25 1:06	20.66	0.09	5.62
10/29/25 1:07	20.66	0.09	5.65
10/29/25 1:08	20.66	0.09	5.63
10/29/25 1:09	20.66	0.09	5.6
10/29/25 1:10	20.66	0.09	5.63
10/29/25 1:11	20.66	0.09	5.63
10/29/25 1:12	20.66	0.09	5.64
10/29/25 1:13	20.66	0.09	5.66
10/29/25 1:14	20.66	0.09	5.6
10/29/25 1:15	20.66	0.09	5.65
10/29/25 1:16	20.66	0.09	5.65
10/29/25 1:17	20.66	0.09	5.63
10/29/25 1:18	20.66	0.09	5.62
10/29/25 1:19	20.66	0.09	5.68
10/29/25 1:20	20.66	0.09	5.66
10/29/25 1:21	20.66	0.09	5.65
10/29/25 1:22	20.66	0.09	5.65
10/29/25 1:23	20.66	0.09	5.66
10/29/25 1:24	20.65	0.09	5.66
10/29/25 1:25	20.65	0.09	5.7
10/29/25 1:26	20.66	0.09	5.73
10/29/25 1:27	20.66	0.09	5.68
10/29/25 1:28	20.66	0.09	5.7
10/29/25 1:29	20.66	0.09	5.69
10/29/25 1:30	20.67	0.09	5.7
10/29/25 1:31	20.66	0.09	5.76
10/29/25 1:32	20.67	0.09	5.76
10/29/25 1:33	20.66	0.09	5.76
10/29/25 1:34	20.66	0.09	5.77
10/29/25 1:35	20.66	0.09	5.74
10/29/25 1:36	20.66	0.09	5.74
10/29/25 1:37	20.66	0.09	5.77
10/29/25 1:38	20.66	0.09	5.74
10/29/25 1:39	20.66	0.09	5.78
10/29/25 1:40	20.66	0.09	5.79
10/29/25 1:41	20.66	0.09	5.77
10/29/25 1:42	20.66	0.09	5.79
10/29/25 1:43	20.66	0.09	5.77
10/29/25 1:44	20.66	0.09	5.82
10/29/25 1:45	20.66	0.09	5.84
10/29/25 1:46	20.66	0.09	5.79
10/29/25 1:47	20.66	0.09	5.84
10/29/25 1:48	20.66	0.09	5.82
10/29/25 1:49	20.65	0.09	5.89
10/29/25 1:50	20.65	0.09	5.83
10/29/25 1:51	20.65	0.09	5.8
10/29/25 1:52	20.65	0.09	5.84
10/29/25 1:53	20.65	0.09	5.81
10/29/25 1:54	20.65	0.09	5.89
10/29/25 1:55	20.65	0.09	5.84
10/29/25 1:56	20.65	0.09	5.9
10/29/25 1:57	20.65	0.09	5.86

10/29/25 1:58	20.65	0.09	5.85
10/29/25 1:59	20.65	0.09	5.85
10/29/25 2:00	20.65	0.09	5.85
10/29/25 2:01	20.65	0.09	5.83
10/29/25 2:02	20.65	0.09	5.86
10/29/25 2:03	20.65	0.09	5.9
10/29/25 2:04	20.65	0.09	5.89
10/29/25 2:05	20.65	0.09	5.89
10/29/25 2:06	20.65	0.09	5.88
10/29/25 2:07	20.65	0.09	5.89
10/29/25 2:08	20.65	0.09	5.85
10/29/25 2:09	20.66	0.09	5.95
10/29/25 2:10	20.66	0.09	5.91
10/29/25 2:11	20.66	0.09	5.88
10/29/25 2:12	20.65	0.09	5.92
10/29/25 2:13	20.65	0.09	5.92
10/29/25 2:14	20.65	0.09	5.93
10/29/25 2:15	20.66	0.09	5.95
10/29/25 2:16	20.66	0.09	5.92
10/29/25 2:17	20.66	0.09	5.94
10/29/25 2:18	20.67	0.09	5.92
10/29/25 2:19	20.67	0.08	5.91
10/29/25 2:20	20.67	0.09	5.97
10/29/25 2:21	20.66	0.09	5.89
10/29/25 2:22	20.66	0.08	5.97
10/29/25 2:23	20.67	0.09	5.98
10/29/25 2:24	20.67	0.09	5.97
10/29/25 2:25	20.67	0.09	5.95
10/29/25 2:26	20.67	0.09	5.98
10/29/25 2:27	20.66	0.08	5.99
10/29/25 2:28	20.67	0.08	5.99
10/29/25 2:29	20.66	0.08	5.97
10/29/25 2:30	20.66	0.08	5.99
10/29/25 2:31	20.66	0.08	6.02
10/29/25 2:32	20.66	0.08	6.01
10/29/25 2:33	20.66	0.08	5.98
10/29/25 2:34	20.66	0.08	5.94
10/29/25 2:35	20.66	0.08	6.06
10/29/25 2:36	20.66	0.08	5.99
10/29/25 2:37	20.66	0.08	6.03
10/29/25 2:38	20.66	0.08	6.03
10/29/25 2:39	20.66	0.08	6.03
10/29/25 2:40	20.66	0.08	6
10/29/25 2:41	20.67	0.08	6.02
10/29/25 2:42	20.67	0.08	6
10/29/25 2:43	20.67	0.08	6.05
10/29/25 2:44	20.67	0.08	6.04
10/29/25 2:45	20.67	0.08	6.01
10/29/25 2:46	20.67	0.08	5.99
10/29/25 2:47	20.67	0.08	6.04
10/29/25 2:48	20.67	0.08	6.1
10/29/25 2:49	20.67	0.08	6.1
10/29/25 2:50	20.67	0.08	6.11
10/29/25 2:51	20.67	0.08	6.07
10/29/25 2:52	20.67	0.08	6.11

10/29/25 2:53	20.67	0.08	6.1
10/29/25 2:54	20.67	0.08	6.14
10/29/25 2:55	20.67	0.08	6.09
10/29/25 2:56	20.67	0.08	6.04
10/29/25 2:57	20.66	0.08	6.12
10/29/25 2:58	20.66	0.08	6.14
10/29/25 2:59	20.66	0.08	6.12
10/29/25 3:00	20.66	0.08	6.15
10/29/25 3:01	20.66	0.08	6.07
10/29/25 3:02	20.66	0.08	6.11
10/29/25 3:03	20.66	0.08	6.12
10/29/25 3:04	20.66	0.08	6.14
10/29/25 3:05	20.67	0.08	6.16
10/29/25 3:06	20.66	0.08	6.13
10/29/25 3:07	20.66	0.08	6.14
10/29/25 3:08	20.66	0.08	6.19
10/29/25 3:09	20.66	0.08	6.17
10/29/25 3:10	20.66	0.08	6.13
10/29/25 3:11	20.66	0.08	6.18
10/29/25 3:12	20.66	0.08	6.18
10/29/25 3:13	20.66	0.08	6.21
10/29/25 3:14	20.66	0.08	6.19
10/29/25 3:15	20.66	0.08	6.2
10/29/25 3:16	20.66	0.08	6.14
10/29/25 3:17	20.66	0.08	6.16
10/29/25 3:18	20.66	0.08	6.23
10/29/25 3:19	20.66	0.08	6.24
10/29/25 3:20	20.66	0.08	6.23
10/29/25 3:21	20.66	0.08	6.16
10/29/25 3:22	20.66	0.08	6.21
10/29/25 3:23	20.66	0.08	6.2
10/29/25 3:24	20.66	0.08	6.26
10/29/25 3:25	20.67	0.08	6.22
10/29/25 3:26	20.67	0.08	6.23
10/29/25 3:27	20.67	0.08	6.26
10/29/25 3:28	20.67	0.08	6.25
10/29/25 3:29	20.67	0.08	6.28
10/29/25 3:30	20.67	0.08	6.29
10/29/25 3:31	20.67	0.08	6.31
10/29/25 3:32	20.67	0.08	6.27
10/29/25 3:33	20.67	0.08	6.28
10/29/25 3:34	20.67	0.08	6.23
10/29/25 3:35	20.67	0.08	6.25
10/29/25 3:36	20.67	0.08	6.28
10/29/25 3:37	20.67	0.08	6.3
10/29/25 3:38	20.67	0.08	6.27
10/29/25 3:39	20.67	0.08	6.35
10/29/25 3:40	20.67	0.08	6.29
10/29/25 3:41	20.67	0.08	6.26
10/29/25 3:42	20.67	0.08	6.3
10/29/25 3:43	20.67	0.08	6.32
10/29/25 3:44	20.67	0.08	6.3
10/29/25 3:45	20.67	0.08	6.29
10/29/25 3:46	20.67	0.08	6.28
10/29/25 3:47	20.67	0.08	6.34

10/29/25 3:48	20.67	0.08	6.37
10/29/25 3:49	20.67	0.08	6.38
10/29/25 3:50	20.67	0.08	6.32
10/29/25 3:51	20.67	0.08	6.34
10/29/25 3:52	20.68	0.08	6.32
10/29/25 3:53	20.68	0.08	6.39
10/29/25 3:54	20.68	0.08	6.37
10/29/25 3:55	20.68	0.08	6.42
10/29/25 3:56	20.68	0.08	6.35
10/29/25 3:57	20.68	0.08	6.37
10/29/25 3:58	20.68	0.08	6.38
10/29/25 3:59	20.67	0.08	6.37
10/29/25 4:00	20.67	0.08	6.44
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10/29/25 4:02	20.67	0.08	6.4
10/29/25 4:03	20.67	0.08	6.42
10/29/25 4:04	20.67	0.08	6.38
10/29/25 4:05	20.67	0.08	6.41
10/29/25 4:06	20.67	0.08	6.42
10/29/25 4:07	20.66	0.08	6.44
10/29/25 4:08	20.67	0.08	6.44
10/29/25 4:09	20.67	0.08	6.41
10/29/25 4:10	20.67	0.08	6.42
10/29/25 4:11	20.66	0.08	6.44
10/29/25 4:12	20.66	0.08	6.44
10/29/25 4:13	20.67	0.08	6.46
10/29/25 4:14	20.66	0.08	6.5
10/29/25 4:15	20.66	0.08	6.45
10/29/25 4:16	20.66	0.08	6.43
10/29/25 4:17	20.66	0.08	6.47
10/29/25 4:18	20.66	0.08	6.49
10/29/25 4:19	20.66	0.08	6.46
10/29/25 4:20	20.66	0.08	6.48
10/29/25 4:21	20.66	0.08	6.45
10/29/25 4:22	20.66	0.08	6.49
10/29/25 4:23	20.66	0.08	6.49
10/29/25 4:24	20.67	0.08	6.47
10/29/25 4:25	20.67	0.08	6.53
10/29/25 4:26	20.67	0.08	6.54
10/29/25 4:27	20.67	0.08	6.53
10/29/25 4:28	20.67	0.08	6.52
10/29/25 4:29	20.67	0.08	6.54
10/29/25 4:30	20.67	0.08	6.52
10/29/25 4:31	20.67	0.08	6.55
10/29/25 4:32	20.67	0.08	6.5
10/29/25 4:33	20.67	0.08	6.58
10/29/25 4:34	20.67	0.08	6.57
10/29/25 4:35	20.67	0.08	6.57
10/29/25 4:36	20.67	0.07	6.55
10/29/25 4:37	20.67	0.08	6.56
10/29/25 4:38	20.67	0.08	6.57
10/29/25 4:39	20.67	0.08	6.57
10/29/25 4:40	20.67	0.07	6.56
10/29/25 4:41	20.67	0.07	6.6
10/29/25 4:42	20.67	0.07	6.65

10/29/25 4:43	20.67	0.07	6.63
10/29/25 4:44	20.67	0.08	6.66
10/29/25 4:45	20.67	0.08	6.65
10/29/25 4:46	20.67	0.08	6.6
10/29/25 4:47	20.67	0.08	6.61
10/29/25 4:48	20.67	0.08	6.62
10/29/25 4:49	20.67	0.08	6.64
10/29/25 4:50	20.67	0.08	6.63
10/29/25 4:51	20.67	0.07	6.67
10/29/25 4:52	20.67	0.08	6.69
10/29/25 4:53	20.68	0.08	6.59
10/29/25 4:54	20.67	0.08	6.61
10/29/25 4:55	20.67	0.07	6.64
10/29/25 4:56	20.67	0.08	6.58
10/29/25 4:57	20.67	0.08	6.65
10/29/25 4:58	20.67	0.08	6.66
10/29/25 4:59	20.68	0.08	6.63
10/29/25 5:00	20.67	0.07	6.68
10/29/25 5:01	20.67	0.07	6.68
10/29/25 5:02	20.67	0.07	6.71
10/29/25 5:03	20.67	0.08	6.68
10/29/25 5:04	20.67	0.07	6.7
10/29/25 5:05	20.67	0.07	6.74
10/29/25 5:06	20.67	0.07	6.71
10/29/25 5:07	20.67	0.07	6.73
10/29/25 5:08	20.67	0.08	6.66
10/29/25 5:09	20.67	0.08	6.62
10/29/25 5:10	20.67	0.08	6.68
10/29/25 5:11	20.67	0.07	6.71
10/29/25 5:12	20.67	0.07	6.7
10/29/25 5:13	20.67	0.07	6.7
10/29/25 5:14	20.67	0.07	6.74
10/29/25 5:15	20.67	0.07	6.77
10/29/25 5:16	20.67	0.07	6.75
10/29/25 5:17	20.67	0.07	6.78
10/29/25 5:18	20.68	0.07	6.72
10/29/25 5:19	20.68	0.07	6.74
10/29/25 5:20	20.68	0.07	6.77
10/29/25 5:21	20.68	0.07	6.76
10/29/25 5:22	20.68	0.07	6.77
10/29/25 5:23	20.68	0.07	6.76
10/29/25 5:24	20.67	0.07	6.8
10/29/25 5:25	20.67	0.07	6.78
10/29/25 5:26	20.68	0.07	6.75
10/29/25 5:27	20.67	0.07	6.81
10/29/25 5:28	20.68	0.07	6.81
10/29/25 5:29	20.68	0.07	6.84
10/29/25 5:30	20.68	0.07	6.8
10/29/25 5:31	20.68	0.07	6.86
10/29/25 5:32	20.67	0.07	6.87
10/29/25 5:33	20.67	0.07	6.82
10/29/25 5:34	20.67	0.07	6.84
10/29/25 5:35	20.67	0.07	6.88
10/29/25 5:36	20.67	0.07	6.87
10/29/25 5:37	20.68	0.07	6.85

10/29/25 5:38	20.67	0.07	6.83
10/29/25 5:39	20.67	0.07	6.83
10/29/25 5:40	20.67	0.07	6.82
10/29/25 5:41	20.67	0.07	6.87
10/29/25 5:42	20.67	0.07	6.88
10/29/25 5:43	20.67	0.07	6.9
10/29/25 5:44	20.67	0.07	6.89
10/29/25 5:45	20.67	0.07	6.88
10/29/25 5:46	20.67	0.07	6.89
10/29/25 5:47	20.67	0.07	6.87
10/29/25 5:48	20.67	0.07	6.89
10/29/25 5:49	20.67	0.07	6.87
10/29/25 5:50	20.67	0.07	6.87
10/29/25 5:51	20.67	0.07	6.89
10/29/25 5:52	20.67	0.07	6.93
10/29/25 5:53	20.67	0.07	6.89
10/29/25 5:54	20.67	0.07	6.9
10/29/25 5:55	20.67	0.07	6.93
10/29/25 5:56	20.68	0.07	6.91
10/29/25 5:57	20.68	0.07	6.92
10/29/25 5:58	20.68	0.07	6.96
10/29/25 5:59	20.68	0.07	7.01
10/29/25 6:00	20.68	0.07	6.95
10/29/25 6:01	20.68	0.07	6.93
10/29/25 6:02	20.68	0.07	6.95
10/29/25 6:03	20.68	0.07	6.95
10/29/25 6:04	20.68	0.07	7.01
10/29/25 6:05	20.68	0.07	7.02
10/29/25 6:06	20.68	0.07	6.96
10/29/25 6:07	20.68	0.07	6.98
10/29/25 6:08	20.68	0.07	6.98
10/29/25 6:09	20.68	0.07	7.01
10/29/25 6:10	20.67	0.07	7
10/29/25 6:11	20.68	0.07	7.02
10/29/25 6:12	20.67	0.07	7.03
10/29/25 6:13	20.67	0.07	7.01
10/29/25 6:14	20.67	0.07	7.01
10/29/25 6:15	20.67	0.07	7
10/29/25 6:16	20.67	0.07	7.02
10/29/25 6:17	20.67	0.07	7.06
10/29/25 6:18	20.67	0.07	7.01
10/29/25 6:19	20.67	0.07	7.03
10/29/25 6:20	20.67	0.07	7.02
10/29/25 6:21	20.67	0.07	6.99
10/29/25 6:22	20.67	0.07	7.02
10/29/25 6:23	20.68	0.07	7.12
10/29/25 6:24	20.68	0.07	7.07
10/29/25 6:25	20.68	0.07	7.11
10/29/25 6:26	20.68	0.07	7.07
10/29/25 6:27	20.68	0.07	7.11
10/29/25 6:28	20.68	0.07	7.09
10/29/25 6:29	20.68	0.07	7.07
10/29/25 6:30	20.68	0.07	7.08
10/29/25 6:31	20.68	0.07	7.08
10/29/25 6:32	20.68	0.07	7.06

10/29/25 6:33	20.68	0.07	7.13
10/29/25 6:34	20.68	0.07	7.14
10/29/25 6:35	20.68	0.07	7.13
10/29/25 6:36	20.68	0.07	7.13
10/29/25 6:37	20.68	0.07	7.09
10/29/25 6:38	20.68	0.07	7.06
10/29/25 6:39	20.68	0.07	7.13
10/29/25 6:40	20.68	0.07	7.12
10/29/25 6:41	20.68	0.07	7.11
10/29/25 6:42	20.68	0.07	7.13
10/29/25 6:43	20.68	0.07	7.11
10/29/25 6:44	20.68	0.07	7.17
10/29/25 6:45	20.68	0.07	7.09
10/29/25 6:46	20.68	0.07	7.1
10/29/25 6:47	20.68	0.07	7.17
10/29/25 6:48	20.68	0.07	7.15
10/29/25 6:49	20.68	0.07	7.18
10/29/25 6:50	20.68	0.07	7.12
10/29/25 6:51	20.68	0.07	7.18
10/29/25 6:52	20.67	0.07	7.21
10/29/25 6:53	20.68	0.07	7.19
10/29/25 6:54	20.68	0.07	7.13
10/29/25 6:55	20.68	0.07	7.14
10/29/25 6:56	20.68	0.07	7.16
10/29/25 6:57	20.68	0.07	7.2
10/29/25 6:58	20.67	0.07	7.24
10/29/25 6:59	20.67	0.07	7.2
10/29/25 7:00	20.67	0.07	7.22
10/29/25 7:01	20.67	0.07	7.18
10/29/25 7:02	20.67	0.07	7.17
10/29/25 7:03	20.67	0.07	7.18
10/29/25 7:04	20.67	0.07	7.21
10/29/25 7:05	20.68	0.07	7.16
10/29/25 7:06	20.68	0.07	7.21
10/29/25 7:07	20.68	0.07	7.29
10/29/25 7:08	20.67	0.07	7.23
10/29/25 7:09	20.68	0.07	7.22
10/29/25 7:10	20.68	0.07	7.28
10/29/25 7:11	20.68	0.06	7.26
10/29/25 7:12	20.68	0.06	7.28
10/29/25 7:13	20.68	0.06	7.21
10/29/25 7:14	20.67	0.06	7.24
10/29/25 7:15	20.67	0.07	7.26
10/29/25 7:16	20.67	0.06	7.27
10/29/25 7:17	20.68	0.07	7.3
10/29/25 7:18	20.67	0.07	7.24
10/29/25 7:19	20.68	0.07	7.25
10/29/25 7:20	20.68	0.07	7.22
10/29/25 7:21	20.68	0.07	7.21
10/29/25 7:22	20.68	0.06	7.29
10/29/25 7:23	20.68	0.06	7.26
10/29/25 7:24	20.68	0.06	7.34
10/29/25 7:25	20.68	0.07	7.28
10/29/25 7:26	20.68	0.06	7.28
10/29/25 7:27	20.68	0.07	7.27

10/29/25 7:28	20.68	0.06	7.3
10/29/25 7:29	20.68	0.06	7.33
10/29/25 7:30	20.68	0.06	7.3
10/29/25 7:31	20.68	0.07	7.32
10/29/25 7:32	20.69	0.06	7.33
10/29/25 7:33	20.68	0.06	7.35
10/29/25 7:34	20.68	0.06	7.36
10/29/25 7:35	20.68	0.07	7.33
10/29/25 7:36	20.67	0.06	7.4
10/29/25 7:37	1.55	0	7
10/29/25 7:38	0.01	-0.04	0.57
10/29/25 7:39	0.64	0.62	-0.31
10/29/25 7:40	19.82	20.37	-2.23
10/29/25 7:41	19.93	20.06	-0.95
10/29/25 7:42	19.91	19.84	-1
10/29/25 7:43	19.85	18.85	-0.72
10/29/25 7:44	13.6	9.81	-0.27
10/29/25 7:45	9.96	9.9	-0.93
10/29/25 7:46	13.12	7.43	-0.51
10/29/25 7:47	4.95	0.79	374.64
10/29/25 7:48	0.01	0	508.49
10/29/25 7:49	5.45	0.01	376.72
10/29/25 7:50	0.08	0.01	245
10/29/25 7:51	0	0	250.39
10/29/25 7:52	12.62	0.02	93.49
10/29/25 7:53	4.68	0.1	0.84
10/29/25 7:54	0.14	0.07	0.75
10/29/25 7:55	0.13	0.07	0.79
10/29/25 7:56	7.09	6.93	10.06
10/29/25 7:57	9.9	9.75	0.07
10/29/25 7:58	9.91	9.8	-0.22
10/29/25 7:59	4.02	4.07	134.83
10/29/25 8:00	0.14	0.17	245.75
10/29/25 8:01	0.28	0.38	246.27
10/29/25 8:02	7.18	10.59	118.02
10/29/25 8:03	7.48	11.08	105.74
10/29/25 8:04	7.11	11.45	97.46
10/29/25 8:05	6.94	11.6	101.63
10/29/25 8:06	6.66	11.92	108.9
10/29/25 8:07	6.5	12.08	103.51
10/29/25 8:08	6.46	12.11	99.21
10/29/25 8:09	6.44	12.13	97.83
10/29/25 8:10	6.41	12.17	103.77
10/29/25 8:11	6.52	12.06	102.59
10/29/25 8:12	6.45	12.13	95.36
10/29/25 8:13	6.15	12.43	91.71
10/29/25 8:14	6.07	12.52	100.52
10/29/25 8:15	6.02	12.51	100.74
10/29/25 8:16	6.03	12.58	100.01
10/29/25 8:17	6.07	12.48	96.08
10/29/25 8:18	5.93	12.64	113.7
10/29/25 8:19	5.84	12.67	122.24
10/29/25 8:20	5.82	12.83	143.96
10/29/25 8:21	5.89	12.8	152.03
10/29/25 8:22	6.33	12.6	133.36

10/29/25 8:23	6.99	12.06	111.26
10/29/25 8:24	6.93	12.12	109.96
10/29/25 8:25	7.22	11.83	108.88
10/29/25 8:26	6.76	12.22	104.57
10/29/25 8:27	7.06	12.12	108.43
10/29/25 8:28	7.32	11.73	102.05
10/29/25 8:29	7.16	11.73	106.7
10/29/25 8:30	6.44	12.2	103.21
10/29/25 8:31	6.33	12.31	93.73
10/29/25 8:32	6.61	12.14	97.91
10/29/25 8:33	6.76	11.95	104.8
10/29/25 8:34	6.5	12.18	104.31
10/29/25 8:35	6.84	11.96	112.74
10/29/25 8:36	6.92	11.89	120.98
10/29/25 8:37	6.94	11.93	127.88
10/29/25 8:38	6.96	11.9	123.12
10/29/25 8:39	7.23	11.68	116.59
10/29/25 8:40	7.1	11.78	102.97
10/29/25 8:41	6.94	11.86	98.76
10/29/25 8:42	6.92	11.95	97.81
10/29/25 8:43	7.01	11.88	94.02
10/29/25 8:44	6.37	12.27	85.88
10/29/25 8:45	6.06	12.69	117.2
10/29/25 8:46	6.19	12.57	99.4
10/29/25 8:47	6.26	12.56	97.01
10/29/25 8:48	6.34	12.5	101.28
10/29/25 8:49	6.48	12.38	98.39
10/29/25 8:50	6.6	12.26	106.15
10/29/25 8:51	7.23	11.7	117
10/29/25 8:52	7.27	11.49	110.87
10/29/25 8:53	7.73	11.08	114.55
10/29/25 8:54	7.7	11.01	119.61
10/29/25 8:55	7.54	11.2	115.1
10/29/25 8:56	7.38	11.3	109.92
10/29/25 8:57	7.71	11.16	113.74
10/29/25 8:58	8.22	10.63	112.26
10/29/25 8:59	8.63	10.19	113.78
10/29/25 9:00	8.61	10.2	112.03
10/29/25 9:01	8.58	10.22	117.38
10/29/25 9:02	8.74	10.03	130.19
10/29/25 9:03	8.48	10.28	123.51
10/29/25 9:04	8.27	10.47	125.77
10/29/25 9:05	8.43	10.37	126.13
10/29/25 9:06	8.45	10.34	123.98
10/29/25 9:07	2.66	2.93	80.51
10/29/25 9:08	0.12	0.17	1.25
10/29/25 9:09	0.45	0.45	3.82
10/29/25 9:10	9.64	9.27	6.47
10/29/25 9:11	9.89	9.82	0.26
10/29/25 9:12	5.11	5.07	111.86
10/29/25 9:13	0.13	0.2	246.08
10/29/25 9:14	1.04	1.18	237.16
10/29/25 9:15	8.67	9.75	110.4
10/29/25 9:16	8.56	10.17	104.76
10/29/25 9:17	8.4	10.32	108.36

10/29/25 9:18	8.55	10.18	107.87
10/29/25 9:19	8.07	10.31	87.08
10/29/25 9:20	7.21	10.9	75.09
10/29/25 9:21	6.99	11.15	77.89
10/29/25 9:22	7.01	11.14	87.09
10/29/25 9:23	6.75	11.38	93.57
10/29/25 9:24	6.5	11.58	92.06
10/29/25 9:25	6.08	11.97	105.13
10/29/25 9:26	5.9	12.19	124.1
10/29/25 9:27	5.92	12.16	111.41
10/29/25 9:28	5.81	12.2	123.78
10/29/25 9:29	5.38	12.57	192.52
10/29/25 9:30	5.14	12.84	298.1
10/29/25 9:31	4.87	13.04	451.86
10/29/25 9:32	4.65	13.27	667.98
10/29/25 9:33	4.73	13.24	720.14
10/29/25 9:34	4.82	13.14	659.46
10/29/25 9:35	4.88	13.07	495.39
10/29/25 9:36	4.77	13.11	505.47
10/29/25 9:37	4.89	13.11	502.15
10/29/25 9:38	4.92	13.07	432.78
10/29/25 9:39	4.9	13.08	541.3
10/29/25 9:40	4.79	13.29	268.14
10/29/25 9:41	4.73	13.53	346.34
10/29/25 9:42	5.41	13.16	125.42
10/29/25 9:43	5.54	13.11	137.51
10/29/25 9:44	5.84	12.95	155.19
10/29/25 9:45	6.07	12.63	116.18
10/29/25 9:46	5.72	12.96	155.28
10/29/25 9:47	5.73	12.94	132.63
10/29/25 9:48	5.8	12.8	151.02
10/29/25 9:49	5.63	12.87	176.23
10/29/25 9:50	5.4	12.97	220.92
10/29/25 9:51	5.49	12.9	250.12
10/29/25 9:52	5.34	12.73	488.76
10/29/25 9:53	4.79	13.21	446.14
10/29/25 9:54	4.93	13.11	426.5
10/29/25 9:55	5.01	12.99	463.16
10/29/25 9:56	5.09	12.87	496.5
10/29/25 9:57	5.12	12.92	507.97
10/29/25 9:58	4.99	12.95	458.33
10/29/25 9:59	5.18	12.88	505.37
10/29/25 10:00	5.1	12.98	499.24
10/29/25 10:01	5.07	13.04	477.39
10/29/25 10:02	5.34	12.83	342.41
10/29/25 10:03	5.65	12.57	217.28
10/29/25 10:04	5.45	12.73	303.13
10/29/25 10:05	5.22	13.01	374.23
10/29/25 10:06	5.24	12.96	422.22
10/29/25 10:07	5.02	13.2	472.75
10/29/25 10:08	5.12	13.12	479.64
10/29/25 10:09	5.31	12.95	275.07
10/29/25 10:10	5.75	12.6	140.9
10/29/25 10:11	5.87	12.42	142.68
10/29/25 10:12	6.04	12.29	129.79

10/29/25 10:13	5.86	12.43	160.52
10/29/25 10:14	5.79	12.53	172.32
10/29/25 10:15	5.45	12.79	232.78
10/29/25 10:16	5.36	12.92	209.37
10/29/25 10:17	5.2	13	330.03
10/29/25 10:18	5.25	13.01	262.69
10/29/25 10:19	5.18	13.1	324.51
10/29/25 10:20	5.34	13.03	244.33
10/29/25 10:21	5.24	13.05	285.74
10/29/25 10:22	4.8	13.45	449.33
10/29/25 10:23	5.45	13.16	137.64
10/29/25 10:24	5.78	12.81	90.75
10/29/25 10:25	6.2	12.48	85.14
10/29/25 10:26	6.44	12.4	92.94
10/29/25 10:27	6.62	12.21	97.2
10/29/25 10:28	6.48	12.31	91.74
10/29/25 10:29	6.33	12.45	88.69
10/29/25 10:30	6.4	12.42	94.54
10/29/25 10:31	6.45	12.31	90.21
10/29/25 10:32	6.3	12.44	88.04
10/29/25 10:33	6.51	12.24	92.9
10/29/25 10:34	6.56	12.14	83.19
10/29/25 10:35	6.68	12.02	89.65
10/29/25 10:36	6.73	11.96	83.19
10/29/25 10:37	6.82	11.86	84.09
10/29/25 10:38	6.76	11.92	80.68
10/29/25 10:39	6.95	11.75	86.73
10/29/25 10:40	6.86	11.84	90.97
10/29/25 10:41	7.03	11.72	101.99
10/29/25 10:42	7.3	11.47	107.6
10/29/25 10:43	7.55	11.22	100.07
10/29/25 10:44	7.48	11.28	104.97
10/29/25 10:45	7.49	11.26	112.86
10/29/25 10:46	7.46	11.34	123.89
10/29/25 10:47	7.74	11.08	134.37
10/29/25 10:48	8.1	10.73	152.96
10/29/25 10:49	8.35	10.44	164.43
10/29/25 10:50	8.53	10.28	169.92
10/29/25 10:51	8.61	10.21	168.64
10/29/25 10:52	8.1	10.62	155.16
10/29/25 10:53	0.78	0.94	51.89
10/29/25 10:54	0.11	0.16	1.35
10/29/25 10:55	2.32	2.26	8.17
10/29/25 10:56	9.8	9.49	2.21
10/29/25 10:57	9.88	9.83	0.39
10/29/25 10:58	3	3	164.51
10/29/25 10:59	0.12	0.18	246.57
10/29/25 11:00	2.21	3.82	197.04
10/29/25 11:01	6.73	11.77	75.99
10/29/25 11:02	6.48	12.13	68.31
10/29/25 11:03	6.68	11.93	69.49
10/29/25 11:04	6.41	12.18	68.69
10/29/25 11:05	6.42	12.21	69.49
10/29/25 11:06	6.42	12.2	66.82
10/29/25 11:07	6.57	12.07	68.15

10/29/25 11:08	6.73	11.95	71.54
10/29/25 11:09	7.02	11.63	74.48
10/29/25 11:10	6.87	11.74	70.39
10/29/25 11:11	6.66	11.91	72.12
10/29/25 11:12	6.55	12.06	65.52
10/29/25 11:13	6.61	12.02	65.71
10/29/25 11:14	6.49	12.13	73.96
10/29/25 11:15	6.97	11.78	80.42
10/29/25 11:16	6.97	11.7	82.58
10/29/25 11:17	6.95	11.7	82.88
10/29/25 11:18	6.82	11.81	88.05
10/29/25 11:19	6.58	12.05	74.05
10/29/25 11:20	6.39	12.21	71.2
10/29/25 11:21	6.33	12.32	66.3
10/29/25 11:22	6.36	12.28	69.97
10/29/25 11:23	6.47	12.13	70.42
10/29/25 11:24	6.02	12.48	63.54
10/29/25 11:25	5.9	12.66	69.42
10/29/25 11:26	5.72	12.84	77.51
10/29/25 11:27	5.88	12.73	73.9
10/29/25 11:28	5.79	12.74	71.42
10/29/25 11:29	5.81	12.78	68.31
10/29/25 11:30	5.65	12.85	61.19
10/29/25 11:31	5.69	12.94	69.6
10/29/25 11:32	5.82	12.74	64.59
10/29/25 11:33	6.18	12.48	61.15
10/29/25 11:34	6.09	12.53	61.58
10/29/25 11:35	6.3	12.36	59.63
10/29/25 11:36	6.23	12.36	59.1
10/29/25 11:37	6.25	12.35	60.69
10/29/25 11:38	6.21	12.39	65.46
10/29/25 11:39	6.11	12.48	69.07
10/29/25 11:40	6.1	12.51	68.52
10/29/25 11:41	6.25	12.39	69.68
10/29/25 11:42	6.15	12.42	69.98
10/29/25 11:43	6.15	12.49	71.15
10/29/25 11:44	6.64	12.06	75.24
10/29/25 11:45	6.82	11.78	74.62
10/29/25 11:46	7	11.69	85.95
10/29/25 11:47	7.39	11.29	91.23
10/29/25 11:48	7.24	11.37	89.26
10/29/25 11:49	7.1	11.49	83.81
10/29/25 11:50	7.04	11.62	82.07
10/29/25 11:51	7.38	11.34	88.55
10/29/25 11:52	7.2	11.4	83.02
10/29/25 11:53	7.16	11.5	76.27
10/29/25 11:54	7.26	11.41	82.19
10/29/25 11:55	7.31	11.34	75.45
10/29/25 11:56	7.06	11.55	78.39
10/29/25 11:57	7.12	11.53	80.1
10/29/25 11:58	7.22	11.42	79.95
10/29/25 11:59	6.92	11.68	75.06
10/29/25 12:00	6.67	11.94	77.39
10/29/25 12:01	6.78	11.85	71.09
10/29/25 12:02	6.87	11.77	70.75

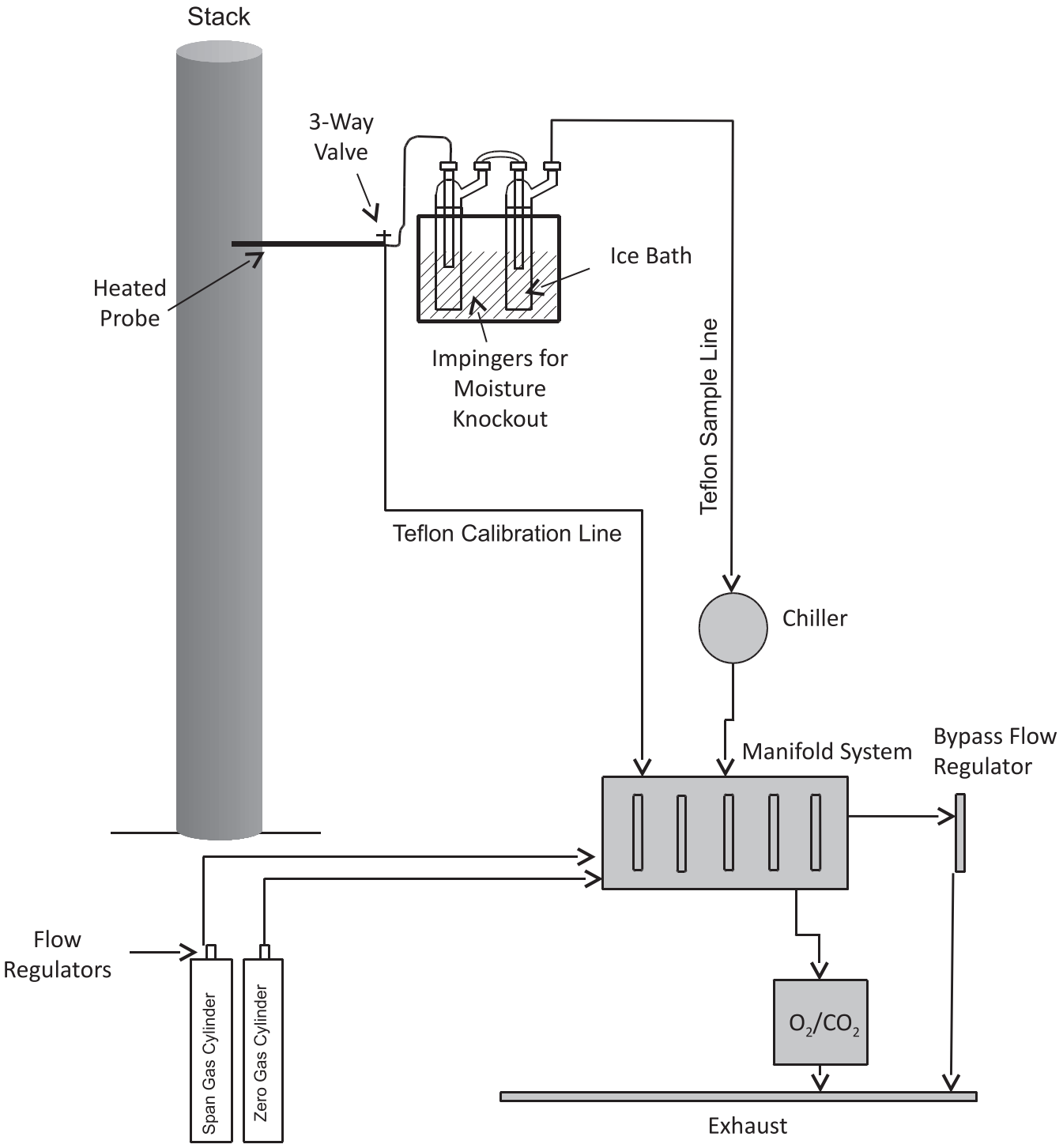
10/29/25 12:03	6.74	11.86	70.52
10/29/25 12:04	6.64	11.98	72.06
10/29/25 12:05	6.54	12.09	75.47
10/29/25 12:06	6.27	12.24	75.6
10/29/25 12:07	6.29	12.33	73.28
10/29/25 12:08	5.93	12.52	62.8
10/29/25 12:09	5.82	12.7	62.04
10/29/25 12:10	5.99	12.56	66.77
10/29/25 12:11	6.32	12.33	73.55
10/29/25 12:12	6.42	12.19	75
10/29/25 12:13	6.69	11.96	81.43
10/29/25 12:14	6.87	11.76	79.58
10/29/25 12:15	6.76	11.83	76.43
10/29/25 12:16	6.59	11.96	73.49
10/29/25 12:17	6.31	12.25	68.89
10/29/25 12:18	6.33	12.24	66.36
10/29/25 12:19	6.08	12.49	66.6
10/29/25 12:20	6.11	12.52	62.54
10/29/25 12:21	6.18	12.53	59.56
10/29/25 12:22	6	12.7	62.08
10/29/25 12:23	6.03	12.87	66.62
10/29/25 12:24	6.15	12.81	73.16
10/29/25 12:25	6.51	12.59	80.26
10/29/25 12:26	6.63	12.42	81.18
10/29/25 12:27	6.59	12.51	82.03
10/29/25 12:28	6.85	12.3	87.4
10/29/25 12:29	6.78	12.32	89.7
10/29/25 12:30	6.92	12.17	92.66
10/29/25 12:31	6.76	12.23	92.53
10/29/25 12:32	6.84	12.1	87.96
10/29/25 12:33	6.59	12.21	70.61
10/29/25 12:34	6.5	12.17	66.5
10/29/25 12:35	1.12	2.01	48.93
10/29/25 12:36	0.11	0.19	1.06
10/29/25 12:37	1.41	1.42	6.94
10/29/25 12:38	9.75	9.39	3.01
10/29/25 12:39	9.87	9.81	0.2
10/29/25 12:40	3.78	3.8	144.62
10/29/25 12:41	0.12	0.2	245.87
10/29/25 12:42	5.17	0.16	193.14
10/29/25 12:43	20.49	0.17	2.71
10/29/25 12:44	20.58	0.17	1.32
10/29/25 12:45	20.6	0.16	1.07
10/29/25 12:46	20.6	0.16	1.06
10/29/25 12:47	14.98	0.16	37.83
10/29/25 12:48	0.06	0.1	3.81
10/29/25 12:49	1.28	1.04	20.66
10/29/25 12:50	-0.02	0.04	0.97
10/29/25 12:51	-0.02	0.01	0.11
10/29/25 12:52	0.69	0.06	25.34
10/29/25 12:53	-0.02	0.01	49.78
10/29/25 12:54	-0.02	0	44.14
10/29/25 12:55	-0.02	0	24.69
10/29/25 12:56	-0.02	0	18.39
10/29/25 12:57	-0.02	0	11.58

10/29/25 12:58	3.1	0.08	7.17
10/29/25 12:59	0.8	0.26	2
10/29/25 13:00	0.08	0.08	0.17
10/29/25 13:01	0.69	0.73	4.9
10/29/25 13:02	9.73	9.52	5.26
10/29/25 13:03	9.87	9.76	0.44
10/29/25 13:04	4.61	4.53	3.62
10/29/25 13:05	0.11	0.17	11.98
10/29/25 13:06	2.12	0.51	12
10/29/25 13:07	14.65	3.36	2.28
10/29/25 13:08	15.1	3.24	1
10/29/25 13:09	15.16	3.23	0.98
10/29/25 13:10	14.7	3.49	0.6
10/29/25 13:11	14.48	3.61	0.48
10/29/25 13:12	14.55	3.57	0.56
10/29/25 13:13	14.74	3.47	0.57
10/29/25 13:14	14.6	3.55	0.48
10/29/25 13:15	14.27	3.73	0.42
10/29/25 13:16	13.83	3.98	0.37
10/29/25 13:17	13.46	4.19	0.32
10/29/25 13:18	13.77	4.01	0.3
10/29/25 13:19	13.71	4.05	0.36
10/29/25 13:20	13.5	4.17	0.29
10/29/25 13:21	13.09	4.4	0.29
10/29/25 13:22	13.06	4.41	0.24
10/29/25 13:23	12.61	4.66	0.27
10/29/25 13:24	12.52	4.71	0.24
10/29/25 13:25	12.57	4.68	0.21
10/29/25 13:26	12.63	4.65	0.26
10/29/25 13:27	12.7	4.61	0.24
10/29/25 13:28	12.72	4.61	0.24
10/29/25 13:29	12.73	4.6	0.24
10/29/25 13:30	12.68	4.63	0.23
10/29/25 13:31	12.71	4.62	0.25
10/29/25 13:32	12.6	4.67	0.23
10/29/25 13:33	12.64	4.65	0.18
10/29/25 13:34	12.68	4.63	0.17
10/29/25 13:35	12.68	4.63	0.21
10/29/25 13:36	12.68	4.62	0.17
10/29/25 13:37	12.65	4.64	0.2
10/29/25 13:38	12.81	4.55	0.18
10/29/25 13:39	12.83	4.54	0.12
10/29/25 13:40	12.69	4.62	0.07
10/29/25 13:41	12.68	4.62	0.1
10/29/25 13:42	12.65	4.64	0.09
10/29/25 13:43	12.87	4.51	0.09
10/29/25 13:44	12.94	4.48	0.05
10/29/25 13:45	12.77	4.57	0.06
10/29/25 13:46	12.7	4.61	0.03
10/29/25 13:47	12.64	4.64	0.02
10/29/25 13:48	12.65	4.63	0.07
10/29/25 13:49	12.7	4.61	0.06
10/29/25 13:50	12.68	4.62	0.07
10/29/25 13:51	12.69	4.62	0.03
10/29/25 13:52	12.86	4.52	0.07

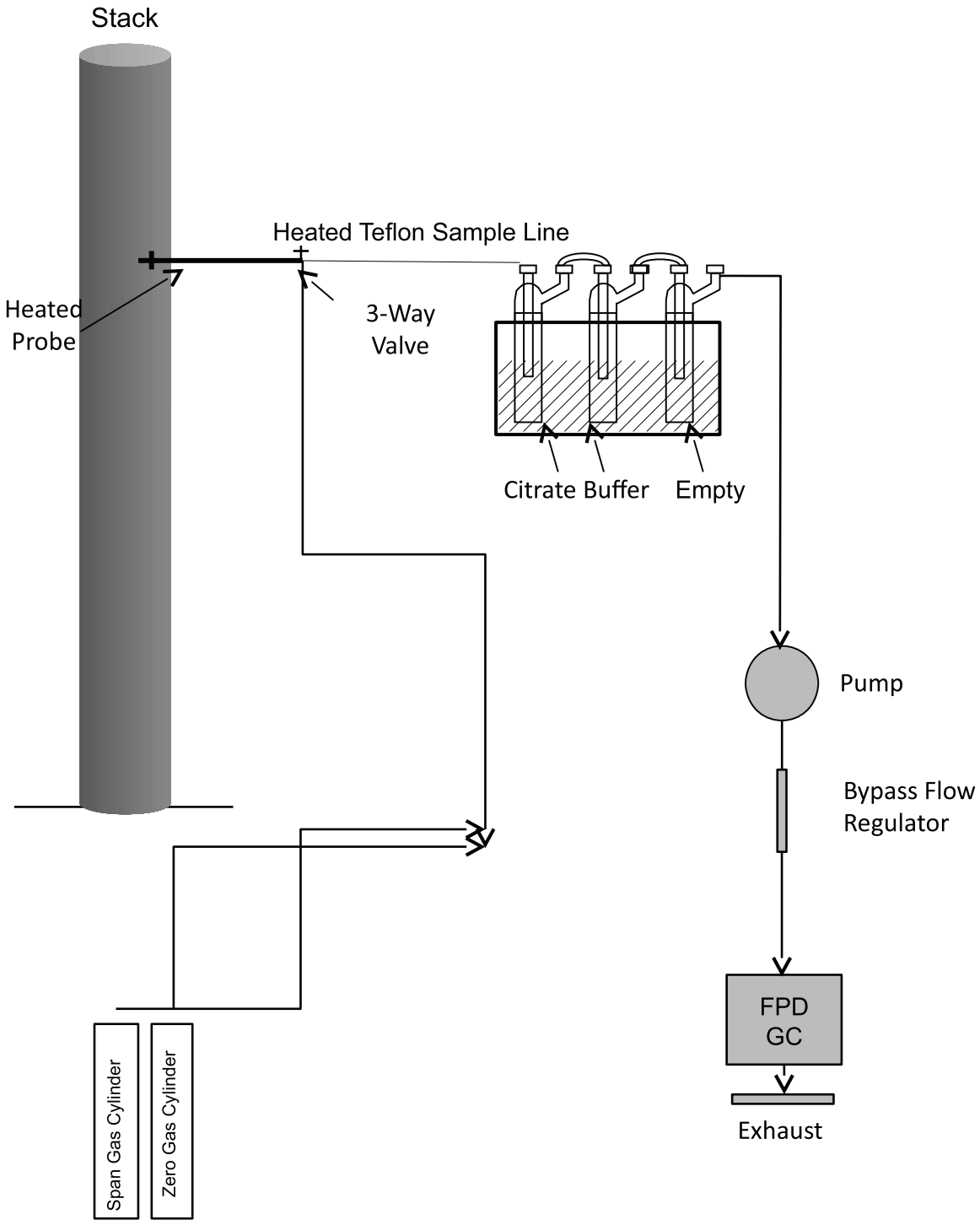
10/29/25 13:53	12.77	4.58	0.04
10/29/25 13:54	12.64	4.66	0.01
10/29/25 13:55	12.6	4.68	0.05
10/29/25 13:56	12.57	4.69	0.01
10/29/25 13:57	12.62	4.66	0.03
10/29/25 13:58	12.63	4.66	0.04
10/29/25 13:59	12.63	4.66	0.04
10/29/25 14:00	12.64	4.65	0.07
10/29/25 14:01	12.6	4.67	0.02
10/29/25 14:02	12.61	4.66	0.05
10/29/25 14:03	12.6	4.68	0.04
10/29/25 14:04	12.57	4.69	0.04
10/29/25 14:05	12.59	4.67	0
10/29/25 14:06	12.6	4.66	0
10/29/25 14:07	12.63	4.65	0
10/29/25 14:08	12.69	4.61	0
10/29/25 14:09	12.67	4.62	0.05
10/29/25 14:10	12.62	4.65	0
10/29/25 14:11	12.62	4.67	0.37
10/29/25 14:12	12.58	4.7	0.44
10/29/25 14:13	12.66	4.57	0.03
10/29/25 14:14	12.73	4.54	0.01
10/29/25 14:15	12.62	4.58	0.04
10/29/25 14:16	12.63	4.58	0
10/29/25 14:17	12.65	4.59	0
10/29/25 14:18	12.59	4.61	0.06
10/29/25 14:19	12.54	4.65	0.07
10/29/25 14:20	12.61	4.61	0.09
10/29/25 14:21	12.71	4.55	0.09
10/29/25 14:22	13.06	4.35	0.04
10/29/25 14:23	13.17	4.3	0.03
10/29/25 14:24	13.19	4.29	0.04
10/29/25 14:25	13.01	4.37	0.08
10/29/25 14:26	1.18	0.53	2.94
10/29/25 14:27	0.08	0.08	0.13
10/29/25 14:28	2.27	2.19	7.35
10/29/25 14:29	9.75	9.42	1.37
10/29/25 14:30	9.84	9.72	-0.5
10/29/25 14:31	2.9	2.88	4.67
10/29/25 14:32	0.08	0.13	11.88
10/29/25 14:33	6.19	0.09	10.72
10/29/25 14:34	20.53	0.11	0.81
10/29/25 14:35	20.6	0.1	0.41
10/29/25 14:36	20.61	0.1	0.45
10/29/25 14:37	20.6	0.1	0.57
10/29/25 14:38	18.89	0.1	0.57

Appendix G - Illustrations

Reference Method Monitors Sampling System
(EPA Method 3A)



Reference Method Monitor Sampling System
(EPA Method 16)



Appendix H - Resume of FTL

CAREER SUMMARY

Mr. Branham is a Project Scientist who has worked in the environmental fieldfor over 7 years. He has been involved with field testing activities on a broad scale and within several different industry types. Over this time, he has developed skills in several areas of emission testing including mobile laboratory operation, meter box operation, and field team supervision.

Education

BS, Parks, Recreation, and Hospitality Administration; Emphasis – Natural Resource Management

Arkansas Tech University

Russellville, AR

Certifications

Visible Emissions Evaluator

Joined Firm

2015

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

Lake City Army Ammunition – Independence, Missouri

Project included sampling for Dioxins and Furans on a hazardous waste combustor via U.S. EPA Reference Test Method 0023a, as well as a RATA to determine relative accuracy of a CO/O2 analyzer they had onsite to monitor emissions from that combustor. Testing was observed by the state regulatory agency. Responsibilities included field organization as well as general field operations.

Martin Marietta Materials – Malvern, Arkansas

Conducted and field managed EPA Method 9 testing at the Jones Mill Quarry location. Responsibilities included project coordination and field operations. Testing parameters included the determination of plume and fugitive emissions opacity.

Clean Harbors – El Dorado, Arkansas

Project included sampling for Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, Total Hydrocarbons, Particulate Matter, Metals, Chlorobenzene, and Hydrogen Cyanide on a hazardous waste incinerator in support of a Comprehensive Performance Test. This project included U.S. EPA Reference Test Methods 6C, 10, 7E, 25A, 5/202, 0030, 29, and OTM-29. Responsibilities included meter box operation, field organization, and general field operations.

Nucor Yamato Steel– Blytheville, Arkansas

Conducted annual compliance and performance specification testing on sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods and instrumental analysis including U.S. EPA Reference Test Methods 5/202 (particulate matter & condensable particulate matter), 12 (lead), 25A (volatile organic compounds), 7E (nitrogen oxides), 6C (sulfur dioxide) and 10 (carbon monoxide). Responsibilities included meter box operation, field organization, and general field operations.

Acme Brick

Conducted and assisted with BMACT testing at multiple locations in Texas and Arkansas. Responsibilities included meter box operation and field organization. Testing parameters included Oxygen, Carbon Dioxide, Nitrogen Oxides, Carbon Monoxide, Non-Methane Volatile Organic Compounds and Total Hydrocarbons, Halide testing with isokinetic train and FTIR, Metals, and Mercury. EPA Methods 3A, 7E, 10, 25A, 26, 29, 30B, and 320. Responsibilities included meter box operation, general field operations, and field organization.

Training

- TVTC Training
- CPR and First Aid
- MSHA Part 46
- Safeland

Last Page of Report

Site Operating Permit Revision Application

Graphic Packaging International, LLC

Texarkana, TX

Submitted by:

Graphic Packaging International

June 2026

Submitted to:

Graphic Packaging International, LLC
9978 FM Road 3129
Queen City, Texas 75572

Texas Commission on Environmental Quality
Air Permits Division
12100 Park 35 Circle, MC-163
Austin, Texas 78753

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Appendix A - PM and TRS Source Testing Results

1. INTRODUCTION

Graphic Packaging International, LLC (GPI) owns and operates a kraft pulp and paper mill near Texarkana, Texas (Texarkana Mill, Mill, or Facility). The Texarkana Mill is located in Cass County, Texas, which is in attainment with the National Ambient Air Quality Standards (NAAQS) for ozone and all criteria pollutants. The Texarkana Mill produces pulp and paper through the following operations: woodyard, power, chemical recovery, caustic plant, non-condensable gas system, pulping, bleaching, papermaking, wastewater treatment, miscellaneous support operations and extruders.

The Facility operates in accordance with Texas Commission on Environmental Quality (TCEQ) Site Operating Permit (SOP) No. O1378 issued December 23, 2025 (Permit). The Facility is classified as a major source with respect to the TCEQ Title V Program, as defined in Title 30 of the Texas Administrative Code (TAC) Chapter 122. The SOP, or Title V Operating Permit (TVOP), expires on December 23, 2030.

GPI conducted particulate matter (PM) testing in February of 2025 and total reduced sulfur (TRS) testing in October of 2025. GPI is requesting to update the Compliance Assurance Monitoring (CAM) deviation limit for the wet scrubbers associated with Nos. 1 and 2 Smelt Dissolving Tanks (Unit IDs SM01 and SM02) to be consistent with the most recent source testing performed. In addition, SM02 was rebuilt in 2019, making SM02 subject to New Source Performance Standards (NSPS) Subpart BBa, Standards of Performance for Kraft Pulp Mill Affected Sources for Which Construction, Reconstruction, or Modification Commenced after May 23, 2013. Permitting was not completed to incorporate the applicable standards. GPI conducted an audit in 2025 under the Texas Audit Privilege Act (TAPA) to voluntarily disclose any violations at the Facility. Findings of the audit, along with the information required under TAPA, have been submitted to the TCEQ on December 10, 2025.

GPI is submitting this minor revision application (Application) to incorporate updates to the CAM and periodic monitoring requirements for the Unit IDs SM01 and SM02 and to add positive applicability for United States Environmental Protection Agency (U.S. EPA) Title 40 Code of Federal Regulations Part 60, Subpart BBa (40 CFR Part 60, Subpart BBa) to unit ID SM02 (Project). The Unit IDs and their associated regulatory updates are summarized in **Table 1-1**.

Table 1-1
Summary of Regulatory Updates by Unit ID

Unit ID	Description	Regulation	Revision
SM01	No. 1 Smelt Dissolving Tank - Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BBa	Add positive applicability of 40 CFR Part 60, Subpart BBa.
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BB	Remove applicability of 40 CFR Part 60, Subpart BB.
SM02	No. 2 Smelt Dissolving Tank – Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).

This Application contains all required forms and supporting information for the revision of the Permit. The following forms are included in this Application: Form OP-2, Form OP-CRO1, Form OP-UA1, Form OP-REQ3, and Form OP-MON. The certification by a responsible official is included in Form OP-CRO1. Form OP-REQ3 is included to document the detailed citations associated with emissions unit that require a revision at the Facility. Tables 1a and 1b of Form OP-REQ3 show the applicable requirements for emissions units undergoing revisions.

There were no off-permit changes or operational flexibility notifications submitted since the last renewal. Therefore, there are no minor new source review (NSR) authorizations that need to be incorporated with this Application.

2. IDENTIFYING AND ADMINISTRATIVE INFORMATION

This section contains identifying and administrative information for the Mill. The following forms are included in this section:

- OP-2: Application for Permit Revision/Renewal

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1)

Date: **6/5/2026**	
Permit No.: **O1378**	
Regulated Entity No.: **RN100543115**	
Company Name: **Graphic Packaging International, LLC**	
For Submissions to EPA	
Has an electronic copy of this application been submitted (or is being submitted) to EPA?	☒ YES ☐ NO
I. Application Type	
Indicate the type of application:	
☐ Renewal	
☒ Streamlined Revision (Must include provisional terms and conditions as explained in the instructions.)	
☐ Significant Revision	
☐ Revision Requesting Prior Approval	
☐ Administrative Revision	
☐ Response to Reopening	
II. Qualification Statement	
For SOP Revisions Only	☒ YES ☐ NO
For GOP Revisions Only	☐ YES ☐ NO

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1 *continued*)

III.	**Major Source Pollutants (Complete this section if the permit revision is due to a change at the site or change in regulations.)**					
Indicate all pollutants for which the site is a major source based on the site's potential to emit: *(Check the appropriate box[es].)*						
☒ VOC	☒ NO_X	☒ SO_2	☒ PM_{10}	☒ CO	☐ Pb	☒ HAP
Other:						
IV.	**Reference Only Requirements** *(For reference only)*					
Has the applicant paid emissions fees for the most recent agency fiscal year (September 1 - August 31)?					☒ YES ☐ NO ☐ N/A	
V.	**Delinquent Fees and Penalties**					
Notice: This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ are paid in accordance with the Delinquent Fee and penalty protocol.						

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 2
Texas Commission on Environmental Quality

Date: **6/5/2026**
Permit No.: **O1378**
Regulated Entity No.: **RN100543115**
Company Name: **Graphic Packaging International, LLC**

Using the table below, provide a description of the revision.

Revision No.	Revision Code	Unit/Group Process			NSR Authorization	Description of Change and Provisional Terms and Conditions
		New Unit	ID No.	Applicable Form		
1	MS-C	NO	SM01	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM01 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
2	MS-C	NO	SM02	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM02 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
3	MS-C	NO	SM02	OP-UA1	N/A	GPI is requesting to add positive applicability for 40 CFR Part 60, Subpart BBa to SM02. In addition, GPI is requesting to remove 40 CFR Part 60, Subpart BB applicability for SM02. No additional emissions unit, emission point, or process is being added or deleted. Suggested regulations to be added to the Permit are found in Form OP-REQ3.

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 3
Texas Commission on Environmental Quality

Date: **6/5/2026**		
Permit No.: **O1378**		
Regulated Entity No.: **RN100543115**		
Company Name: **Graphic Packaging International, LLC**		
I.	**Significant Revision** *(Complete this section if you are submitting a significant revision application or a renewal application that includes a significant revision.)*	
A.	Is the site subject to bilingual requirements pursuant to 30 TAC § 122.322?	☐ YES ☐ NO
B.	Indicate the alternate language(s) in which public notice is required:	
C.	Will, there be a change in air pollutant emissions as a result of the significant revision?	☐ YES ☐ NO

Using the table below, indicate the air pollutant(s) that will be changing and include a brief description of the change in pollutant emissions for each pollutant:

Pollutant	Description of the Change in Pollutant Emissions

3. RESPONSIBLE OFFICIAL CERTIFICATION

This section contains certification requirements of this Application for the Mill. The following forms are included in this section:

- Form OP-CRO1: Certification by Responsible Official

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program

All initial permit application, revision, renewal, and reopening submittals requiring certification must be addressed using this form. Updates to site operating permit (SOP) and temporary operating permit (TOP) applications, other than public notice verification materials, must be certified prior to authorization of public notice or start of public announcement. Updates to general operating permit (GOP) applications must be certified prior to receiving an authorization to operate under a GOP.

I. Identifying Information	
RN: **RN100543115**	
CN: **CN601710460**	
Account No.: **CG-0010-G**	
Permit No.: **O1378**	
Project No.: **TBA**	
Area Name: **Texarkana Mill**	
Company Name: **Graphic Packaging International, LLC**	
II. Certification Type *(Please mark appropriate box)*	
☒ Responsible Official Representative	☐ Duly Authorized Representative
III. Submittal Type *(Please mark appropriate box) (Only one response can be accepted per form)*	
☐ SOP/TOP Initial Permit Application	☒ Permit Revision, Renewal, or Reopening
☐ GOP Initial Permit Application	☐ Update to Permit Application
☐ Other: _____	

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program
Texas Commission on Environmental Quality

All initial issuance, revision, and renewal permit application submittals requiring certification must be accompanied by this form. Updates to acid rain or CSAPR (other than public notice verification materials) must be certified prior to authorization of public notice for the draft permit.

IV. Certification of Truth
This certification does not extend to information which is designated by TCEQ as information for reference only.
I, **Jeffery Suelzer** certify that I am the **RO** *(Certifier Name printed or typed)* *(RO or DAR)* and that, based on information and belief formed after reasonable inquiry, the statements and information dated during the time period or on the specific date(s) below, are true, accurate, and complete: *Note: Enter Either a Time Period or Specific Date(s) for each certification. This section must be completed. The certification is not valid without documentation date(s).*
Time Period: From _____ to _____ *(Start Date)* *(End Date)*
Specific Dates: **6/5/2026** _____ _____ _____ *(Date 1)* *(Date 2)* *(Date 3)* *(Date 4)*
_____ _____ *(Date 5)* *(Date 6)*
Signature: _____ Signature Date: _____ Title: **Manufacturing Director**

4. PROCESS DESCRIPTION

The Texarkana Mill produces bleached kraft pulp that is used to make paperboard for packaging materials. The operations with air emissions sources at the Texarkana Mill include the following:

- Woodyard
- Power
- Chemical Recovery
- Caustic Plant
- Non-Condensable Gas System
- Pulping
- Bleaching
- Papermaking
- Wastewater Treatment
- Miscellaneous Support Operations
- Extruders

GPI woodyard operations debark logs, process chips, and intake purchased chips as raw materials to the process, which are digested under elevated temperature and pressure in an alkaline solution of sodium sulfide and sodium hydroxide, called “white liquor.” The two pulping lines process hardwood and softwood to produce a pulp slurry which is bleached and sent to the paper machines. The final product is dried and can be laminated through extruders that combine it with polyethylene.

This Application only concerns the smelt dissolving tanks used in the chemical recovery operations. There have been no additional changes to the Mill’s operations since the last renewal of the TVOP application; therefore, only a discussion of the chemical recovery operations is included.

CHEMICAL RECOVERY OPERATIONS

The Texarkana Mill operates two liquor recovery systems that process kraft black liquor from the hardwood and softwood pulping operations. Weak liquor from the pulping process is collected in separate weak black liquor storage tanks, one for the No. 1 System and one for the No. 2 System. The liquor from each system is sent to the multiple effect evaporator set associated with that system. Black liquor from these evaporators is then sent to heavy liquor storage before being further processed in the concentrators. Emissions from the No. 1 and No. 2 Multiple Effect Evaporator Sets and No. 1 and No. 2

Concentrators are collected and controlled by the non-condensable gas (NCG) system. The foul condensates are collected in the evaporator hotwells and routed to the sewer and wastewater treatment system. The combined contaminated condensate is collected and may be used as shower water in the brown stock washers or sewered.

Tall oil soap is produced as a byproduct of the evaporation process. Liquor is extracted from an intermediate stage of each evaporator system and sent to No. 2 Weak Liquor Storage Tank. The soap is then concentrated and kept in the No. 1 and No. 2 Soap Storage Tanks prior to loading into trucks for offsite processing.

The Texarkana Mill recovers cooking chemicals by firing concentrated black liquor into either of the two indirect contact recovery furnaces, No. 1 Recovery Furnace (RB01) and No. 2 Recovery Furnace (RB02). The organics from the liquor are combusted to generate heat for process steam, while the inorganic chemicals collect in the bottom of the furnaces in the form of molten smelt. The recovery furnaces are also permitted to fire natural gas, primarily during start-up operations. Each furnace operates as an independent system that includes: a smelt tank, electrostatic precipitator (ESP) for PM control, and two exhaust stacks. Ash from the ESPs is returned to the system in the Precipitator Ash Tanks (one for each recovery furnace) that are vented to the smelt dissolving tank scrubbers. The molten smelt from each recovery furnace is directed to one of two dedicated smelt tanks, where it is dissolved into weak wash or water to form green liquor, a preliminary step to regenerating white liquor in the causticizing operation. SM01 and SM02 are equipped with scrubbers. The control devices are designed to capture particulates and TRS compounds and return them to the smelt tanks. Weak wash, an aqueous solution of sodium hydroxide, sodium sulfide, and sodium carbonate, is used as the scrubbing medium.

5. PROJECT DESCRIPTION

GPI is requesting to update the CAM deviation limit for the wet scrubbers associated with SM01 and SM02 to be consistent with the most recent source testing performed. Pursuant to 40 CFR §63.864(j)(5)(i)(B)(1), "the minimum fan amperage operating limit must be set as the midpoint between the lowest of the 1-hour average fan amperage values associated with each test run demonstrating compliance with the applicable emission limit in §63.862 and the no-load amperage value." The no-load amperage value is determined using manufacturers specifications, or by performing a no-load test of the fan motor for each smelt dissolving tank scrubber. In 2025, GPI completed PM source testing of SM01 and SM02, on February 11 and 12, respectively. TRS source testing was also performed on SM02 on October 28, 2025. While both pollutants were tested under the applicable NSPS BBa requirements for SM02, the operating parameters (i.e., fan amps and scrubber flow) are established based on the PM performance tests as the operating parameter values were higher than those observed during the TRS test. Therefore, SM01 and SM02 utilize the PM source testing results for the 1-hour average fan amperages of the wet scrubber. The no-load fan amperage value for SM01 and SM02 have been obtained from no-load tests performed in 2015 and 2023, respectively. Therefore, GPI has calculated the lowest 1-hour average fan amperage, as provided in the Source Test Report, and the no-load value, and is requesting the value be used for the CAM deviation limit. Please see Table 5-1 for current Permit values and proposed values. The suggested permit revisions can be found in strikethrough and red text in Form OP-MON.

Table 5-1
Smelt Dissolving Tank Test Results and Proposed Values

Unit Name	No. 1 Smelt Dissolving Tank	No. 2 Smelt Dissolving Tank
Unit ID No.	SM01	SM02
Current Permit Average Fan Amp Value	77	36
No Load Fan Amp Values	50.2	28
Minimum 1-Hour Average Fan Amp	81.8	43.19
Proposed Average Fan Amp Value	66	36
Current Permit Weak Wash Flow to Fan (gpm)	48	75
Proposed Weak Wash Flow to Fan (gpm)	48	77
Current Permit Weak Wash Flow to Scrubber (gpm)	88	95
Proposed Weak Wash Flow to Scrubber (gpm)	87	90

In addition, SM02 was rebuilt in 2019 and is therefore subject to NSPS Subpart BBa. Permitting was not completed to incorporate the applicable Subpart BBa standards associated with SM02. Pursuant to Section 10(G) of the Environmental, Health and Safety Audit Privilege Act, which provides immunity for violations voluntarily disclosed as a result of a compliance audit, the Mill conducted an audit under the TAPA, commencing April 30, 2025, to voluntarily disclose any violations at the Facility. The audit was complete on November 18, 2025 and the audit findings were submitted on December 10, 2025. In addition, a source test for TRS was performed on SM02 on October 28, 2025 to demonstrate compliance with Subpart BBa. Since there were no additions or deletions of an emissions unit, emissions point, or process, Form OP-SUMR is not required per form instructions. However, GPI is requesting to update the Unit Summary of the Permit to include a row for 40 CFR Part 60, Subpart BBa requirements for SM02. An example of the row to include, in red, is found below.

Unit/Group/Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
SM02	KRAFT PULP MILLS	N/A	60BBa-01	40 CFR Part 60, Subpart BBa	No changing attributes.

40 CFR Part 60, Subpart BBa lists additional requirements for sources constructed, reconstructed, or modified after May 23, 2013. SM02 was reconstructed in 2019 and is now regulated by Subpart BBa, rather than Subpart BB. GPI is requesting that the Applicable Requirements Summary also be updated to include the regulations applicable to SM02 in Subpart BBa and to delete regulatory requirements of Subpart BB. The suggested regulations applicable to SM02 to include (in red) and delete (in strikethrough) in the Permit can be found in the example on the following page and in Form OP-REQ3.

Applicable Requirements Summary

Unit Group Process ID No.	Unit Group Process Type	SOP Index No.	Pollutant	State Rule or Federal Regulation Name	Emission Limitation, Standard or Equipment Specification Citation	Textual Description (See Special term and Condition 1.B.)	Monitoring and Testing Requirements	Recordkeeping Requirements (30 TAC §122.144)	Reporting Requirements (30 TAC §122.145)
~~SM02~~	~~EU~~	~~60BB-01~~	~~PM~~	~~40 CFR Part 60, Subpart BB~~	~~§60.282(a)(2)~~	~~On and after the test completion no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases containing PM > 0.1 g/kg black liquor solids (dry weight).~~	~~§ 60.285(a) [G]§ 60.285(c) § 60.285(f)(1) ** See CAM Summary~~	~~None~~	~~None~~

~~SM02~~	~~EU~~	~~60BB-01~~	~~TRS~~	~~40 CFR Part 60, Subpart BB~~	~~§60.283(a)(4)~~	~~On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.~~	~~§ 60.284(b) [G]§ 60.284(b)(2) § 60.284(c)(4) § 60.284(f) § 60.285(a) [G]§ 60.285(e) § 60.285(f)(2)~~	~~§60.284(c)(4)~~	~~None~~
SM02	EU	60BBa-01	PM	40 CFR Part 60, Subpart BBa	§60.282a(a)(3)	On and after the performance test completion no owner/operation shall discharge to the atmosphere from any new smelt dissolving tank that is not associated with a new or reconstructed	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

						recovery furnace subject to the provisions of 60.282a(a)(2) any gases which contain filterable particulate matter in excess of 0.1 gram per kilogram (g/kg) of black liquor solids (dry weight).			
SM02	EU	60BBa-01	TRS	40 CFR Part 60, Subpart BBa	§60.283a(a)(4)	On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7) §60.285a(e) §60.285a(f)(2)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

6. UNIT ATTRIBUTE INFORMATION

This section contains the applicable unit attribute forms to document regulatory applicability. The following forms are included in this section:

- OP-UA1: Miscellaneous and Generic Unit Attributes

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

General Information

Requested Information	Response
Date:	06/05/2026
Customer Reference No.:	CN601710460
Regulated Entity No.:	RN100543115
Permit No.:	O1378
Permit Area Name:	Texarkana Mill
Permit Type:	SOP
Project Type:	Revision
Submission Type:	Existing Application Update
Project Number (if available):	TBD
Form Information	**TCEQ Entry Only**
Title V Form Release Date:	10/1998
Form Number:	10044
APD ID Number:	35v1.0
Version Revised Date:	07/2025
	This form is for use by facilities subject to air quality permit requirements and may be revised periodically.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table of Contents

Table	Regulation	Page	Data Submitted
N/A	N/A	OP-SUM Table 1	Yes
N/A	N/A	OP-REQ2	Yes
Table 1	N/A	Page 1	Yes

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-SUM - Individual Unit Summary
Table 1

Unit AI	Revision No.	Unit ID No.	Group ID No.	Unit Name/Description	CAM	PCA AI	Preconstruction Authorization (PCA) Category	Authorization/ Registration Number	Permit By Rule (PBR) Number	PBR Effective Date
	1	SM01		NO. 1 SMELT TANK	Y			2975		
	1	SM01		NO. 1 SMELT TANK	Y			PSDTX778M2		
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.261	03/14/1997
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.262	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			2975		
	2	SM02		NO. 2 SMELT TANK	Y			PSDTX778M2		
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.261	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.262	03/14/1997

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-REQ2 - Negative Applicable/Superseded Requirement Determinations

Unit AI	Revision No.	Unit ID No.	Potentially Applicable Regulatory Name	Negative Applicability/Superseded Requirement Citation	Negative Applicability/Superseded Requirement Reason
	3	SM02	**40 CFR Part 60, Subpart BBa**	40 CFR Part 60, Subpart BB	SM02 has been rebuilt and is now subject to 40 CFR Part 60, Subpart BBa, which promulgates requirements for sources that have been constructed, reconstructed, or modified after May 23, 2013. 40 CFR Part 60, Subpart BB no longer applies.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table 1

Unit ID No.	SOP/GOP Index No.	Unit Type	Date Constructed/Placed in Service	Functionally Identical Replacement	Maximum Rated Capacity	Technical Information and Unit Description
SM02	60BBa-01	EU	**10/03/2019**			No. 2 Smelt Tank was rebuilt in 2019 and is therefore subject to 40 CFR Part 60, Subpart BBa.

Go to the Table of Contents

7. APPLICABLE REQUIREMENT INFORMATION

This section contains forms that document potentially applicable requirements. The following forms are included in this section:

- OP-REQ3: Applicable Requirements Summary

Applicable Requirements Summary
Form OP-REQ3
(Page 1)
Federal Operating Permit Program
Table 1a: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	Unit/Group/Process Applicable Form	SOP/GOP Index No	Pollutant	Applicable Regulatory Requirement Name	Applicable Regulatory Requirement Standard(s)
3	*SM02*	OP-UA1	*60BBa-01*	*PM & TRS*	*40 CFR Part 60, Subpart BBa*	*§ 60.280a* *§ 60.282a(a)(3)* *§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)* *§ 60.287a(a)* *§ 60.287a(b)(4)* *§ 60.287a(b)(7)* *§ 60.287a(c)* *§60.288a*

Applicable Requirements Summary
Form OP-REQ3 (Page 2)
Federal Operating Permit Program
Table 1b: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	SOP/GOP Index No.	Pollutant	Monitoring and Testing Requirements	Recordkeeping Requirements	Reporting Requirements
2	SM02	60BBa-01	PM & TRS	*§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)*	§ 60.287a(a) § 60.287a(b)(4) § 60.287a(b)(7) § 60.287a(c)	§60.288a

8. COMPLIANCE ASSURANCE MONITORING AND PERIODIC MONITORING

CAM is a Federal program established under 40 CFR Part 64 regulations. The regulatory requirements governing implementation of CAM in Texas are also established in 30 TAC Chapter 122, Subchapter G. CAM applies to an emissions unit located at a major source that meets all of the following:

- The emissions unit is subject to an emissions limitation or standard for an air pollutant in an applicable requirement;
- The emissions unit uses a control device to achieve compliance with the applicable emissions limitation or standard; and
- The emissions unit has the pre-control potential-to-emit greater than or equal to the amount in tons per year required for the site to be classified as a major source.

CAM applicability is determined on a pollutant-by-pollutant basis. Please note that 30 TAC §122.604(c) and (d) include CAM exemptions for certain emissions limitations or standards and certain utility units. For example, CAM does not apply to emissions limitations or standards proposed by U.S. EPA after November 15, 1990 under the Federal Clean Air Act Sections §111 (Standards of Performance for New Stationary Sources) or §112 (Hazardous Air Pollutants). Additionally, CAM does not apply to emissions limitations or standards for which the applicable requirement specifies a continuous compliance determination method.

CAM applicability is determined for the emissions unit, not the control device. Sites are required to address CAM as part of the Title V application process. As such, GPI has reviewed the applicable existing CAM plans for accuracy. Form OP-MON has been included with this Application for the CAM plans that require revisions.

Periodic monitoring is a Federal monitoring program established under 40 CFR Part 70 regulations. The regulatory requirements governing implementation of periodic monitoring in Texas are also established in 30 TAC Chapter 122, Subchapter G. An emissions unit will require periodic monitoring for an emissions limitation or standard when the regulation does not specify sufficient monitoring to determine compliance with the applicable requirement. Form OP-MON has been included to document revisions of the periodic monitoring at the Mill.

Pursuant to 40 CFR §64.2(b)(1), the CAM requirements under 40 CFR Part 64 do not apply to SM02. §64.2(b)(1) exempts units subject to emissions limitations or standards in NSPS promulgated after

November 15, 1990. Subpart BBa lists its own monitoring, performance testing, and compliance provisions for PM and TRS, satisfying the intent of CAM. GPI is requesting to remove CAM requirements that no longer apply to SM02 and has included the suggested strikethrough in Form OP-MON.

Texas Commission on Environmental Quality
Monitoring Requirements
Form OP-MON
(PAGE 3)
Federal Operating Permit Program
Table 1c: CAM/PM Case-By-Case Additions

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**1**		
Unit/EPN/Group/Process ID No.: **SM01**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: **30 TAC Chapter 111, Nonagricultural Processes & 30 TAC Chapter 111, Visible Emissions**		
SOP/GOP Index No.: **R1151-01 & R1111-01**		
Pollutant: **PM & Opacity**		
Main Standard: **§111.151(a) & §111.111(a)(1)(B)**		
Monitoring Type: **CAM & Periodic Monitoring**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 66 ~~77~~ amps; [ii] Minimum liquid flow rate = 87.17 ~~88~~ gpm to scrubber and 47.99 ~~48~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM01**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: **Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**		

Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:
± 2% of span; or
± 5% of design liquid flow rate

Verification Procedures:
N/A

Representative Date: **N/A**

VI. Periodic Monitoring Case-by-case: N/A - No changes to periodic monitoring

Indicator: **[I] Fan motor current; [II] Liquid flow rate**	Minimum Frequency: **Four times per hour**

Averaging Period: **3 hour**

Periodic Monitoring Text:
[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**2**		
Unit/EPN/Group/Process ID No.: **SM02**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: ~~**40 CFR Part 60, Subpart BB &**~~ **30 TAC Chapter 111, Nonagricultural Processes**		
SOP/GOP Index No.: ~~**60BB-01 &**~~ **R1111-01**		
Pollutant: ~~**PM &**~~ **Opacity**		
Main Standard: ~~**§60.282(a)(2) &**~~ **§111.11(a)(1)(B)**		
Monitoring Type: **CAM**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 35.6 ~~36~~ amps; [ii] Minimum liquid flow rate = 89.62 ~~95~~ gpm to scrubber and 76.54 ~~75~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM02**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: ~~**Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**~~ ~~**Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:**~~ ~~**± 2% of span; or**~~ ~~**± 5% of design liquid flow rate**~~		

Verification Procedures: **N/A**	
Representative Date: **N/A**	
VI. Periodic Monitoring Case-by-case	
Indicator: **Fan Amperage & Liquid Flow Rate**	Minimum Frequency: **Four times per hour**
Averaging Period: **3 hour**	
Periodic Monitoring Text: **[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.** **[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.**	

APPENDIX A -
PM AND TRS SOURCE TESTING RESULTS

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Test Dates:
February 11-13, 2025

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subparts MM & S

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Lucas Hotubbee
lucas.hotubbee@alliancetg.com
(479) 206-1157

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewer
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

COMPANY:		Graphic Packaging International		SOURCE:		LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, NCG01	
REVIEWER:				DATE OF SAMPLING:		February 11-13, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. E	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. E	Operating parameters of the pollution control equipment					
13.	App. E	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. D	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	App. C	Chain of custody of samples					
31.	App. C	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. D	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the source) tested and operating conditions for the specific test dates and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections in the test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

March 11, 2025

Riley Wilson, QSTI – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

Appendix A Sample Calculations
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Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing was conducted to determine the concentrations and emission rates of particulate matter (PM), particulate matter no more than 10 microns in diameter (PM_{10}), particulate matter no more than 2.5 microns in diameter ($PM_{2.5}$), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	$PM/PM_{10}/PM_{2.5}$
No. 2 Lime Kiln	LK02	$PM/PM_{10}/PM_{2.5}$
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	$PM/PM_{10}/PM_{2.5}$
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	$PM/PM_{10}/PM_{2.5}$
No. 1 Smelt Tank Scrubber	SM01	$PM/PM_{10}/PM_{2.5}$
No. 2 Smelt Tank Scrubber	SM02	$PM/PM_{10}/PM_{2.5}$
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John T. Fussell
Alliance Personnel	Riley Wilson Dominic Bradley Ethan Dobbs Lucas Hotubbee Joshua Moore Marcus Nichols Chris Shepard Calvin Standridge

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) developed by Alliance.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on February 11-13, 2025. Testing consisted of determining the concentration and emission rate of CH_3OH at the exhaust of NCG01 and of $PM/PM_{10}/PM_{2.5}$ at the exhausts of LK1, LK2, RB01A/RB01B, RB02A/RB02B, SM01, and SM02.

Tables 2-1 through 2-4 provide a summary of the emission testing results with comparisons to the applicable NESHAP or TCEQ permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Table 2-1: Summary of Results – Nos. 1 and 2 Lime Kilns

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
LK01 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.015	0.015	0.013	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**22**
Total PM[1] Emission Rate, lb/hr	4.7	4.6	4.4	4.5
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	27.60
Percent of Limit, %	--	--	--	**16**
LK02 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.018	0.006	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**21**
Total PM[1] Emission Rate, lb/hr	6.6	6.6	2.8	5.3
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	26.30
Percent of Limit, %	--	--	--	**20**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-2: Summary of Results – Nos. 1 and 2 Recovery Furnaces

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
RB01A (North Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0082	0.0051	0.0074	0.0069
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**16**
Total PM[1] Emission Rate, lb/hr	6.5	3.6	5.2	5.1
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**19**
RB01B (South Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0013	0.0012	0.0010	0.0011
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**3**
Total PM[1] Emission Rate, lb/hr	1.2	1.2	1.1	1.2
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**4**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
RB02A (West Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.014	0.043	0.025
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**56**
Total PM[1] Emission Rate, lb/hr	21.2	19.9	53.2	31.5
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**74**
RB02B (East Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.030	0.012	0.014	0.019
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**43**
Total PM[1] Emission Rate, lb/hr	36.2	16.2	18.4	23.6
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**55**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-3: Summary of Results – Nos. 1 and 2 Smelt Tank Scrubbers

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
SM01 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.15	0.083	0.073	0.10
NESHAP PM Limit, lb/ton	--	--	--	0.40
Percent of Limit, %	--	--	--	
Total PM[1] Emission Rate, lb/hr	7.8	4.4	3.9	5.4
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	10.9
Percent of Limit, %	--	--	--	**49**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
SM02 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.077	0.063	0.060	0.067
NESHAP PM Limit, lb/ton	--	--	--	0.20
Percent of Limit, %	--	--	--	**33**
Total PM[1] Emission Rate, lb/hr	8.0	7.4	6.4	7.3
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	19.85
Percent of Limit, %	--	--	--	**37**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-4: Summary of Results – NCG Oxidation Unit Scrubber

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
Methanol Data				
Concentration, ppmvd @ 10% O_2	1.1	1.1	0.97	1.1
NESHAP Limit, ppmvd @ 10% O_2	--	--	--	20
Percent of Limit, %	--	--	--	**5**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture	320	FTIR – Continuous Sampling

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated to equivalent diameters and compared to Figure 1-1 in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and an inclined manometer. The stack gas temperature was measured with a K-type thermocouple and a pyrometer.

The O_2 and CO_2 concentrations were assumed to be ambient for the molecular weight and volumetric flow rate calculations at the Nos. 1 and 2 Smelt Tank Scrubbers (SM01 and SM02).

Stack gas velocity pressure and temperature readings were recorded during each test run and were utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing were conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on-site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content (BWS) was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to the testing, each impinger was filled with a known quantity of water or silica gel. Each impinger was analyzed gravimetrically before and after each test run to determine the amount of condensed moisture. All gravimetric analyses were performed on the same balance.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing was conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system consisted of a stainless-steel nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, an un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and five (5) chilled impingers. The first and second impingers were initially empty, the third impinger contained 100 mL of de-ionized water, the fourth impinger was initially empty, and the fifth impinger contained 200-300 grams of silica gel. The un-weighed, 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of 248 ±25°F, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained at a temperature that was greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The nitrogen purge was omitted because the amount of condensate that was collected in the dry impingers was minimal. After the leak check, the impinger contents were measured for moisture gain.

The front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 120-minute purge was conducted at a rate of 14 liters per minute. The nitrogen purge was started within 30 minutes of the conclusion of sampling. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. Condensate was collected in the first dry impinger; therefore, the front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 60-minute purge was conducted at a rate of 14 liters per minute. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder were rinsed six (6) times with acetone to remove any adhering particulate matter, and the resulting rinses were recovered in container 2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water, then with acetone and then with hexane. The resulting water rinse was recovered in container CPM Cont. #1, and the acetone and hexane rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed sequentially

with DIUF water, acetone, and hexane. The resulting water rinse was added to container CPM Cont. #1, and the resulting acetone and hexane rinses were added to container CPM Cont. #2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for condensable particulate matter analysis. The total moles of sulfate and ammonium were determined in the sample fraction and the maximum mass adjustment factor (MMAF) was calculated to correct for residual ammonia in accordance with OTM-59.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture were determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream was extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 FTIR, which was operated with a portable computer. FTIR spectra for each calibration gas were stored on the computer's hard drive, and these single component calibration spectra were used to analyze the spectra of the measured samples. The gas components to be measured were selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio were measured and recorded to document the analyzer's performance. A leak check was performed on the sample cell. The instrument path length was verified by using ethylene as the Calibration Transfer Standard. Dynamic spiking was performed by using a certified standard of the target compound or appropriate surrogate, which was balanced in nitrogen with sulfur hexafluoride blended as a tracer, to calculate the dilution factor. All test spectra, interferograms, and analytical method information were recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at the Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) was introduced directly to the instrument sample port. The signal amplitude was recorded, a background spectra was taken, a linearity check was performed and recorded, the peak-to-peak noise and the root mean square in the spectral region of interest were measured and a screenshot was recorded, all while the nitrogen was flowing.

Following the zero gas checks, room air was pulled through the sample chamber, the line width and resolution were verified to be at 1879 cm-1, the peak position was entered and a screenshot of the FWHH was recorded. Following these checks, another background spectra was recorded, and the calibration transfer standard (CTS) was introduced directly to the instrument sample port. The CTS instrument recovery was recorded, and the instrument mechanical response time was measured.

Next, stack gas was introduced to the FTIR through the sampling system and several scans were taken until a stable reading was achieved. The native concentration of our target spiking analyte (methanol) was recorded. Spike gas was introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate, and a corresponding dilution ratio and a system response time were calculated. Matrix spike recovery spectra were recorded and were within ± 30% of the calculated value of the spike concentration in accordance with the method's requirements.

The matrix spike recovery was conducted one (1) time at the beginning of the testing, and the CTS recovery procedures were repeated following each test run. The corresponding values were recorded.

Appendix A

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	13.3	= average analyzer value during test, % dry
C_o	0.2	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	10.1	= average of pretest & posttest calibration responses, % dry
C_{O_2}	13.2	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.1	= average analyzer value during test, % dry
C_o	0.0	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.8	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	3.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
ΔH	2.158	= pressure differential of orifice, in H_2O
Pm	30.19	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
Pg	-0.48	= static pressure, in. H_2O
Ps	29.99	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Y \times Vm \times Pm}{Tm}$$

where,

Y	0.999	= meter correction factor
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Tm	523.5	= absolute meter temperature, °R
Vmstd	48.077	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	506	= weight of H_2O collected, g
Vwstd	23.863	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37} - \left(\frac{2,827}{Ts + 365}\right)}{Ps}$$

where,

Ts	363.9	= stack temperature, °F
Ps	29.99	= absolute stack gas pressure, in. Hg
BWSsat	1.000	= dimensionless

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	23.863	= standard wet volume, scf
Vmstd	48.077	= standard meter volume, dscf
BWS	0.332	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	1.000	= moisture fraction (theoretical at saturated conditions)
BWSmsd	0.332	= moisture fraction (measured)
BWS	0.332	

Excess Air (EA), %

$$EA = \frac{(\%O_2 - [0.5 \times \%CO]) \times 100}{(0.264 \times \%N_2) - \%O_2 - (0.5 \times \%CO)}$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
CO	0.0	= carbon monoxide concentration, % (assumed zero)
N_2	79.5	= nitrogen concentration, %
EA	40.97259538	= %

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
Md	30.55	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	30.55	= molecular weight (DRY), lb/lb mol
BWS	0.332	= moisture fraction, dimensionless
Ms	26.39	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.804	= pitot tube coefficient
$\Delta P^{1/2}$	0.713	= velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Ms	26.39	= molecular weight of stack gas, lb/lb mol
Vs	50.0	= ft/sec

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	50.0	= stack gas velocity, ft/sec
As	46.16	= cross-sectional area of stack, ft^2
Qa	138,543	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	138,543	= average stack gas flow at stack conditions, acfm
BWS	0.332	= moisture fraction, dimensionless
Ps	29.99	= absolute stack gas pressure, in. Hg
Ts	823.5	= absolute stack temperature, °R
Qs	59,472	= dscfm

Dry Gas Meter Calibration Check (Yqa), dimensionless

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{0.0319 \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0.999	= meter correction factor, dimensionless
Θ	60	= run time, min.
Vm	47.32	= total meter volume, dcf
Tm	523.5	= absolute meter temperature, °R
ΔH@	1.832	= orifice meter calibration coefficient, in. H_2O
Pb	30.03	= barometric pressure, in. Hg
ΔH avg	2.158	= average pressure differential of orifice, in H_2O
Md	30.55	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	1.469	= average squareroot pressure differential of orifice, $(in. H2O)^{1/2}$
Yqa	0.2	= percent

Volume of Nozzle (Vn), ft^3

$$Vn = \frac{Ts \times \left(0.002669 \times Vlc + \frac{Vm \times Pm \times Y}{Tm} \right)}{Ps}$$

where,

Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Vlc	506.0	= volume of H_2O collected, ml
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Y	0.999	= meter correction factor, unitless
Tm	523.5	= absolute meter temperature, °R
Vn	111.928	= volume of nozzle, ft^3

Isokinetic Sampling Rate (I), %

$$I = \left(\frac{Vn}{\theta \times 60 \times An \times Vs} \right) \times 100$$

where,

Vn	111.928	= nozzle volume, ft3
θ	60.0	= run time, minutes
An	0.00059	= area of nozzle, ft^2
Vs	50.0	= average velocity, ft/sec
I	104.7	= %

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Filterable PM Concentration (C_s), grain/dscf

$$C_s = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn	29.2	= filterable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_s	0.0094	= grain/dscf

Filterable PM Emission Rate (PMR), lb/hr

$$PMR = \frac{C_s \times Qs \times 60}{7.0E+03}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
PMR	4.78	= lb/hr

Condensable PM Concentration (C_{CPM}), grain/dscf

$$C_{CPM} = \frac{M_{CPM} \times 0.0154}{Vmstd}$$

where,

M_{CPM}	10.7	= condensable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_{CPM}	0.0034	= grain/dscf

Condensable PM Emission Rate (ER_{CPM}), lb/hr

$$ER_{CPM} = \frac{C_{CPM} \times Qs \times 60\frac{min}{hr}}{7.0E+03}$$

where,

C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
ER_{CPM}	1.75	= lb/hr

Total PM Concentration (C_{TPM}), grain/dscf

$$C_{TPM} = C_S + C_{CPM}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
C_{TPM}	0.0128	= grain/dscf

Total PM Emission Rate (ER_{TPM}), lb/hr

$$ER_{TPM} = PMR + ER_{CPM}$$

where,

PMR	4.78	= filterable PM emission rate, lb/hr
ER_{CPM}	1.75	= condensable PM emission rate, lb/hr
ER_{TPM}	6.53	= lb/hr

Location:	Graphic Packaging International - Queen City, TX
Source:	NCG Oxidation Unti Scrubber (NCG01)
Project No.:	AST-2024-4204
Run No. /Method	Run 1 / Method 320
Run No.	1
Target	35

Methanol - Outlet Concentration (C_{CH_3OH}), ppmvd

$$C_{CH_3OH} = \frac{C_{CH_3OHw}}{1 - BWS}$$

where,

C_{CH_3OHw}	0.5	= Methanol - Outlet Concentration, ppmvw
BWS	0.444	= moisture fraction, unitless
C_{CH_3OH}	0.8	= ppmvd

Methanol - Outlet Concentration (C_{CH_3OHw}), ppmvw

$$C_{CH_3OHw} = C_{CH_3OH} \times (1 - BWS)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
BWS	0.444	= moisture fraction, unitless
C_{CH_3OHw}	0.5	= ppmvw

Methanol - Outlet Concentration (C_{CH_3OHc10}), ppmvd @ 10% O_2

$$C_{CH_3OHc10} = C_{CH_3OH} \times \left(\frac{20.9 - 10}{20.9 - O_2}\right)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
C_{O_2}	13.2	= oxygen concentration, %
C_{CH_3OHc10}	1.1	= ppmvd @10% O_2

Methanol - Outlet Emission Rate (ER_{CH_3OH}), lb/hr

$$ER_{CH_3OH} = \frac{C_{CH_3OH} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 454 \frac{g}{lb}}$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
MW	32.04	= CH_3OH molecular weight, g/g-mole
Qs	6,235	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{CH_3OH}	2.65	= lb/hr

Location Graphic Packaging
Source(s) NCG Incinerator
Project No. AST-2024-4204
Date(s) 2/5/2025

CTS Recovery Value (CTS_R), %

$$\frac{CTS_{avg}}{CTS_{cyl}} \times 100$$

Where,

CTS_{avg}	98.17	= average of all CTS calibration gas readings, ppm
CTS_{cyl}	103	= CTS bottle certified gas value, ppm
CTS_R	95.3%	= CTS recovery value, %

Spike Dilution Factor (DF), %

$$\frac{SF6_{spike} - SF6_{nat}}{SF6_{dir}} \times 100$$

Where,

$SF6_{dir}$	12.03	= average of direct tracer gas value readings
$SF6_{nat}$	0.01	= average of native tracer gas value readings
$SF6_{spike}$	0.759135	= average of dynamic spike tracer gas value readings
DF	6.23%	= spike dilution factor, %

Calculated Spike ($Spike_{calc}$), ppm

$$(DF \times Analyte_{dir}) + (Analyte_{nat} \times (1 - DF))$$

Where,

%DF	6.23%	= spike dilution factor, %
$Analyte_{dir}$	100.07	= average of direct analyte gas values, ppm
Analyte $_{nat}$	0.49	= average of native analyte gas values, ppm
$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm

Spike Recovery Value ($Spike_R$), %

$$\frac{Analyte_{spike}}{Spike_{calc}} \times 100$$

Where,

$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm
$Analyte_{spike}$	5.39	= average of spiked analyte gas values, ppm
$Spike_R$	80.55%	= spike recovery value, %

Appendix B

LK01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

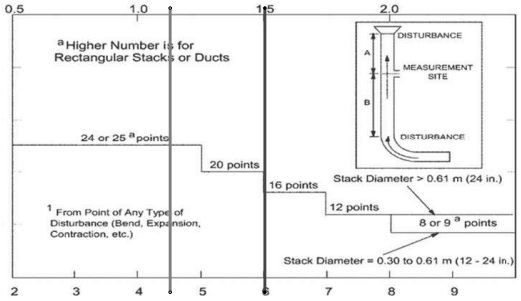
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	160.00	160.10	160.06	160.05
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	42.600	42.370	39.800	41.590
Meter Temperature, °F	(Tm)	47.5	48.5	48.3	48.1
Meter Temperature, °R	(Tm)	507.2	508.2	508.0	507.8
Meter Orifice Pressure, in. WC	(ΔH)	1.633	1.583	1.600	1.606
Volume H_2O Collected, mL	(Vlc)	190.2	195.2	196.8	194.1
Nozzle Diameter, in	(Dn)	0.247	0.247	0.247	0.247
Area of Nozzle, ft^2	(An)	0.0003	0.0003	0.0003	0.0003
Filterable PM Mass, mg	(Mn)	53.7	55.5	44.9	51.4
Condensable PM Mass, mg	(M_{CPM})	4.6	1.8	5.9	4.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.028	44.691	41.999	43.906
Standard Water Volume, ft^3	(Vwstd)	8.970	9.206	9.281	9.152
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
Meter Pressure, in Hg	(Pm)	30.46	30.46	30.46	30.46
Volume at Nozzle, ft^3	(Vn)	59.617	59.606	56.658	58.63
Isokinetic Sampling Rate, (%)	(I)	103.3	103.8	97.1	101.4
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	2.2	3.2	-3.6	0.6
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.019	0.016	0.018
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.015	0.015	0.013	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	4.3	4.5	3.8	4.2
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0016	0.0006	0.0022	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.37	0.14	0.51	0.34
Total PM Concentration, grain/dscf	(C_{TPM})	0.020	0.020	0.019	0.019
Total PM Emission Rate, lb/hr	(ER_{TPM})	4.7	4.6	4.4	4.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Lime Kiln (LK01)
Project No.: AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	56.50	in
Nipple Length:	8.50	in
Depth of Duct:	48.00	in
Cross Sectional Area of Duct:	12.57	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	1.5	(must be ≥ 0.5)
Distance B:	18.0	ft
Distance B Duct Diameters:	4.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/13/25	
Reviewer (Initial and Date):	CAL 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

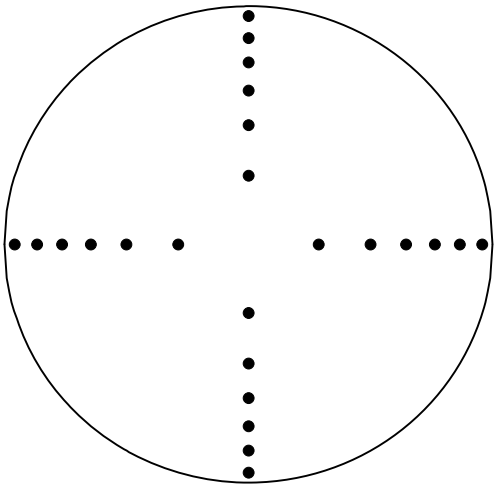
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

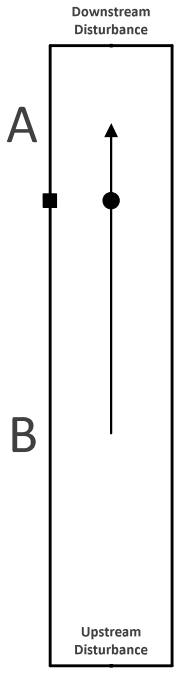
*Percent of stack diameter from inside wall to traverse point.

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.01	9 1/2
2	6.7	3.22	11 11/16
3	11.8	5.66	14 3/16
4	17.7	8.50	17
5	25.0	12.00	20 1/2
6	35.6	17.09	25 9/16
7	64.4	30.91	39 7/16
8	75.0	36.00	44 1/2
9	82.3	39.50	48
10	88.2	42.34	50 13/16
11	93.3	44.78	53 5/16
12	97.9	46.99	55 1/2

Stack Diagram
A = 6 ft.
B = 18 ft.
Depth of Duct = 48 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	6
2	4
3	3
4	5
5	5
6	3
7	2
8	0
9	5
10	2
11	6
12	8
13	2
14	10
15	6
16	5
17	0
18	6
19	6
20	8
21	2
22	3
23	3
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.44	0.42	0.43	0.43
Point 2		0.69	0.69	0.70	0.69
Point 3		0.76	0.67	0.73	0.72
Point 4		0.68	0.66	0.67	0.67
Point 5		0.70	0.70	0.69	0.70
Point 6		0.73	0.71	0.72	0.72
Point 7		0.74	0.72	0.74	0.73
Point 8		0.74	0.75	0.75	0.75
Point 9		0.66	0.66	0.67	0.66
Point 10		0.64	0.64	0.65	0.64
Point 11		0.58	0.56	0.57	0.57
Point 12		0.55	0.54	0.53	0.54
Point 13		0.45	0.45	0.44	0.45
Point 14		0.71	0.72	0.71	0.71
Point 15		0.75	0.73	0.73	0.74
Point 16		0.69	0.70	0.70	0.70
Point 17		0.70	0.70	0.69	0.70
Point 18		0.73	0.74	0.73	0.73
Point 19		0.72	0.73	0.72	0.72
Point 20		0.74	0.71	0.71	0.72
Point 21		0.65	0.66	0.66	0.66
Point 22		0.65	0.64	0.65	0.65
Point 23		0.59	0.60	0.60	0.60
Point 24		0.55	0.54	0.53	0.54
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.810	0.805	0.807	0.808
Pitot Tube Coefficient	(Cp)	0.832	0.832	0.832	0.832
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.66	-0.66	-0.65	-0.66
Stack Pressure, in. Hg	(Ps)	30.29	30.29	30.29	30.29
Stack Cross-sectional Area, ft^2	(As)	12.57	12.57	12.57	12.57
Stack Temperature, °F	(Ts)	130.3	131.3	130.8	130.8
Stack Temperature, °R	(Ts)	590.0	591.0	590.5	590.5
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
O_2 Concentration, %	(O_2)	7.3	7.1	6.9	7.10
CO_2 Concentration, %	(CO_2)	16.5	16.9	17.2	16.87
N_2 Concentration, %	(N_2)	76.2	76	75.9	76.03
Excess Air, %	(EA)	56.96	54.77	52.52	54.75
Molecular Weight, lb/lb-mole (dry)	(Md)	30.93	30.99	31.03	30.98
Molecular Weight, lb/lb-mole (wet)	(Ms)	29.00	28.99	29.06	29.02
Velocity, ft/sec	(Vs)	47.2	47.0	47.0	47.1
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	35,619	35,424	35,457	35,500
At Standard Conditions, scfm	(Qsw)	32,251	32,021	32,080	32,117
At Standard Conditions, dscfm	(Qs)	27,423	27,097	27,218	27,246

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	14:50	2/13/2025	16:38	2/13/2025	18:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	7.32	16.48	7.07	16.92	6.90	17.15
Analysis #2	7.32	16.49	7.05	16.92	6.90	17.15
Analysis #3	7.32	16.49	7.06	16.92	6.90	17.15
Average	7.3	16.5	7.1	16.9	6.9	17.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.7	815.0	689.0	654.7	1014.9	3533.3
Final Mass, g	498.0	852.6	692.8	656.7	1023.4	3723.5
Gain	138.3	37.6	3.8	2.0	8.5	190.2
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.6	641.4	687.6	557.7	939.6	3320.9
Final Mass, g	633.7	680.7	691.3	558.4	952.0	3516.1
Gain	139.1	39.3	3.7	0.7	12.4	195.2
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.4	662.6	692.8	656.7	1023.4	3533.9
Final Mass, g	631.5	701.3	706.4	657.9	1033.6	3730.7
Gain	133.1	38.7	13.6	1.2	10.2	196.8

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	13:20	**Source:** No.1 Lime Kiln (LK01)
Date:	2/13/25	Run 1 VALID	**End Time:**	14:26	**Project No.:** AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	14.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26962-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	190.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.3 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.237	in.		CO_2:	16.5 %	2.505
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- -- 8			Mid 3 (cf)	--
Ms:	28.94	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. 45	Amb. 45	Ideal	Actual		Amb. 45	Amb. 45	Amb. 45	Amb. 45		
A1	0.00	2.50	168.410	0.44	49	129	1.09	1.10	3	255	257	38	66	93.6	38.66
2	2.50	5.00	169.750	0.69	48	129	1.71	1.70	4	255	254	39	70	92.4	48.42
3	5.00	7.50	171.400	0.76	47	129	1.88	1.90	4	256	256	39	69	103.2	50.81
4	7.50	10.00	173.330	0.68	47	129	1.68	1.70	5	252	253	39	72	104.0	48.06
5	10.00	12.50	175.170	0.70	47	129	1.73	1.70	5	253	255	39	70	102.5	48.77
6	12.50	15.00	177.010	0.73	47	128	1.81	1.80	5	251	255	38	69	103.0	49.76
7	15.00	17.50	178.900	0.74	47	129	1.83	1.80	5	250	254	39	71	101.9	50.14
8	17.50	20.00	180.780	0.74	47	129	1.83	1.80	5	249	256	39	73	101.3	50.14
9	20.00	22.50	182.650	0.66	47	129	1.63	1.60	5	247	255	39	72	102.1	47.35
10	22.50	25.00	184.430	0.64	47	131	1.58	1.60	5	243	253	40	68	103.9	46.71
11	25.00	27.50	186.210	0.58	47	130	1.43	1.40	4	251	255	41	67	103.4	44.43
12	27.50	30.00	187.900	0.55	47	130	1.36	1.40	4	244	254	41	66	104.3	43.26
B1	30.00	32.50	189.560	0.45	48	131	1.11	1.10	4	252	255	41	68	105.4	39.17
2	32.50	35.00	191.080	0.71	47	131	1.75	1.80	5	250	255	41	69	102.5	49.20
3	35.00	37.50	192.930	0.75	47	131	1.85	1.90	5	250	250	42	71	103.0	50.56
4	37.50	40.00	194.840	0.69	48	131	1.70	1.70	5	254	256	42	72	101.5	48.50
5	40.00	42.50	196.650	0.70	48	132	1.72	1.70	5	257	254	42	73	102.0	48.89
6	42.50	45.00	198.480	0.73	48	131	1.80	1.80	6	251	258	43	73	100.4	49.88
7	45.00	47.50	200.320	0.72	48	132	1.77	1.80	6	250	251	42	74	101.7	49.58
8	47.50	50.00	202.170	0.74	48	131	1.82	1.80	6	244	255	43	76	101.3	50.23
9	50.00	52.50	204.040	0.65	48	132	1.60	1.60	5	243	255	43	76	102.4	47.11
10	52.50	55.00	205.810	0.65	48	132	1.60	1.60	5	245	255	43	78	101.8	47.11
11	55.00	57.50	207.570	0.59	48	132	1.45	1.50	5	249	255	43	79	106.2	44.88
12	57.50	60.00	209.320	0.55	48	131	1.36	1.40	5	253	256	44	81	106.1	43.30
	Final DGM:		211.010												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.600	ft^3	0.66	in. WC	47.5	°F	130.3	°F	6	1.633	in. WC	103.3	0.150	2.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	15:05	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	16:10	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26961-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	195.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.1 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	16.9 %	2.42
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.007	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	211.150	0.42	46	130	1.02	1.00	3	261	257	43	67	102.5	37.89
2	2.50	5.00	212.560	0.69	47	131	1.67	1.70	4	248	255	44	69	102.7	48.61
3	5.00	7.50	214.370	0.67	47	131	1.62	1.60	4	248	256	46	69	102.5	47.90
4	7.50	10.00	216.150	0.66	47	131	1.59	1.60	4	244	253	46	70	106.7	47.54
5	10.00	12.50	217.990	0.70	47	130	1.69	1.70	4	244	256	46	70	95.1	48.92
6	12.50	15.00	219.680	0.71	47	130	1.72	1.70	4	248	255	47	71	101.7	49.26
7	15.00	17.50	221.500	0.72	48	131	1.74	1.70	4	250	256	48	71	100.3	49.65
8	17.50	20.00	223.310	0.75	48	130	1.82	1.80	5	248	254	48	71	102.1	50.63
9	20.00	22.50	225.190	0.66	48	131	1.60	1.60	4	241	254	48	71	104.2	47.54
10	22.50	25.00	226.990	0.64	49	131	1.55	1.60	4	249	259	48	70	105.0	46.81
11	25.00	27.50	228.780	0.56	49	131	1.36	1.40	4	253	256	48	71	106.6	43.79
12	27.50	30.00	230.480	0.54	49	133	1.31	1.30	4	245	255	49	72	102.9	43.07
B1	30.00	32.50	232.090	0.45	49	132	1.09	1.10	3	253	257	49	74	99.3	39.29
2	32.50	35.00	233.510	0.72	49	133	1.74	1.70	5	251	255	49	75	102.5	49.74
3	35.00	37.50	235.360	0.73	49	133	1.76	1.80	5	252	255	49	76	104.1	50.08
4	37.50	40.00	237.250	0.70	49	132	1.69	1.70	5	256	254	49	78	103.3	49.00
5	40.00	42.50	239.090	0.70	49	132	1.69	1.70	5	254	255	50	78	102.8	49.00
6	42.50	45.00	240.920	0.74	49	132	1.79	1.80	5	252	252	50	77	101.1	50.38
7	45.00	47.50	242.770	0.73	49	131	1.77	1.80	5	247	252	50	74	103.3	49.99
8	47.50	50.00	244.650	0.71	49	132	1.72	1.70	5	246	256	51	72	102.0	49.35
9	50.00	52.50	246.480	0.66	50	132	1.60	1.60	5	250	256	51	69	104.5	47.58
10	52.50	55.00	248.290	0.64	50	131	1.56	1.60	5	252	256	51	69	109.5	46.81
11	55.00	57.50	250.160	0.60	50	131	1.46	1.50	5	253	255	51	70	99.8	45.33
12	57.50	60.00	251.810	0.54	51	131	1.32	1.30	5	256	255	52	70	108.7	43.00
	Final DGM:		253.520												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.370	ft^3	0.65	in. WC	48.5	°F	131.3	°F	5	1.583	in. WC	103.8	0.154	3.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	16:25	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	17:45	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	49	°F	26970-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	131	°F		Pg:	-0.65 in. WC	196.8
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.65	in. WC		O_2:	6.9 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	17.2 %	2.421
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.004	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	253.680	0.43	49	130	1.05	1.10	3	252	244	46	70	105.0	38.34
2	2.50	5.00	255.150	0.70	49	129	1.70	1.70	5	246	252	46	68	95.8	48.87
3	5.00	7.50	256.860	0.73	49	129	1.78	1.80	5	250	257	46	68	94.9	49.91
4	7.50	10.00	258.590	0.67	48	128	1.63	1.60	5	253	255	45	69	97.4	47.77
5	10.00	12.50	260.290	0.69	48	130	1.67	1.70	5	243	248	45	73	98.5	48.56
6	12.50	15.00	262.030	0.72	49	130	1.75	1.80	5	251	251	45	76	97.3	49.61
7	15.00	17.50	263.790	0.74	49	131	1.79	1.80	5	251	247	45	74	92.3	50.34
8	17.50	20.00	265.480	0.75	48	129	1.82	1.80	5	252	245	45	69	100.3	50.59
9	20.00	22.50	267.330	0.67	49	130	1.63	1.60	4	253	251	45	68	98.5	47.86
10	22.50	25.00	269.050	0.65	48	132	1.57	1.60	6	253	258	43	67	94.0	47.22
11	25.00	27.50	270.660	0.57	48	131	1.38	1.40	5	247	260	43	67	93.4	44.18
12	27.50	30.00	272.160	0.53	47	131	1.28	1.30	4	254	263	43	68	95.7	42.60
B1	30.00	32.50	273.640	0.44	47	131	1.06	1.10	3	255	259	43	68	98.6	38.81
2	32.50	35.00	275.030	0.71	47	132	1.71	1.70	5	254	262	43	68	98.5	49.35
3	35.00	37.50	276.790	0.73	48	131	1.77	1.80	6	254	260	43	69	96.4	49.99
4	37.50	40.00	278.540	0.70	48	131	1.69	1.70	5	255	254	44	69	96.7	48.96
5	40.00	42.50	280.260	0.69	48	132	1.67	1.70	5	253	260	44	70	95.8	48.65
6	42.50	45.00	281.950	0.73	48	131	1.77	1.80	6	252	263	45	71	92.0	49.99
7	45.00	47.50	283.620	0.72	48	131	1.74	1.70	5	251	259	46	72	92.6	49.65
8	47.50	50.00	285.290	0.71	49	132	1.72	1.70	5	250	259	47	72	98.7	49.35
9	50.00	52.50	287.060	0.66	49	132	1.60	1.60	5	249	258	48	73	99.5	47.58
10	52.50	55.00	288.780	0.65	49	132	1.57	1.60	5	248	259	48	75	95.6	47.22
11	55.00	57.50	290.420	0.60	49	132	1.45	1.50	4	258	261	49	78	98.8	45.36
12	57.50	60.00	292.050	0.53	49	132	1.28	1.30	4	253	258	50	83	92.2	42.64
	Final DGM:		293.480												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	39.800	ft^3	0.66	in. WC	48.3	°F	130.8	°F	6	1.600	in. WC	97.1	0.152	-3.6

LK02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

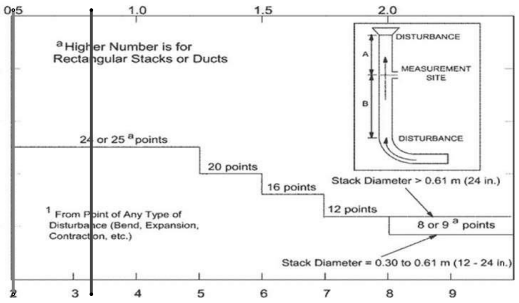
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	309.82	309.98	310.00	309.93
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.375	44.885	45.085	43.782
Meter Temperature, °F	(Tm)	53.6	54.0	57.1	54.9
Meter Temperature, °R	(Tm)	513.3	513.6	516.8	514.6
Meter Orifice Pressure, in. WC	(ΔH)	1.554	1.846	1.838	1.746
Volume H_2O Collected, mL	(Vlc)	336.8	374.0	370.4	360.4
Nozzle Diameter, in	(Dn)	0.416	0.416	0.416	0.416
Area of Nozzle, ft^2	(An)	0.0009	0.0009	0.0009	0.0009
Filterable PM Mass, mg	(Mn)	51.7	64.4	23.3	46.5
Condensable PM Mass, mg	(M_{CPM})	10.4	2.3	5.6	6.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	43.210	46.875	46.794	45.626
Standard Water Volume, ft^3	(Vwstd)	15.883	17.638	17.468	16.996
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
Meter Pressure, in Hg	(Pm)	30.45	30.48	30.48	30.47
Volume at Nozzle, ft^3	(Vn)	67.623	73.830	73.701	71.72
Isokinetic Sampling Rate, (%)	(I)	91.2	98.8	99.9	96.6
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.8	0.5	0.9	0.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.021	0.008	0.016
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.017	0.018	0.006	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	5.5	6.4	2.3	4.7
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.004	0.001	0.002	0.002
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.11	0.23	0.55	0.63
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.022	0.010	0.018
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.6	6.6	2.8	5.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	89.50	in
Nipple Length:	2.00	in
Depth of Duct:	87.50	in
Cross Sectional Area of Duct:	41.76	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	0.8	**(must be ≥ 0.5)**
Distance B:	15.0	ft
Distance B Duct Diameters:	2.1	**(must be ≥ 2)**
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/13/25	
Reviewer (Initial and Date):	EDO 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

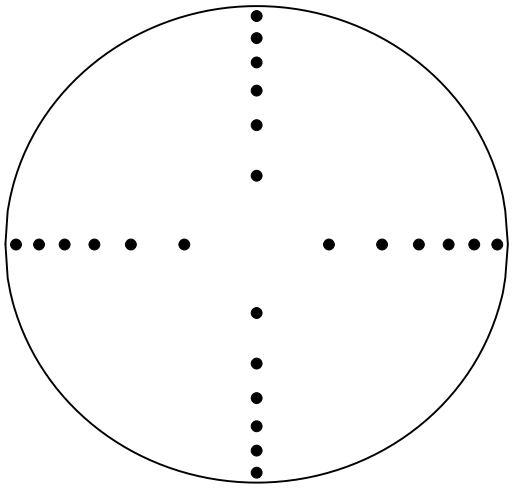
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.84	3 13/16
2	6.7	5.86	7 7/8
3	11.8	10.33	12 5/16
4	17.7	15.49	17 1/2
5	25.0	21.88	23 7/8
6	35.6	31.15	33 1/8
7	64.4	56.35	58 3/8
8	75.0	65.63	67 5/8
9	82.3	72.01	74
10	88.2	77.18	79 3/16
11	93.3	81.64	83 5/8
12	97.9	85.66	87 11/16

Stack Diagram
A = 6 ft.
B = 15 ft.
Depth of Duct = 87.5 in.

Cross Sectional Area



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	4
2	3
3	8
4	2
5	0
6	1
7	-2
8	-3
9	4
10	3
11	2
12	0
13	3
14	3
15	1
16	-3
17	3
18	4
19	2
20	1
21	0
22	0
23	3
24	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.13	0.12	0.12	0.12
Point 2		0.12	0.13	0.13	0.13
Point 3		0.14	0.14	0.12	0.13
Point 4		0.13	0.13	0.14	0.13
Point 5		0.15	0.12	0.13	0.13
Point 6		0.14	0.14	0.13	0.14
Point 7		0.13	0.13	0.13	0.13
Point 8		0.12	0.12	0.14	0.13
Point 9		0.15	0.13	0.13	0.14
Point 10		0.13	0.12	0.14	0.13
Point 11		0.11	0.14	0.12	0.12
Point 12		0.12	0.13	0.13	0.13
Point 13		0.14	0.12	0.15	0.14
Point 14		0.13	0.14	0.13	0.13
Point 15		0.12	0.14	0.14	0.13
Point 16		0.14	0.13	0.12	0.13
Point 17		0.13	0.12	0.11	0.12
Point 18		0.15	0.13	0.13	0.14
Point 19		0.14	0.13	0.12	0.13
Point 20		0.11	0.13	0.11	0.12
Point 21		0.12	0.15	0.14	0.14
Point 22		0.14	0.14	0.13	0.14
Point 23		0.12	0.15	0.15	0.14
Point 24		0.13	0.13	0.14	0.13
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.361	0.363	0.361	0.362
Pitot Tube Coefficient	(Cp)	0.819	0.819	0.819	0.819
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.08	-0.06	-0.07	-0.07
Stack Pressure, in. Hg	(Ps)	30.33	30.34	30.33	30.33
Stack Cross-sectional Area, ft^2	(As)	41.76	41.76	41.76	41.76
Stack Temperature, °F	(Ts)	152.8	152.9	154.2	153.3
Stack Temperature, °R	(Ts)	612.5	612.6	613.9	613.0
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
O_2 Concentration, %	(O_2)	8.8	7.9	8	8.23
CO_2 Concentration, %	(CO_2)	15.1	16.4	16.2	15.90
N_2 Concentration, %	(N_2)	76.1	75.7	75.8	75.87
Excess Air, %	(EA)	77.94	65.37	66.60	69.97
Molecular Weight, lb/lb-mole (dry)	(Md)	30.77	30.94	30.91	30.87
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.39	27.51	27.41	27.43
Velocity, ft/sec	(Vs)	21.7	21.8	21.7	21.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	54,429	54,507	54,393	54,443
At Standard Conditions, scfm	(Qsw)	47,539	47,604	47,403	47,515
At Standard Conditions, dscfm	(Qs)	34,943	34,965	34,517	34,809

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	9:40	2/13/2025	11:22	2/13/2025	12:45
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	8.81	15.09	7.88	16.36	7.95	16.18
Analysis #2	8.80	15.10	7.90	16.39	7.96	16.19
Analysis #3	8.80	15.10	7.89	16.39	7.96	16.19
Average	8.8	15.1	7.9	16.4	8.0	16.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.3	816.2	718.0	651.0	1012.3	3556.8
Final Mass, g	557.1	923.9	733.1	655.4	1024.1	3893.6
Gain	197.8	107.7	15.1	4.4	11.8	336.8
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.8	641.0	743.5	560.0	982.0	3421.3
Final Mass, g	685.5	741.6	787.0	578.6	1002.6	3795.3
Gain	190.7	100.6	43.5	18.6	20.6	374.0
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.7	671.0	731.0	617.3	975.2	3504.2
Final Mass, g	699.5	772.5	774.0	634.1	994.5	3874.6
Gain	189.8	101.5	43.0	16.8	19.3	370.4

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	8:15	**Source:**	No.2 Lime Kiln (LK02)	
Date:	2/13/25	Run 1 VALID	**End Time:**	9:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26973-A	Pb:	30.34	in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	148	°F		Pg:	-0.08	in. WC	336.8
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.14	in. WC		O_2:	8.8	%	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.428	in.		CO_2:	15.1	%	11.960
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	26.35	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
					50	50	Ideal	Actual		50	50	50	50		
A1	0.00	2.50	36.145	0.13	50	152	1.53	1.50	4	259	254	44	66	99.7	22.08
2	2.50	5.00	37.830	0.12	50	153	1.41	1.40	4	256	255	43	66	102.0	21.24
3	5.00	7.50	39.485	0.14	51	152	1.65	1.70	4	254	260	40	67	102.2	22.92
4	7.50	10.00	41.280	0.13	51	153	1.53	1.50	4	253	257	41	67	101.6	22.10
5	10.00	12.50	43.000	0.15	51	153	1.76	1.80	4	255	253	41	67	101.8	23.74
6	12.50	15.00	44.850	0.14	51	153	1.65	1.70	4	251	255	41	67	101.4	22.94
7	15.00	17.50	46.630	0.13	51	152	1.53	1.50	4	254	255	41	68	100.7	22.08
8	17.50	20.00	48.335	0.12	52	152	1.42	1.40	4	251	250	41	68	102.1	21.22
9	20.00	22.50	50.000	0.15	52	153	1.77	1.80	4	253	255	42	69	101.1	23.74
0	22.50	25.00	51.840	0.13	53	153	1.54	1.50	4	250	254	42	70	100.6	22.10
11	25.00	27.50	53.550	0.11	53	153	1.30	1.30	4	252	260	43	71	100.4	20.33
12	27.50	30.00	55.120	0.12	53	152	1.42	1.40	4	258	256	44	73	101.6	21.22
B1	30.00	32.50	56.780	0.14	54	153	1.66	1.70	4	251	259	45	73	101.1	22.94
2	32.50	35.00	58.565	0.13	54	154	1.54	1.50	4	255	256	45	73	101.1	22.12
3	35.00	37.50	60.285	0.12	55	153	1.42	1.40	4	255	254	45	74	100.4	21.24
4	37.50	40.00	61.930	0.14	55	153	1.66	1.70	4	254	258	46	74	100.6	22.94
5	40.00	42.50	63.710	0.13	55	152	1.54	1.60	4	251	252	46	75	101.4	22.08
6	42.50	45.00	65.440	0.15	55	153	1.78	1.80	5	253	254	47	76	101.6	23.74
7	45.00	47.50	67.300	0.14	56	153	1.66	1.70	5	255	257	47	78	101.0	22.94
8	47.50	50.00	69.090	0.11	56	154	1.31	1.30	5	255	255	47	78	101.5	20.35
9	50.00	52.50	70.685	0.12	57	153	1.43	1.40	5	250	256	47	78	102.1	21.24
10	52.50	55.00	72.365	0.14	57	154	1.66	1.70	5	256	258	46	80	101.1	22.96
11	55.00	57.50	74.160	0.12	57	153	1.43	1.40	5	258	251	46	80	100.9	21.24
12	57.50	60.00	75.820	0.13	57	152	1.55	1.60	5	256	254	47	82	99.2	22.08
	Final DGM:		77.520												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.375	ft^3	0.13	in. WC	53.6	°F	152.8	°F	5	1.554	in. WC	91.2	0.265	0.8

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	9:55	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	11:00	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26960-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.06 in. WC	374.0
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	7.9 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.419	in.		CO_2:	16.4 %	14.03
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	77.745	0.12	53	153	1.68	1.70	4	258	255	42	65	101.0	20.88
2	2.50	5.00	79.540	0.13	53	154	1.82	1.80	4	254	256	42	66	100.9	21.75
3	5.00	7.50	81.405	0.14	53	154	1.96	2.00	4	256	254	42	67	100.2	22.57
4	7.50	10.00	83.325	0.13	53	154	1.82	1.80	4	253	258	43	68	100.7	21.75
5	10.00	12.50	85.185	0.12	53	154	1.68	1.70	4	253	259	43	68	99.9	20.90
6	12.50	15.00	86.960	0.14	53	153	1.96	2.00	4	254	256	43	68	100.6	22.56
7	15.00	17.50	88.890	0.13	53	153	1.82	1.80	4	256	253	43	68	100.3	21.74
8	17.50	20.00	90.745	0.12	53	153	1.68	1.70	5	258	250	44	68	99.3	20.88
9	20.00	22.50	92.510	0.13	54	152	1.83	1.80	5	253	255	45	70	98.9	21.72
0	22.50	25.00	94.345	0.12	54	152	1.69	1.70	5	254	259	45	71	99.9	20.87
11	25.00	27.50	96.125	0.14	54	152	1.97	2.00	5	253	260	45	69	100.3	22.54
12	27.50	30.00	98.055	0.13	54	153	1.82	1.80	5	252	254	45	69	99.6	21.74
B1	30.00	32.50	99.900	0.12	54	153	1.68	1.70	5	259	257	48	72	100.0	20.88
2	32.50	35.00	101.680	0.14	54	154	1.96	2.00	5	260	255	47	73	100.0	22.57
3	35.00	37.50	103.600	0.14	54	153	1.96	2.00	5	253	255	48	73	100.4	22.56
4	37.50	40.00	105.530	0.13	54	153	1.82	1.80	5	255	256	48	75	100.9	21.74
5	40.00	42.50	107.400	0.12	54	151	1.69	1.70	5	253	255	49	75	100.9	20.85
6	42.50	45.00	109.200	0.13	55	152	1.83	1.80	5	251	255	50	75	101.4	21.72
7	45.00	47.50	111.085	0.13	55	152	1.83	1.80	5	253	255	51	75	100.9	21.72
8	47.50	50.00	112.960	0.13	55	153	1.83	1.80	5	256	254	52	75	100.7	21.74
9	50.00	52.50	114.830	0.15	55	153	2.11	2.00	5	257	251	53	75	99.8	23.35
10	52.50	55.00	116.820	0.14	55	153	1.97	2.00	5	254	250	53	77	100.7	22.56
11	55.00	57.50	118.760	0.15	55	153	2.11	2.10	5	255	253	55	77	100.9	23.35
12	57.50	60.00	120.770	0.13	55	153	1.83	1.80	5	255	259	55	79	100.2	21.74
	Final DGM:		122.630												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.885	ft^3	0.13	in. WC	54.0	°F	152.9	°F	5	1.846	in. WC	98.8	0.265	0.5

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	12:20	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26972-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.07 in. WC	370.4
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.418	in.		CO_2:	16.2 %	14.042
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	-- -- --	0.000		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	122.895	0.12	56	153	1.69	1.70	4	258	258	48	68	101.0	20.88
2	2.50	5.00	124.700	0.13	56	155	1.83	1.80	4	250	259	45	66	99.9	21.77
3	5.00	7.50	126.555	0.12	56	154	1.69	1.70	4	258	252	45	66	100.5	20.90
4	7.50	10.00	128.350	0.14	56	155	1.97	2.00	4	257	252	46	68	101.5	22.59
5	10.00	12.50	130.305	0.13	56	155	1.83	1.80	4	255	253	47	69	101.0	21.77
6	12.50	15.00	132.180	0.13	56	154	1.83	1.80	4	258	256	47	69	100.9	21.75
7	15.00	17.50	134.055	0.13	56	155	1.83	1.80	4	258	255	47	70	100.1	21.77
8	17.50	20.00	135.915	0.14	57	154	1.97	2.00	4	258	256	48	70	100.9	22.57
9	20.00	22.50	137.865	0.13	57	155	1.83	1.80	4	257	250	49	70	101.8	21.77
0	22.50	25.00	139.760	0.14	57	154	1.97	2.00	4	254	258	49	70	101.2	22.57
11	25.00	27.50	141.715	0.12	57	153	1.69	1.70	4	256	257	51	72	101.0	20.88
12	27.50	30.00	143.525	0.13	57	154	1.83	1.80	4	258	259	53	72	101.5	21.75
B1	30.00	32.50	145.415	0.15	57	155	2.11	2.00	4	258	252	54	72	100.4	23.39
2	32.50	35.00	147.420	0.13	57	154	1.83	1.80	4	257	253	55	73	100.9	21.75
3	35.00	37.50	149.300	0.14	57	154	1.97	2.00	4	256	254	55	73	100.2	22.57
4	37.50	40.00	151.235	0.12	57	155	1.69	1.70	4	255	257	58	74	98.7	20.92
5	40.00	42.50	153.000	0.11	57	155	1.55	1.60	5	257	256	57	74	100.4	20.03
6	42.50	45.00	154.720	0.13	58	154	1.84	1.80	5	255	255	58	74	101.0	21.75
7	45.00	47.50	156.605	0.12	58	154	1.70	1.70	5	257	256	59	75	101.8	20.90
8	47.50	50.00	158.430	0.11	58	154	1.55	1.60	5	258	259	59	75	101.3	20.01
9	50.00	52.50	160.170	0.14	58	154	1.98	2.00	5	256	260	59	75	101.3	22.57
10	52.50	55.00	162.130	0.13	59	153	1.84	1.90	5	252	260	59	75	100.5	21.74
11	55.00	57.50	164.010	0.15	59	154	2.12	2.10	5	250	254	60	75	101.7	23.37
12	57.50	60.00	166.050	0.14	59	154	1.98	2.00	5	251	257	60	76	99.5	22.57
	Final DGM:		167.980												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.085	ft^3	0.13	in. WC	57.1	°F	154.2	°F	5	1.838	in. WC	99.9	0.272	0.9

RB01A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

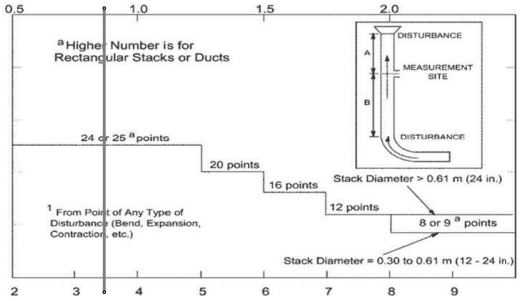
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	47.320	47.695	47.820	47.612
Meter Temperature, °F	(Tm)	63.8	65.7	68.5	66.0
Meter Temperature, °R	(Tm)	523.5	525.4	528.1	525.7
Meter Orifice Pressure, in. WC	(ΔH)	2.158	2.179	2.183	2.174
Volume H_2O Collected, mL	(Vlc)	506.0	450.5	464.3	473.6
Nozzle Diameter, in	(Dn)	0.330	0.330	0.330	0.330
Area of Nozzle, ft^2	(An)	0.0006	0.0006	0.0006	0.0006
Filterable PM Mass, mg	(Mn)	29.2	18.1	26.2	24.5
Condensable PM Mass, mg	(M_{CPM})	10.7	3.3	4.6	6.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.077	48.287	48.162	48.175
Standard Water Volume, ft^3	(Vwstd)	23.863	21.246	21.896	22.335
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
Meter Pressure, in Hg	(Pm)	30.19	30.19	30.19	30.19
Volume at Nozzle, ft^3	(Vn)	111.928	108.082	108.829	109.61
Isokinetic Sampling Rate, (%)	(I)	104.7	101.2	102.2	102.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.2	0.3	0.2	0.2
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0094	0.0058	0.0084	0.0079
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0082	0.0051	0.0074	0.0069
Filterable PM Emission Rate, lb/hr	(PMR)	4.8	3.1	4.4	4.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0034	0.0011	0.0015	0.0020
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.75	0.56	0.77	1.03
Total PM Concentration, grain/dscf	(C_{TPM})	0.013	0.007	0.010	0.010
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.5	3.6	5.2	5.1

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/24	
Reviewer (Initial and Date):	EDO 2/11/24	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

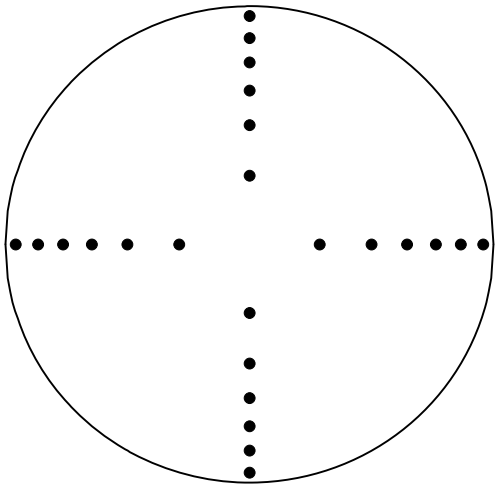
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

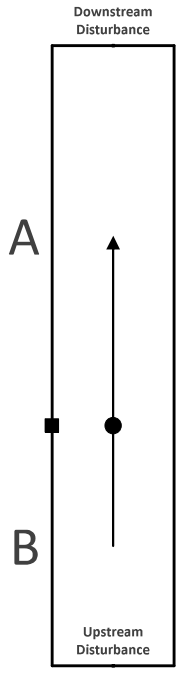
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	5
5	4
6	0
7	3
8	6
9	-2
10	0
11	4
12	1
13	5
14	4
15	2
16	9
17	7
18	4
19	5
20	2
21	3
22	6
23	5
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.51	0.52	0.50	0.51
Point 2		0.48	0.53	0.53	0.51
Point 3		0.49	0.51	0.51	0.50
Point 4		0.53	0.53	0.49	0.52
Point 5		0.52	0.52	0.52	0.52
Point 6		0.49	0.49	0.51	0.50
Point 7		0.51	0.48	0.49	0.49
Point 8		0.53	0.51	0.50	0.51
Point 9		0.51	0.52	0.48	0.50
Point 10		0.48	0.50	0.51	0.50
Point 11		0.52	0.53	0.52	0.52
Point 12		0.54	0.54	0.54	0.54
Point 13		0.52	0.54	0.50	0.52
Point 14		0.51	0.53	0.51	0.52
Point 15		0.48	0.49	0.53	0.50
Point 16		0.53	0.50	0.52	0.52
Point 17		0.51	0.48	0.48	0.49
Point 18		0.49	0.52	0.50	0.50
Point 19		0.53	0.51	0.53	0.52
Point 20		0.50	0.53	0.54	0.52
Point 21		0.53	0.55	0.55	0.54
Point 22		0.51	0.53	0.52	0.52
Point 23		0.49	0.50	0.49	0.49
Point 24		0.51	0.48	0.48	0.49
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.713	0.717	0.714	0.715
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.48	-0.45	-0.46	-0.46
Stack Pressure, in. Hg	(Ps)	29.99	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	363.9	363.1	362.6	363.2
Stack Temperature, °R	(Ts)	823.5	822.8	822.3	822.9
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
O_2 Concentration, %	(O_2)	6.1	6.2	6.2	6.17
CO_2 Concentration, %	(CO_2)	14.4	14.2	14.3	14.30
N_2 Concentration, %	(N_2)	79.5	79.6	79.5	79.53
Excess Air, %	(EA)	40.97	41.85	41.93	41.58
Molecular Weight, lb/lb-mole (dry)	(Md)	30.55	30.52	30.54	30.53
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.39	26.70	26.62	26.57
Velocity, ft/sec	(Vs)	50.0	49.9	49.8	49.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	138,543	138,342	137,991	138,292
At Standard Conditions, scfm	(Qsw)	88,990	88,949	88,779	88,906
At Standard Conditions, dscfm	(Qs)	59,472	61,771	61,032	60,758

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:25	2/11/2025	12:50	2/11/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.10	14.34	6.20	14.22	6.16	14.25
Analysis #2	6.10	14.36	6.19	14.24	6.16	14.25
Analysis #3	6.11	14.36	6.19	14.24	6.16	14.26
Average	6.1	14.4	6.2	14.2	6.2	14.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.4	640.6	698.9	644.3	934.1	3411.3
Final Mass, g	705.0	761.1	722.3	779.6	949.3	3917.3
Gain	211.6	120.5	23.4	135.3	15.2	506.0
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.6	656.8	740.2	636.0	941.0	3472.6
Final Mass, g	686.4	748.9	774.0	762.4	951.4	3923.1
Gain	187.8	92.1	33.8	126.4	10.4	450.5
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.0	639.8	722.0	648.9	942.2	3446.9
Final Mass, g	711.2	731.2	743.7	771.2	953.9	3911.2
Gain	217.2	91.4	21.7	122.3	11.7	464.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	50	°F	26987-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	350	°F		Pg:	-0.48 in. WC	506.0
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.47	in. WC		O_2:	6.1 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.333	in.		CO_2:	14.4 %	4.162
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	771.740	0.51	62	359	2.15	2.20	4	257	251	39	73	101.1	49.52
2	2.50	5.00	773.720	0.48	62	361	2.02	2.00	4	258	256	41	73	99.0	48.10
3	5.00	7.50	775.600	0.49	62	363	2.05	2.10	4	254	258	43	74	100.7	48.66
4	7.50	10.00	777.530	0.53	62	366	2.21	2.20	4	254	257	45	75	100.6	50.69
5	10.00	12.50	779.530	0.52	63	365	2.18	2.20	4	255	258	46	75	101.3	50.18
6	12.50	15.00	781.530	0.49	63	365	2.05	2.10	4	258	256	48	75	99.1	48.71
7	15.00	17.50	783.430	0.51	63	364	2.14	2.20	4	256	256	48	75	101.4	49.67
8	17.50	20.00	785.415	0.53	63	366	2.22	2.20	4	258	254	48	76	100.9	50.69
9	20.00	22.50	787.425	0.51	63	365	2.14	2.20	4	254	255	50	76	101.2	49.70
0	22.50	25.00	789.405	0.48	63	364	2.01	2.00	4	256	251	50	76	101.6	48.19
11	25.00	27.50	791.335	0.52	63	363	2.18	2.20	4	253	253	51	76	100.6	50.12
12	27.50	30.00	793.325	0.54	64	360	2.28	2.30	4	255	258	59	78	100.4	50.98
1	30.00	32.50	795.355	0.52	64	362	2.19	2.20	4	257	257	56	78	99.6	50.09
2	32.50	35.00	797.330	0.51	64	364	2.14	2.20	4	257	256	54	79	100.7	49.67
3	35.00	37.50	799.305	0.48	64	365	2.02	2.00	4	257	255	53	80	100.4	48.21
4	37.50	40.00	801.215	0.53	64	368	2.22	2.20	4	253	253	53	80	100.8	50.76
5	40.00	42.50	803.225	0.51	65	366	2.14	2.20	4	252	254	53	80	100.9	49.73
6	42.50	45.00	805.205	0.49	65	365	2.06	2.10	4	251	251	53	79	100.0	48.71
7	45.00	47.50	807.130	0.53	65	365	2.23	2.20	4	250	250	55	76	100.4	50.66
8	47.50	50.00	809.140	0.50	65	363	2.11	2.10	4	258	255	55	74	101.2	49.15
9	50.00	52.50	811.110	0.53	65	365	2.23	2.20	5	257	256	56	74	100.4	50.66
10	52.50	55.00	813.120	0.51	66	365	2.15	2.20	5	259	258	57	72	100.9	49.70
11	55.00	57.50	815.105	0.49	66	362	2.07	2.10	5	258	259	57	72	100.2	48.63
12	57.50	60.00	817.040	0.51	66	362	2.16	2.20	5	253	259	57	72	102.5	49.61
	Final DGM:		819.060												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.320	ft^3	0.51	in. WC	63.8	°F	363.9	°F	5	2.158	in. WC	104.7	0.332	0.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	11:15	**Source:**	No.1 Recovery Furnace (RB01A) North Stack	
Date:	2/11/25	Run 2 VALID	**End Time:**	12:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	64	°F	26988-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	364	°F		Pg:	-0.45 in. WC	450.5
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.323	in.		CO_2:	14.2 %	4.21
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- --	0.002		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	819.395	0.52	64	360	2.20	2.20	4	251	254	40	71	101.3	50.03
2	2.50	5.00	821.405	0.53	64	361	2.24	2.20	4	252	254	41	71	100.6	50.54
3	5.00	7.50	823.420	0.51	64	361	2.15	2.20	4	255	255	41	71	100.8	49.58
4	7.50	10.00	825.400	0.53	64	361	2.23	2.30	4	258	253	41	73	100.7	50.54
5	10.00	12.50	827.415	0.52	64	361	2.19	2.20	4	256	258	41	73	99.1	50.06
6	12.50	15.00	829.380	0.49	65	362	2.07	2.10	4	253	256	45	73	100.6	48.63
7	15.00	17.50	831.320	0.48	65	362	2.03	2.00	4	256	253	45	73	100.8	48.13
8	17.50	20.00	833.245	0.51	65	362	2.15	2.20	4	259	251	46	74	99.9	49.61
9	20.00	22.50	835.210	0.52	65	363	2.19	2.20	4	254	250	46	74	100.5	50.12
0	22.50	25.00	837.205	0.50	65	363	2.11	2.10	4	251	258	50	74	100.7	49.15
11	25.00	27.50	839.165	0.53	66	364	2.24	2.30	4	252	259	51	74	101.5	50.63
12	27.50	30.00	841.200	0.54	66	364	2.28	2.30	4	255	254	51	75	101.3	51.11
1	30.00	32.50	843.250	0.54	66	363	2.28	2.30	4	255	256	52	75	101.4	51.08
2	32.50	35.00	845.305	0.53	66	365	2.23	2.30	5	255	254	52	76	99.5	50.66
3	35.00	37.50	847.300	0.49	66	365	2.07	2.00	5	256	255	53	77	98.5	48.71
4	37.50	40.00	849.200	0.50	66	364	2.11	2.10	5	258	255	51	77	101.6	49.18
5	40.00	42.50	851.180	0.48	67	365	2.03	2.00	5	253	256	50	76	101.4	48.21
6	42.50	45.00	853.120	0.52	67	365	2.20	2.20	5	254	256	49	78	100.5	50.18
7	45.00	47.50	855.120	0.51	67	365	2.15	2.20	5	257	258	49	78	100.5	49.70
8	47.50	50.00	857.100	0.53	67	365	2.24	2.30	5	252	254	49	79	100.3	50.66
9	50.00	52.50	859.115	0.55	67	364	2.32	2.30	5	254	253	53	80	101.4	51.58
10	52.50	55.00	861.190	0.53	67	364	2.24	2.20	5	256	252	52	79	99.7	50.63
11	55.00	57.50	863.195	0.50	67	363	2.12	2.10	5	255	259	53	78	100.6	49.15
12	57.50	60.00	865.160	0.48	67	363	2.03	2.00	5	255	253	53	77	100.8	48.16
	Final DGM:		867.090												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.695	ft^3	0.51	in. WC	65.7	°F	363.1	°F	5	2.179	in. WC	101.2	0.306	0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	66	°F	26696-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	363	°F		Pg:	-0.46	in. WC	464.3
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2	%	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.322	in.		CO_2:	14.3	%	4.224
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial	Final	Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	--	--	0.001	Mid 1 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf)			--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)			--
												Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	867.500	0.50	67	358	2.13	2.10	3	254	255	42	69	102.0	49.00
2	2.50	5.00	869.500	0.53	67	359	2.25	2.30	3	255	256	42	69	101.4	50.48
3	5.00	7.50	871.545	0.51	67	359	2.17	2.20	3	251	258	42	69	100.6	49.52
4	7.50	10.00	873.535	0.49	67	361	2.08	2.10	3	253	257	42	69	101.5	48.60
5	10.00	12.50	875.500	0.52	67	360	2.21	2.20	3	256	256	42	71	100.7	50.03
6	12.50	15.00	877.510	0.51	68	361	2.17	2.20	3	258	259	43	70	100.8	49.58
7	15.00	17.50	879.505	0.49	68	361	2.08	2.10	4	256	258	45	71	100.2	48.60
8	17.50	20.00	881.450	0.50	68	361	2.13	2.10	4	259	258	45	70	99.5	49.09
9	20.00	22.50	883.400	0.48	68	361	2.04	2.10	4	259	253	43	72	98.9	48.10
0	22.50	25.00	885.300	0.51	68	361	2.17	2.20	4	260	250	43	72	101.1	49.58
11	25.00	27.50	887.300	0.52	68	364	2.20	2.20	4	251	260	45	73	101.0	50.15
12	27.50	30.00	889.315	0.54	68	364	2.29	2.30	4	252	251	44	73	99.4	51.11
1	30.00	32.50	891.335	0.50	68	365	2.12	2.10	4	255	254	45	76	99.7	49.21
2	32.50	35.00	893.285	0.51	68	365	2.16	2.20	4	256	258	45	76	100.8	49.70
3	35.00	37.50	895.275	0.53	68	365	2.24	2.30	4	257	259	46	76	101.4	50.66
4	37.50	40.00	897.315	0.52	69	365	2.20	2.20	5	253	253	48	77	99.4	50.18
5	40.00	42.50	899.300	0.48	69	364	2.04	2.10	5	252	255	48	75	100.2	48.19
6	42.50	45.00	901.225	0.50	69	363	2.12	2.10	5	257	258	50	75	100.7	49.15
7	45.00	47.50	903.200	0.53	69	363	2.25	2.30	5	258	254	51	74	100.8	50.60
8	47.50	50.00	905.235	0.54	69	363	2.29	2.30	5	256	257	53	73	101.4	51.08
9	50.00	52.50	907.300	0.55	70	365	2.33	2.30	5	259	256	52	70	101.1	51.61
10	52.50	55.00	909.380	0.52	71	364	2.21	2.20	5	252	258	55	70	100.9	50.15
11	55.00	57.50	911.405	0.49	71	365	2.08	2.10	5	255	259	55	71	99.9	48.71
12	57.50	60.00	913.350	0.48	71	365	2.04	2.10	5	253	255	56	72	102.2	48.21
	Final DGM:		915.320												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.820	ft^3	0.51	in. WC	68.5	°F	362.6	°F	5	2.183	in. WC	102.2	0.313	0.2

RB01B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

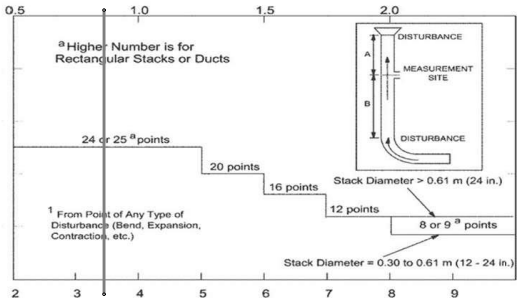
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	40.100	43.045	41.880	41.675
Meter Temperature, °F	(Tm)	62.2	68.3	63.0	64.5
Meter Temperature, °R	(Tm)	521.8	528.0	522.7	524.2
Meter Orifice Pressure, in. WC	(ΔH)	1.621	1.838	1.792	1.750
Volume H_2O Collected, mL	(Vlc)	261.9	266.2	247.8	258.6
Nozzle Diameter, in	(Dn)	0.362	0.362	0.362	0.362
Area of Nozzle, ft^2	(An)	0.0007	0.0007	0.0007	0.0007
Filterable PM Mass, mg	(Mn)	3.4	3.2	2.7	3.1
Condensable PM Mass, mg	(M_{CPM})	4.4	5.1	4.6	4.7
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	40.450	42.936	42.193	41.860
Standard Water Volume, ft^3	(Vwstd)	12.351	12.554	11.686	12.197
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
Meter Pressure, in Hg	(Pm)	30.15	30.17	30.16	30.16
Volume at Nozzle, ft^3	(Vn)	82.136	86.257	83.691	84.03
Isokinetic Sampling Rate, (%)	(I)	93.7	98.3	96.8	96.2
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.3	0.5	-0.4	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0013	0.0012	0.0010	0.0011
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0013	0.0012	0.0010	0.0011
Filterable PM Emission Rate, lb/hr	(PMR)	0.52	0.46	0.40	0.46
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0017	0.0018	0.0017	0.0017
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.67	0.74	0.68	0.69
Total PM Concentration, grain/dscf	(C_{TPM})	0.0030	0.0030	0.0027	0.0029
Total PM Emission Rate, lb/hr	(ER_{TPM})	1.2	1.2	1.1	1.2

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01B) South Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/25	
Reviewer (Initial and Date):	EDO 2/11/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

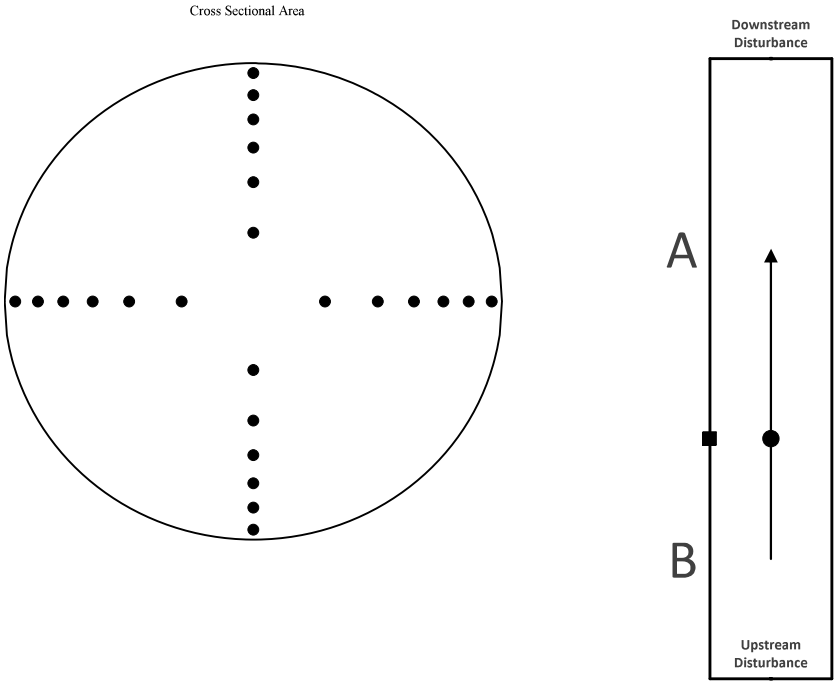
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	2
2	6
3	8
4	4
5	1
6	0
7	2
8	3
9	0
10	-2
11	1
12	8
13	4
14	2
15	6
16	3
17	2
18	3
19	4
20	7
21	5
22	9
23	5
24	2
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.21	0.21	0.20	0.21
Point 2		0.23	0.24	0.21	0.23
Point 3		0.24	0.23	0.23	0.23
Point 4		0.25	0.24	0.25	0.25
Point 5		0.23	0.22	0.24	0.23
Point 6		0.21	0.20	0.20	0.20
Point 7		0.22	0.24	0.21	0.22
Point 8		0.24	0.22	0.25	0.24
Point 9		0.21	0.25	0.23	0.23
Point 10		0.22	0.23	0.22	0.22
Point 11		0.24	0.21	0.24	0.23
Point 12		0.23	0.24	0.21	0.23
Point 13		0.22	0.23	0.23	0.23
Point 14		0.24	0.21	0.25	0.23
Point 15		0.23	0.24	0.23	0.23
Point 16		0.21	0.22	0.20	0.21
Point 17		0.25	0.24	0.21	0.23
Point 18		0.20	0.23	0.21	0.21
Point 19		0.23	0.25	0.21	0.23
Point 20		0.25	0.24	0.22	0.24
Point 21		0.23	0.24	0.25	0.24
Point 22		0.22	0.25	0.23	0.23
Point 23		0.24	0.22	0.24	0.23
Point 24		0.25	0.23	0.23	0.24
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.478	0.480	0.474	0.477
Pitot Tube Coefficient	(Cp)	0.836	0.836	0.836	0.836
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.12	-0.13	-0.12	-0.12
Stack Pressure, in. Hg	(Ps)	30.02	30.02	30.02	30.02
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	364.3	363.7	363.1	363.7
Stack Temperature, °R	(Ts)	824.0	823.3	822.8	823.4
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
O_2 Concentration, %	(O_2)	8	8	8	8.00
CO_2 Concentration, %	(CO_2)	14	14	14	14.00
N_2 Concentration, %	(N_2)	78	78	78	78.00
Excess Air, %	(EA)	63.53	63.53	63.53	63.53
Molecular Weight, lb/lb-mole (dry)	(Md)	30.56	30.56	30.56	30.56
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.63	27.72	27.84	27.73
Velocity, ft/sec	(Vs)	34.1	34.1	33.6	33.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	94,410	94,473	93,103	93,996
At Standard Conditions, scfm	(Qsw)	60,665	60,750	59,913	60,443
At Standard Conditions, dscfm	(Qs)	46,475	47,006	46,918	46,800

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:33	2/11/2025	12:58	2/11/2025	16:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.91	13.52	7.11	13.23	7.18	13.38
Analysis #2	6.92	13.55	7.11	13.25	7.19	13.39
Analysis #3	6.91	13.53	7.11	13.25	7.19	13.38
Average	6.9	13.5	7.1	13.2	7.2	13.4

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.4	670.7	716.5	642.3	942.1	3482.0
Final Mass, g	651.4	760.2	733.5	646.2	952.6	3743.9
Gain	141.0	89.5	17.0	3.9	10.5	261.9
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	507.8	644.0	779.4	644.1	933.3	3508.6
Final Mass, g	639.0	740.2	803.0	648.1	944.5	3774.8
Gain	131.2	96.2	23.6	4.0	11.2	266.2
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.5	672.4	733.4	645.7	952.0	3514.0
Final Mass, g	689.0	723.0	740.1	647.8	961.9	3761.8
Gain	178.5	50.6	6.7	2.1	9.9	247.8

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26697-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	346	°F		Pg:	-0.12 in. WC	261.9
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.27	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.376	in.		CO_2:	14 %	6.965
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	-- -- -- 0.000			Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- -- -- 5			Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	293.420	0.21	61	360	1.47	1.50	3	259	259	40	72	100.6	33.06
2	2.50	5.00	295.015	0.23	61	361	1.61	1.60	3	255	251	41	72	101.9	34.62
3	5.00	7.50	296.705	0.24	61	363	1.67	1.70	3	254	251	42	73	101.4	35.41
4	7.50	10.00	298.420	0.25	61	365	1.74	1.80	3	253	254	42	73	100.9	36.18
5	10.00	12.50	300.160	0.23	61	366	1.60	1.60	3	252	258	43	73	101.3	34.73
6	12.50	15.00	301.835	0.21	61	363	1.47	1.50	3	258	259	43	73	100.1	33.12
7	15.00	17.50	303.420	0.22	61	365	1.53	1.50	3	257	259	45	78	101.3	33.94
8	17.50	20.00	305.060	0.24	61	366	1.67	1.70	3	255	256	48	78	98.9	35.47
9	20.00	22.50	306.730	0.21	61	365	1.46	1.50	3	256	255	48	78	102.5	33.16
10	22.50	25.00	308.351	0.22	61	365	1.53	1.50	3	252	252	48	78	101.9	33.94
11	25.00	27.50	310.000	0.24	62	366	1.67	1.70	3	250	254	48	78	100.5	35.47
12	27.50	30.00	311.700	0.23	62	365	1.60	1.60	4	251	255	50	76	101.1	34.71
B1	30.00	32.50	313.375	0.22	62	366	1.53	1.50	4	255	253	51	75	101.5	33.96
2	32.50	35.00	315.020	0.24	62	364	1.68	1.70	4	256	258	51	74	100.7	35.43
3	35.00	37.50	316.725	0.23	63	363	1.61	1.60	4	253	257	50	74	101.4	34.66
4	37.50	40.00	318.410	0.21	63	365	1.47	1.50	4	255	256	51	72	101.4	33.16
5	40.00	42.50	320.020	0.25	63	366	1.74	1.80	4	258	258	52	73	98.3	36.21
6	42.50	45.00	321.720	0.20	63	365	1.40	1.40	4	252	259	56	74	100.7	32.36
7	45.00	47.50	323.280	0.23	63	364	1.61	1.60	4	259	260	56	76	100.5	34.69
8	47.50	50.00	324.950	0.25	63	363	1.75	1.80	4	256	260	55	76	101.3	36.14
9	50.00	52.50	326.705	0.23	63	365	1.61	1.60	4	252	256	54	77	101.2	34.71
10	52.50	55.00	328.385	0.22	64	364	1.54	1.70	4	254	254	52	78	105.4	33.92
11	55.00	57.50	330.100	0.24	64	364	1.68	1.70	4	255	255	52	79	100.9	35.43
12	57.50	60.00	331.815	0.25	65	364	1.75	1.80	4	255	253	52	79	98.1	36.16
	Final DGM:		333.520												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	40.100 ft^3	0.23 in. WC	62.2 °F	364.3 °F	4	1.621 in. WC	93.7	0.234	0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	11:15	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 2	VALID	End Time:	12:20	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	62	°F	26698-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.13	in. WC	266.2
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.377	in.		CO_2:	14	%	7.82
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	334.150	0.21	66	362	1.66	1.70	4	255	253	40	68	100.1	32.72
2	2.50	5.00	335.845	0.24	66	363	1.89	1.90	4	254	258	40	68	100.4	35.00
3	5.00	7.50	337.660	0.23	67	363	1.82	1.80	4	255	254	41	68	101.2	34.27
4	7.50	10.00	339.455	0.24	67	363	1.90	1.90	4	254	256	42	70	105.7	35.00
5	10.00	12.50	341.370	0.22	67	363	1.74	1.80	4	258	258	42	70	100.0	33.51
6	12.50	15.00	343.105	0.20	67	363	1.58	1.60	4	260	259	42	71	99.7	31.95
7	15.00	17.50	344.755	0.24	67	363	1.90	1.90	4	256	254	45	71	100.8	35.00
8	17.50	20.00	346.580	0.22	68	364	1.74	1.80	4	253	257	45	70	101.6	33.53
9	20.00	22.50	348.345	0.25	68	365	1.98	2.00	4	258	256	45	71	100.9	35.77
10	22.50	25.00	350.210	0.23	68	365	1.82	1.80	4	254	251	45	72	100.9	34.31
11	25.00	27.50	352.000	0.21	68	365	1.66	1.70	4	255	257	48	71	101.4	32.78
12	27.50	30.00	353.720	0.24	68	364	1.90	1.90	5	255	254	48	73	100.4	35.02
B1	30.00	32.50	355.540	0.23	68	364	1.82	1.80	5	256	258	47	73	101.7	34.29
2	32.50	35.00	357.345	0.21	68	363	1.67	1.70	5	253	256	47	75	99.2	32.74
3	35.00	37.50	359.030	0.24	69	363	1.91	1.90	5	257	258	50	75	100.1	35.00
4	37.50	40.00	360.850	0.22	69	363	1.75	1.80	5	254	259	50	75	100.8	33.51
5	40.00	42.50	362.605	0.24	69	362	1.91	1.90	5	255	254	50	75	100.1	34.98
6	42.50	45.00	364.425	0.23	70	362	1.83	1.80	5	258	251	51	76	100.3	34.24
7	45.00	47.50	366.215	0.25	70	362	1.99	2.00	5	256	255	52	78	100.3	35.70
8	47.50	50.00	368.080	0.24	70	365	1.90	1.90	5	259	258	55	78	100.0	35.04
9	50.00	52.50	369.900	0.24	70	365	1.90	1.90	5	251	259	55	80	101.1	35.04
10	52.50	55.00	371.740	0.25	70	365	1.98	2.00	5	250	256	56	80	101.0	35.77
11	55.00	57.50	373.615	0.22	70	366	1.74	1.80	5	253	257	56	80	102.5	33.57
12	57.50	60.00	375.400	0.23	70	365	1.83	1.80	5	251	254	57	80	100.8	34.31
	Final DGM:		377.195												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.045	ft^3	0.23	in. WC	68.3	°F	363.7	°F	5	1.838	in. WC	98.3	0.226	0.5

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	68	°F	26699-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.12	in. WC	247.8
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.374	in.		CO_2:	14	%	7.923
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 / Mid 2 / Mid 3	Post	Mid 1 (cf)			--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.002	-- / -- / --	0.000	Mid 2 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- / -- / --	6	Mid 3 (cf)			--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- / -- / --	Pass	Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	377.420	0.20	60	360	1.57	1.60	4	254	255	41	75	99.7	31.89
2	2.50	5.00	379.050	0.21	60	361	1.64	1.70	4	251	252	42	75	98.5	32.70
3	5.00	7.50	380.700	0.23	60	362	1.80	1.80	4	253	251	42	75	100.5	34.24
4	7.50	10.00	382.460	0.25	61	363	1.95	2.00	4	258	254	42	76	101.3	35.72
5	10.00	12.50	384.310	0.24	61	365	1.87	1.90	4	254	252	42	76	100.7	35.04
6	12.50	15.00	386.110	0.20	61	365	1.56	1.60	4	257	256	43	76	98.6	31.99
7	15.00	17.50	387.720	0.21	61	364	1.64	1.70	4	256	259	44	76	101.2	32.76
8	17.50	20.00	389.415	0.25	61	365	1.95	2.00	4	258	258	45	76	100.6	35.77
9	20.00	22.50	391.250	0.23	61	365	1.79	1.80	4	256	257	45	76	99.9	34.31
10	22.50	25.00	393.000	0.22	61	363	1.72	1.70	4	253	255	45	77	99.1	33.51
11	25.00	27.50	394.700	0.24	62	363	1.88	1.90	4	256	255	46	77	100.9	35.00
12	27.50	30.00	396.510	0.21	62	363	1.65	1.70	4	254	253	47	78	101.3	32.74
B1	30.00	32.50	398.210	0.23	62	364	1.80	1.80	4	254	254	47	78	100.3	34.29
2	32.50	35.00	399.970	0.25	62	365	1.95	2.00	4	255	256	47	78	100.6	35.77
3	35.00	37.50	401.810	0.23	63	365	1.80	1.80	4	256	258	46	79	101.8	34.31
4	37.50	40.00	403.600	0.20	63	362	1.57	1.60	4	258	256	47	75	98.6	31.93
5	40.00	42.50	405.220	0.21	65	361	1.66	1.70	4	256	251	48	75	100.6	32.70
6	42.50	45.00	406.920	0.21	65	360	1.66	1.70	4	258	252	48	71	100.5	32.68
7	45.00	47.50	408.620	0.21	66	361	1.66	1.70	4	254	258	49	71	99.2	32.70
8	47.50	50.00	410.300	0.22	67	362	1.74	1.80	5	251	256	47	71	101.1	33.49
9	50.00	52.50	412.055	0.25	67	362	1.98	2.00	5	250	257	48	72	100.3	35.70
10	52.50	55.00	413.910	0.23	67	363	1.82	1.80	5	252	258	49	73	100.9	34.27
11	55.00	57.50	415.700	0.24	67	365	1.89	1.90	5	256	254	49	73	100.6	35.04
12	57.50	60.00	417.520	0.23	68	365	1.82	1.80	5	253	255	50	75	100.3	34.31
	Final DGM:		419.300												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.880	ft^3	0.23	in. WC	63.0	°F	363.1	°F	5	1.792	in. WC	96.8	0.217	-0.4

RB02A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

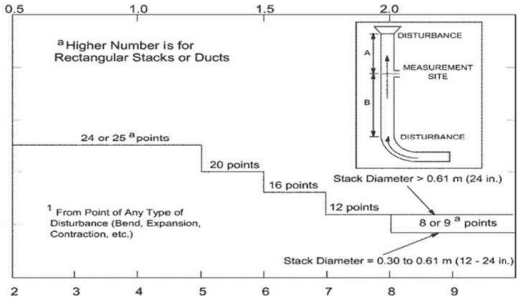
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.020	42.440	43.385	42.282
Meter Temperature, °F	(Tm)	48.3	61.7	68.3	59.4
Meter Temperature, °R	(Tm)	507.9	521.3	528.0	519.1
Meter Orifice Pressure, in. WC	(ΔH)	1.533	1.608	1.650	1.597
Volume H_2O Collected, mL	(Vlc)	251.0	250.6	288.0	263.2
Nozzle Diameter, in	(Dn)	0.292	0.292	0.292	0.292
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	57.8	51.0	152.4	87.1
Condensable PM Mass, mg	(M_{CPM})	2.9	5.9	3.7	4.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	42.463	42.810	43.215	42.829
Standard Water Volume, ft^3	(Vwstd)	11.837	11.818	13.582	12.413
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
Meter Pressure, in Hg	(Pm)	29.87	29.88	29.88	29.88
Volume at Nozzle, ft^3	(Vn)	88.809	86.910	90.386	88.70
Isokinetic Sampling Rate, (%)	(I)	96.9	96.7	99.4	97.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.2	0.1	0.0
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.021	0.018	0.054	0.031
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.017	0.014	0.043	0.025
Filterable PM Emission Rate, lb/hr	(PMR)	20.2	17.9	52.0	30.0
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0011	0.0021	0.0013	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.01	2.07	1.26	1.45
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.021	0.056	0.033
Total PM Emission Rate, lb/hr	(ER_{TPM})	21.2	19.9	53.2	31.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.2 Recovery Furnace (RB02A) West Stack
Project No.: AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	(must be ≥ 0.5)
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

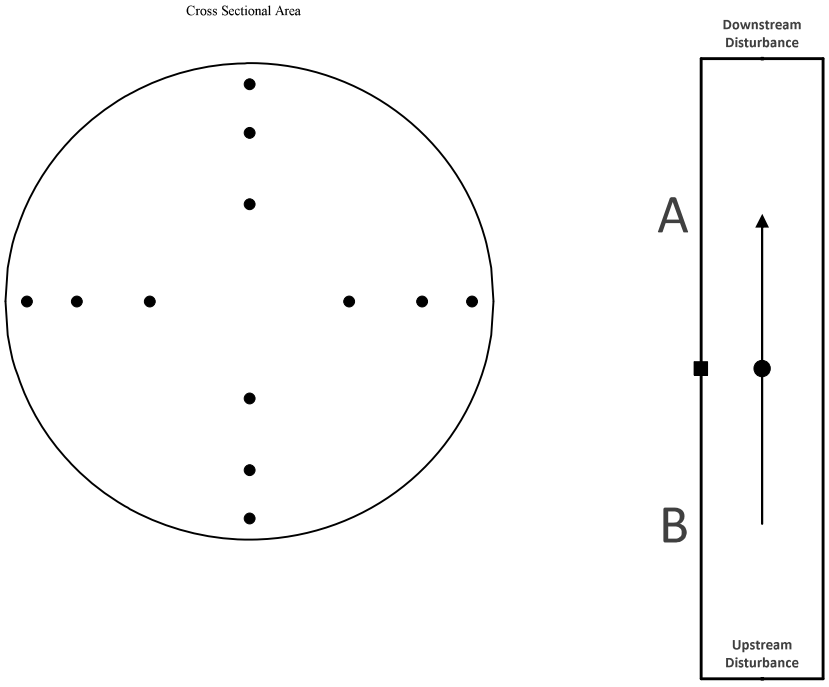
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	8
5	2
6	3
7	6
8	7
9	4
10	0
11	2
12	5
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.57	0.59	0.61	0.59
Point 2		0.59	0.63	0.63	0.62
Point 3		0.60	0.60	0.60	0.60
Point 4		0.63	0.61	0.63	0.62
Point 5		0.62	0.59	0.65	0.62
Point 6		0.64	0.61	0.61	0.62
Point 7		0.61	0.63	0.59	0.61
Point 8		0.63	0.60	0.62	0.62
Point 9		0.64	0.64	0.63	0.64
Point 10		0.60	0.61	0.61	0.61
Point 11		0.65	0.62	0.64	0.64
Point 12		0.60	0.59	0.59	0.59
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.784	0.781	0.786	0.784
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.63	-0.61	-0.62	-0.62
Stack Pressure, in. Hg	(Ps)	29.71	29.72	29.71	29.71
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	397.8	374.4	374.7	382.3
Stack Temperature, °R	(Ts)	857.4	834.1	834.3	841.9
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
O_2 Concentration, %	(O_2)	4.6	4.3	4.5	4.47
CO_2 Concentration, %	(CO_2)	16.2	16.5	16.3	16.33
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	28.21	25.89	27.42	27.17
Molecular Weight, lb/lb-mole (dry)	(Md)	30.78	30.81	30.79	30.79
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.99	28.04	27.73	27.92
Velocity, ft/sec	(Vs)	54.7	53.7	54.3	54.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	234,751	230,403	233,140	232,765
At Standard Conditions, scfm	(Qsw)	143,473	144,762	146,434	144,890
At Standard Conditions, dscfm	(Qs)	112,196	113,444	111,417	112,352

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:42	2/12/2025	14:15	2/12/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	4.58	16.15	4.25	16.51	4.46	16.22
Analysis #2	4.58	16.16	4.26	16.53	4.46	16.26
Analysis #3	4.59	16.17	4.26	16.52	4.46	16.27
Average	4.6	16.2	4.3	16.5	4.5	16.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.2	657.7	740.5	636.8	944.1	3478.3
Final Mass, g	679.7	704.2	750.9	639.5	955.0	3729.3
Gain	180.5	46.5	10.4	2.7	10.9	251.0
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	671.2	509.7	740.2	647.4	1008.0	3576.5
Final Mass, g	691.1	714.7	756.8	651.6	1012.9	3827.1
Gain	19.9	205.0	16.6	4.2	4.9	250.6
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.5	645.8	775.5	650.6	924.3	3505.7
Final Mass, g	734.8	665.7	802.7	653.5	937.0	3793.7
Gain	225.3	19.9	27.2	2.9	12.7	288.0

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02A) West Stack	
Date:	2/12/25	Run 1 VALID	End Time:	11:07	Project No.:	AST-2024-4204	Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26705-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	399	°F		Pg:	-0.63 in. WC	251.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.6 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.304	in.		CO_2:	16.2 %	2.505
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	--	-- --	0.000	Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	-- --	5	Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 55	Stack Amb. 55	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 55	Filter Amb. 55	Imp Exit Amb. 55	CPM Amb. 55	% ISO	Vs (fps)
A1	0.00	5.00	907.840	0.57	45	394	1.41	1.40	4	256	257	44	69	100.2	53.09
2	5.00	10.00	911.120	0.59	46	395	1.46	1.50	4	254	255	45	70	100.3	54.05
3	10.00	15.00	914.465	0.60	46	395	1.48	1.50	4	256	254	47	71	100.8	54.51
4	15.00	20.00	917.855	0.63	47	396	1.56	1.60	4	258	257	48	71	99.8	55.88
5	20.00	25.00	921.300	0.62	47	399	1.53	1.50	4	259	256	48	73	100.9	55.54
6	25.00	30.00	924.750	0.64	48	401	1.58	1.60	4	260	253	48	73	99.3	56.49
B1	30.00	35.00	928.200	0.61	48	400	1.51	1.50	4	260	252	50	72	100.0	55.12
2	35.00	40.00	931.595	0.63	50	400	1.56	1.60	4	254	258	50	71	99.9	56.02
3	40.00	45.00	935.055	0.64	50	399	1.59	1.60	5	256	259	49	73	100.5	56.43
4	45.00	50.00	938.565	0.60	50	398	1.49	1.50	5	258	260	49	74	100.6	54.60
5	50.00	55.00	941.970	0.65	51	398	1.62	1.60	5	255	256	51	75	100.2	56.83
6	55.00	60.00	945.505	0.60	51	398	1.49	1.50	5	254	254	53	78	98.9	54.60
	Final DGM:		948.860												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.020	ft^3	0.62	in. WC	48.3	°F	397.8	°F	5	1.533	in. WC	96.9	0.218	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26706-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	398	°F		Pg:	-0.61	in. WC	250.6
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.3	%	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.307	in.		CO_2:	16.5	%	2.48
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 / Mid 2 / Mid 3 / Post				Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	-- / -- / -- / 0.000				Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	-- / -- / -- / 5				Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	-- / -- / -- / Pass				Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	949.090	0.59	59	374	1.54	1.50	4	253	256	40	76	99.2	53.38
2	5.00	10.00	952.525	0.63	60	375	1.64	1.70	4	253	256	42	73	100.4	55.19
3	10.00	15.00	956.120	0.60	60	374	1.56	1.60	4	253	257	43	75	99.5	53.83
4	15.00	20.00	959.600	0.61	61	375	1.59	1.60	4	257	255	41	68	100.1	54.31
5	20.00	25.00	963.135	0.59	61	375	1.54	1.50	4	255	256	42	69	99.7	53.41
6	25.00	30.00	966.600	0.61	62	376	1.59	1.60	4	254	251	44	71	100.8	54.34
B1	30.00	35.00	970.165	0.63	62	375	1.65	1.70	4	255	254	46	72	100.1	55.19
2	35.00	40.00	973.765	0.60	62	374	1.57	1.60	4	254	256	46	73	100.6	53.83
3	40.00	45.00	977.300	0.64	63	375	1.68	1.70	5	256	258	45	75	100.1	55.63
4	45.00	50.00	980.935	0.61	63	374	1.60	1.60	5	256	257	48	76	100.2	54.28
5	50.00	55.00	984.490	0.62	63	373	1.63	1.60	5	259	254	49	78	99.5	54.69
6	55.00	60.00	988.050	0.59	64	373	1.55	1.60	5	260	255	51	78	99.5	53.35
	Final DGM:		991.530												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	42.440 ft^3	0.61 in. WC	61.7 °F	374.4 °F	5	1.608 in. WC	96.7	0.216	-0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	62	°F	26709-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	374	°F		Pg:	-0.62 in. WC	288.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.61	in. WC		O_2:	4.5 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.301	in.		CO_2:	16.3 %	2.613
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. --	Filter Amb. --	Imp Exit Amb. --	CPM Amb. --	% ISO	Vs (fps)
A1	0.00	5.00	992.320	0.61	67	373	1.61	1.60	3	254	252	48	70	100.3	54.25
2	5.00	10.00	995.910	0.63	67	373	1.67	1.70	3	254	258	48	71	99.7	55.13
3	10.00	15.00	999.535	0.60	67	374	1.58	1.60	3	258	256	48	71	100.5	53.83
4	15.00	20.00	1003.100	0.63	67	374	1.66	1.70	3	253	254	47	71	100.6	55.16
5	20.00	25.00	1006.755	0.65	68	374	1.72	1.70	3	256	257	46	73	99.4	56.03
6	25.00	30.00	1010.430	0.61	68	375	1.61	1.60	3	253	259	46	74	99.7	54.31
B1	30.00	35.00	1014.000	0.59	68	375	1.56	1.60	3	258	260	46	75	100.8	53.41
2	35.00	40.00	1017.550	0.62	69	376	1.64	1.70	3	256	260	49	75	100.9	54.79
3	40.00	45.00	1021.195	0.63	69	375	1.67	1.70	4	255	260	49	76	100.7	55.19
4	45.00	50.00	1024.865	0.61	70	376	1.62	1.60	4	254	258	51	78	100.4	54.34
5	50.00	55.00	1028.470	0.64	70	376	1.70	1.70	4	258	255	52	78	100.2	55.66
6	55.00	60.00	1032.155	0.59	70	375	1.57	1.60	4	256	256	52	78	100.4	53.41
	Final DGM:		1035.705												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.385	ft^3	0.62	in. WC	68.3	°F	374.7	°F	4	1.650	in. WC	99.4	0.239	0.1

RB02B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

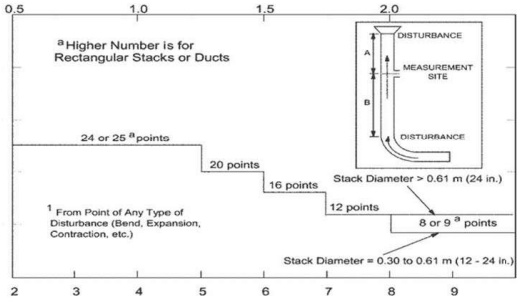
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	44.125	45.125	44.820	44.690
Meter Temperature, °F	(Tm)	53.3	72.4	62.2	62.6
Meter Temperature, °R	(Tm)	512.9	532.1	521.8	522.3
Meter Orifice Pressure, in. WC	(ΔH)	1.908	1.942	1.942	1.931
Volume H_2O Collected, mL	(Vlc)	319.2	291.3	328.1	312.9
Nozzle Diameter, in	(Dn)	0.295	0.295	0.295	0.295
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	105.1	43.2	51.4	66.6
Condensable PM Mass, mg	(M_{CPM})	4.0	4.8	4.5	4.4
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.319	44.680	45.250	45.083
Standard Water Volume, ft^3	(Vwstd)	15.053	13.738	15.473	14.755
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
Meter Pressure, in Hg	(Pm)	29.90	29.90	29.90	29.90
Volume at Nozzle, ft^3	(Vn)	96.813	95.419	99.108	97.11
Isokinetic Sampling Rate, (%)	(I)	100.1	98.4	100.8	99.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.3	0.0	-0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.036	0.015	0.018	0.023
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.030	0.012	0.014	0.019
Filterable PM Emission Rate, lb/hr	(PMR)	34.8	14.6	16.9	22.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0014	0.0017	0.0015	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.33	1.62	1.48	1.48
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.017	0.019	0.024
Total PM Emission Rate, lb/hr	(ER_{TPM})	36.2	16.2	18.4	23.6

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	**(must be ≥ 0.5)**
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

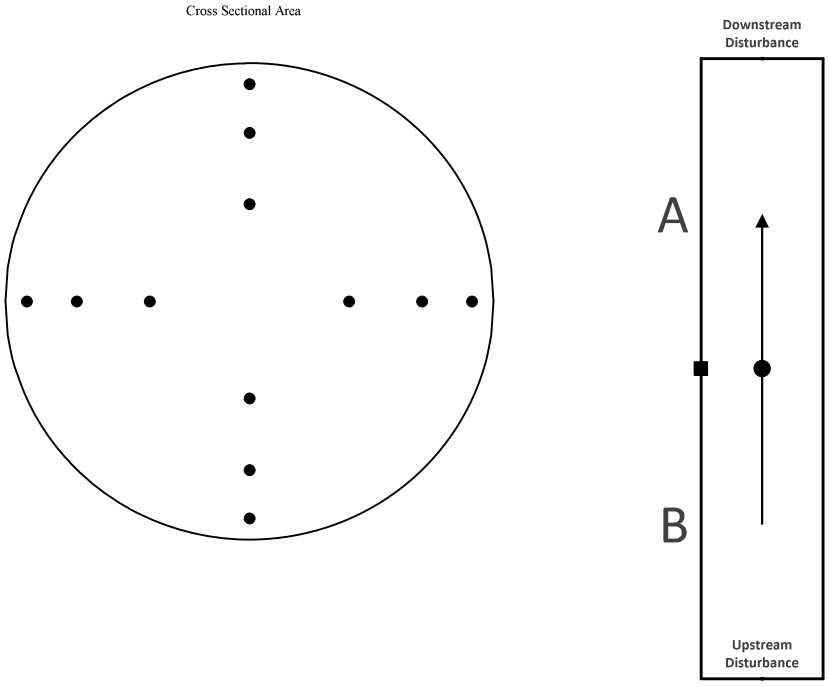
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	4
3	1
4	3
5	2
6	1
7	0
8	-2
9	-3
10	-1
11	0
12	6
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.62	0.60	0.59	0.60
Point 2		0.63	0.63	0.63	0.63
Point 3		0.65	0.61	0.65	0.64
Point 4		0.61	0.62	0.61	0.61
Point 5		0.59	0.64	0.64	0.62
Point 6		0.63	0.63	0.63	0.63
Point 7		0.61	0.59	0.61	0.60
Point 8		0.59	0.61	0.63	0.61
Point 9		0.61	0.63	0.64	0.63
Point 10		0.64	0.62	0.65	0.64
Point 11		0.65	0.59	0.61	0.62
Point 12		0.59	0.61	0.63	0.61
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.786	0.784	0.792	0.787
Pitot Tube Coefficient	(Cp)	0.830	0.830	0.830	0.830
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.54	-0.55	-0.53	-0.54
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	381.3	396.8	396.3	391.4
Stack Temperature, °R	(Ts)	840.9	856.5	855.9	851.1
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
O_2 Concentration, %	(O_2)	5.6	5.1	5.3	5.33
CO_2 Concentration, %	(CO_2)	15.2	15.7	15.5	15.47
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	36.58	32.26	33.96	34.27
Molecular Weight, lb/lb-mole (dry)	(Md)	30.66	30.72	30.69	30.69
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.50	27.73	27.46	27.56
Velocity, ft/sec	(Vs)	56.6	56.7	57.5	56.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	242,764	243,366	246,763	244,298
At Standard Conditions, scfm	(Qsw)	151,315	148,927	151,116	150,453
At Standard Conditions, dscfm	(Qs)	113,585	113,905	112,609	113,366

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:35	2/12/2025	14:07	2/12/2025	15:53
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	5.58	15.23	5.08	15.66	5.25	15.51
Analysis #2	5.59	15.23	5.10	15.67	5.25	15.49
Analysis #3	5.58	15.22	5.10	15.67	5.25	15.49
Average	5.6	15.2	5.1	15.7	5.3	15.5

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.9	645.2	748.0	647.7	933.7	3484.5
Final Mass, g	687.3	741.5	776.2	651.5	947.2	3803.7
Gain	177.4	96.3	28.2	3.8	13.5	319.2
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.7	640.3	746.6	649.0	961.2	3490.8
Final Mass, g	698.7	686.5	771.7	649.5	975.7	3782.1
Gain	205.0	46.2	25.1	0.5	14.5	291.3
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.9	658.1	750.2	639.4	952.3	3499.9
Final Mass, g	691.0	735.7	785.2	644.8	971.3	3828.0
Gain	191.1	77.6	35.0	5.4	19.0	328.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 1	VALID	End Time:	11:17	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	55	°F	26704-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	380	°F		Pg:	-0.54	in. WC	319.2
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.6	%	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.2	%	3.091
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.001	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 2 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					55	55				55	55	55	55		
A1	0.00	5.00	915.775	0.62	52	376	1.91	1.90	3	254	251	42	75	100.7	56.56
2	5.00	10.00	919.480	0.63	52	378	1.94	2.00	3	256	252	42	75	100.4	57.08
3	10.00	15.00	923.200	0.65	52	380	2.00	2.00	3	256	256	43	76	100.5	58.05
4	15.00	20.00	926.975	0.61	52	382	1.87	1.90	3	258	260	43	78	99.7	56.30
5	20.00	25.00	930.600	0.59	53	383	1.81	1.80	3	259	258	45	78	100.5	55.40
6	25.00	30.00	934.200	0.63	53	385	1.93	1.90	3	253	257	46	78	100.2	57.32
B1	30.00	35.00	937.905	0.61	53	385	1.87	1.90	3	254	256	48	78	99.7	56.40
2	35.00	40.00	941.530	0.59	54	383	1.81	1.80	4	253	253	49	81	100.4	55.40
3	40.00	45.00	945.135	0.61	54	383	1.88	1.90	4	257	252	50	81	100.5	56.33
4	45.00	50.00	948.800	0.64	54	381	1.97	2.00	4	255	255	52	83	100.1	57.63
5	50.00	55.00	952.545	0.65	55	380	2.01	2.00	4	255	254	52	83	100.3	58.05
6	55.00	60.00	956.335	0.59	55	379	1.83	1.80	4	256	251	53	82	98.9	55.27
	Final DGM:		959.900												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.125	ft^3	0.62	in. WC	53.3	°F	381.3	°F	4	1.908	in. WC	100.1	0.249	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	53	°F	26707-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	381	°F		Pg:	-0.55 in. WC	291.3
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.1 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.7 %	3.08
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.000	--	--	--	0.002	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	959.925	0.60	70	396	1.87	1.90	4	251	252	45	76	99.3	56.30
2	5.00	10.00	963.600	0.63	70	396	1.97	2.00	4	260	251	43	75	99.7	57.69
3	10.00	15.00	967.380	0.61	70	397	1.90	1.90	4	256	254	45	76	100.1	56.80
4	15.00	20.00	971.115	0.62	71	396	1.94	2.00	5	253	250	51	75	100.8	57.23
5	20.00	25.00	974.915	0.64	71	396	2.00	2.00	5	255	258	51	71	100.4	58.15
6	25.00	30.00	978.760	0.63	72	395	1.98	2.00	5	254	253	52	73	100.3	57.66
B1	30.00	35.00	982.580	0.59	73	397	1.85	1.90	5	255	258	53	75	99.6	55.86
2	35.00	40.00	986.255	0.61	74	397	1.92	1.90	5	252	253	53	76	99.6	56.80
3	40.00	45.00	990.000	0.63	74	398	1.98	1.90	5	252	255	54	78	100.8	57.76
4	45.00	50.00	993.850	0.62	74	398	1.95	2.00	5	254	254	55	80	100.7	57.30
5	50.00	55.00	997.665	0.59	75	399	1.85	1.90	5	256	257	56	80	100.5	55.93
6	55.00	60.00	1001.385	0.61	75	397	1.92	1.90	5	258	255	56	81	97.3	56.80
	Final DGM:		1005.050												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.125	ft^3	0.62	in. WC	72.4	°F	396.8	°F	5	1.942	in. WC	98.4	0.235	-0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	72	°F	26708-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	397	°F		Pg:	-0.53 in. WC	328.1
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.3 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.295	in.		CO_2:	15.5 %	3.133
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Mid 1 (cf) --
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 2 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 3 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	6.280	0.59	61	393	1.82	1.80	4	254	251	43	70	100.2	55.73
2	5.00	10.00	9.905	0.63	61	395	1.94	1.90	4	256	252	43	71	101.0	57.66
3	10.00	15.00	13.675	0.65	61	396	1.99	2.00	4	258	250	43	72	99.7	58.60
4	15.00	20.00	17.450	0.61	61	396	1.87	1.90	4	254	256	45	72	100.4	56.77
5	20.00	25.00	21.135	0.64	61	396	1.96	2.00	4	258	258	45	73	100.6	58.15
6	25.00	30.00	24.915	0.63	62	397	1.93	1.90	4	257	259	45	73	100.1	57.72
B1	30.00	35.00	28.655	0.61	62	397	1.87	1.90	4	256	260	46	74	100.7	56.80
2	35.00	40.00	32.355	0.63	63	397	1.94	2.00	4	258	254	48	75	100.5	57.72
3	40.00	45.00	36.115	0.64	63	397	1.97	2.00	4	259	257	49	78	99.7	58.18
4	45.00	50.00	39.875	0.65	63	398	2.00	2.00	5	257	255	50	79	99.8	58.67
5	50.00	55.00	43.665	0.61	64	397	1.88	1.90	5	256	255	51	79	100.2	56.80
6	55.00	60.00	47.360	0.63	64	396	1.94	2.00	5	255	256	51	82	99.7	57.69
	Final DGM:		51.100												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.820	ft^3	0.63	in. WC	62.2	°F	396.3	°F	5	1.942	in. WC	100.8	0.255	0.0

SM01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

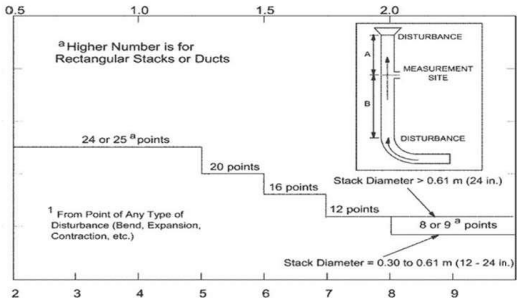
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	49.70	49.70	49.69	49.70
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	48.040	48.100	53.630	49.923
Meter Temperature, °F	(Tm)	51.4	49.9	53.6	51.6
Meter Temperature, °R	(Tm)	511.1	509.6	513.3	511.3
Meter Orifice Pressure, in. WC	(ΔH)	1.950	1.958	2.417	2.108
Volume H_2O Collected, mL	(Vlc)	806.2	438.4	456.0	566.9
Nozzle Diameter, in	(Dn)	0.382	0.382	0.382	0.382
Area of Nozzle, ft^2	(An)	0.0008	0.0008	0.0008	0.0008
Filterable PM Mass, mg	(Mn)	245.4	122.5	118.9	162.3
Condensable PM Mass, mg	(M_{CPM})	13.8	7.9	9.3	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	49.919	50.129	55.555	51.868
Standard Water Volume, ft^3	(Vwstd)	38.020	20.675	21.505	26.733
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
Meter Pressure, in Hg	(Pm)	30.17	30.17	30.21	30.19
Volume at Nozzle, ft^3	(Vn)	103.488	81.841	88.953	91.43
Isokinetic Sampling Rate, (%)	(I)	101.3	91.2	100.1	97.5
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	1.7	1.7	1.7	1.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.076	0.038	0.033	0.049
Filterable PM Emission Rate, lb/hr	(PMR)	7.4	4.1	3.6	5.1
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.15	0.083	0.073	0.10
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0043	0.0024	0.0026	0.0031
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.42	0.26	0.28	0.32
Total PM Concentration, grain/dscf	(C_{TPM})	0.080	0.040	0.036	0.052
Total PM Emission Rate, lb/hr	(ER_{TPM})	7.8	4.4	3.9	5.4

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Smelt Tank Scrubber (SM01)
Project No.: AST-2024-4204
Date: 02/10/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	54.00	in
Nipple Length:	9.00	in
Depth of Duct:	45.00	in
Cross Sectional Area of Duct:	11.04	ft^2
No. of Test Ports:	1	
Distance A:	112.0	ft
Distance A Duct Diameters:	29.9	(must be ≥ 0.5)
Distance B:	60.0	ft
Distance B Duct Diameters:	16.0	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/10/25	
Reviewer (Initial and Date):	CAL 2/10/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

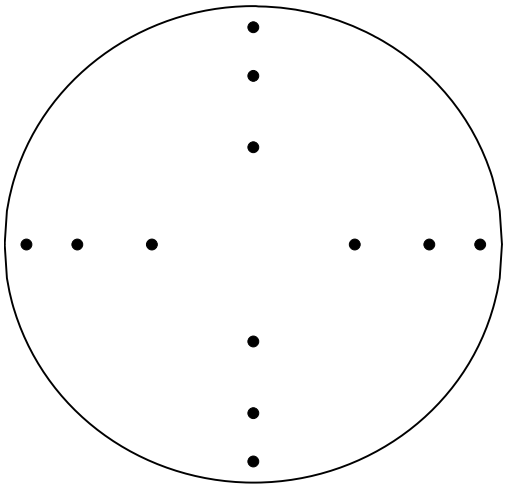
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

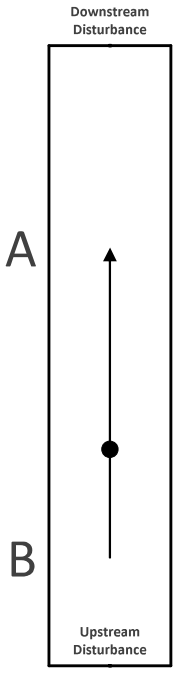
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	1.98	11
2	14.6	6.57	15 9/16
3	29.6	13.32	22 5/16
4	70.4	31.68	40 11/16
5	85.4	38.43	47 7/16
6	95.6	43.02	52
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 112 ft.
B = 60 ft.
Depth of Duct = 45 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	-4
2	-2
3	-1
4	1
5	0
6	2
7	3
8	5
9	4
10	3
11	-1
12	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.16	0.16	0.17	0.16
Point 2		0.17	0.18	0.18	0.18
Point 3		0.23	0.22	0.23	0.23
Point 4		0.32	0.31	0.30	0.31
Point 5		0.29	0.28	0.27	0.28
Point 6		0.27	0.28	0.27	0.27
Point 7		0.40	0.35	0.36	0.37
Point 8		0.29	0.34	0.33	0.32
Point 9		0.28	0.29	0.28	0.28
Point 10		0.24	0.23	0.25	0.24
Point 11		0.19	0.18	0.19	0.19
Point 12		0.16	0.17	0.17	0.17
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.495	0.495	0.496	0.495
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.39	-0.39	-0.39	-0.39
Stack Pressure, in. Hg	(Ps)	30.00	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	11.04	11.04	11.04	11.04
Stack Temperature, °F	(Ts)	163.5	152.3	151.4	155.7
Stack Temperature, °R	(Ts)	623.2	611.9	611.1	615.4
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	25.10	25.98	26.04	25.70
Velocity, ft/sec	(Vs)	31.0	30.1	30.2	30.4
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	20,517	19,971	19,993	20,160
At Standard Conditions, scfm	(Qsw)	17,420	17,268	17,310	17,333
At Standard Conditions, dscfm	(Qs)	11,402	12,707	12,830	12,313

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.2	648.2	744.6	544.8	948.7	3244.5
Final Mass, g	873.1	888.1	769.2	557.9	962.4	4050.7
Gain	514.9	239.9	24.6	13.1	13.7	806.2
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.0	799.4	763.4	637.7	942.4	3637.9
Final Mass, g	819.0	864.0	792.7	644.0	956.6	4076.3
Gain	324.0	64.6	29.3	6.3	14.2	438.4
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.9	828.8	768.8	556.4	956.3	3469.2
Final Mass, g	735.9	871.4	789.3	560.3	968.3	3925.2
Gain	377.0	42.6	20.5	3.9	12.0	456.0

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	Run 1	VALID	End Time:	9:40	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	160	°F	26974-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	163	°F		Pg:	-0.39 in. WC	806.2
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.313	in.		CO_2:	0 %	9.461
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- -- 12			Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					45	45				45	45	45	45		
1	0.00	5.00	756.890	0.16	48	167	1.23	1.20	3	254	255	43	68	100.6	25.11
2	5.00	10.00	760.060	0.17	49	163	1.32	1.30	3	256	254	35	73	101.1	25.80
3	10.00	15.00	763.360	0.23	49	167	1.77	1.80	4	254	254	35	69	99.5	30.10
4	15.00	20.00	767.120	0.32	50	168	2.46	2.50	7	256	256	36	67	99.4	35.54
5	20.00	25.00	771.550	0.29	50	168	2.24	2.20	6	255	253	38	80	101.8	33.83
6	25.00	30.00	775.870	0.27	51	164	2.10	2.10	6	255	257	40	83	102.5	32.54
7	30.00	35.00	780.090	0.40	52	162	3.12	3.10	9	255	257	41	78	99.0	39.54
8	35.00	40.00	785.060	0.29	53	163	2.27	2.30	8	256	254	41	73	103.8	33.70
9	40.00	45.00	789.510	0.28	53	162	2.19	2.20	7	255	256	41	68	100.3	33.08
10	45.00	50.00	793.740	0.24	54	160	1.89	1.90	7	256	249	40	72	103.8	30.58
11	50.00	55.00	797.810	0.19	54	159	1.50	1.50	7	255	256	39	74	105.0	27.19
12	55.00	60.00	801.480	0.16	54	159	1.26	1.30	6	253	250	40	71	107.5	24.95
	Final DGM:		804.930												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.040 ft^3	0.25 in. WC	51.4 °F	163.5 °F	9	1.950 in. WC	101.3	0.345	1.7

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 2**	**VALID**	**End Time:**	12:15	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	51	°F	26989-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	164	°F		Pg:	-0.39 in. WC	438.4
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.345	in.		CO_2:	0 %	7.80
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.005	-- -- --	0.002		Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
1	0.00	5.00	805.210	0.16	49	146	1.28	1.30	3	254	249	46	66	102.8	24.68
2	5.00	10.00	808.510	0.18	50	153	1.42	1.40	4	255	256	37	68	99.4	26.33
3	10.00	15.00	811.880	0.22	49	152	1.74	1.70	5	254	256	39	82	100.5	29.09
4	15.00	20.00	815.640	0.31	49	153	2.44	2.40	7	253	259	40	84	101.8	34.56
5	20.00	25.00	820.150	0.28	48	151	2.21	2.20	6	256	255	40	75	102.8	32.79
6	25.00	30.00	824.480	0.28	49	148	2.23	2.20	6	255	255	42	67	100.9	32.71
7	30.00	35.00	828.750	0.35	49	147	2.78	2.80	8	255	256	43	66	101.1	36.54
8	35.00	40.00	833.530	0.34	50	147	2.71	2.70	8	256	256	46	75	100.9	36.01
9	40.00	45.00	838.240	0.29	51	149	2.31	2.30	7	255	254	49	82	101.9	33.32
10	45.00	50.00	842.640	0.23	51	158	1.81	1.80	7	256	255	49	73	103.3	29.89
11	50.00	55.00	846.590	0.18	52	160	1.41	1.40	6	255	255	48	69	101.3	26.48
12	55.00	60.00	850.020	0.17	52	163	1.33	1.30	6	256	255	46	72	100.2	25.80
	Final DGM:		853.310												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.100 ft^3	0.25 in. WC	49.9 °F	152.3 °F	8	1.958 in. WC	91.2	0.264	1.7

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	14:05	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 3**	**VALID**	**End Time:**	15:05	**Project No.:**	AST-2024-4204 — **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	27.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	50	°F	26700-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	152	°F		Pg:	-0.39 in. WC	456.0
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.328	in.		CO_2:	0 %	9.650
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm				
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 / Mid 3	Post	Check Pt. / Initial / Final / Corr.	
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- / --	0.002	Mid 1 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	--	-- / --	9	Mid 2 (cf)	--
Ms:	25.91	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	--	-- / --	Pass	Mid 3 (cf)	--
											Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
1	0.00	5.00	853.490	0.17	52	154	1.64	1.60	4	254	254	51	67	100.8	25.18
2	5.00	10.00	857.170	0.18	50	150	1.74	1.70	4	254	254	43	69	102.9	25.83
3	10.00	15.00	861.030	0.23	51	148	2.24	2.20	5	256	256	42	68	99.5	29.14
4	15.00	20.00	865.260	0.30	52	148	2.92	2.90	6	255	255	44	70	100.7	33.29
5	20.00	25.00	870.150	0.27	53	147	2.64	2.60	5	255	256	44	66	101.9	31.55
6	25.00	30.00	874.860	0.27	54	146	2.65	2.70	6	256	255	47	65	102.1	31.53
7	30.00	35.00	879.590	0.36	55	146	3.53	3.50	8	256	255	48	72	99.4	36.40
8	35.00	40.00	884.910	0.33	55	154	3.20	3.20	8	255	256	48	69	100.5	35.08
9	40.00	45.00	890.030	0.28	55	155	2.71	2.70	8	256	256	46	73	101.2	32.34
10	45.00	50.00	894.780	0.25	55	156	2.42	2.40	7	256	254	45	68	101.9	30.59
11	50.00	55.00	899.300	0.19	55	158	1.83	1.80	7	255	254	44	76	103.2	26.71
12	55.00	60.00	903.290	0.17	56	155	1.65	1.70	6	254	256	45	78	104.3	25.20
	Final DGM:		907.120												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	53.630 ft^3	0.25 in. WC	53.6 °F	151.4 °F	8	2.417 in. WC	100.1	0.259	1.7

SM02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

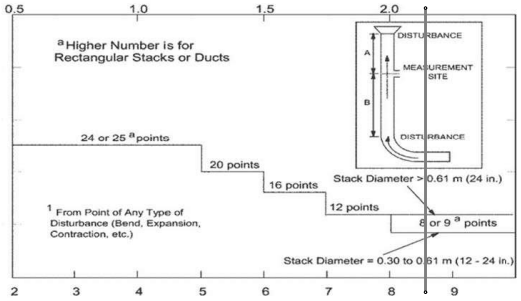
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	97.01	96.99	96.99	97.00
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	48.530	39.450	39.950	42.643
Meter Temperature, °F	(Tm)	61.0	63.1	64.0	62.7
Meter Temperature, °R	(Tm)	520.7	522.8	523.7	522.4
Meter Orifice Pressure, in. WC	(ΔH)	2.317	1.467	1.458	1.747
Volume H_2O Collected, mL	(Vlc)	467.7	380.9	370.7	406.4
Nozzle Diameter, in	(Dn)	0.344	0.305	0.305	0.318
Area of Nozzle, ft^2	(An)	0.0006	0.0005	0.0005	0.0006
Filterable PM Mass, mg	(Mn)	108.2	73.4	71.1	84.2
Condensable PM Mass, mg	(M_{CPM})	8.0	16.2	6.8	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.707	39.354	39.782	42.615
Standard Water Volume, ft^3	(Vwstd)	22.057	17.963	17.482	19.167
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
Meter Pressure, in Hg	(Pm)	29.93	29.87	29.87	29.89
Volume at Nozzle, ft^3	(Vn)	82.478	67.206	67.182	72.29
Isokinetic Sampling Rate, (%)	(I)	93.9	99.1	100.3	97.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	-1.7	0.2	1.6	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.034	0.029	0.028	0.030
Filterable PM Emission Rate, lb/hr	(PMR)	7.5	6.1	5.8	6.5
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.077	0.063	0.060	0.067
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0025	0.0064	0.0026	0.0038
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.55	1.35	0.56	0.82
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.035	0.030	0.034
Total PM Emission Rate, lb/hr	(ER_{TPM})	8.0	7.4	6.4	7.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN	
Reviewer (Initial and Date):	CAL	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

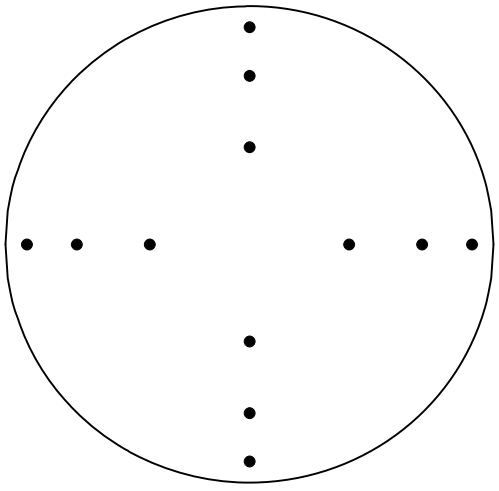
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

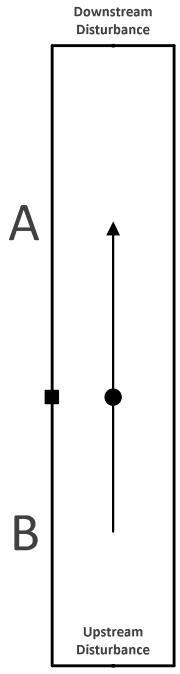
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 55 ft.
B = 42 ft.
Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	2
3	1
4	0
5	1
6	2
7	-3
8	-2
9	0
10	1
11	-1
12	3
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.36	0.35	0.34	0.35
Point 2		0.34	0.34	0.34	0.34
Point 3		0.31	0.30	0.32	0.31
Point 4		0.32	0.30	0.31	0.31
Point 5		0.34	0.33	0.35	0.34
Point 6		0.35	0.36	0.36	0.36
Point 7		0.35	0.36	0.35	0.35
Point 8		0.33	0.34	0.34	0.34
Point 9		0.32	0.33	0.31	0.32
Point 10		0.30	0.32	0.32	0.31
Point 11		0.33	0.33	0.34	0.33
Point 12		0.35	0.36	0.35	0.35
CALCULATED DATA					
Square Root of ΔP, $(in. WC)^{1/2}$	(ΔP)	0.577	0.579	0.579	0.578
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.61	-0.61	-0.61	-0.61
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	18.99	18.99	18.99	18.99
Stack Temperature, °F	(Ts)	151.5	155.2	155.5	154.1
Stack Temperature, °R	(Ts)	611.2	614.8	615.2	613.7
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.00	25.74	25.71	25.82
Velocity, ft/sec	(Vs)	35.3	35.7	35.7	35.6
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	40,191	40,629	40,702	40,507
At Standard Conditions, scfm	(Qsw)	34,462	34,630	34,673	34,589
At Standard Conditions, dscfm	(Qs)	25,439	24,719	24,670	24,942

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.9	799.9	724.0	643.3	951.8	3613.9
Final Mass, g	847.9	880.1	741.1	647.1	965.4	4081.6
Gain	353.0	80.2	17.1	3.8	13.6	467.7
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.7	829.0	790.1	560.5	971.9	3510.2
Final Mass, g	696.1	854.5	797.1	561.2	982.2	3891.1
Gain	337.4	25.5	7.0	0.7	10.3	380.9
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.2	799.1	740.3	641.5	938.2	3614.3
Final Mass, g	806.2	832.5	753.1	643.9	949.3	3985.0
Gain	311.0	33.4	12.8	2.4	11.1	370.7

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 1	VALID	End Time:	11:18	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26702-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	154	°F		Pg:	-0.61 in. WC	467.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.308	in.		CO_2:	0 %	6.815
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	-- --	0.002	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-344-3	SS	Vacuum (in Hg):	15	--	-- --	10	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.344		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 45	Stack Amb. 45	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 45	Filter Amb. 45	Imp Exit Amb. 45	CPM Amb. 45	% ISO	Vs (fps)
A1	0.00	5.00	420.260	0.36	55	154	2.47	2.50	6	248	246	41	68	96.9	37.04
2	5.00	10.00	424.350	0.34	54	151	2.34	2.30	6	247	257	40	72	99.8	35.91
3	10.00	15.00	428.450	0.31	54	149	2.14	2.10	5	246	256	46	70	95.2	34.23
4	15.00	20.00	432.190	0.32	60	149	2.24	2.20	6	254	257	47	68	98.1	34.78
5	20.00	25.00	436.150	0.34	63	149	2.39	2.40	6	250	252	47	67	97.8	35.85
6	25.00	30.00	440.240	0.35	64	148	2.47	2.50	7	251	248	46	69	99.6	36.35
B1	30.00	35.00	444.480	0.35	63	150	2.46	2.50	7	254	253	45	70	100.7	36.41
2	35.00	40.00	448.750	0.33	63	151	2.31	2.30	6	255	248	42	76	99.6	35.38
3	40.00	45.00	452.850	0.32	63	152	2.24	2.20	6	255	251	38	81	98.0	34.87
4	45.00	50.00	456.820	0.30	64	153	2.10	2.10	5	253	255	40	67	100.3	33.79
5	50.00	55.00	460.760	0.33	64	154	2.31	2.30	6	255	254	40	68	98.4	35.47
6	55.00	60.00	464.810	0.35	65	158	2.43	2.40	7	256	254	41	74	94.1	36.64
	Final DGM:		468.790												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	48.530	ft^3	0.33	in. WC	61.0	°F	151.5	°F	7	2.317	in. WC	93.9	0.262	-1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	61	°F	26703-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	152	°F		Pg:	-0.61 in. WC	380.9
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.33	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.307	in.		CO_2:	0 %	4.34
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- --	0.003	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	--	-- --	6	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	468.950	0.35	62	158	1.51	1.50	3	254	255	42	67	97.0	36.64
2	5.00	10.00	472.170	0.34	60	155	1.46	1.50	4	260	263	43	83	103.7	36.03
3	10.00	15.00	475.560	0.30	61	156	1.29	1.30	4	261	254	43	76	102.8	33.87
4	15.00	20.00	478.720	0.30	61	158	1.29	1.30	4	260	251	45	66	101.0	33.93
5	20.00	25.00	481.820	0.33	61	160	1.41	1.40	4	260	249	45	74	98.3	35.64
6	25.00	30.00	484.980	0.36	62	154	1.56	1.60	5	260	252	47	81	102.4	37.04
B1	30.00	35.00	488.440	0.36	63	151	1.57	1.60	4	246	244	47	73	98.7	36.95
2	35.00	40.00	491.790	0.34	64	153	1.48	1.50	4	257	252	51	68	101.5	35.97
3	40.00	45.00	495.140	0.33	64	152	1.45	1.50	4	259	250	49	72	101.3	35.57
4	45.00	50.00	498.450	0.32	66	154	1.40	1.40	4	260	241	49	72	102.1	34.92
5	50.00	55.00	501.730	0.33	66	156	1.44	1.40	4	258	246	50	69	99.8	35.52
6	55.00	60.00	504.980	0.36	67	155	1.57	1.60	5	261	254	51	67	100.4	37.07
	Final DGM:		508.400												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	39.450 ft^3	0.34 in. WC	63.1 °F	155.2 °F	5	1.467 in. WC	99.1	0.286	0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 3	VALID	End Time:	15:28	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	63	°F	26971-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	155	°F		Pg:	-0.61 in. WC	370.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.306	in.		CO_2:	0 %	4.327
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.007	-- -- --	0.009		Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	511.870	0.34	64	154	1.48	1.50	3	258	253	46	73	99.5	36.00
2	5.00	10.00	515.150	0.34	65	151	1.49	1.50	5	260	253	46	74	100.9	35.91
3	10.00	15.00	518.490	0.32	65	153	1.40	1.40	5	260	245	46	84	103.5	34.90
4	15.00	20.00	521.810	0.31	64	156	1.34	1.30	4	260	247	47	82	101.8	34.43
5	20.00	25.00	525.010	0.35	64	155	1.52	1.50	5	259	250	47	79	102.9	36.56
6	25.00	30.00	528.450	0.36	64	158	1.55	1.60	5	259	252	49	66	102.7	37.16
B1	30.00	35.00	531.920	0.35	64	158	1.51	1.50	5	259	249	47	67	102.0	36.64
2	35.00	40.00	535.320	0.34	64	158	1.47	1.50	4	261	251	47	70	103.8	36.12
3	40.00	45.00	538.730	0.31	63	156	1.34	1.30	4	260	246	48	69	100.7	34.43
4	45.00	50.00	541.890	0.32	63	155	1.39	1.40	4	263	248	47	68	101.3	34.95
5	50.00	55.00	545.120	0.34	64	156	1.47	1.50	4	257	255	47	67	99.4	36.06
6	55.00	60.00	548.390	0.35	64	156	1.52	1.50	4	261	251	46	66	102.7	36.58
	Final DGM:		551.820												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	39.950	ft^3	0.34	in. WC	64.0	°F	155.5	°F	5	1.458	in. WC	100.3	0.289	1.6

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

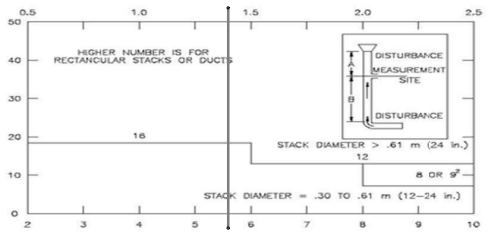
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		9:10	10:42	11:57	--
Stop Time		10:09	11:41	12:56	--
Input Data - Outlet					
Moisture Fraction, dimensionless	BWS	0.444	0.442	0.442	0.443
Volumetric Flow Rate (M1-4), dscfm	Qs	6,235	6,311	6,345	6,297
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	13.20	13.24	13.06	13.17
CO_2 Concentration, % dry	C_{CO_2}	3.13	3.20	3.19	3.17
Methanol - Outlet Concentration, ppmvd	C_{CH_3OH}	0.81	0.77	0.70	0.76
Methanol - Outlet Concentration, ppmvw	C_{CH_3OHw}	0.45	0.43	0.39	0.42
Methanol - Outlet Concentration, ppmvd @ 10 % O_2	C_{CH_3OHc15}	1.1	1.1	0.97	1.1
Methanol - Outlet Emission Rate, lb/hr	ER_{CH_3OH}	0.03	0.02	0.02	0.02

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unit Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	in
Nipple Length:	7.00	in
Depth of Duct:	29.00	in
Cross Sectional Area of Duct:	4.59	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	ft
Distance A Duct Diameters:	23.4	**(must be > 0.5)**
Distance B:	13.5	ft
Distance B Duct Diameters:	5.6	**(must be > 2)**
Actual Number of Traverse Points:	16	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	3.2	1.00	8
2	10.5	3.05	10 1/16
3	19.4	5.63	12 5/8
4	32.3	9.37	16 3/8
5	67.7	19.63	26 5/8
6	80.6	23.37	30 3/8
7	89.5	25.96	32 15/16
8	96.8	28.00	35
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

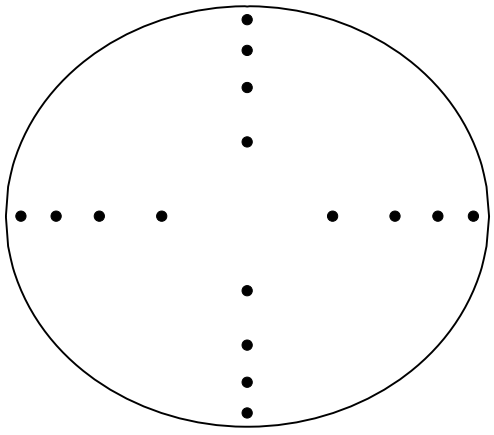
Stack Diagram

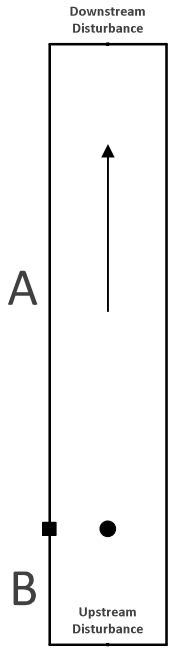
A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX

Source NCG Oxidation Unit Scrubber (NCG01)

Project No. AST-2024-4204

Date 2/13/25

Sample Point	Angle (ΔP=0)
1	3
2	5
3	2
4	6
5	5
6	2
7	8
8	5
9	10
10	5
11	12
12	8
13	8
14	2
15	2
16	5
Average	5.5

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204

Run No.	1		2		3	
Date	2/13/25		2/13/25		2/13/25	
Status	VALID		VALID		VALID	
Start Time	9:20		10:55		12:40	
Stop Time	9:30		11:05		12:50	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.54	174	0.58	176	0.55	177
2	0.53	175	0.55	176	0.54	177
3	0.51	175	0.54	176	0.55	178
4	0.46	175	0.51	177	0.56	178
5	0.46	176	0.49	177	0.52	177
6	0.45	176	0.46	178	0.51	177
7	0.46	176	0.49	178	0.48	178
8	0.43	177	0.52	178	0.45	178
B-1	0.54	176	0.55	176	0.49	176
2	0.55	177	0.58	177	0.56	177
3	0.56	177	0.56	177	0.59	178
4	0.59	178	0.54	178	0.60	178
5	0.55	178	0.54	178	0.61	177
6	0.57	177	0.57	178	0.56	178
7	0.58	178	0.54	177	0.52	177
8	0.60	178	0.51	177	0.54	177

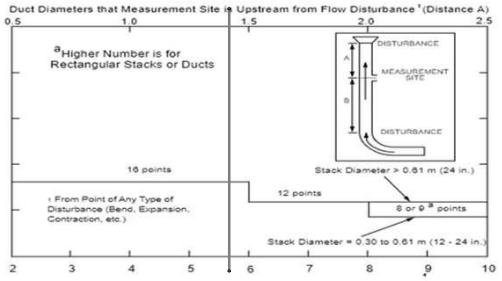
					Average
Square Root of ΔP, (in. WC)$^{1/2}$	**$(\Delta P)^{1/2}$**	0.723	0.730	0.734	0.729
Average ΔP, in. WC	**(ΔP)**	0.52	0.53	0.54	0.53
Pitot Tube Coefficient	**(Cp)**	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	**(Pb)**	30.46	30.46	30.46	30.46
Static Pressure, in. WC	**(Pg)**	-0.48	-0.45	-0.49	-0.47
Stack Pressure, in. Hg	**(Ps)**	30.42	30.43	30.42	30.43
Average Temperature, °F	**(Ts)**	176.4	177.1	177.4	177.0
Average Temperature, °R	**(Ts)**	636.1	636.8	637.0	636.6
Measured Moisture Fraction	**(BWSmsd)**	0.444	0.442	0.442	0.443
Moisture Fraction @ Saturation	**(BWSsat)**	0.457	0.464	0.467	0.463
Moisture Fraction	**(BWS)**	0.444	0.442	0.442	0.443
O2 Concentration, %	**(O2)**	13.20	13.24	13.06	13.17
CO2 Concentration, %	**(CO2)**	3.13	3.20	3.19	3.17
Molecular Weight, lb/lb-mole (dry)	**(Md)**	29.03	29.04	29.03	29.03
Molecular Weight, lb/lb-mole (wet)	**(Ms)**	24.14	24.17	24.16	24.16
Velocity, ft/sec	**(Vs)**	48.3	48.8	49.1	48.7
VFR at stack conditions, acfm	**(Qa)**	13,294	13,422	13,501	13,406
VFR at standard conditions, scfh	**(Qsw)**	672,819	678,628	682,305	677,917
VFR at standard conditions, scfm	**(Qsw)**	11,214	11,310	11,372	11,299
VFR at standard conditions, dscfm	**(Qsd)**	6,235	6,311	6,345	6,297

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unti Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date:	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	**in**
Nipple Length:	7.00	**in**
Depth of Duct:	29.00	**in**
Cross Sectional Area of Duct:	4.59	**ft²**
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	**ft**
Distance A Duct Diameters:	23.4	**(must be ≥ 0.5)**
Distance B:	13.5	**ft**
Distance B Duct Diameters:	5.6	**(must be ≥ 2)**
Minimum Number of Traverse Points:	16	
Actual Number of Traverse Points:	3	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

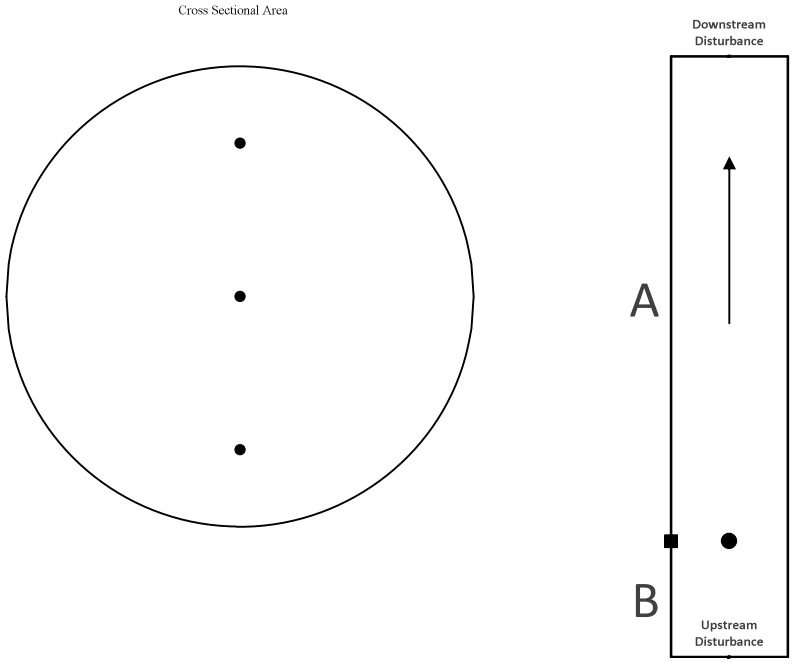
Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	4.84	11.84
2	50.0	14.50	21.50
3	83.3	24.16	31.16
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram

A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.



Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.26	3.08
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Average Zero Response (Co)	0.24	0.02
Pretest System Cal Response	10.10	9.81
Posttest System Cal Response	10.10	9.84
Average Cal Response (C_M)	10.10	9.83
Corrected Run Average (Corr)	13.20	3.13
9:10	13.46	2.95
9:11	13.66	2.75
9:12	13.34	2.77
9:13	13.13	2.98
9:14	13.70	2.72
9:15	13.11	2.92
9:16	13.41	3.01
9:17	13.39	2.88
9:18	13.33	2.91
9:19	12.86	3.11
9:20	13.58	2.83
9:21	13.71	2.67
9:22	12.94	3.14
9:23	13.04	3.23
9:24	13.54	2.92
9:25	13.17	2.91
9:26	13.11	3.07
9:27	13.40	2.93
9:28	13.23	2.87
9:29	13.28	2.97
9:30	12.74	3.15
9:31	13.00	3.24
9:32	13.55	2.90
9:33	13.89	2.64
9:34	13.33	2.94
9:35	13.43	3.07
9:36	13.43	3.05
9:37	13.65	3.07
9:38	13.28	3.13
9:39	12.98	3.54
9:40	13.29	3.31
9:41	13.01	3.64
9:42	13.10	3.53
9:43	12.76	3.54
9:44	13.11	3.51
9:45	12.67	3.43
9:46	12.19	3.68
9:47	12.61	3.60
9:48	13.24	3.12
9:49	13.73	2.71
9:50	13.53	2.80
9:51	12.98	3.19
9:52	12.80	3.23
9:53	13.65	2.74
9:54	13.86	2.61
9:55	13.79	2.60
9:56	13.81	2.67
9:57	13.77	2.73
9:58	13.85	2.86
9:59	13.48	3.05
10:00	12.71	3.50
10:01	13.43	3.36
10:02	13.28	3.26
10:03	12.38	3.78
10:04	12.85	3.65
10:05	13.83	2.98
10:06	13.98	2.74
10:07	13.30	2.97
10:08	12.74	3.27
10:09	12.11	3.76

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.32	3.17
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Average Zero Response (Co)	0.21	0.03
Pretest System Cal Response	10.10	9.84
Posttest System Cal Response	10.13	9.84
Average Cal Response (C_M)	10.12	9.84
Corrected Run Average (Corr)	13.24	3.20
10:42	12.69	3.47
10:43	13.78	2.68
10:44	13.66	2.62
10:45	13.75	2.57
10:46	13.10	3.07
10:47	13.52	2.74
10:48	13.38	2.78
10:49	13.02	3.03
10:50	12.91	3.28
10:51	13.26	3.25
10:52	13.68	3.02
10:53	13.83	2.85
10:54	13.60	2.88
10:55	13.23	3.33
10:56	13.45	3.19
10:57	13.25	3.16
10:58	13.22	3.28
10:59	13.88	3.08
11:00	13.21	3.20
11:01	13.20	3.44
11:02	13.43	3.29
11:03	12.83	3.41
11:04	12.73	3.61
11:05	12.85	3.60
11:06	13.26	3.37
11:07	13.69	3.11
11:08	13.44	3.10
11:09	13.39	3.21
11:10	13.04	3.26
11:11	12.95	3.49
11:12	12.91	3.34
11:13	13.32	3.25
11:14	12.83	3.26
11:15	13.00	3.40
11:16	13.42	3.21
11:17	13.64	3.06
11:18	13.64	2.93
11:19	13.56	2.96
11:20	13.54	3.01
11:21	13.22	3.11
11:22	13.45	3.23
11:23	13.22	3.17
11:24	13.30	3.28
11:25	12.88	3.27
11:26	13.28	3.31
11:27	13.22	3.15
11:28	14.05	2.80
11:29	13.66	2.79
11:30	13.79	3.02
11:31	13.38	3.04
11:32	13.49	3.30
11:33	13.57	3.06
11:34	13.08	3.44
11:35	13.44	3.27
11:36	13.02	3.37
11:37	13.56	3.30
11:38	13.06	3.29
11:39	12.69	3.60
11:40	13.41	3.23
11:41	13.54	3.11

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.16	3.15
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Average Zero Response (Co)	0.22	0.03
Pretest System Cal Response	10.13	9.84
Posttest System Cal Response	10.12	9.81
Average Cal Response (C_M)	10.13	9.83
Corrected Run Average (Corr)	13.06	3.19
11:57	13.24	2.94
11:58	12.96	3.17
11:59	13.51	2.85
12:00	13.07	3.00
12:01	13.43	3.13
12:02	13.15	3.06
12:03	13.55	3.05
12:04	13.64	2.82
12:05	13.53	3.01
12:06	12.69	3.36
12:07	12.85	3.57
12:08	13.00	3.45
12:09	12.44	3.56
12:10	12.67	3.72
12:11	12.83	3.56
12:12	13.24	3.26
12:13	13.12	3.08
12:14	13.17	3.10
12:15	13.37	2.92
12:16	13.30	2.90
12:17	13.01	3.07
12:18	12.88	3.21
12:19	13.43	3.04
12:20	13.60	2.73
12:21	13.35	3.03
12:22	13.23	3.04
12:23	13.02	3.33
12:24	13.43	3.03
12:25	12.54	3.45
12:26	12.79	3.63
12:27	12.54	3.44
12:28	12.82	3.53
12:29	13.21	3.10
12:30	12.76	3.50
12:31	13.11	3.21
12:32	13.04	3.18
12:33	13.14	3.10
12:34	12.97	3.04
12:35	13.14	3.05
12:36	13.33	2.95
12:37	13.49	2.83
12:38	13.59	2.79
12:39	13.45	2.80
12:40	13.72	2.88
12:41	13.64	2.86
12:42	13.58	2.98
12:43	13.07	3.26
12:44	13.05	3.59
12:45	12.84	3.48
12:46	12.54	3.60
12:47	13.55	3.18
12:48	12.87	3.29
12:49	13.38	3.18
12:50	13.09	3.09
12:51	13.50	2.99
12:52	13.36	2.87
12:53	12.84	3.09
12:54	13.22	3.10
12:55	13.38	2.89
12:56	13.18	2.95

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
9:10	191.0	1.037	0.4	45.0
9:11	191.0	1.036	0.5	45.8
9:12	191.0	1.036	0.5	44.7
9:13	191.0	1.036	0.6	45.2
9:14	191.0	1.035	0.5	46.0
9:15	191.0	1.036	0.5	45.8
9:16	191.0	1.036	0.4	45.1
9:17	191.0	1.036	0.5	45.7
9:18	191.0	1.036	0.5	45.8
9:20	190.9	1.037	0.4	44.5
9:21	191.1	1.036	0.5	45.3
9:22	191.1	1.037	0.5	44.5
9:23	191.0	1.036	0.5	44.0
9:24	191.0	1.036	0.5	44.0
9:25	191.0	1.036	0.4	44.1
9:26	191.0	1.037	0.4	45.4
9:27	191.0	1.036	0.4	45.4
9:28	191.1	1.036	0.4	44.6
9:29	191.0	1.036	0.4	45.2
9:30	190.9	1.036	0.4	44.9
9:31	190.9	1.036	0.4	45.5
9:32	191.0	1.036	0.4	46.4
9:33	190.9	1.037	0.4	44.6
9:34	190.9	1.038	0.5	43.1
9:35	191.0	1.036	0.5	43.6
9:36	191.2	1.037	0.5	44.0
9:37	191.1	1.037	0.5	43.8
9:38	191.0	1.037	0.4	43.4
9:39	191.0	1.037	0.4	42.9
9:40	191.0	1.037	0.4	43.0
9:41	191.0	1.037	0.3	42.9
9:43	191.0	1.037	0.3	43.7
9:44	191.0	1.037	0.3	43.0
9:45	191.0	1.037	0.4	45.2
9:46	191.0	1.037	0.3	43.4
9:47	191.0	1.037	0.3	44.3
9:48	191.0	1.037	0.4	45.1
9:49	190.9	1.037	0.4	44.7
9:50	191.0	1.037	0.5	44.1
9:51	191.0	1.037	0.5	43.8
9:52	191.0	1.036	0.5	44.3
9:53	191.0	1.037	0.4	45.6
9:54	191.0	1.037	0.4	45.5
9:55	191.0	1.037	0.5	45.2
9:56	191.0	1.038	0.6	44.4
9:57	191.0	1.037	0.8	43.6
9:58	191.0	1.038	0.7	42.7
9:59	191.0	1.038	0.6	42.6
10:00	191.0	1.038	0.5	43.1
10:01	191.0	1.037	0.5	43.4
10:02	191.0	1.037	0.4	43.4
10:03	191.0	1.037	0.4	42.6
10:05	191.0	1.037	0.3	44.1
10:06	191.0	1.037	0.4	45.6
10:07	191.0	1.037	0.5	43.4
10:08	191.0	1.038	0.6	43.4
10:09	190.9	1.037	0.5	43.9

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.037	0.5	44.4

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
10:42	191.0	1.040	0.5	43.3
10:43	191.0	1.040	0.4	44.8
10:44	191.0	1.039	0.5	45.1
10:45	191.0	1.040	0.6	44.5
10:46	191.0	1.040	0.7	43.6
10:47	191.0	1.040	0.7	43.8
10:48	191.0	1.040	0.6	44.6
10:49	191.0	1.040	0.6	43.9
10:50	191.0	1.040	0.5	44.1
10:51	191.0	1.039	0.4	45.4
10:52	191.0	1.039	0.4	44.9
10:53	191.0	1.040	0.5	43.9
10:54	191.0	1.040	0.5	43.9
10:55	191.0	1.039	0.5	43.4
10:56	191.0	1.039	0.5	44.4
10:57	191.0	1.040	0.3	42.9
10:58	191.0	1.040	0.4	44.0
10:59	191.0	1.040	0.5	43.1
11:00	191.0	1.040	0.4	43.1
11:01	191.0	1.040	0.4	44.1
11:03	190.9	1.040	0.4	44.0
11:04	190.9	1.040	0.5	44.7
11:05	191.0	1.040	0.3	43.5
11:06	191.0	1.040	0.3	43.8
11:07	191.0	1.039	0.3	44.9
11:08	191.0	1.040	0.3	43.8
11:09	191.0	1.040	0.4	43.5
11:10	191.0	1.039	0.4	45.0
11:11	191.0	1.039	0.4	44.6
11:12	191.0	1.039	0.4	45.4
11:13	191.0	1.040	0.4	45.7
11:14	191.0	1.040	0.3	44.5
11:15	191.0	1.039	0.3	45.7
11:16	191.0	1.039	0.3	45.6
11:17	191.0	1.039	0.3	44.4
11:18	190.9	1.040	0.4	43.2
11:19	190.9	1.039	0.4	44.4
11:20	190.9	1.040	0.5	43.0
11:21	190.9	1.040	0.4	43.1
11:22	190.9	1.039	0.5	43.1
11:23	191.0	1.040	0.4	43.3
11:25	191.1	1.039	0.4	43.1
11:26	191.1	1.039	0.4	45.0
11:27	191.0	1.039	0.3	45.4
11:28	191.0	1.039	0.4	45.2
11:29	191.0	1.039	0.4	44.6
11:30	191.0	1.039	0.5	44.8
11:31	191.0	1.040	0.7	43.0
11:32	191.0	1.039	0.5	43.5
11:33	190.9	1.039	0.5	43.9
11:34	190.9	1.039	0.4	43.8
11:35	190.9	1.039	0.4	44.5
11:36	190.9	1.039	0.4	44.7
11:37	190.9	1.038	0.4	44.8
11:38	190.9	1.040	0.3	44.5
11:39	191.0	1.039	0.4	44.5
11:40	191.0	1.039	0.4	45.6
11:41	191.0	1.039	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
11:57	190.9	1.039	0.3	43.3
11:58	190.9	1.039	0.3	43.6
11:59	190.9	1.039	0.4	43.8
12:00	190.9	1.040	0.4	43.5
12:01	190.9	1.039	0.4	43.4
12:02	191.0	1.039	0.4	42.8
12:03	191.0	1.040	0.5	42.8
12:04	191.0	1.040	0.5	43.1
12:05	191.1	1.039	0.5	44.3
12:06	191.1	1.040	0.4	42.2
12:07	191.1	1.040	0.3	41.7
12:09	191.0	1.040	0.3	43.0
12:10	190.9	1.039	0.4	44.6
12:11	190.9	1.039	0.4	44.5
12:12	191.0	1.039	0.3	44.6
12:13	191.1	1.039	0.3	43.5
12:14	191.1	1.040	0.4	43.4
12:15	191.1	1.039	0.3	43.5
12:16	191.0	1.040	0.3	44.2
12:17	191.0	1.039	0.4	43.4
12:18	191.0	1.040	0.3	43.3
12:19	191.0	1.039	0.3	45.1
12:20	190.9	1.039	0.4	44.5
12:21	190.9	1.039	0.4	44.0
12:22	190.8	1.039	0.5	44.1
12:23	190.9	1.039	0.4	43.0
12:24	191.0	1.040	0.4	42.5
12:25	191.1	1.039	0.4	43.6
12:26	191.1	1.039	0.3	45.6
12:27	191.1	1.039	0.4	44.8
12:28	191.0	1.039	0.3	44.6
12:29	191.0	1.039	0.3	44.0
12:31	191.0	1.039	0.3	45.0
12:32	191.0	1.038	0.3	44.7
12:33	191.0	1.038	0.3	46.1
12:34	191.0	1.038	0.4	45.3
12:35	191.0	1.039	0.3	44.7
12:36	191.0	1.038	0.4	45.8
12:37	191.0	1.038	0.4	45.3
12:38	191.0	1.039	0.6	44.8
12:39	190.9	1.038	0.5	44.0
12:40	190.9	1.039	0.5	44.1
12:41	190.9	1.039	0.5	43.1
12:42	190.9	1.039	0.5	44.7
12:43	191.0	1.039	0.5	43.6
12:44	191.1	1.039	0.5	44.3
12:45	191.0	1.038	0.4	45.1
12:46	191.0	1.038	0.3	45.1
12:47	191.0	1.038	0.4	45.9
12:48	191.0	1.039	0.3	44.5
12:49	191.1	1.038	0.4	44.9
12:50	191.0	1.039	0.4	44.5
12:51	191.0	1.038	0.4	46.0
12:53	191.0	1.038	0.3	45.4
12:54	191.0	1.038	0.4	44.7
12:55	191.0	1.038	0.4	45.8
12:56	190.9	1.038	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Appendix C

Alliance Technical Group, LLC
Analytical Services
214 Central Circle
Decatur, AL 35603
(256) 274-4488
www.alliancetg.com

Analytical Laboratory Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, Texas 75572

Project No. AST-2024-4204LS

Version No. LT 2022-00_24.4

Certification Statement

Alliance Technical Group, LLC (ATG) has completed the analysis as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and ATG is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Any deviations or problems are detailed in the relevant sections on the test report.

This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Validation Signature

The analytical data and all QC contained within this report was reviewed and validated by the following individual.

Rebecca Pope

Digitally signed by Rebecca Pope
Reason: I have reviewed this document
Location:
Date: 2025.03.06 12:42:30-06'00'
Foxit PDF Editor Version: 12.1.4

Rebecca Pope
Laboratory Quality Analyst

Date

Project Narrative

Analytical Method(s):	*Method 5 - Determination of Particulate Matter Emissions From Stationary Sources* *Method 202 - Dry Impinger Method for Determining Condensable Particulate Matter Emissions From Stationary Sources*
Filterable	The filter(s) were oven dried and desiccated per the method until a final weight was obtained. The liquid fractions were extracted if required, evaporated and cooled until a final weight was obtained. These fractions were summed together to provide the total Filterable Particulate Matter collected.
Condensable	The filter(s) were cut up and extracted per the method. The organic extract was added to the organic rinse, and the inorganic extract was added to the inorganic rinse. The inorganic fraction was extracted with solvent per the method. Extracts were combined with the organic rinse. The organic and inorganic fractions were evaporated and desiccated until a final weight was obtained.
MDL	The Minimum Detection Level (MDL) is 0.5 mg per fraction. If the measured result for a fraction is less than the MDL, the MDL was used in ensuing calculations.
Blank Correction	If blank correction is performed, only blank values returned higher than the MDL are used. If a blank returns a value less than the MDL, no correction is included. Method 202 Recovery Blank corrections are applied by fraction (inorganic subtracted from inorganic; organic subtracted from organic).
Custody:	The samples were received by Madilyn Golembeck on 02/24/25 in Decatur, AL. The samples were received in good condition with proper Chain-of-Custody documentation. No apparent container problems were noted upon receipt. Prior to analysis, the samples were kept secure with access limited to authorized personnel of ATG.
Number of Samples:	129
Labeling:	Acceptable
Analyst:	Evan Marth-Laboratory Analyst
Equipment:	Ohaus Balance PX224, S/N B919636400. This scale was used for analytical determinations. A&D Weighing AND EJ-1500, S/N 5A2845843. This scale was only used to measure the total mass of rinse collected. Analysis was performed on the same balance as the associated tare. Quincy Lab Inc oven, 40CG, SN G4-007640. Desiccator Number: 2 contained M5 rinse petri dishes.. Desiccator Number: 3 contained M5 filters. Desiccator Number: 4 contained organic rinse tins & inorganic rinse petri dishes. Desiccator Number: 5 contained M5 rinse petri dishes & organic rinse tins.
Lab Reagents:	Acetone Lot Number: 240513 Hexane Lot Number: 240648
QC Notes:	The samples met the minimum criteria established by the relevant method.
Reporting Notes:	The M5 samples were collected in the field using DI water in place of acetone for the rinse. The M202 DI water, hexane, and acetone reagent blanks were HELD. No. 1 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 2 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-E M5 rinse run 3 contains visibly more and darker PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-W M5 rinse run 1 contains visibly more PM than runs 2 and 3. No. 2 Smelt Tank Scrubber M5 rinse run 1 contains visbly more PM than runs 2 and 3.
Certifications:	Primary Accreditation: Louisiana Environmental Laboratory Accreditation Program (LELAP) Agency Interest (AI) No. 194891 Certificate: 05054, Expiration Date: 6/30/25 Secondary Accreditation: Texas Commission on Environmental Quality Certificate: T104704540-TX-C25-00047, Expiration Date: 2/28/26 Virginia Environmental Laboratory Accreditation Program (VELAP) VA Laboratory ID: 460299, Certificate: 13081 Expiration Date: 9/14/2025
State Registrations:	PADEP # 68-04598 NYDOH # 12146

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2294		2295		2296	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Filter ID	26987-A		26988-A		26696-A	
Filter Tare Weight, g	0.4609		0.4591		0.4504	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:00		8:01		8:02	
Filter Weight, g	0.4817		0.4711		0.4723	
Filter PM Mass, mg*	**20.8**		**12.0**		**21.9**	
Front Half Rinse						
Lab ID	2318		2319		2320	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5853		G5854		G5855	
Beaker tare, g	44.4445		46.9315		47.1823	
Field Vessel with DI Water, g	197.0		233.2		170.1	
Empty Field Vessel,g	28.6		28.2		27.4	
DI Water Mass, g	168.4		205.0		142.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:01	8:00	15:02	8:01	15:03	8:02
Weight, g	44.4531	44.4526	46.9378	46.9374	47.1868	47.1864
Rinse PM Mass, mg*	**8.4**		**6.1**		**4.3**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**29.2**		**18.1**		**26.2**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2297		2298		2299	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Filter ID	26697-A		26698-A		26699-A	
Filter Tare Weight, g	0.4586		0.4665		0.4639	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:03		8:04		8:05	
Filter Weight, g	0.4596		0.4688		0.4647	
Filter PM Mass, mg*	**1.0**		**2.3**		**0.8**	
Front Half Rinse						
Lab ID	2321		2322		2323	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5856		G5857		G5858	
Beaker tare, g	40.4982		42.8656		46.6289	
Field Vessel with DI Water, g	192.0		211.2		204.2	
Empty Field Vessel,g	28.1		28.1		28.5	
DI Water Mass, g	163.9		183.1		175.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:04	8:03	15:05	8:04	15:06	8:05
Weight, g	40.5008	40.5003	42.8667	42.8663	46.6309	46.6307
Rinse PM Mass, mg*	**2.4**		**0.9**		**1.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**3.4**		**3.2**		**2.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2300		2301		2302	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Filter ID	26974-A		26989-A		26700-A	
Filter Tare Weight, g	0.4583		0.4533		0.4701	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:06		8:07		8:08	
Filter Weight, g	0.6305		0.5645		0.5783	
Filter PM Mass, mg*	**172.2**		**111.2**		**108.2**	
Front Half Rinse						
Lab ID	2324		2325		2326	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5859		G5860		G5861	
Beaker tare, g	42.6719		40.4452		41.3230	
Field Vessel with DI Water, g	158.0		204.4		141.5	
Empty Field Vessel,g	29.1		28.5		29.0	
DI Water Mass, g	128.9		175.9		112.5	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:07	8:06	15:08	8:07	15:09	8:08
Weight, g	42.7452	42.7450	40.4567	40.4563	41.3338	41.3337
Rinse PM Mass, mg*	**73.2**		**11.3**		**10.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**245.4**		**122.5**		**118.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2303		2304		2305	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Filter ID	26704-A		26707-A		26708-A	
Filter Tare Weight, g	0.4591		0.4513		0.4611	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:09		8:10		8:11	
Filter Weight, g	0.4943		0.4947		0.5073	
Filter PM Mass, mg*	**35.2**		**43.4**		**46.2**	
Front Half Rinse						
Lab ID	2327		2328		2329	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5862		G5863		G5864	
Beaker tare, g	46.6607		33.1419		43.5493	
Field Vessel with DI Water, g	152.5		109.7		148.9	
Empty Field Vessel,g	27.3		27.8		27.0	
DI Water Mass, g	125.2		81.9		121.9	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:10	8:09	15:11	8:10	15:12	8:11
Weight, g	46.6834	46.6832	33.1496	33.1493	43.6557	43.6553
Rinse PM Mass, mg*	**22.6**		**7.6**		**106.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**57.8**		**51.0**		**152.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2306		2307		2308	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Filter ID	26705-A		26706-A		26709-A	
Filter Tare Weight, g	0.4641		0.4546		0.4555	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:12		8:13		8:14	
Filter Weight, g	0.5186		0.4899		0.4912	
Filter PM Mass, mg*	**54.5**		**35.3**		**35.7**	
Front Half Rinse						
Lab ID	2330		2331		2332	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5865		G5866		G5867	
Beaker tare, g	41.4498		46.8473		41.7306	
Field Vessel with DI Water, g	161.9		174.0		175.3	
Empty Field Vessel,g	26.9		28.3		27.2	
DI Water Mass, g	135.0		145.7		148.1	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:13	8:12	15:14	8:13	15:15	8:14
Weight, g	41.5004	41.5005	46.8552	46.8551	41.7462	41.7463
Rinse PM Mass, mg*	**50.6**		**7.9**		**15.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**105.1**		**43.2**		**51.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2309		2310		2311	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Filter ID	26702-A		26703-A		26971-A	
Filter Tare Weight, g	0.4583		0.4611		0.4626	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:15		8:16		8:17	
Filter Weight, g	0.5226		0.5186		0.5168	
Filter PM Mass, mg*	**64.3**		**57.5**		**54.2**	
Front Half Rinse						
Lab ID	2333		2334		2335	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5868		G5869		G5870	
Beaker tare, g	46.0004		38.3894		47.8755	
Field Vessel with DI Water, g	122.8		104.6		118.2	
Empty Field Vessel,g	29.4		27.7		27.9	
DI Water Mass, g	93.4		76.9		90.3	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:16	8:15	15:17	8:16	15:18	8:17
Weight, g	46.0441	46.0444	38.4051	38.4055	47.8925	47.8923
Rinse PM Mass, mg*	**43.9**		**15.9**		**16.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**108.2**		**73.4**		**71.1**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2312		2313		2314	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Filter ID	26962-A		26961-A		26970-A	
Filter Tare Weight, g	0.4713		0.4648		0.4520	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:18		8:19		8:20	
Filter Weight, g	0.5219		0.5158		0.4907	
Filter PM Mass, mg*	**50.6**		**51.0**		**38.7**	
Front Half Rinse						
Lab ID	2336		2337		2338	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5871		G5872		G5873	
Beaker tare, g	43.1226		42.5851		44.9883	
Field Vessel with DI Water, g	108.9		92.3		98.7	
Empty Field Vessel,g	28.2		27.2		28.1	
DI Water Mass, g	80.7		65.1		70.6	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:19	8:18	15:20	8:19	15:21	8:20
Weight, g	43.1258	43.1255	42.5898	42.5894	44.9947	44.9943
Rinse PM Mass, mg*	**3.1**		**4.5**		**6.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**53.7**		**55.5**		**44.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2315		2316		2317	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Filter ID	26973-A		26960-A		26972-A	
Filter Tare Weight, g	0.4544		0.4476		0.4644	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:21		8:22		8:23	
Filter Weight, g	0.4880		0.4856		0.4698	
Filter PM Mass, mg*	**33.6**		**38.0**		**5.4**	
Front Half Rinse						
Lab ID	2339		2340		2341	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5874		G5875		G5876	
Beaker tare, g	45.9829		40.9130		47.1276	
Field Vessel with DI Water, g	123.5		102.2		179.3	
Empty Field Vessel,g	29.2		28.2		27.9	
DI Water Mass, g	94.3		74.0		151.4	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:22	8:21	15:23	8:22	15:24	8:23
Weight, g	46.0011	46.0008	40.9396	40.9391	47.1458	47.1453
Rinse PM Mass, mg*	**18.1**		**26.4**		**17.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**51.7**		**64.4**		**23.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Blank Rinse		
Lab ID	2342	
Field ID	DI Water Blank	
Beaker ID	G5877	
Beaker tare, g	45.4094	
Field Vessel with DI Water, g	386.7	
Empty Field Vessel, g	178.6	
DI Water Mass, g	208.1	
Date - Desiccator	2/25/25	
Time - Desiccator	15:00	
Date of Weighing	2/26/25	2/27/25
Time of Weighing	15:25	8:24
Weight, g	45.4097	45.4097
Measured Blank Mass, mg	**0.3**	
Blank Mass, mg*	**0.3**	
Blank Mass, mg/g	**0.0014**	

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2343		2344		2345	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Organic Fraction						
Lab ID	2367		2368		2369	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	2367		2368		2369	
Beaker tare, g	4.1481		4.1697		4.1752	
Field Vessel w/ Solvent, g	301.0		277.6		261.7	
Empty Field Vessel, g	176.9		176.8		176.8	
Solvent Mass, g	124.1		100.8		84.9	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	4.1533	4.1537	4.1728	4.1731	4.1780	4.1784
Organic Condensable Mass, mg*	**5.4**		**3.3**		**3.0**	
Inorganic Fraction						
Lab ID	2391		2392		2393	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5878		G5879		G5880	
Beaker tare, g	42.8783		39.7638		46.7558	
Field Vessel w/ Water, g	677.1		575.1		654.6	
Empty Field Vessel, g	286.2		286.6		285.8	
Water Mass, g	390.9		288.5		368.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	42.8857	42.8855	39.7660	39.7657	46.7596	46.7592
Inorganic Condensable Mass, mg*	**7.3**		**2.0**		**3.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.7**		**3.3**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2346		2347		2348	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Organic Fraction						
Lab ID	2370		2371		2372	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	2370		2371		2372	
Beaker tare, g	4.1708		4.1859		4.1780	
Field Vessel w/ Solvent, g	292.3		272.5		278.4	
Empty Field Vessel, g	177.5		176.3		176.9	
Solvent Mass, g	114.8		96.2		101.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	4.1753	4.1755	4.1892	4.1891	4.1811	4.1810
Organic Condensable Mass, mg*	**4.6**		**3.2**		**3.1**	
Inorganic Fraction						
Lab ID	2394		2395		2396	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5881		G5882		G5883	
Beaker tare, g	41.1547		42.8616		31.5071	
Field Vessel w/ Water, g	640.1		606.9		636.0	
Empty Field Vessel, g	286.2		286.4		286.1	
Water Mass, g	353.9		320.5		349.9	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	41.1568	41.1563	42.8653	42.8657	31.5107	31.5106
Inorganic Condensable Mass, mg*	**1.8**		**3.9**		**3.5**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.4**		**5.1**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2349		2350		2351	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Organic Fraction						
Lab ID	2373		2374		2375	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	2373		2374		2375	
Beaker tare, g	4.2438		4.2125		4.2150	
Field Vessel w/ Solvent, g	298.4		291.4		220.1	
Empty Field Vessel, g	176.7		176.5		177.7	
Solvent Mass, g	121.7		114.9		42.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	4.2482	4.2485	4.2162	4.2165	4.2184	4.2187
Organic Condensable Mass, mg*	**4.6**		**3.8**		**3.6**	
Inorganic Fraction						
Lab ID	2397		2398		2399	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5884		G5885		G5886	
Beaker tare, g	50.4549		33.9860		42.7755	
Field Vessel w/ Water, g	1135.0		994.8		957.7	
Empty Field Vessel, g	441.2		441.6		439.7	
Water Mass, g	693.8		553.2		518.0	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	50.4661	50.4662	33.9919	33.9922	42.7833	42.7833
Inorganic Condensable Mass, mg*	**11.2**		**6.1**		**7.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**13.8**		**7.9**		**9.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2352		2353		2354	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Organic Fraction						
Lab ID	2376		2377		2378	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	2376		2377		2378	
Beaker tare, g	4.2256		4.2210		4.2251	
Field Vessel w/ Solvent, g	268.5		269.3		261.8	
Empty Field Vessel, g	178.0		178.3		177.5	
Solvent Mass, g	90.5		91.0		84.3	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	4.2289	4.2289	4.2243	4.2245	4.2278	4.2281
Organic Condensable Mass, mg*	**3.3**		**3.4**		**2.8**	
Inorganic Fraction						
Lab ID	2400		2401		2402	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5887		G5888		G5889	
Beaker tare, g	39.6069		45.8132		42.3755	
Field Vessel w/ Water, g	555.9		607.3		602.0	
Empty Field Vessel, g	286.0		286.2		286.3	
Water Mass, g	269.9		321.1		315.7	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	39.6085	39.6086	45.8175	45.8179	42.3783	42.3785
Inorganic Condensable Mass, mg*	**1.6**		**4.5**		**2.9**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**2.9**		**5.9**		**3.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2355		2356		2357	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Organic Fraction						
Lab ID	2379		2380		2381	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	2379		2380		2381	
Beaker tare, g	4.2316		4.2100		4.2438	
Field Vessel w/ Solvent, g	257.7		272.3		295.6	
Empty Field Vessel, g	177.0		177.7		177.2	
Solvent Mass, g	80.7		94.6		118.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	4.2352	4.2352	4.2142	4.2140	4.2464	4.2465
Organic Condensable Mass, mg*	**3.6**		**4.1**		**2.7**	
Inorganic Fraction						
Lab ID	2403		2404		2405	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5890		G5891		G5892	
Beaker tare, g	46.8411		33.4643		41.8922	
Field Vessel w/ Water, g	582.1		593.0		634.4	
Empty Field Vessel, g	286.0		285.9		285.9	
Water Mass, g	296.1		307.1		348.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	46.8433	46.8437	33.4670	33.4670	41.8960	41.8961
Inorganic Condensable Mass, mg*	**2.4**		**2.7**		**3.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.0**		**4.8**		**4.5**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2358		2359		2360	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Organic Fraction						
Lab ID	2382		2383		2384	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	2382		2383		2384	
Beaker tare, g	4.2097		4.2193		4.2603	
Field Vessel w/ Solvent, g	256.4		268.9		265.7	
Empty Field Vessel, g	178.7		177.1		177.3	
Solvent Mass, g	77.7		91.8		88.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	4.2135	4.2132	4.2261	4.2260	4.2634	4.2634
Organic Condensable Mass, mg*	**3.7**		**6.8**		**3.1**	
Inorganic Fraction						
Lab ID	2406		2407		2408	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5893		G5894		G5895	
Beaker tare, g	38.9202		45.5879		41.7805	
Field Vessel w/ Water, g	945.0		956.2		863.2	
Empty Field Vessel, g	440.0		441.8		441.4	
Water Mass, g	505.0		514.4		421.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	38.9267	38.9264	45.5993	45.5994	41.7863	41.7861
Inorganic Condensable Mass, mg*	**6.3**		**11.5**		**5.7**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**8.0**		**16.2**		**6.8**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2361		2362		2363	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Organic Fraction						
Lab ID	2385		2386		2387	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	2385		2386		2387	
Beaker tare, g	4.1945		4.2061		4.2093	
Field Vessel w/ Solvent, g	433.2		399.7		423.8	
Empty Field Vessel, g	285.6		285.0		285.6	
Solvent Mass, g	147.6		114.7		138.2	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	4.1982	4.1982	4.2092	4.2092	4.2125	4.2127
Organic Condensable Mass, mg*	**3.7**		**3.1**		**3.3**	
Inorganic Fraction						
Lab ID	2409		2410		2411	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5896		G5897		G5898	
Beaker tare, g	39.9904		38.9263		47.8517	
Field Vessel w/ Water, g	569.3		575.6		607.9	
Empty Field Vessel, g	285.7		286.1		285.3	
Water Mass, g	283.6		289.5		322.6	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	39.9933	39.9933	38.9268	38.9272	47.8564	47.8563
Inorganic Condensable Mass, mg*	**2.9**		**0.7**		**4.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.6**		**1.8**		**5.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2364		2365		2366	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Organic Fraction						
Lab ID	2388		2389		2390	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	2388		2389		2390	
Beaker tare, g	4.2001		4.2214		4.1849	
Field Vessel w/ Solvent, g	434.2		412.2		432.4	
Empty Field Vessel, g	285.1		284.9		284.9	
Solvent Mass, g	149.1		127.3		147.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	4.2073	4.2077	4.2241	4.2241	4.1891	4.1891
Organic Condensable Mass, mg*	**7.4**		**2.7**		**4.2**	
Inorganic Fraction						
Lab ID	2412		2413		2414	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5899		G5900		G5901	
Beaker tare, g	37.9457		41.3364		44.6145	
Field Vessel w/ Water, g	678.5		673.6		638.3	
Empty Field Vessel, g	285.8		285.7		285.8	
Water Mass, g	392.7		387.9		352.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	37.9508	37.9505	41.3381	41.3380	44.6181	44.6177
Inorganic Condensable Mass, mg*	**4.9**		**1.6**		**3.4**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.4**		**2.3**		**5.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2415		N/A	
Field ID	Field Train Blank		N/A	
Organic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2416		2418	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	2416		2418	
Beaker tare, g	4.2179		4.2326	
Field Vessel w/ Solvent, g	351.6		350.2	
Empty Field Vessel, g	177.2		176.5	
Solvent Mass, g	174.4		173.7	
Date - Desiccator	2/26/25		2/26/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	4.2204	4.2207	4.2328	4.2331
Measured Organic Mass, mg	**2.6**		**0.4**	
Organic Mass, mg*	**2.0**		**0.5**	
Inorganic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2417		2419	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	G5902		G5903	
Beaker tare, g	48.0627		39.1195	
Field Vessel w/ Water, g	321.9		329.5	
Empty Field Vessel, g	177.1		177.2	
Water Mass, g	144.8		152.3	
Date - Desiccator	3/3/25		3/3/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	48.0640	48.0641	39.1200	39.1195
Measured Inorganic Mass, mg	**1.4**		**0.2**	
Inorganic Mass, mg*	**1.4**		**0.5**	

The total results have been calculated based on MDL values for any sample fractions which were below the MDL.

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL
City, State: QUEEN CITY, TX
Source: RB01A-N, RB01B-S, SM01
Project No: AST-2024-4204

Turn Around Time: [✓] Standard [ ] Expedited ____ days
Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079
Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5 — Filter Number - 83mm Quartz	Method 5 — Filter Number - 83mm Teflon	Method 5 — Probe Nozzle Rinse - DIUF	Method 5 — Probe Nozzle Rinse - 1-bromopropane	Method 17 — Filter Number - 47mm Quartz	Method 17 — Nozzle Rinse - Acetone	Method 201A — PM 2.5 Filter Number- 47mm Quartz	Method 201A — PM 2.5 Rinse - Acetone	Method 201A — PM 10 Filter Number- 47mm Quartz	Method 201A — PM 10 Rinse - Acetone	Method 202 — CPM Filter - 83mm Tefon	Method 202 — Condensate Catch - DIUF	Method 202 — Solvent Rinse - DIUF/Hexane
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 1	5	2/11/25	11:30	RW		26987-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 2	5	2/11/25	13:55	RW		26988-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 3	5	2/11/25	17:30	RW		26696-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 1	5	2/11/25	11:40	RW		26697-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 2	5	2/11/25	13:40	RW		26698-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 3	5	2/11/25	17:10	RW		26699-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 1	5	2/11/25	11:20	RW		26974-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 2	5	2/11/25	13:45	RW		26989-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 3	5	2/11/25	17:00	RW		26700-A		✓								✓	✓	✓
M5 ~~ACETONE~~ BLANK DIUF	1	2/11/25	11:00	RW				✓										
M202 FT PROOF BLANK	2	2/11/25	11:15	RW													✓	✓
M202 FT RECOVERY BLANK	3	2/11/25	14:30	RW												✓	✓	✓
M202 ACETONE BLANK	1	2/11/25	11:00	RW														
M202 WATER BLANK	1	2/11/25	11:00	RW														
M202 HEXANE BLANK	1	2/11/25	11:00	RW														

Relinquished By _____ Date 2-14-25 Received By Madilyn Galenbeck Date 2/28/25

Relinquished By _____ Date _____ Received By _____ Date _____

Relinquished By _____ Date _____ Received By _____ Date _____

Sample Container Recieved Temperature (°F) 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL

City, State: QUEEN CITY, TX

Source: RB02A-E, RB02B-W, SM02), LK01, LK02

Project No.: AST-2024-4204

Turn Around Time: [✔] Standard [ ] Expedited ____ days

Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079

Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5: Filter Number - 83mm Quartz	Method 5: Filter Number - 83mm Teflon	Method 5: Probe Nozzle Rinse - DIUF	Method 5: Probe Nozzle Rinse - 1-bromopropane	Method 17: Filter Number - 47mm Quartz	Method 17: Nozzle Rinse - Acetone	Method 201A: PM 2.5 Filter Number - 47mm Quartz	Method 201A: PM 2.5 Rinse - Acetone	Method 201A: PM 10 Filter Number - 47mm Quartz	Method 201A: PM 10 Rinse - Acetone	Method 202: CPM Filter - 83mm Teflon	Method 202: Condensate Catch - DIUF	Method 202: Solvent Rinse - DIUF/Hexane
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 1	5	2/12/25	12:45	RW		26704-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 2	5	2/12/25	15:00	RW		26707-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 3	5	2/12/25	17:00	RW		26708-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 1	5	2/12/25	12:45	RW		26705-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 2	5	2/12/25	15:00	RW		26706-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 3	5	2/12/25	17:00	RW		26709-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 1	5	2/12/25	12:45	RW		26702-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 2	5	2/12/25	15:00	RW		26703-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 3	5	2/12/25	17:00	RW		26971-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 1	5	2/13/25	15:50	RW		26962-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 2	5	2/13/25	17:30	RW		26961-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 3	5	2/13/25	19:00	RW		26970-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 1	5	2/13/25	10:35	RW		26973-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 2	5	2/13/25	12:15	RW		26960-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 3	5	2/13/25	13:45	RW		26972-A		✔								✔	✔	✔

Relinquished By: [signature] Date: 2-14-25 Received By: madelyn Galenkeed Date: 2/24/25

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Sample Container Recieved Temperature (°F): 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-001

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	Ohaus	PA214	B919636400	Balance Room	210 g	0.0001g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000
5	0.0001	5.0000	0.0000	5	0.0001	5.0000	0.0000
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0.2	0.0001	0.2000	0.0000	0.2	0.0001	0.2000	0.0000
1	0.0001	1.0000	0.0000	1	0.0001	1.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
50	0.0003	49.9998	-0.0002	50	0.0003	49.9998	-0.0002
150	0.0003	149.9998	-0.0002	150	0.0003	149.9998	-0.0002

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	YES	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED		*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.00011g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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P.O. Box 266 Decatur, Al. Phone 1-800-461-4153

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-003

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	A&D	EJ-1500	5A2845843	LAB	1500 g	0.1g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0	0.0	0.0	0	0.0	0.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
0	0.0	0.0	0.0	0	0.0	0.0	0.0

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
100	0.1	100.0	0.0	100	0.1	100.0	0.0
200	0.1	200.0	0.0	200	0.1	200.0	0.0
500	0.1	500.0	0.0	500	0.1	500.0	0.0
1000	0.1	1000.0	0.0	1000	0.1	1000.0	0.0

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB-44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	**YES**	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED			*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.11g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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P.O. Box 266 Decatur, Al. Phone 1-800-461-4153

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26680-A	0.4978	11/14/24	MEG	S/N G4-007640	105° C	379990
26681-A	0.4918	11/14/24	MEG	S/N G4-007640	105° C	379990
26682-A	0.4955	11/14/24	MEG	S/N G4-007640	105° C	379990
26683-A	0.4954	11/14/24	MEG	S/N G4-007640	105° C	379990
26684-A	0.4894	11/14/24	MEG	S/N G4-007640	105° C	379990
26685-A	0.4901	11/14/24	MEG	S/N G4-007640	105° C	379990
26686-A	0.4930	11/14/24	MEG	S/N G4-007640	105° C	379990
26687-A	0.4940	11/14/24	MEG	S/N G4-007640	105° C	379990
26688-A	0.4948	11/14/24	MEG	S/N G4-007640	105° C	379990
26689-A	0.4879	11/14/24	MEG	S/N G4-007640	105° C	379990
26690-A	0.4676	11/27/24	MEG	S/N G4-007640	105° C	379990
26691-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26692-A	0.4628	11/27/24	MEG	S/N G4-007640	105° C	379990
26693-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26694-A	0.4669	11/27/24	MEG	S/N G4-007640	105° C	379990
26695-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26696-A	0.4504	11/27/24	MEG	S/N G4-007640	105° C	379990
26697-A	0.4586	11/27/24	MEG	S/N G4-007640	105° C	379990
26698-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26699-A	0.4639	11/27/24	MEG	S/N G4-007640	105° C	379990
26700-A	0.4701	11/27/24	MEG	S/N G4-007640	105° C	379990
26701-A	0.4645	11/27/24	MEG	S/N G4-007640	105° C	379990
26702-A	0.4583	11/27/24	MEG	S/N G4-007640	105° C	379990
26703-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26704-A	0.4591	11/27/24	MEG	S/N G4-007640	105° C	379990
26705-A	0.4641	11/27/24	MEG	S/N G4-007640	105° C	379990
26706-A	0.4546	11/27/24	MEG	S/N G4-007640	105° C	379990
26707-A	0.4513	11/27/24	MEG	S/N G4-007640	105° C	379990
26708-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26709-A	0.4555	11/27/24	MEG	S/N G4-007640	105° C	379990
26710-A	0.4571	11/27/24	MEG	S/N G4-007640	105° C	379990
26711-A	0.4452	11/27/24	MEG	S/N G4-007640	105° C	379990
26712-A	0.4487	11/27/24	MEG	S/N G4-007640	105° C	379990
26713-A	0.4460	11/27/24	MEG	S/N G4-007640	105° C	379990
26714-A	0.4481	11/27/24	MEG	S/N G4-007640	105° C	379990
26715-A	0.4502	11/27/24	MEG	S/N G4-007640	105° C	379990
26716-A	0.4512	11/27/24	MEG	S/N G4-007640	105° C	379990
26717-A	0.4510	11/27/24	MEG	S/N G4-007640	105° C	379990
26718-A	0.4406	11/27/24	MEG	S/N G4-007640	105° C	379990
26719-A	0.4459	11/27/24	MEG	S/N G4-007640	105° C	379990

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26960-A	0.4476	12/09/24	MEG	S/N G4-007640	105° C	379990
26961-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26962-A	0.4713	12/09/24	MEG	S/N G4-007640	105° C	379990
26963-A	0.4658	12/09/24	MEG	S/N G4-007640	105° C	379990
26964-A	0.4577	12/09/24	MEG	S/N G4-007640	105° C	379990
26965-A	0.4503	12/09/24	MEG	S/N G4-007640	105° C	379990
26966-A	0.4683	12/09/24	MEG	S/N G4-007640	105° C	379990
26967-A	0.4473	12/09/24	MEG	S/N G4-007640	105° C	379990
26968-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26969-A	0.4585	12/09/24	MEG	S/N G4-007640	105° C	379990
26970-A	0.4520	12/10/24	MEG	S/N G4-007640	105° C	379990
26971-A	0.4626	12/10/24	MEG	S/N G4-007640	105° C	379990
26972-A	0.4644	12/10/24	MEG	S/N G4-007640	105° C	379990
26973-A	0.4544	12/10/24	MEG	S/N G4-007640	105° C	379990
26974-A	0.4583	12/10/24	MEG	S/N G4-007640	105° C	379990
26975-A	0.4575	12/10/24	MEG	S/N G4-007640	105° C	379990
26976-A	0.4632	12/10/24	MEG	S/N G4-007640	105° C	379990
26977-A	0.4587	12/10/24	MEG	S/N G4-007640	105° C	379990
26978-A	0.4639	12/10/24	MEG	S/N G4-007640	105° C	379990
26979-A	0.4622	12/10/24	MEG	S/N G4-007640	105° C	379990
26980-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26981-A	0.4647	12/10/24	MEG	S/N G4-007640	105° C	379990
26982-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26983-A	0.4535	12/10/24	MEG	S/N G4-007640	105° C	379990
26984-A	0.4513	12/10/24	MEG	S/N G4-007640	105° C	379990
26985-A	0.4568	12/10/24	MEG	S/N G4-007640	105° C	379990
26986-A	0.4582	12/10/24	MEG	S/N G4-007640	105° C	379990
26987-A	0.4609	12/10/24	MEG	S/N G4-007640	105° C	379990
26988-A	0.4591	12/10/24	MEG	S/N G4-007640	105° C	379990
26989-A	0.4533	12/10/24	MEG	S/N G4-007640	105° C	379990
26990-A	0.4506	12/10/24	MEG	S/N G4-007640	105° C	379990
26991-A	0.4612	12/10/24	MEG	S/N G4-007640	105° C	379990
26992-A	0.4482	12/10/24	MEG	S/N G4-007640	105° C	379990
26993-A	0.4480	12/10/24	MEG	S/N G4-007640	105° C	379990
26994-A	0.4560	12/10/24	MEG	S/N G4-007640	105° C	379990
26995-A	0.4564	12/10/24	MEG	S/N G4-007640	105° C	379990
26996-A	0.4534	12/10/24	MEG	S/N G4-007640	105° C	379990
26997-A	0.4525	12/10/24	MEG	S/N G4-007640	105° C	379990
26998-A	0.4501	12/10/24	MEG	S/N G4-007640	105° C	379990
26999-A	0.4491	12/10/24	MEG	S/N G4-007640	105° C	379990

This is the last page of the report.

Appendix D

LK01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-247-1	0.247	0.248	0.247	0.247	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-203-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	P-205-3	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
14:45	70.0	16:30	68.0	18:00	73.0
15:00	70.0	16:45	68.0	18:15	73.0
15:15	70.0	17:00	69.0	18:30	74.0
15:30	70.0	17:15	69.0	18:45	74.0
15:45	71.0	17:30	69.0	19:00	75.0

LK02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-7	0.416	0.416	0.416	0.416	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-206-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	PR-208-3	150.0	150.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
9:40	70.0	11:20	73.0	12:40	73.0
9:55	70.0	11:35	73.0	12:55	73.0
10:10	70.0	11:50	73.0	13:10	74.0
10:25	70.0	12:05	74.0	13:25	74.0
10:40	70.0	12:20	73.0	13:40	74.0

RB01A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS07	0.330	0.330	0.330	0.330	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-2	365.0	365.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	68.0
10:30	73.0	12:55	70.0	16:00	68.0
10:45	73.0	13:10	70.0	16:15	67.0
11:00	74.0	13:25	69.0	16:30	67.0
11:15	74.0	13:40	69.0	16:45	66.0

RB01B

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-36	0.362	0.362	0.362	0.362	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-309-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-0	355.0	355.0	0.0%	± 1.5 % (absolute)	10'

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	66.0	12:40	72.0	15:45	75.0
10:30	66.0	12:55	72.0	16:00	74.0
10:45	67.0	13:10	72.0	16:15	74.0
11:00	67.0	13:25	72.0	16:30	75.0
11:15	68.0	13:40	71.0	16:45	75.0

RB02A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-07	0.292	0.292	0.292	0.292	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-209-2	385.0	384.0	0.1%	± 1.5 % (absolute)	9'

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

RB02B

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-7	0.295	0.295	0.295	0.295	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-202-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-210-2	395.0	395.0	0.0%	± 1.5 % (absolute)	10 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

SM01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-382-2	0.382	0.381	0.382	0.382	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-205-2	160.0	161.0	0.2%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	71.0
10:30	73.0	12:55	69.0	16:00	72.0
10:45	73.0	13:10	68.0	16:15	72.0
11:00	74.0	13:25	68.0	16:30	72.0
11:15	74.0	13:40	69.0	16:45	73.0

SM02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-344-3	0.344	0.344	0.345	0.344	0.001	≤ 0.004 in.	SS
2/12/25	SS-305-2	0.305	0.306	0.305	0.305	0.001		SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-205-2	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
2/13/25	P-203-1	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
2/13/25	P-203-1	176.0	178.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
2/13/25	Weather Station	NA	NA	NA	

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Make	Servomex	Servomex
Model	4900	4900
S/N	653218	653218
Operating Range	25	25
Cylinder ID		
Zero	NA	NA
Low	NA	NA
Mid	EB0096121	EB0096121
High	CC737073	CC737073
Cylinder Certified Values		
Zero	NA	NA
Mid	10	10
High	19.93	19.8
Cylinder Expiration Date		
Zero	NA	NA
Mid	8/18/32	8/18/32
High	9/15/32	9/15/32
Type of Sample Line	Heated Sample Line	

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	9:05	12.85	3.41
2	9:07	13.33	3.29
3	9:09	13.22	3.16
Average		13.1	3.3
Criteria Met		Single Point	Single Point

Alliance TECHNICAL GROUP

Calibration Data

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Parameter	O_2 - Outlet	CO_2 - Outlet
Expected Average Concentration	10.00	10.00
Span Between		
Low	10.00	10.00
High	50.00	50.00
Desired Span	19.93	19.80
Low Range Gas		
Low	NA	NA
High	NA	NA
Mid Range Gas		
Low	7.97	7.92
High	11.96	11.88
High Range Gas		
Low	NA	NA
High	NA	NA
Actual Concentration (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.00	10.00
High	19.93	19.80
Response Time (seconds)	35.00	35.00
Upscale Calibration Gas (C_{MA})	Mid	Mid
Instrument Response (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.10	10.04
High	19.92	19.84
Performance (% of Span or Cal. Gas Conc.)		
Zero	0.00	0.00
Low	NA	NA
Mid	0.50	0.20
High	0.05	0.20
Status		
Zero	PASS	PASS
Low	NA	NA
Mid	PASS	PASS
High	PASS	PASS

Bias/Drift Determinations

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1		
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Run 2		
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Run 3		
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 2/13/25		
Span Value	19.93	19.80
Initial Instrument Zero Cal Response	0.00	0.00
Initial Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Bias (%)		
Pretest Zero	1.30	0.00
Posttest Zero	1.05	0.20
Pretest Span	0.00	-1.16
Posttest Span	0.00	-1.01
Drift (%)		
Zero	-0.25	0.20
Mid	0.00	0.15
Run 2 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Bias (%)		
Pretest Zero	1.05	0.20
Posttest Zero	1.05	0.10
Pretest Span	0.00	-1.01
Posttest Span	0.15	-1.01
Drift (%)		
Zero	0.00	-0.10
Mid	0.15	0.00
Run 3 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81
Bias (%)		
Pretest Zero	1.05	0.10
Posttest Zero	1.15	0.15
Pretest Span	0.15	-1.01
Posttest Span	0.10	-1.16
Drift (%)		
Zero	0.10	0.05
Mid	-0.05	-0.15

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Response Times, seconds		
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**
Zero	35	35
Low	NA	NA
Mid	35	35

Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Date(s)	2/5/2025
Ethylene Cylinder ID	CC768666
Concentration (ppmv)	103.0
Instrument Outlet	MKS 20 (Serial #111455302)

CTS 1	98.03
CTS 2	98.31
CTS 3	98.14
CTS 4	98.19
CTS 5	--
CTS 6	--

CTS 7	--
CTS 8	--
CTS 9	--
CTS 10	--
CTS 11	--
CTS 12	--

AVERAGE	98.17
MAX	98.31
deviation	0.14
MIN	98.03
deviation	0.14

Greatest Deviation from average
0.14%

Agreement with Assumed Pathlength
95.31%
within 5% no correction required

CTS 1

Date	Time	File	Temperature (C	Pressure	Ethylene
2/12/25	17:51:48	24-4204_000007.LAB	191.0	1.002	98.15
2/12/25	17:52:51	24-4204_000008.LAB	191.0	1.002	97.88
2/12/25	17:53:54	24-4204_000009.LAB	191.0	1.002	98.07

CTS 2

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	7:41:32	24-4204_000785.LAB	190.9	1.020	98.26
2/13/25	7:42:35	24-4204_000786.LAB	191.0	1.020	98.36
2/13/25	7:43:38	24-4204_000787.LAB	191.0	1.020	98.31

CTS 3

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	10:32:36	24-4204_000947.LAB	191.0	1.025	97.92
2/13/25	10:33:38	24-4204_000948.LAB	191.0	1.025	98.10
2/13/25	10:34:41	24-4204_000949.LAB	191.0	1.025	98.40

CTS 4

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	13:25:54	24-4204_001111.LAB	191.0	1.026	98.21
2/13/25	13:26:57	24-4204_001112.LAB	191.0	1.026	98.22
2/13/25	13:28:00	24-4204_001113.LAB	191.1	1.025	98.14

CTS 5

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 6

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 7

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 8

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 9

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 10

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 11

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 12

Date	Time	File	Temperature (C	Pressure	Ethylene

Location	Graphic Packaging
Source	NCG Incinerator
Project No.	AST-2024-4204
Date	2/5/2025

Spike Cylinder ID	CC774584	Component
Spike Gas concentration	96.8	Methanol
Tracer Cylinder ID	CC774584	Component
Tracer Gas concentration	10.1	SF6
Instrument ID Outlet	MKS 20 (Serial #111455302)	

Direct Spike Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/12/25	18:06:28	24-4204_000021.LAB	191.0	1.030	98.62	12.006
02/12/25	18:07:30	24-4204_000022.LAB	190.9	1.030	99.29	12.015
02/12/25	18:08:33	24-4204_000023.LAB	190.9	1.030	99.83	12.021
02/12/25	18:09:36	24-4204_000024.LAB	190.9	1.030	100.33	12.027
02/12/25	18:10:39	24-4204_000025.LAB	191.0	1.031	100.46	12.029
02/12/25	18:11:42	24-4204_000026.LAB	190.9	1.031	100.82	12.037
02/12/25	18:12:45	24-4204_000027.LAB	191.0	1.031	101.13	12.049
				Average	**100.07**	**12.026**

Native Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	9:10:34	24-4204_000870.LAB	191.0	1.037	0.44	0.010
02/13/25	9:11:37	24-4204_000871.LAB	191.0	1.036	0.48	0.010
02/13/25	9:12:40	24-4204_000872.LAB	191.0	1.036	0.46	0.010
02/13/25	9:13:42	24-4204_000873.LAB	191.0	1.036	0.56	0.010
02/13/25	9:14:45	24-4204_000874.LAB	191.0	1.035	0.53	0.010
02/13/25	9:15:48	24-4204_000875.LAB	191.0	1.036	0.52	0.010
02/13/25	9:16:51	24-4204_000876.LAB	191.0	1.036	0.43	0.010
				Average	**0.49**	**0.010**

Spiked values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	8:42:17	24-4204_000843.LAB	191.0	1.036	5.14	0.757
02/13/25	8:43:20	24-4204_000844.LAB	191.1	1.035	5.25	0.766
02/13/25	8:44:23	24-4204_000845.LAB	191.1	1.036	5.17	0.757
02/13/25	8:45:26	24-4204_000846.LAB	191.0	1.035	5.38	0.764
02/13/25	8:46:28	24-4204_000847.LAB	191.0	1.034	5.72	0.758
02/13/25	8:47:31	24-4204_000848.LAB	191.0	1.036	5.58	0.763
02/13/25	8:48:34	24-4204_000849.LAB	191.0	1.035	5.50	0.751
				Average	**5.39**	**0.759**

Dilution Factor

6.2%

Calculated Spike

6.69

Spike Recovery

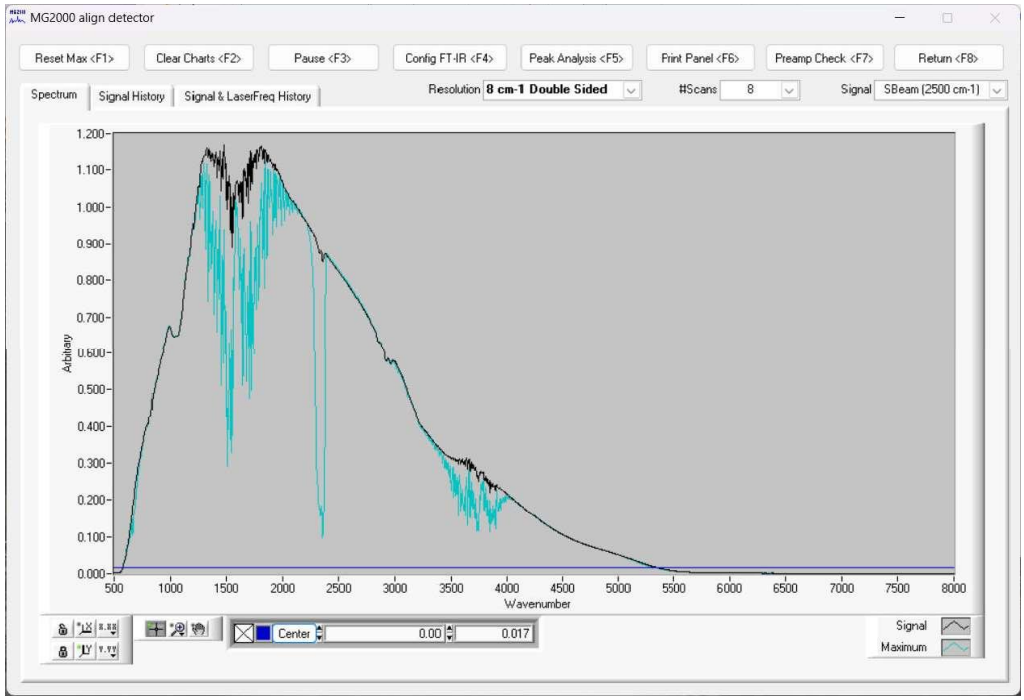
80.55%

Location	Graphic Packaging
Project No.	AST-2024-4204
Instrument	MKS 20 (Serial #111455302)

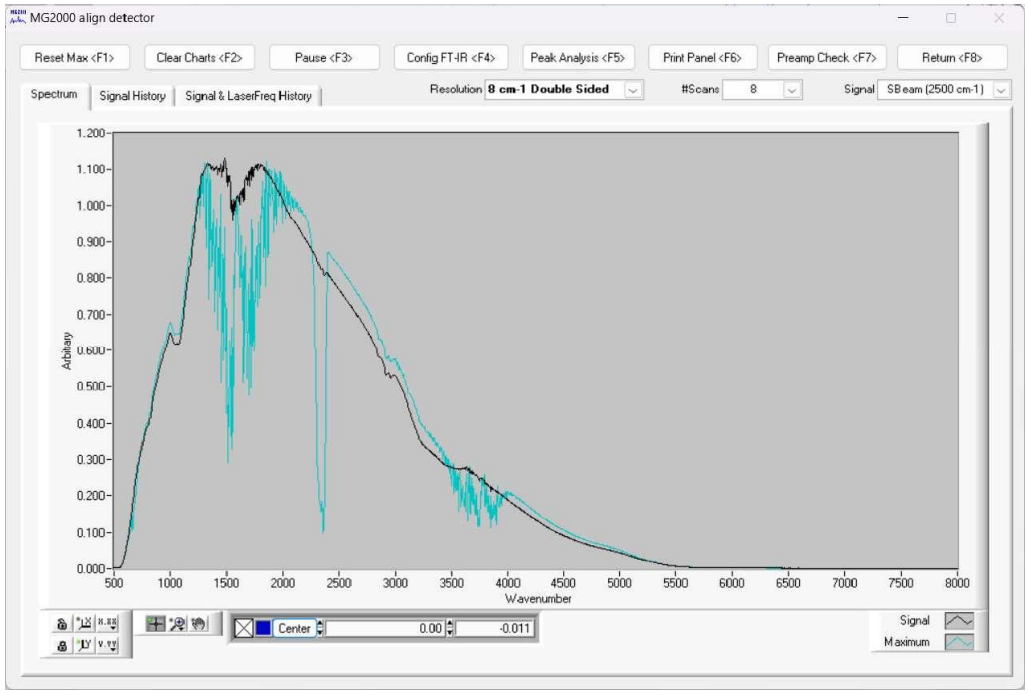
Summary of Spikes

Source	NCG Incinerator
Date	2/5/25
Time	8:42
Analyte	Methanol
Direct	100.07
Native	0.49
Spiked	5.39
Dilution	6.2%
Recovery	81%
Result	PASS

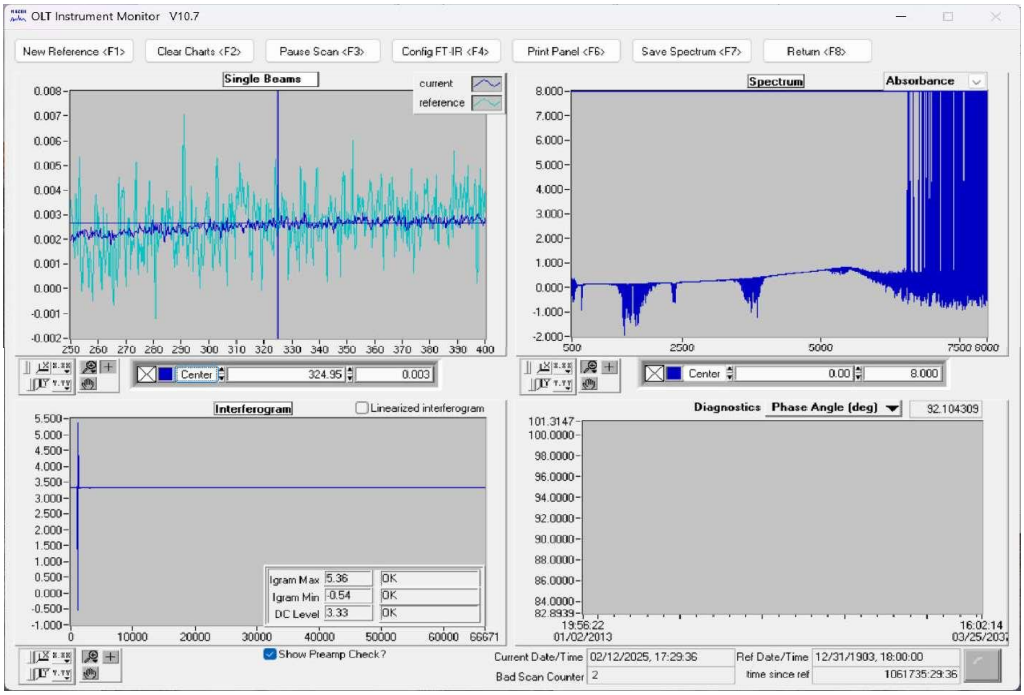
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Pre-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



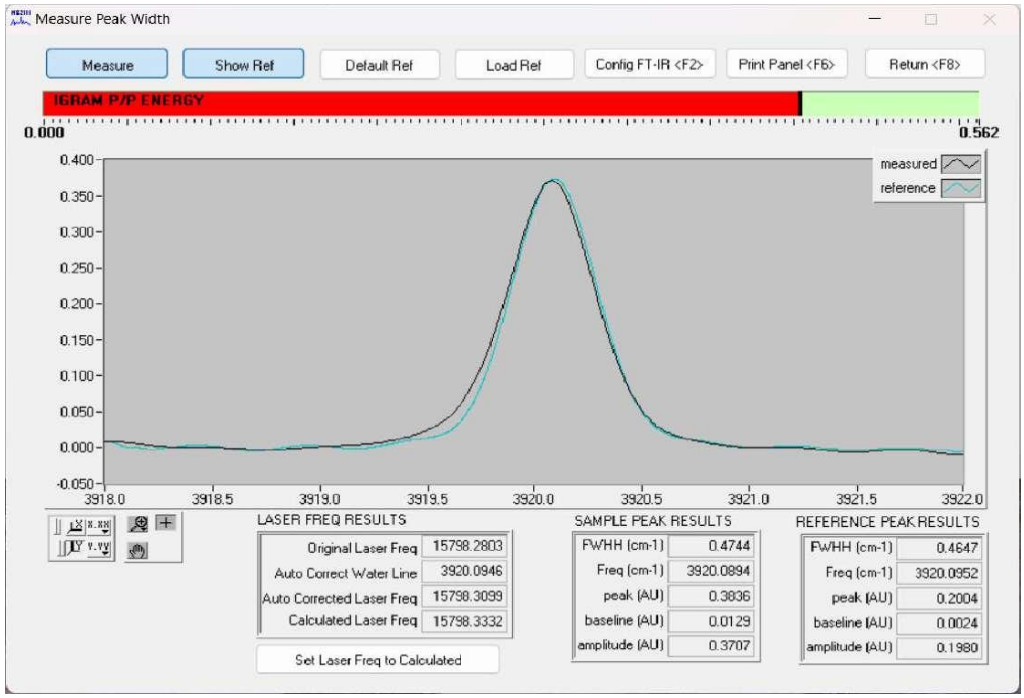
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Post-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/13/2025



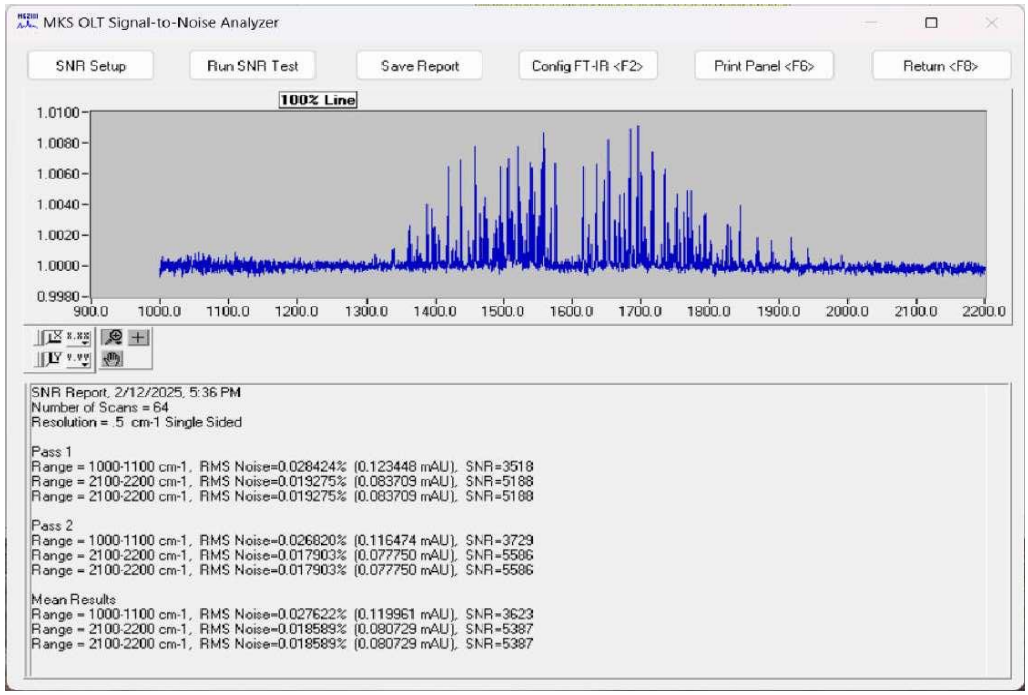
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Detector Linearity
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Peak Analysis
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Signal to Noise Ratio
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Analysis Validation Utility
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025

Analysis Validation Report

Sample Filename: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_001011.LAB

Filename for noise: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_000945.LAB
Interferences Filenames: C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2C
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
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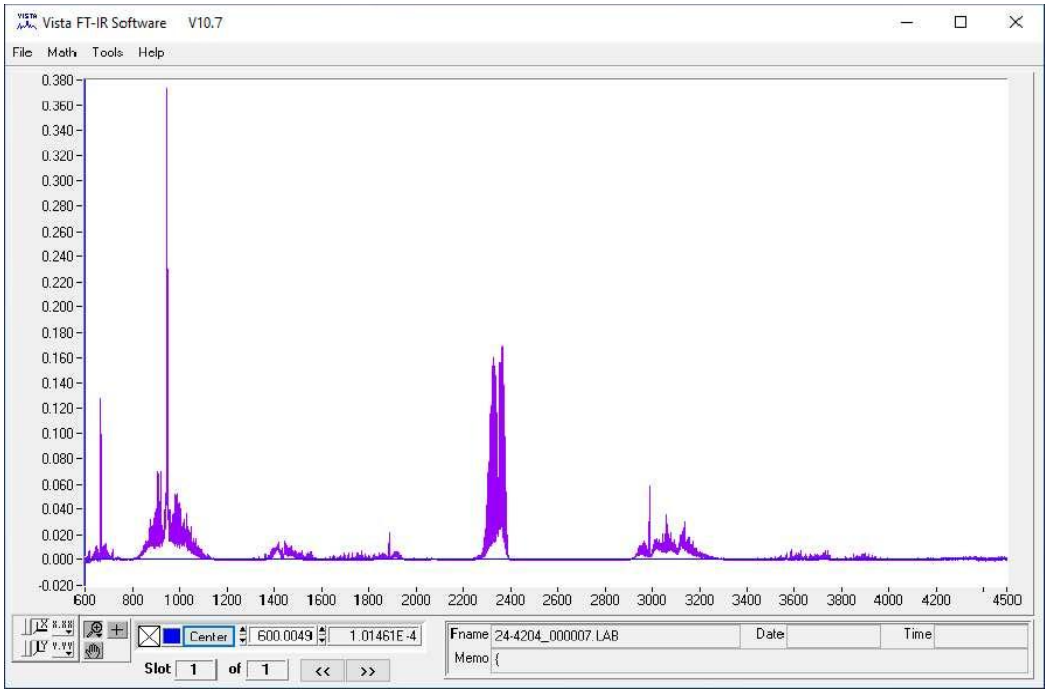
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #

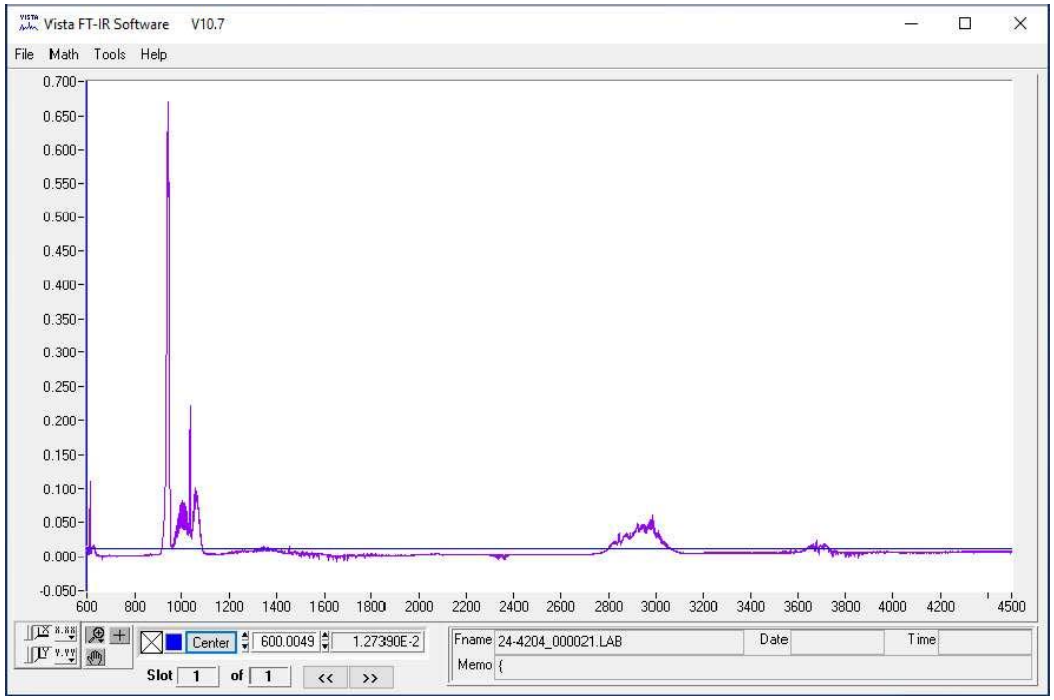
Recipe path: C:\OLT\RECIPES\Coal EGU Testing R3 - Copy DO NOT USE.MGRCP

Gas calibration Name	Conc	MDC3	**MDC2**	MDC1	MAU	FMU*R	OCU
NO (350,3000) 191C	19.47	5.27	**0.17**	0.26	0.36	7.19	7.19
NO2 (150) 191C (1OF2)	1.58	1.46	**0.16**	0.05	0.05	1.52	1.52
NO2 (2000) 191C (2OF2)	1.64	10.16	**0.5**	1.15	1.46	12.94	12.94
N2O (100,200,300) 191C	0.44	0.45	**0.05**	0.05	0.06	0.52	0.52
NH3 (300) 191C (1OF2)	0.07	1.38	**0.04**	0.15	0.25	2.34	2.34
NH3 (3000) 191C (2OF2)	6.47	33.8	**0.58**	1.37	2.59	63.76	63.76
CO (500) 191C (1OF2)	149.62	8.29	**0.1**	0.14	0.31	16.87	16.87
CO% (1) 191C (2OF2)	0.01	0	**0**	0	0	0.01	0.01
H2O% (40) 191C	44.5	0.44	-	0.01	0.02	0.75	0.75
CO2% (40) 191C	1.94	0.16	-	0.01	0.02	0.23	0.23
CH4 (250) 191C (1OF2)	-0.49	2.67	**0.05**	0.49	1.29	7.05	7.05
CH4 (3000) 191C (2OF2)	0.55	18.41	**0.6**	1.36	2.24	30.32	30.32
FORMALDEHYDE (70) 191C	-0.1	0.29	**0.09**	0.24	0.29	0.35	0.35
PROPYLENE (200,1000) 191(	-0.95	4.24	**0.25**	0.55	0.64	4.97	4.97
ETHYLENE (100,3000) 191C	-0.47	1.76	**0.11**	0.21	0.36	3.07	3.07
ACETYLENE (1000) 191C	0.43	4.8	**0.26**	0.83	1	5.78	5.78
PROPANE (100) 191C	0.15	1.01	**0.09**	0.16	0.19	1.2	1.2
ETHANE (500) 191C	-0.27	2.08	**0.16**	0.27	0.3	2.32	2.32
ACETALDEHYDE (1000) 191(	-0.85	1.18	**0.12**	0.42	0.46	1.28	1.28
HCL PPM (100) 191C	0.05	0.32	**0.08**	0.16	0.29	0.59	0.59
HF PPM (10) 191C	0.32	0.95	**0.04**	0.09	0.17	1.7	1.7
HCN (100) 191C	0.28	7.31	**0.13**	0.87	1.49	12.51	12.51
HBR (100) 180C	0.08	1.33	**0.27**	0.73	1.48	2.71	2.71
SO2 (1000) 191C	-1.9	3.46	**0.24**	0.2	0.38	6.66	6.66
SO3 (150) 191C	-749.83	0	-	0.07	0.07	0	0.07
COS (100) 150C	0.42	0.19	**0.01**	0.02	0.02	0.25	0.25
H2SO4 (50) 150C	-0.13	0.2	**0.05**	0.06	0.07	0.22	0.22
SF6 (10) 191C	-0.01	0.02	**0.01**	0.01	0.01	0.02	0.02
MEOH (10) 191C	0.37	0.56	**0.24**	0.15	0.17	0.65	0.65

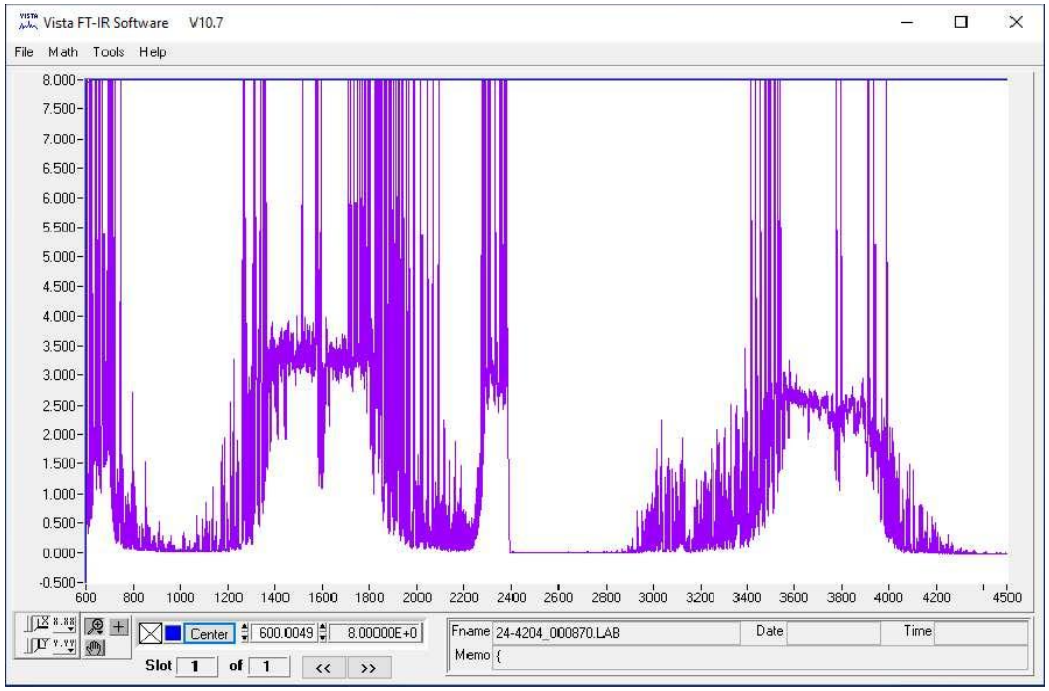
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (CTS)	24-4204_000007.LAB
Date	2/12/2025
Time	5:51:48 PM



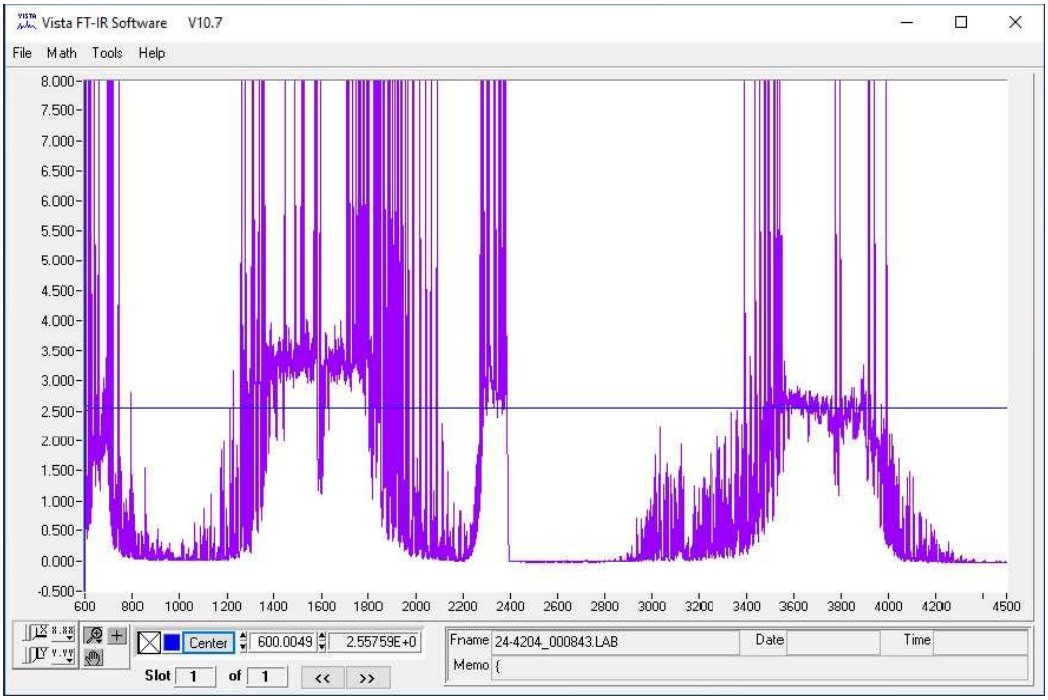
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Analyte Direct)	24-4204_000021.LAB
Date	2/12/2025
Time	6:06:28 PM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Native)	24-4204_000870.LAB
Date	2/13/2025
Time	9:10:34 AM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Spike)	24-4204_000843.LAB
Date	2/13/2025
Time	8:42:17 AM



Certifications & Calibrations

Equipment Detail - Dry Gas Meter

Console ID: MB-210-2447
Meter S/N: 20035533
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	30.17					
Final Barometric Pressure, in. Hg	(Pb_F)	30.20					
Average Barometric Pressure, in. Hg	(Pb)	30.19					
Critifcal Orifice ID	(Y)	29	29	19	19	6	6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	21.0	21.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	738.100	713.100	730.000	705.500	749.350	724.000
Final DGM Volume, ft^3	(Vm_F)	748.955	723.620	736.700	712.200	754.500	729.210
Total DGM Volume, ft^3	(Vm)	10.855	10.520	6.700	6.700	5.150	5.210
Ambient Temperature, °F	(Ta)	64	64	64	64	64	64
Initial DGM Temperature, °F	(Tm_I)	62	62	63	61	62	62
Final DGM Temperature, °F	(Tm_F)	63	63	64	63	63	62
Average DGM Temperature, °F	(Tm)	63	63	64	62	63	62
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.50	3.40	1.40	1.40	0.13	0.13
Standard Meter volume, ft^3	(Vmstd)	11.1629	10.8158	6.8420	6.8617	5.2530	5.3193
Standard Critical Orifice Volume, ft^3	(Vcr)	11.0047	11.0047	6.8537	6.8537	5.2497	5.2497
Meter Correction Factor	(Y)	0.986	1.017	1.002	0.999	0.999	0.987
Tolerance	--	0.013	0.019	0.003	0.000	0.001	0.011
Orifice Calibration Value	(ΔH @)	1.672	1.624	1.712	1.717	1.691	1.693
Tolerance	--	0.013	0.061	0.027	0.032	0.007	0.008
Orifice Cal Check	--	0.85		0.72		0.85	
Meter Correction Factor	**(Y)**	**0.998**					
Orifice Calibration Value	**(ΔH @)**	**1.685**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	99	559	0.2	1
223	683	224	684	-0.1	1
248	708	249	709	-0.1	1
273	733	274	734	-0.1	1
300	760	300	760	0.0	0
400	860	399	859	0.1	1
500	960	498	958	0.2	2
600	1,060	600	1,060	0.0	0
700	1,160	703	1,163	-0.3	3
800	1,260	802	1,262	-0.2	2
900	1,360	903	1,363	-0.2	3
1,000	1,460	1,003	1,463	-0.2	3
1,100	1,560	1,103	1,563	-0.2	3
1,200	1,660	1,203	1,663	-0.2	3

Personnel

Calibration By: EDO
Calibration Date: 2/4/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-211-2613
Meter S/N: MB-211-2613
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.89					
Final Barometric Pressure, in. Hg	(Pb_F)	29.89					
Average Barometric Pressure, in. Hg	(Pb)	29.89					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647s-6	1647s-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	22.0	22.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	59.700	71.250	83.820	91.100	98.000	103.400
Final DGM Volume, ft^3	(Vm_F)	70.545	82.082	90.650	97.904	103.241	108.615
Total DGM Volume, ft^3	(Vm)	10.845	10.832	6.830	6.804	5.241	5.215
Ambient Temperature, °F	(Ta)	55	55	55	55	55	55
Initial DGM Temperature, °F	(Tm_I)	56	56	60	60	67	67
Final DGM Temperature, °F	(Tm_F)	56	56	60	60	67	67
Average DGM Temperature, °F	(Tm)	56	56	60	60	67	67
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	4.10	4.10	1.60	1.60	0.15	0.15
Standard Meter volume, ft^3	(Vmstd)	11.2001	11.1867	6.9568	6.9303	5.2486	5.2226
Standard Critical Orifice Volume, ft^3	(Vcr)	10.9920	10.9920	6.8458	6.8458	5.2437	5.2437
Meter Correction Factor	(Y)	0.981	0.983	0.984	0.988	0.999	1.004
Tolerance	--	0.008	0.007	0.006	0.002	0.009	0.014
Orifice Calibration Value	(ΔH @)	1.971	1.971	1.956	1.956	1.921	1.921
Tolerance	--	0.022	0.022	0.007	0.007	0.029	0.029
Orifice Cal Check	--	1.95		1.56		1.99	
Meter Correction Factor	**(Y)**	**0.990**					
Orifice Calibration Value	**(ΔH @)**	**1.949**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIE
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	66	526	0.4	2
100	560	98	558	0.4	2
223	683	221	681	0.3	2
248	708	246	706	0.3	2
273	733	271	731	0.3	2
300	760	298	758	0.3	2
400	860	395	855	0.6	5
500	960	494	954	0.6	6
600	1,060	595	1,055	0.5	5
700	1,160	696	1,156	0.3	4
800	1,260	795	1,255	0.4	5
900	1,360	895	1,355	0.4	5
1,000	1,460	994	1,454	0.4	6
1,100	1,560	1,094	1,554	0.4	6
1,200	1,660	1,193	1,653	0.4	7

Personnel

Calibration By: David Larru
Calibration Date: 1/3/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-214-2990
Meter S/N: 18392990
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.66					
Final Barometric Pressure, in. Hg	(Pb_F)	29.66					
Average Barometric Pressure, in. Hg	(Pb)	29.66					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647-6	1647-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	16.0	16.0	20.0	20.0	24.0	23.0
Initial DGM Volume, ft^3	(Vm_I)	733.400	721.100	745.400	752.400	759.200	764.600
Final DGM Volume, ft^3	(Vm_F)	744.442	732.054	752.170	759.180	764.418	769.813
Total DGM Volume, ft^3	(Vm)	11.042	10.954	6.770	6.780	5.218	5.213
Ambient Temperature, °F	(Ta)	67	67	67	67	67	67
Initial DGM Temperature, °F	(Tm_I)	73	73	73	73	73	73
Final DGM Temperature, °F	(Tm_F)	73	73	73	73	73	73
Average DGM Temperature, °F	(Tm)	73	73	73	73	73	73
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.80	3.80	1.50	1.50	0.14	0.14
Standard Meter volume, ft^3	(Vmstd)	10.9475	10.8603	6.6741	6.6840	5.1268	5.1219
Standard Critical Orifice Volume, ft^3	(Vcr)	10.7824	10.7824	6.7153	6.7153	5.1437	5.1437
Meter Correction Factor	(Y)	0.985	0.993	1.006	1.005	1.003	1.004
Tolerance	--	0.014	0.007	0.007	0.005	0.004	0.005
Orifice Calibration Value	(ΔH @)	1.823	1.823	1.845	1.845	1.828	1.828
Tolerance	--	0.009	0.009	0.013	0.013	0.004	0.004
Orifice Cal Check	--	1.65		1.67		1.51	
Meter Correction Factor	**(Y)**	**0.999**					
Orifice Calibration Value	**(ΔH @)**	**1.832**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	100	560	0.0	0
223	683	228	688	-0.7	5
248	708	253	713	-0.7	5
273	733	278	738	-0.7	5
300	760	306	766	-0.8	6
400	860	407	867	-0.8	7
500	960	508	968	-0.8	8
600	1,060	612	1,072	-1.1	12
700	1,160	716	1,176	-1.4	16
800	1,260	817	1,277	-1.3	17
900	1,360	920	1,380	-1.5	20
1,000	1,460	1,021	1,481	-1.4	21
1,100	1,560	1,122	1,582	-1.4	22
1,200	1,660	1,224	1,684	-1.4	24

Personnel

Calibration By: David Larru
Calibration Date: 2/7/2025
Reviewed By: Timothy Branham

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE

Blend Type:	GAS	MOL	
Pressure:	2000	psia	**Sales Order: 1354918**
Volume:	138.9	cf	
Dew Point:	0 C		**RBTGS Part No.:** 304930

Cylinder Size: I-150
Valve Outlet: CGA 350
Cylinder No.: **CC774584**
Bar Code No.: 107623038

Lot No.: NV2411081526
Analysis Date: November 13, 2024
Date Issued: November 15, 2024
Expiration Date: November 15, 2028

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Sulfur Hexafluoride	2551-62-4	10.0	ppm	10.1	59.2	10.1	ppm	5%	M
Methanol	67-56-1	100.0	ppm	96.8	110.7	96.8	ppm	2%	B
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical Oxygen Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0096121	**Certification Date:**	08/20/2024
Product ID Number:	124300	**Expiration Date:**	08/18/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0096121.20240814-0	**Lot Number:**	EB0096121.20240814
Customer PO. NO.:		**Tracking Number:**	095703714
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.00 %**	±0.08 %	NDIR	08/20/2024
Oxygen	**10.00 %**	±0.03 %	MPA	08/19/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726207	CC726207.20230109	07/09/2031	GMIS	N2	O2	12.01 %	0.122	SRM 2659a
CC749195	CC749195.20230228	07/09/2031	GMIS	N2	O2	20.01 %	0.112	SRM 2659a
EB0006119	EB0006119.20210412	01/03/2032	GMIS	N2	CO2	19.58 %	0.375	C2190301.03
EB0016852	EB0016852.20210412	01/03/2032	GMIS	N2	CO2	11.92 %	0.235	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	07/29/2024
CO2	NDIR	Thermo	410i	1162980025	08/13/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC737073	**Certification Date:**	09/17/2024
Product ID Number:	124240	**Expiration Date:**	09/15/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC737073.20240903-0	**Lot Number:**	CC737073.20240903
Customer PO. NO.:		**Tracking Number:**	103890438
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.8 %**	±0.13 %	FTIR	09/17/2024
Oxygen	**19.93 %**	±0.03 %	MPA	09/10/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
CC769424	CC769424.20240512	08/05/2032	GMIS	N2	O2	19.98 %	0.155	SRM 2659a
EB0010822	EB0010822.20230816	07/09/2032	GMIS	N2	CO2	24.84 %	0.292	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/21/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	09/17/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

CERTIFIED GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC768666	**Certification Date:**	06/19/2024
Product ID Number:	124838	**Expiration Date:**	06/17/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC768666.20240618-0	**Lot Number:**	CC768666.20240618
Customer PO. NO.:		**Tracking Number:**	108819146
Customer:		**Previous Certification Dates:**	

This mixture is for laboratory use only, not for drug, household or other use.
This mixture is certified in Mole % to be within ±2% of the actual number reported with a confidence of 95%.
This mixture was manufactured by scale; weights traceable to N.I.S.T. Certificate #822/266926-02.
Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Ethylene	**103 PPM**	± 2% NIST	FTIR
Nitrogen	Balance		

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC734580	CC734580	07/26/2024	PS	N2	C2H4	1005 PPM	2	4034426

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
C2H4	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-G, Revised on 2017-07-02

Appendix E

LK01

#1 Lime Kiln Process Data

	Start Time:		2/13/25 16:25	2/13/25 15:05	2/13/25 13:20	
	End Time:		2/13/25 17:46	2/13/25 16:10	2/13/25 14:26	
Run #			3	2	1	Avgs
Tag						
FIC0262G.pv	Mud Flow	gpm	161.25	160.4	160.0	160.5
FYC0262G.pv	Lime Production	tons/day	160.06	160.1	160.0	160.0
FIC0275G.pv	Natural Gas Flow	cfm	832.71	835.0	822.8	830.2
AT0267G.pv	Kiln O2	%	1.96	2.0	2.0	2.0
AM0273BG.pv	Hot End Temp (oil)	°F	1313.76	1326.4	1247.3	1295.8
TT0273G.pv	Hot End Temp (gas)	°F	NA	NA	NA	
TT0269G.pv	Wet End Temp	°F	439.63	438.1	452.9	443.5
FT0296G.pv	Scrubber Recirc Flow	gpm	404.15	403.7	403.6	403.8
DPT0297G.pv	Scrubber delta P	in. H2O	17.16	17.2	17.3	17.2
DIC0260G.pv	Precoat Filter Solids	%	31.86	32.0	32.0	31.9
	Scrubber solids	%	NA	NA	NA	
CAUS-#1kiln.CARE	Carbonate Test	% CaCO3	4.40	4.4	13.0	7.3
H_LK01_TRS.avg	TRS/O2	ppm	8.27	8.2	5.9	7.5
I_LK01_o2.avg.filt	Excess stack O2	%	6.72	6.8	6.8	6.7

LK02

#2 Lime Kiln Process Data

		Start Time:	2/13/2025 11:15	2/13/2025 9:55	2/13/2025 8:15	
		End Time:	2/13/2025 12:20	2/13/2025 11:00	2/13/2025 9:20	
Run #		Units	3	2	1	AVG
Tag						
FIC0035G.pv	Mud Flow	gpm	287.16	287.09	287.02	287.2
FYC0035G.pv	Lime Production	tons/day	310.00	309.98	309.82	310.0
FIC0057G.pv	Natural Gas Flow	cfm	1241.62	1265.10	1175.79	1241.6
FIC3102G.pv	Fuel Oil Flow	gpm	0.00	0.00	0.00	0.0
AT0045G.pv	Excess O2	%	4.00	3.91	5.00	4.0
AM0047BG.pv	Hot End Temp (oil)	°F	1357.95	1226.80	1279.54	1357.9
TT0047G.pv	Hot End Temp (gas)	°F	1357.49	1228.54	1280.14	1357.5
TT0044G.pv	Wet End Temperature	°F	620.79	614.41	599.04	620.8
FT0066G.pv	Scrubber Recirc Flow	gpm	742.60	744.03	743.38	742.6
DPT0065G.pv	Scrubber delta P	in. H2O	32.29	32.57	32.73	32.3
DIC0036G.pv	Precoat Filter Solids	%	34.01	34.01	34.00	34.0
CAUS-#2kiln.CARB	Carbonate Test	% CaCO3	2.20	13.00	12.31	2.2
h_lk02_trs.avg	TRS/O2	ppm	0.30	0.40	0.40	0.3
i_lk02_o2.avg.filt	O2	%	8.12	8.13	9.13	8.1

RB01

#1 Recovery Boiler Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40 AM	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46 AM	
	Run	3	2	1	
Tag					Averages
FT0170E.pv	Steam load (kpph)	354.13	354.04	356.26	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.68	212.46	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.93	201.70	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.77	119.98	120.7
AIC0066E.pv	Excess O2	2.99	3.03	2.92	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.19	0.20	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.78	79.71	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.08	83.90	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.78	211.15	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	
TIC786E.PV	Bl. Liq. Nozzle temp. (F)	[-11059] No Good Data For Calculation	] No Good Data For Cal	] No Good Data For Cal	#DIV/0!
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.69	49.70	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
H_RB1N_TRS.AVG	TRS/O2 -- North (ppm)	1.18	1.46	1.44	1.4
H_RB1S_TRS.AVG	TRS/O2 -- South (ppm)	0.62	0.63	0.07	0.4
H_RB1N_SO2.AVG	SO2/O2 -- North (ppm)	0.05	19.56	3.11	7.6
H_RB1S_SO2.AVG	SO2/O2 -- South (ppm)	-0.17	24.73	4.34	9.6
I_RB1N_O2.FILT	O2 -- North %	5.88	5.92	5.76	5.9
I_RB1S_O2.FILT	O2 -- South %	7.20	7.27	6.75	7.1
AT0421BE.PV	Opacity -- North %	4.85	5.31	4.52	4.9
AT0421CE.PV	Opacity -- South %	4.01	4.21	4.10	4.1

RB02

#2 Recovery Boiler West Stack -- Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.9	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.1	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.7	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.1	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.2	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.2	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.6	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.5	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.2	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.4	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.2	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.0	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.0	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.5	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.1	90.3
H_RB2E_TRS.AVG	TRS/O2 -- East (ppm)	0.66	0.76	0.6	0.7
H_RB2W_TRS.AVG	TRS/O2 -- West (ppm)	0.32	0.26	#VALUE!	#VALUE!
H_RB2E_SO2.AVG	SO2/O2 -- East (ppm)	0.00	0.10	0.2	0.1
H_RB2W_SO2.AVG	SO2/O2 -- West (ppm)	0.00	0.00	0.1	0.0
I_RB2E_O2.FILT	O2 -- East %	4.25	3.90	4.4	4.2
I_RB2W_O2.FILT	O2 -- West %	4.98	4.79	5.3	5.0
AT2083E.PV	Opacity -- East %	9.71	9.61	10.0	9.8
AT2082E.PV	Opacity -- West %	10.90	10.75	11.6	11.1

SM01

#1 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46	
	Run #	3	2	1	**Averages**
Tag					
FT0170E.pv	Steam load (kpph)	354.13	354.0	356.3	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.7	212.5	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.9	201.7	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.8	120.0	120.7
AIC0066E.pv	Excess O2	2.99	3.0	2.9	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.2	0.2	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.8	79.7	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.1	83.9	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.8	211.2	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	Tag not found
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.7	49.7	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.0	0.0	0.0
Ft1024e.pv	Weak Wash flow to fan (gpm)	47.99	48.14	48.32	48.1
FT1030E.pv	Weak Wash flow to scrubber (gpm)	87.37	87.17	87.88	87.5
TIC786E.PV	Precip. Ash Tank Temp. (F)	59] No Good Data For Calcu	o Good Data For C	No Good Data For C	#DIV/0!
IT3025e.pv	Scrubber Fan Amps	83.46	83.5	81.8	82.9

SM02

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.91	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.12	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.72	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.08	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.21	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.19	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.60	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.49	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.22	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.35	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.20	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.01	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.54	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.09	90.3
TT2268E.PV	Precip. Ash Tank Temp. (F)	228.03	228.01	227.36	227.8
IT3028e.pv	Scrubber fan amps	43.19	43.19548758	43.70370315	43.4

NCG01

GRAPHIC PACKAGING INTERNATIONAL - TEXARKANA MILL
INCINERATOR EXHAUST STACK (NCG01)
PROCESS DATA

	Start Time:	2/13/25 11:57	2/13/25 10:42	2/13/25 9:10	
	End Time:	2/13/25 12:57	2/13/25 11:42	2/13/25 10:10	
					Avg
PI Tag No.	**Parameter Description**	**Run 3**	**Run 2**	**Run 1**	
TIC3076H.PV	Incinerator chamber temperature, F	1448.68	1449.0	1446.9	1448.20
AIC3112H.PV	Incinerator SO2 scrubber pH	9.82	9.8	9.6	9.74
FT3104H.PV	Incinerator SO2 scrubber recirc flow, gpm	405.99	405.9	412.0	407.97
	Hardwood blow rate	48	48	48	48.00
	Pine blow rate	67	67	67	67.00
FIC3387C.pv	A-line brown stock flow, gpm	2898.79	2900.7	2697.0	2832.17
FQC3377C.pv	B-line brown stock flow, gpm	4101.42	4036.0	4014.9	4050.79

Notes:
This testing for methanol at the incinerator stack was conducted due to the 40 CFR 63 requirement to retest certain MACT I sources.
The port tested was on west side of stack, approximately 20 feet above the 10th floor of #2 Power Boiler.
Pine and hardwood digesters were blown during the testing.
Several periods of digester double blows occurred during the testing.

Appendix F

Data Log

DAQ #	1.00	2.00
DasyLab #	0.00	1.00
Time	O2	CO2
2/13/2025 7:30	0.03	0.00
2/13/2025 7:31	0.00	0.00
2/13/2025 7:32	0.00	0.00
2/13/2025 7:33	0.00	0.00
2/13/2025 7:34	0.00	0.00
2/13/2025 7:35	7.79	7.03
2/13/2025 7:36	19.92	19.84
2/13/2025 7:37	16.14	16.33
2/13/2025 7:38	10.10	10.04
2/13/2025 7:39	6.34	6.47
2/13/2025 7:40	0.00	0.02
2/13/2025 7:41	0.00	0.01
2/13/2025 7:42	0.00	0.01
2/13/2025 7:43	0.00	0.00
2/13/2025 7:44	0.00	0.00
2/13/2025 7:45	0.00	0.01
2/13/2025 7:46	0.00	0.02
2/13/2025 7:47	2.36	0.04
2/13/2025 7:48	20.59	0.06
2/13/2025 7:49	20.77	0.06
2/13/2025 7:50	6.39	0.06
2/13/2025 7:51	0.36	0.01
2/13/2025 7:52	0.26	0.00
2/13/2025 7:53	5.48	4.91
2/13/2025 7:54	10.10	9.76
2/13/2025 7:55	10.10	9.79
2/13/2025 7:56	10.10	9.81
2/13/2025 7:57	12.21	7.97
2/13/2025 7:58	20.78	0.17
2/13/2025 7:59	20.85	0.08
2/13/2025 8:00	20.86	0.07
2/13/2025 8:01	20.87	0.06
2/13/2025 8:02	20.87	0.06
2/13/2025 8:03	20.87	0.05
2/13/2025 8:04	20.88	0.05
2/13/2025 8:05	20.88	0.05
2/13/2025 8:06	20.88	0.05
2/13/2025 8:07	20.09	0.44
2/13/2025 8:08	12.18	4.21
2/13/2025 8:09	12.22	4.17
2/13/2025 8:10	11.85	4.24
2/13/2025 8:11	11.14	4.55
2/13/2025 8:12	12.16	4.06
2/13/2025 8:13	12.03	3.97
2/13/2025 8:14	12.56	3.94
2/13/2025 8:15	12.66	3.69
2/13/2025 8:16	12.26	3.79
2/13/2025 8:17	11.42	4.21

Data Log

Time	O2	CO2
2/13/2025 8:18	10.55	4.51
2/13/2025 8:19	10.93	4.39
2/13/2025 8:20	12.03	3.71
2/13/2025 8:21	11.74	3.76
2/13/2025 8:22	12.08	3.69
2/13/2025 8:23	12.74	3.29
2/13/2025 8:24	12.54	3.32
2/13/2025 8:25	12.26	3.46
2/13/2025 8:26	11.69	3.75
2/13/2025 8:27	11.75	3.80
2/13/2025 8:28	10.96	4.10
2/13/2025 8:29	11.05	4.13
2/13/2025 8:30	11.35	4.42
2/13/2025 8:31	11.26	3.12
2/13/2025 8:32	10.39	3.27
2/13/2025 8:33	9.55	3.76
2/13/2025 8:34	10.03	3.58
2/13/2025 8:35	10.35	3.35
2/13/2025 8:36	10.20	3.38
2/13/2025 8:37	9.75	3.69
2/13/2025 8:38	9.98	3.69
2/13/2025 8:39	9.60	3.63
2/13/2025 8:40	9.61	3.74
2/13/2025 8:41	9.76	3.66
2/13/2025 8:42	10.02	3.56
2/13/2025 8:43	10.22	3.43
2/13/2025 8:44	10.06	3.31
2/13/2025 8:45	10.29	3.33
2/13/2025 8:46	10.14	3.24
2/13/2025 8:47	9.99	3.31
2/13/2025 8:48	9.83	3.38
2/13/2025 8:49	10.33	3.61
2/13/2025 8:50	11.03	3.86
2/13/2025 8:51	11.51	3.86
2/13/2025 8:52	11.72	3.74
2/13/2025 8:53	11.51	3.87
2/13/2025 8:54	11.71	3.81
2/13/2025 8:55	11.61	3.85
2/13/2025 8:56	11.79	3.89
2/13/2025 8:57	11.57	3.90
2/13/2025 8:58	11.66	3.99
2/13/2025 8:59	12.02	4.04
2/13/2025 9:00	12.52	3.89
2/13/2025 9:01	12.95	3.61
2/13/2025 9:02	12.98	3.57
2/13/2025 9:03	13.49	3.13
2/13/2025 9:04	13.06	3.16
2/13/2025 9:05	12.85	3.41
2/13/2025 9:06	12.94	3.42
2/13/2025 9:07	13.33	3.29
2/13/2025 9:08	13.16	3.17

Data Log

Time	O2	CO2
2/13/2025 9:09	13.22	3.16
2/13/2025 9:10	13.46	2.95
2/13/2025 9:11	13.66	2.75
2/13/2025 9:12	13.34	2.77
2/13/2025 9:13	13.13	2.98
2/13/2025 9:14	13.70	2.72
2/13/2025 9:15	13.11	2.92
2/13/2025 9:16	13.41	3.01
2/13/2025 9:17	13.39	2.88
2/13/2025 9:18	13.33	2.91
2/13/2025 9:19	12.86	3.11
2/13/2025 9:20	13.58	2.83
2/13/2025 9:21	13.71	2.67
2/13/2025 9:22	12.94	3.14
2/13/2025 9:23	13.04	3.23
2/13/2025 9:24	13.54	2.92
2/13/2025 9:25	13.17	2.91
2/13/2025 9:26	13.11	3.07
2/13/2025 9:27	13.40	2.93
2/13/2025 9:28	13.23	2.87
2/13/2025 9:29	13.28	2.97
2/13/2025 9:30	12.74	3.15
2/13/2025 9:31	13.00	3.24
2/13/2025 9:32	13.55	2.90
2/13/2025 9:33	13.89	2.64
2/13/2025 9:34	13.33	2.94
2/13/2025 9:35	13.43	3.07
2/13/2025 9:36	13.43	3.05
2/13/2025 9:37	13.65	3.07
2/13/2025 9:38	13.28	3.13
2/13/2025 9:39	12.98	3.54
2/13/2025 9:40	13.29	3.31
2/13/2025 9:41	13.01	3.64
2/13/2025 9:42	13.10	3.53
2/13/2025 9:43	12.76	3.54
2/13/2025 9:44	13.11	3.51
2/13/2025 9:45	12.67	3.43
2/13/2025 9:46	12.19	3.68
2/13/2025 9:47	12.61	3.60
2/13/2025 9:48	13.24	3.12
2/13/2025 9:49	13.73	2.71
2/13/2025 9:50	13.53	2.80
2/13/2025 9:51	12.98	3.19
2/13/2025 9:52	12.80	3.23
2/13/2025 9:53	13.65	2.74
2/13/2025 9:54	13.86	2.61
2/13/2025 9:55	13.79	2.60
2/13/2025 9:56	13.81	2.67
2/13/2025 9:57	13.77	2.73
2/13/2025 9:58	13.85	2.86
2/13/2025 9:59	13.48	3.05

Data Log

Time	O2	CO2
2/13/2025 10:00	12.71	3.50
2/13/2025 10:01	13.43	3.36
2/13/2025 10:02	13.28	3.26
2/13/2025 10:03	12.38	3.78
2/13/2025 10:04	12.85	3.65
2/13/2025 10:05	13.83	2.98
2/13/2025 10:06	13.98	2.74
2/13/2025 10:07	13.30	2.97
2/13/2025 10:08	12.74	3.27
2/13/2025 10:09	12.11	3.76
2/13/2025 10:10	12.28	3.74
2/13/2025 10:11	13.04	3.36
2/13/2025 10:12	13.47	3.04
2/13/2025 10:13	13.10	3.09
2/13/2025 10:14	13.29	3.22
2/13/2025 10:15	4.55	1.05
2/13/2025 10:16	0.21	0.04
2/13/2025 10:17	0.31	0.14
2/13/2025 10:18	9.35	8.93
2/13/2025 10:19	10.09	9.84
2/13/2025 10:20	10.10	9.84
2/13/2025 10:21	7.54	2.79
2/13/2025 10:22	0.02	0.02
2/13/2025 10:23	0.00	0.02
2/13/2025 10:24	0.00	0.02
2/13/2025 10:25	0.00	0.02
2/13/2025 10:26	0.00	0.02
2/13/2025 10:27	0.00	0.02
2/13/2025 10:28	0.00	0.02
2/13/2025 10:29	0.00	0.02
2/13/2025 10:30	0.05	0.28
2/13/2025 10:31	0.01	0.16
2/13/2025 10:32	0.00	0.03
2/13/2025 10:33	0.00	0.02
2/13/2025 10:34	0.00	0.02
2/13/2025 10:35	0.00	0.02
2/13/2025 10:36	3.68	0.84
2/13/2025 10:37	13.44	3.26
2/13/2025 10:38	13.62	2.92
2/13/2025 10:39	12.79	3.36
2/13/2025 10:40	13.76	2.89
2/13/2025 10:41	13.23	2.98
2/13/2025 10:42	12.69	3.47
2/13/2025 10:43	13.78	2.68
2/13/2025 10:44	13.66	2.62
2/13/2025 10:45	13.75	2.57
2/13/2025 10:46	13.10	3.07
2/13/2025 10:47	13.52	2.74
2/13/2025 10:48	13.38	2.78
2/13/2025 10:49	13.02	3.03
2/13/2025 10:50	12.91	3.28

Data Log

Time	O2	CO2
2/13/2025 10:51	13.26	3.25
2/13/2025 10:52	13.68	3.02
2/13/2025 10:53	13.83	2.85
2/13/2025 10:54	13.60	2.88
2/13/2025 10:55	13.23	3.33
2/13/2025 10:56	13.45	3.19
2/13/2025 10:57	13.25	3.16
2/13/2025 10:58	13.22	3.28
2/13/2025 10:59	13.88	3.08
2/13/2025 11:00	13.21	3.20
2/13/2025 11:01	13.20	3.44
2/13/2025 11:02	13.43	3.29
2/13/2025 11:03	12.83	3.41
2/13/2025 11:04	12.73	3.61
2/13/2025 11:05	12.85	3.60
2/13/2025 11:06	13.26	3.37
2/13/2025 11:07	13.69	3.11
2/13/2025 11:08	13.44	3.10
2/13/2025 11:09	13.39	3.21
2/13/2025 11:10	13.04	3.26
2/13/2025 11:11	12.95	3.49
2/13/2025 11:12	12.91	3.34
2/13/2025 11:13	13.32	3.25
2/13/2025 11:14	12.83	3.26
2/13/2025 11:15	13.00	3.40
2/13/2025 11:16	13.42	3.21
2/13/2025 11:17	13.64	3.06
2/13/2025 11:18	13.64	2.93
2/13/2025 11:19	13.56	2.96
2/13/2025 11:20	13.54	3.01
2/13/2025 11:21	13.22	3.11
2/13/2025 11:22	13.45	3.23
2/13/2025 11:23	13.22	3.17
2/13/2025 11:24	13.30	3.28
2/13/2025 11:25	12.88	3.27
2/13/2025 11:26	13.28	3.31
2/13/2025 11:27	13.22	3.15
2/13/2025 11:28	14.05	2.80
2/13/2025 11:29	13.66	2.79
2/13/2025 11:30	13.79	3.02
2/13/2025 11:31	13.38	3.04
2/13/2025 11:32	13.49	3.30
2/13/2025 11:33	13.57	3.06
2/13/2025 11:34	13.08	3.44
2/13/2025 11:35	13.44	3.27
2/13/2025 11:36	13.02	3.37
2/13/2025 11:37	13.56	3.30
2/13/2025 11:38	13.06	3.29
2/13/2025 11:39	12.69	3.60
2/13/2025 11:40	13.41	3.23
2/13/2025 11:41	13.54	3.11

Data Log

Time	O2	CO2
2/13/2025 11:42	13.67	3.01
2/13/2025 11:43	13.60	2.99
2/13/2025 11:44	3.47	1.05
2/13/2025 11:45	0.21	0.02
2/13/2025 11:46	1.56	1.13
2/13/2025 11:47	10.12	9.83
2/13/2025 11:48	10.13	9.84
2/13/2025 11:49	12.20	5.78
2/13/2025 11:50	13.28	2.93
2/13/2025 11:51	13.24	2.92
2/13/2025 11:52	13.22	2.83
2/13/2025 11:53	13.14	2.85
2/13/2025 11:54	13.31	2.91
2/13/2025 11:55	13.04	2.98
2/13/2025 11:56	13.15	3.19
2/13/2025 11:57	13.24	2.94
2/13/2025 11:58	12.96	3.17
2/13/2025 11:59	13.51	2.85
2/13/2025 12:00	13.07	3.00
2/13/2025 12:01	13.43	3.13
2/13/2025 12:02	13.15	3.06
2/13/2025 12:03	13.55	3.05
2/13/2025 12:04	13.64	2.82
2/13/2025 12:05	13.53	3.01
2/13/2025 12:06	12.69	3.36
2/13/2025 12:07	12.85	3.57
2/13/2025 12:08	13.00	3.45
2/13/2025 12:09	12.44	3.56
2/13/2025 12:10	12.67	3.72
2/13/2025 12:11	12.83	3.56
2/13/2025 12:12	13.24	3.26
2/13/2025 12:13	13.12	3.08
2/13/2025 12:14	13.17	3.10
2/13/2025 12:15	13.37	2.92
2/13/2025 12:16	13.30	2.90
2/13/2025 12:17	13.01	3.07
2/13/2025 12:18	12.88	3.21
2/13/2025 12:19	13.43	3.04
2/13/2025 12:20	13.60	2.73
2/13/2025 12:21	13.35	3.03
2/13/2025 12:22	13.23	3.04
2/13/2025 12:23	13.02	3.33
2/13/2025 12:24	13.43	3.03
2/13/2025 12:25	12.54	3.45
2/13/2025 12:26	12.79	3.63
2/13/2025 12:27	12.54	3.44
2/13/2025 12:28	12.82	3.53
2/13/2025 12:29	13.21	3.10
2/13/2025 12:30	12.76	3.50
2/13/2025 12:31	13.11	3.21
2/13/2025 12:32	13.04	3.18

Data Log

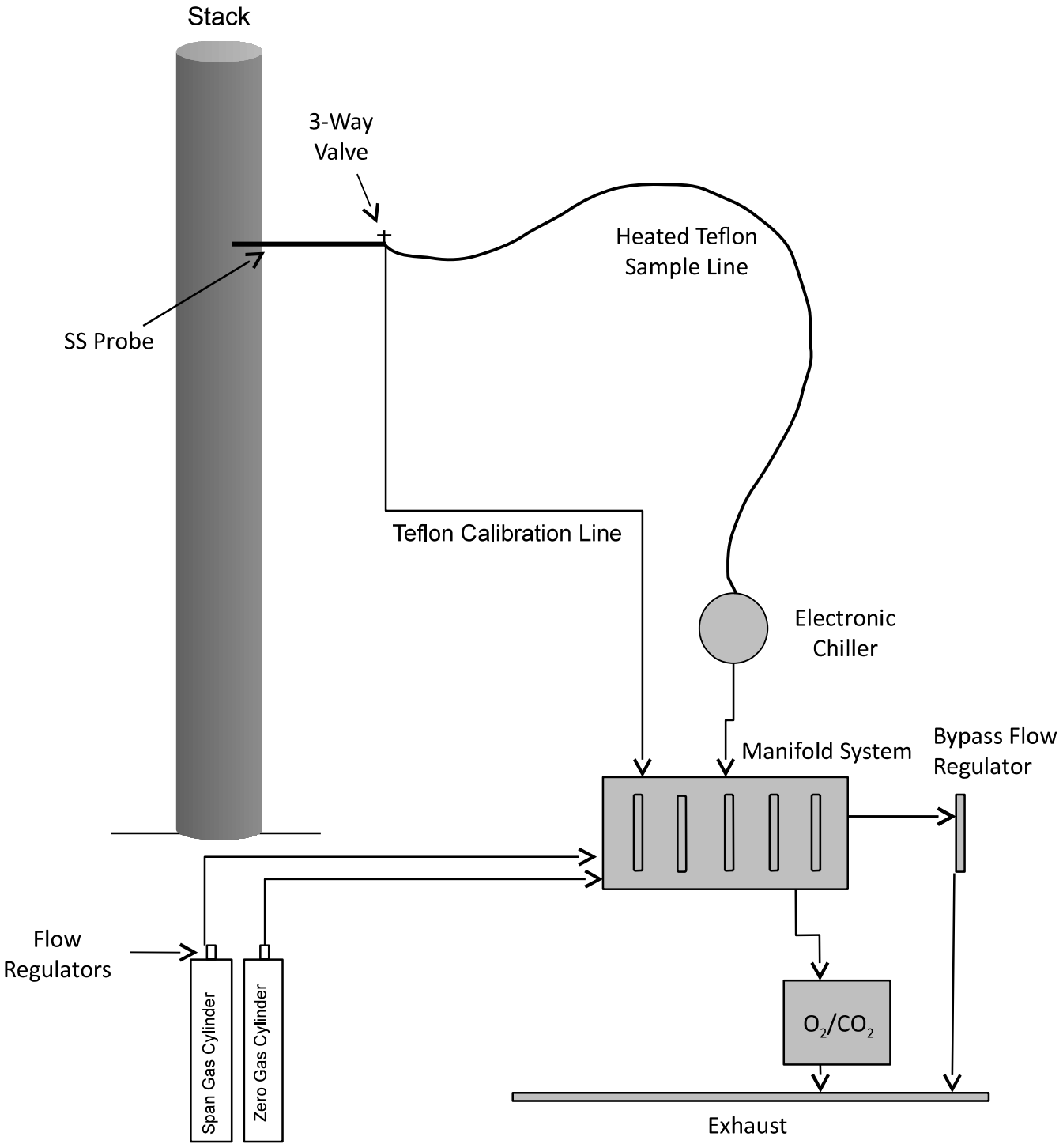
Time	O2	CO2
2/13/2025 12:33	13.14	3.10
2/13/2025 12:34	12.97	3.04
2/13/2025 12:35	13.14	3.05
2/13/2025 12:36	13.33	2.95
2/13/2025 12:37	13.49	2.83
2/13/2025 12:38	13.59	2.79
2/13/2025 12:39	13.45	2.80
2/13/2025 12:40	13.72	2.88
2/13/2025 12:41	13.64	2.86
2/13/2025 12:42	13.58	2.98
2/13/2025 12:43	13.07	3.26
2/13/2025 12:44	13.05	3.59
2/13/2025 12:45	12.84	3.48
2/13/2025 12:46	12.54	3.60
2/13/2025 12:47	13.55	3.18
2/13/2025 12:48	12.87	3.29
2/13/2025 12:49	13.38	3.18
2/13/2025 12:50	13.09	3.09
2/13/2025 12:51	13.50	2.99
2/13/2025 12:52	13.36	2.87
2/13/2025 12:53	12.84	3.09
2/13/2025 12:54	13.22	3.10
2/13/2025 12:55	13.38	2.89
2/13/2025 12:56	13.18	2.95
2/13/2025 12:57	13.44	3.04
2/13/2025 12:58	13.53	3.03
2/13/2025 12:59	13.52	3.05
2/13/2025 13:00	4.47	1.66
2/13/2025 13:01	0.23	0.03
2/13/2025 13:02	1.76	1.36
2/13/2025 13:03	10.12	9.80
2/13/2025 13:04	10.12	9.81
2/13/2025 13:05	11.99	5.97
2/13/2025 13:06	10.57	4.46
2/13/2025 13:07	10.41	4.66
2/13/2025 13:08	10.80	4.42
2/13/2025 13:09	11.56	4.06
2/13/2025 13:10	11.63	3.84
2/13/2025 13:11	9.24	3.35
2/13/2025 13:12	0.05	0.02
2/13/2025 13:13	0.02	0.00
2/13/2025 13:14	0.02	0.00
2/13/2025 13:15	0.01	0.00
2/13/2025 13:16	0.01	0.00
2/13/2025 13:17	0.00	0.00
2/13/2025 13:18	0.00	0.00
2/13/2025 13:19	0.00	0.00
2/13/2025 13:20	0.00	0.00
2/13/2025 13:21	0.00	0.00
2/13/2025 13:22	0.00	0.00
2/13/2025 13:23	0.02	0.28

Data Log

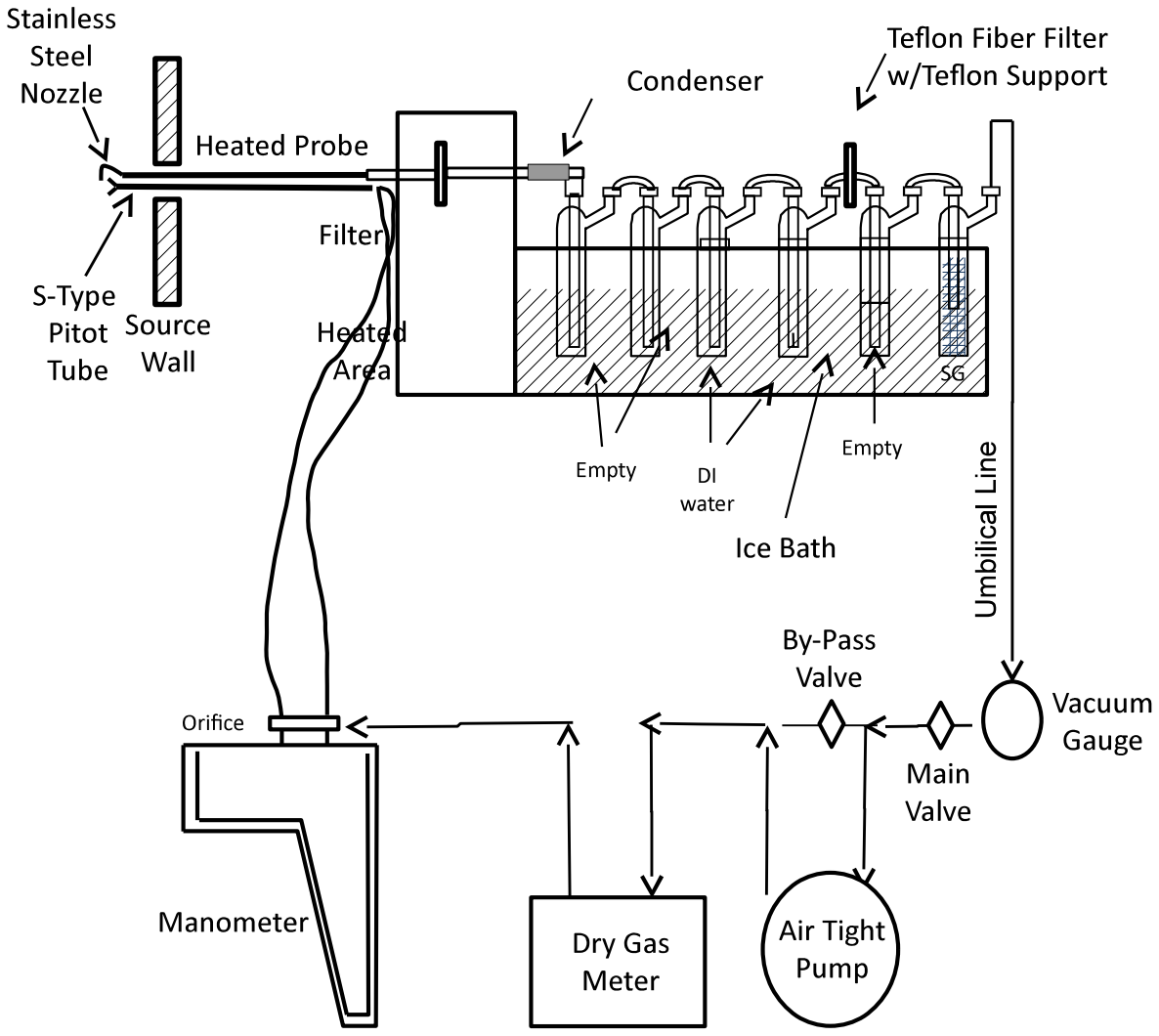
Time	O2	CO2
2/13/2025 13:24	0.02	0.11
2/13/2025 13:25	0.00	0.01
2/13/2025 13:26	0.00	0.00
2/13/2025 13:27	0.00	0.00
2/13/2025 13:28	0.00	0.00
2/13/2025 13:29	0.00	0.00
2/13/2025 13:30	0.00	0.00
2/13/2025 13:31	0.00	0.00
2/13/2025 13:32	0.00	0.00
2/13/2025 13:33	0.00	0.00
2/13/2025 13:34	0.00	0.00
2/13/2025 13:35	0.00	0.00
2/13/2025 13:36	0.00	0.00
2/13/2025 13:37	0.00	0.00
2/13/2025 13:38	0.00	0.00
2/13/2025 13:39	0.00	0.00
2/13/2025 13:40	0.00	0.00
2/13/2025 13:41	0.00	0.00
2/13/2025 13:42	0.00	0.00
2/13/2025 13:43	0.00	0.00
2/13/2025 13:44	0.00	0.00
2/13/2025 13:45	0.00	0.00
2/13/2025 13:46	0.00	0.00
2/13/2025 13:47	0.00	0.00

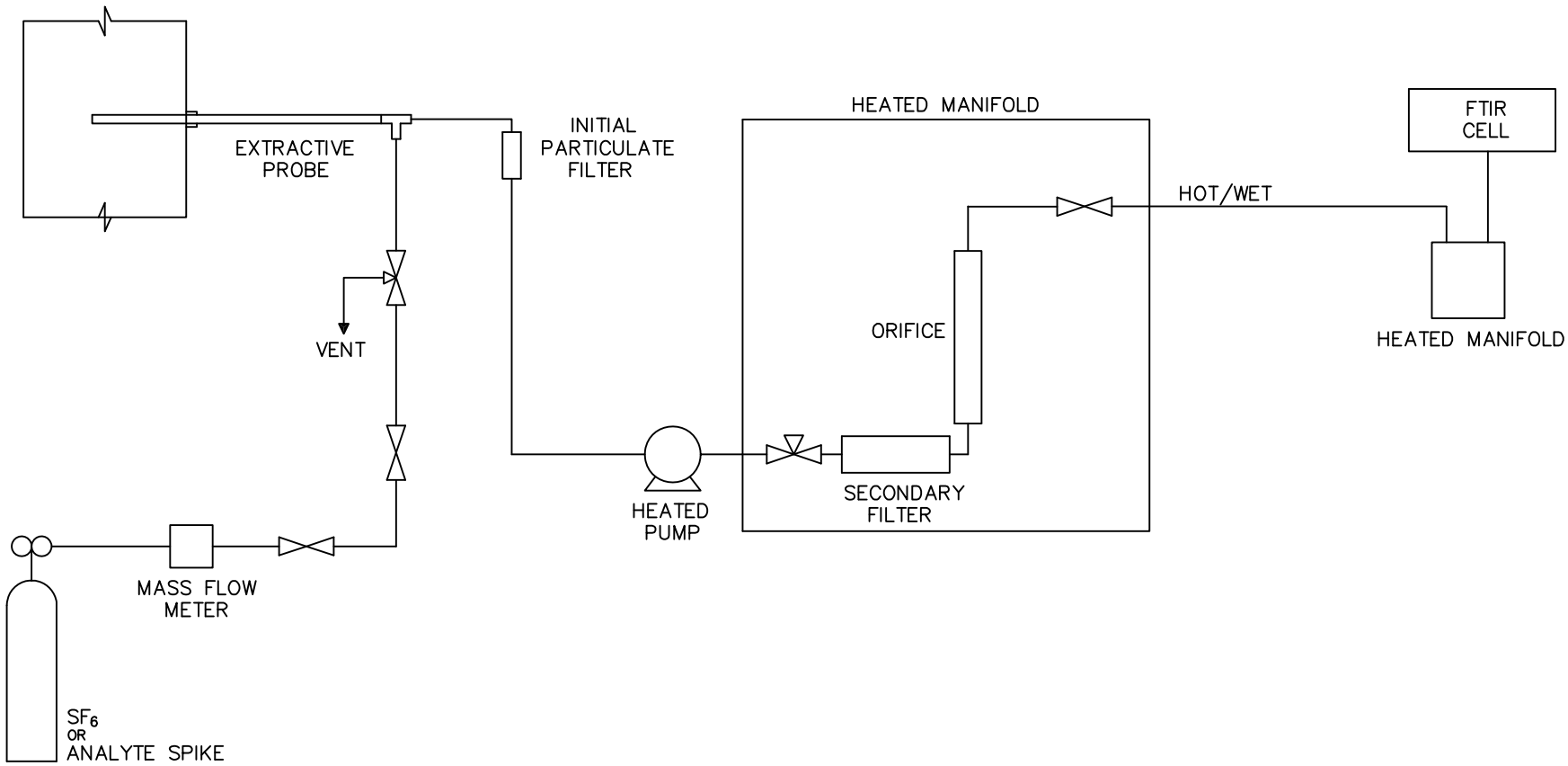
Appendix G

Reference Method Monitors Sampling System
(EPA Method 3A)



Schematic Diagram of the EPA Combined Methods 5/202 Sampling Train for Particulate Matter





EPA METHOD 320 FTIR SAMPLING/SPIKING SYSTEM

DRAWN BY:	KWB	JOB NO.:	2007-0308	REVISION:	1	SCALE:	NTS

E. ROBERTS Alley & Associates INCORPORATED
Environmental Engineering & Consulting
1931 Central Parkway SW Suite S
Decatur, AL 35601
Phone: (615) 351-0121
Fax: (615) 351-0151
www.eralley.com

Appendix H

CAREER SUMMARY

Mr. Wilson is a Project Scientist who has worked in the environmental field approximately four years. He has been involved with field testing activities on a broad scale and within several different industry types. Over the past four years, he has developed skills in several areas of emission testing including mobile laboratory operation and field team supervision.

Education
BS, Emergency Management
Arkansas Tech University
Russellville, AR

Joined Firm
2013

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

DeSoto Gathering Company – Arkansas

Conducted and field managed multiple NSPS, Subpart JJJJ and state permit compliance tests on natural gas-fired compressor engines at multiple stations throughout Arkansas. Responsibilities included project coordination and mobile laboratory and meter box console operation. Testing parameters included nitrogen oxides, carbon monoxide and non-methane volatile organic compounds. EPA Methods 3A, 7E, 10, 19 and 25A.

Saint Gobain – Bryant, Arkansas

Conducted and field managed compliance testing to determine the emission rates of multiple pollutants to demonstrate compliance with federal and state regulations. Testing involved wet chemistry (filterable and condensable particulate matter) and other isokinetic applications. Testing also involved instrumental analysis of sulfur dioxide, carbon monoxide, nitrogen oxides and volatile organic compounds. Mr. Wilson was responsible for operating the dry gas meter consoles and the mobile laboratory equipment as well as coordinating activities with the facility on site contact.

El Dorado Chemical – El Dorado, Arkansas

Conducted compliance testing on multiple sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods, instrumental, and FTIR analysis including U.S. EPA Reference Test Methods 5, 201A/202 (particulate matter & condensable particulate matter), 3A (oxygen and carbon dioxide), 6C (sulfur dioxide) 25A (volatile organic compounds), 7E (nitrogen oxides), 10 (carbon monoxide), and 320 (FTIR). Mr. Wilson was a member of the AST field team for this testing project.

Training

- TVTC Training
- CPR and First Aid
- Safeland
- MSHA Part 46 & Part 48

Appendix I

Brooke T. Paup, *Chairwoman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 13, 2025

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW,
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2025
Expiration Date: 02/28/2026
Certificate ID: TX-C25-00047

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation (FoA) specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Note: For the attached FoA table, matrices may include DW (drinking water), NPW (non-potable water), S (solid and chemical materials), A (air), and/ or BT (biological tissue).

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2025

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix J

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources to be Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Proposed Test Dates:
December 3-5, 2024

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subpart MM and 40 CFR 63, Subpart S

Source Information

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146
(subject to change)

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing will be conducted to determine the emission rates of particulate matter (PM), condensable particulate matter (CPM), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	PM, CPM
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NESHAP.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NESHAP, the facility will conduct a performance test program to determine the compliance status of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01.

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3/3A, 4, 5/202, and 320. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the facility TCEQ Permits, 40 CFR 63, Subpart MM, and 40 CFR 63, Subpart S.
- Emissions testing will be conducted on the exhaust of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01. The No. 1 and No. 2 Recovery Furnaces each exhaust to two (2) stacks: The No. 1 Recovery Furnace to the North (RB01A) and South (RB01B) Stacks, and the No. 2 Recovery Furnace to the West (RB02A) and East (RB02B) Stacks.
- Performance testing will be conducted at the maximum normal operation load for each source.
- Each of the three (3) test runs per source will be approximately 1 hour in duration.
- A minimum of 0.90 dscm (31.8 dscf) will be collected during each PM test run.
- Per Subpart MM, DI water will be used as the sample recovery solvent during PM testing.
- PM sample analysis will be conducted at Alliance's Decatur, AL laboratory.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

LK01 and LK02:

- Lime Production Rate, tons/day
- Scrubber Recirculation Flow, gph
- Scrubber Delta P, WC

RB01A/RB01B and RB02A/RB02B:

- Steam Load, kPPH
- Fuel Data

SM01 and SM02:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

NCG01:

- Chamber Temperature, °F
- Scrubber pH
- Scrubber Recirculation Flow, gph

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – December 2, 2024					
Equipment Setup & Pretest QA/QC Checks					6 hr
DAY 2 – December 3, 2024					
RB01A/RB01B & SM01	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 3 – December 4, 2024					
RB02A/RB02B & SM02	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 4 – December 5, 2024					
All Sources	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
LK01 & LK02	BWS	4			
	PM/CPM	5/202			
NCG01	BWS/CH_3OH	320			
DAY 5 – December 6, 2024					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
LK01	PM, CPM – 27.60 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
LK02	PM, CPM – 26.30 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
RB01A/RB01B	PM, CPM – 26.58 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
RB02A/RB02B	PM, CPM – 42.59 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
SM01	PM, CPM – 10.90 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
SM02	PM, CPM – 19.85 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
NCG01	CH_3OH – 20 ppmvd @ 10% O_2	63, Subpart S

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Laboratory Data* – Copies of laboratory report(s) and chain of custody(s).
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.
- *Photos* – Include stacks being tested and must include all ports and the nearest upstream and downstream disturbances, as well as all equipment being used to conduct the testing (e.g., glassware, meter box, gas cylinders, probe assembly, etc.).

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture Content	320	FTIR – Continuous Sampling

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with an EPA Method 1 verification measurement provided by the Field Team Leader. These measurements will be included in the test report.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample will be collected during each test run. The bags will be collected from the positive pressure side of the sample pump and conditioner. They will be collected through a manifold with a restriction (either rotameter or critical orifice) to ensure even filling throughout the course of the run. Samples will be concurrent with the test runs. The bag samples will be analyzed on site with a gas analyzer. The remaining stack gas constituent will be assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing will be conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system will consist of a glass nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train will consist of a coiled condenser and four (4) chilled impingers. The first and second impingers will be initially empty, the third will contain 100 mL of de-ionized water and the last impinger will contain 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter will be placed between the second and third impingers. The probe liner heating system will be maintained at a temperature of 248 ±25°F, and the impinger temperature will be maintained at 68°F or less throughout testing. The temperature of the Teflon filter will be maintained greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. If condensate is collected in the first dry impinger, then the front-half of the sample train (the nozzle, probe, and heated pre-weighed filter) will be removed in order to purge the back-half of the sample train (coil condenser, first and second impingers and CPM filter). A glass bubbler will be inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water will be added to the first impinger to raise the water level above the bubbler, then the coil condenser will be replaced. Zero nitrogen will be connected to the condenser, and a 60-minute purge at 14 liters per minute will be conducted. After the completion of the nitrogen purge the impinger contents will be measured for moisture gain. The nitrogen purge will be omitted if minimal condensate is collected in the dry impingers.

The pre-weighed quartz filter will be carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder will be rinsed three (3) times with DI water to remove any adhering particulate matter and these rinses will be recovered in container 2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 will be recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, the coil condenser, impingers 1 and 2 and all connecting glassware will be rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses will be added to container CPM Cont. #1 while the solvent rinses will be recovered in container CPM Cont. #2. The Teflon filter will be removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder will be rinsed with DIUF water and then with acetone, followed by hexane. The water rinse will be added to container CPM Cont. #1 while the solvent rinses will be added to container CPM Cont. #2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture will be determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream will be extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 or CAI 600 FTIR operated by a portable computer. The computer has FTIR spectra of calibration gases stored on the hard drive. These single component calibration spectra are used to analyze the measured sample spectra. The gas components to be measured will be selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio will be measured and recorded to document analyzer performance. A leak check will be performed on the sample cell. The instrument path length will be verified using ethylene as the Calibration Transfer Standard. Dynamic spiking will be performed using a certified standard of the target compound or appropriate surrogate in nitrogen with sulfur hexafluoride blended as a tracer to calculate the dilution factor. All test spectra, interferograms, and analytical method information are recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Low Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

EPA Protocol 1 Calibration Gases – Cylinder calibration gases used will meet EPA Protocol 1 (+/- 2%) standards or will be certified standards.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) will be introduced directly to the instrument sample port. While flowing nitrogen the signal amplitude will be recorded, a background spectra will be taken, a linearity check will be performed and recorded, the peak to peak noise and the root mean square in the spectral region of interest will be measured and a screenshot will be recorded.

Following the zero gas checks, room air will be pulled through the sample chamber and the line width and resolution will be verified to be at 1879 cm-1, the peak position will be entered and the FWHH will be recorded (screenshot). Following these checks, another background spectra will be recorded and the calibration transfer standard (CTS) will be introduced directly to the instrument sample port. The CTS instrument recovery will be recorded and the instrument mechanical response time will be measured.

Next, stack gas will be introduced to the FTIR through the sampling system and several scans will be taken until a stable reading will be achieved. The native concentration of our surrogate or target spiking analyte will be recorded. Spike gas will be introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate and a corresponding dilution ratio will be calculated along with a system response time. Matrix spike recovery spectra will be recorded and will be within the ± 30% of the calculated value of the spike concentration that the method requires.

The matrix spike recovery will be conducted once at the beginning of the testing and the CTS recovery procedures will be repeated following each test run. The corresponding values will be recorded.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Nozzles. Nozzles are measured three (3) times prior to initiating sampling with a caliper. The maximum difference between any two (2) dimensions is 0.004 in.
- Digital Calipers. Calipers are calibrated annually by Alliance by using gage blocks that are calibrated annually by an outside laboratory.

- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.
- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. A mass flow controller calibration is conducted on each Environics system annually following the procedures in the Manufacturer's Operation manual. A methane/ethane penetration factor check is conducted on the total hydrocarbon analyzers equipped with non-methane cutters every six (6) months following the procedures in 40 CFR 60, Subpart JJJJ. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- An isokinetic sampling rate of 90-110% will be maintained, as applicable.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

4.3 Analytical Laboratory

Analytical laboratory selection for sample analyses is based on the capabilities, certifications and accreditations that the laboratory possesses. An approved analytical laboratory subcontractor list is maintained with a copy of the certificate and analyte list as evidence of compliance. Alliance assumes responsibility to the client for the subcontractor's work. Alliance maintains a verifiable copy of the results with chain of custody documentation.

Jon Niermann, *Chairman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 14, 2024

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2024
Expiration Date: 02/28/2025
Document ID: TX-C24-00053

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2024

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix K

Special Conditions

Permit Numbers 2975 and PSDTX778M2

Emission Standards

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates," and those sources are limited to the emission limits and other conditions specified in the attached table including emissions from maintenance, startup, and shutdown (MSS) activities represented on pages B-1 and B-2 of the February 11, 2005, amendment application for Recovery Furnace Nos. 1 and 2.

   In addition, this permit authorizes all emissions from planned startup and shutdown activities associated with facilities or groups of facilities that are authorized by this permit.

Fuel Specifications

2. Fuel for mill combustion sources shall be limited as follows:

   A. Fuel for No. 2 Power Boiler (Emission Point Number [PN PB02]) shall be limited to bark and wood materials (defined as any uncontaminated wood materials including but not limited to sawdust, pallets, size-reduced limbs, and any other wood material from a tree such as nut shells); pipeline-quality, sweet natural gas as defined in the General Rules; Nos. 2, 4, and 6 fuel oil containing less than 3 percent sulfur by weight; primary clarifier underflow fiber cake (sludge from the wastewater treatment plant) as defined in the file by correspondence dated October 21, 1994, or used railroad crossties (26.2 tons per hour [tph] based on a 30-day average). All railroad crossties used as fuel in the No. 2 Power Boiler shall meet the specifications of Title 40 Code of Federal Regulations (40 CFR) Part 241, Subpart B, § 241.4(a). **(11/22)**

   The burning rate for bark is limited to 75 tph. Compliance with this rate shall be determined by a 30-day average. Records shall be maintained on-site for a rolling 24-month period and made available to personnel from the TCEQ upon request.

   B. Fuel for the No. 1 Power Boiler (EPN PB01) shall be limited to natural gas. Nos. 2, 4, and 6 fuel oils containing no more than 3 percent sulfur by weight. If the sulfur content of the fuel oil will exceed 3 weight percent, the permit holder must notify the TCEQ Regional Office and propose a fuel mixing plan that will not cause an exceedance of the maximum allowable emission rates; otherwise, the permit holder must obtain approval from the Executive Director.

   Annual fuel firing rates (MMBtu/yr, HHV) are limited as follows: Natural Gas - 5,725,625; No. 6 Fuel Oil - 681,120; Total Fuel Oils (Nos. 2, 4, and 6 Fuel Oils) - 3,300,910; Total - All Fuels (Natural Gas and Fuel Oils) - 5,725,625.

   While firing only No. 6 fuel oil, the total hours of operation for the No. 1 Power Boiler over any consecutive 12-month period shall not exceed a maximum of 720 hours.

   C. The Nos. 1 and 2 Lime Kilns (EPNs LK01 and LK02) shall burn only pipeline-quality, sweet natural gas as defined in the General Rule and Nos. 2, 4, and 6 fuel oils containing less than 3 percent sulfur by weight.

   D. Auxiliary fuel for the Recovery Furnace Nos. 1 and 2 shall be only pipeline-quality, sweet natural gas as defined in the General Rules.

   E. Auxiliary fuel for the NCG Oxidation Unit shall be sweet natural gas. This fuel shall be used, as necessary, to maintain the required minimum temperature in the NCG Oxidation Unit.

Use of any other fuel shall require prior approval from the Executive Director of the Texas Commission on Environmental Quality (TCEQ).

Federal Applicability

3. These facilities shall comply with all applicable requirements of the U.S. Environmental Protection Agency (EPA) regulations on Standards of Performance for New Stationary Sources in 40 CFR Part 60, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart BB - Kraft Paper Mills (The Smelt Dissolving Tank No. 2, the non-condensable gas (NCG) oxidation unit, the Recovery Furnace Nos. 1 and 2, and all affected facilities);

   C. Subpart D - Commercial Steam Generating Units (Power Boiler No. 2 [EPN PB02]); and

   D. Subparts A and BB, § 60.283 (a)(1)(iii) only - Kraft Pulp Mills (Power Boiler No. 2 [EPN PB02]).

4. These facilities shall comply with all applicable requirements of the EPA regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 63, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart S – Pulp and Paper Industry;

   C. Subpart MM - Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (Lime Kiln Nos. 1 and 2 (Emission Point Nos. [EPN] LK01 and LK02), Recovery Furnace Nos. 1 and 2 (EPNs RB01 and RB02), and Smelt Dissolving Tank Nos. 1 and 2 (EPNs SM01 and SM02); and

   D. Subpart DDDDD - Industrial, Commercial, and Institutional Boilers (Power Boiler No. 1 [EPN PB01] and Power Boiler No. 2 [EPN PB02], and all affected facilities).

5. These facilities shall comply with all applicable requirements of the EPA Regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 61, specifically the following:

   A. Subpart A - General Provisions; and

   B. Subpart E – Mercury (Power Boiler No. 2 [EPN PB02]).

Opacity/Visible Emission Limitations

6. Opacity of emissions from Power Boiler No. 1, the Smelt Tank Scrubber Nos. 1 and 2, the Lime Kiln Stack Nos. 1 and 2, the NCG oxidation unit scrubber, and the Recovery Furnace Stack Nos. 1 and 2 shall not exceed 20 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in Title 30 Texas Administrative Code (30 TAC) §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

7. Opacity of emissions from any uncontrolled stationary vent shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS. If this condition is violated, further controls may be required to be installed and/or implemented to limit visible emissions.

8. Opacity of emissions from the A-Line and B-Line Bleach Plant Scrubbers shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

Operational Limitations, Work Practice, and Plant Design

9. Power Boiler No. 1 (EPN PB01) emission concentrations are limited as follows during production operations:

   A. Nitrogen oxides (NO_x): 0.6 lb/ million British Thermal Unit (MMBtu) (24-hour average).

   B. Carbon monoxide (CO): 400 parts per million dry volume (ppmv), corrected to 3 percent dry oxygen. (24-hour average).

   C. Sulfur dioxide (SO_2): 440 ppmv (3-hour average) for fuel oil firing.

10. In-stack concentration of sulfur dioxide (SO_2) from Recovery Furnace Nos. 1 and 2 shall not exceed 300 parts per million by volume (ppmv) and 100 ppmv during production operations, averaged over a three-hour and a yearly period, respectively, and corrected to a dry 8 percent oxygen (O_2) basis. Compliance with the SO_2 concentrations provided in this condition may be determined by the use of continuous monitoring data.

11. The No. 1 Lime Kiln shall comply with the following limitations during production operations:

   A. The maximum total reduced sulfur (TRS) shall be 20 parts per million by volume (ppmv) corrected to 10 percent oxygen (O_2) (measured as hydrogen sulfide, 12-hour average).

   B. The maximum total carbon monoxide shall be 0.064lb/MMBtu (short term)(24-hr average) and 0.051 lb/MMBtu (annual).

   C. The maximum nitrogen oxides shall be 0.17 lb/MMBtu (fuel oil) (24-hour average) and 0.18 lb/MMBtu (natural gas) (24-hour average).

12. PB01 shall be equipped with multi-cyclones to control emissions of PM, and shall be equipped with at least a 218.9-foot tall stack, as measured from the ground level, to provide adequate dispersion of the boiler exhaust and shall have no raincaps or other similar devices that will prevent adequate dispersion of the boiler exhaust. The permit holder shall install stack testing port in the boiler stack.

13. The EPN PB02 shall be equipped with multi-cyclones and a scrubber with the following control efficiencies: 95 percent removal efficiency for hydrogen chloride, 98.5 percent for total particulate matter (PM) and 90 percent for SO_2.

14. Maximum hourly emission rates (ER) for EPN PB02 shall be based on 24-hour averages (except for SO_2 when firing fuel oil, which shall be based on a three-hour averaging time according to 30 TAC §112.9 and NO_x, which shall also be based on a three-hour averaging time according to 40 CFR Part 60, Subpart D).

    The mill is authorized to operate:

    24 hours/day, 7 days/week, 52 weeks/year, and 8,760 hours /year and 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

15. Emissions of chlorine (Cl_2) and chlorine dioxide (ClO2) from the bleaching plant shall be minimized by the use of weak wash (sodium sulfide solution) scrubbers equipped with a pH monitor and control system. The solution of the scrubbers shall be maintained at a minimum pH of eight in order to insure that the emission control efficiencies are maintained at the following values:

Scrubber and Emission Point No.	Emission Control Efficiencies
B-line (BP14)	95 percent (Cl_2/ClO2)
B-line (BP15)	95 percent (Cl_2/ClO2)
A-line (BP16)	95 percent (Cl_2/ClO2)

    The bleach plant lines are also authorized to operate as follows:

    A. When both the A- and B-lines are operating, the B-line bleach plant vents can be routed to the A-line bleach plant scrubber (EPN BP16).

    B. When the B-line is not operating, the A-line bleach plant vents can be routed to the B-line bleach plant scrubbers (EPNs BP14 and BP15).

        This is in line with MAERT statement that emissions from all three scrubbers shall be summed for compliance.

16. In order to maintain the maximum combustion efficiency for TRS compounds and NCGs, the NCG oxidation unit shall be operated as shown in Special Condition No. 21 with a residence time of 0.11 seconds (minimum) and a TRS removal efficiency of 99.9 percent. Immediate corrective action shall be taken when the O_2 deviates below 4 percent per (3-hour rolling average).

17. The SO_2 packed tower scrubber on the NCG oxidation unit shall use a recirculating sodium hydroxide solution. The solution shall be maintained at the minimum pH to ensure good SO_2 removal.

18. Recovery Furnace No. 1 (EPNs RB01A and RB01B) shall be limited to 54.5 tph of black liquor solids and a natural gas firing rate of 375 MMBtu/per hour (hr). Recovery Furnace No. 2 (EPNs RB02A and RB02B) is limited to 99.25 tph of black liquor solids and a natural gas firing rate of 750 MMBtu/hr. The maximum hourly ER for most pollutants from Recovery Furnace Nos.1 and 2 are based on a 24-hour averaging time except for TRS (as hydrogen sulfide [H_2S]) which is based on a 12-hour averaging time while PM and SO_2 are based on a 3-hour averaging time.

    The maximum ER for the Recovery Furnace Nos. 1 and 2 shall be split between the two stacks in the MAERT for accounting purposes only. To determine compliance with the MAERT, the

emission rates listed for each stack shall be summed since each furnace is a single facility and the individual stack emissions may vary.

In order to comply with the PM/PM_{10} MSS emission limits represented in the MAERT for the four Recovery Furnace Stacks (EPNs RB01A, RB01B, RB02A, and RB02B) during planned MSS activities, the planned MSS activities shall be limited to 25 hours per year for each of the four Recovery Furnace Stacks.

19. Lime Kiln No. 1 (LK01) is limited to 228 tons per day and 68,620 tons per year. The maximum firing rate for LK01 using either Nos. 2, 4, or 6 fuel oils shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 420,480 MMBtu/yr. The maximum firing rate for LK01 using natural gas shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 550,000 MMBtu/yr.

20. Lime Kiln No. 2 (LK02) shall be limited to 400 tons per day of lime with a burner rating of 132.3 MMBtu/hr for short-term oil firing or 113.3 MMBtu/hr for sustained oil firing, and 113.3 MMBtu/hr for both short-term and sustained firing for natural gas. The maximum hourly ER for most pollutants from EPN LK02 shall be based on a 24-hour averaging time except for TRS (as H_2S) which is based on a 12-hour averaging time while PM and SO_2 shall be based on a three-hour averaging time.

Demonstration of Continuous Compliance

21. The following parameters shall be monitored and recorded:

Table 1: Monitoring Parameters and Limits

Unit	Parameter	Limit
Smelt Tank Scrubber No. 1	PM - Fan motor current	Title V Compliance Assurance
	PM - Liquid flow rate to scrubber	Monitoring (CAM)*
	PM - Liquid flow rate to fan	Title V CAM*
	PM (Opacity) - Fan motor current	Title V CAM*
	PM (Opacity) - Liquid flow rate to scrubber	Title V Periodic Monitoring*
	PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring*
		Title V Periodic Monitoring*

Unit	Parameter	Limit
Smelt Tank Scrubber No. 2[H]	PM - Fan motor current PM - Liquid flow rate to scrubber PM - Liquid flow rate to fan PM (Opacity) - Fan motor current	Title V CAM * Title V CAM* Title V CAM* TitleV Periodic Monitoring*
Smelt Tank Scrubber No. 2[H]	PM (Opacity) - Liquid flow rate to scrubber PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring* Title V Periodic Monitoring*
Precipitator Ash Tank No. 2	Temperature	235^{O}F maximum, daily average
No. 2 Recovery Boiler Ash Tank	Temperature	235^{O}F maximum, daily average
Power Boiler No. 1	Opacity SO_2 - Fuel sulfur content	20 percent Title V Periodic Monitoring*
Power Boiler No. 2[I]	PM - Liquid flow rate PM - Pressure drop PM (Opacity) - Liquid flow rate PM (Opacity) - Pressure drop SO_2 NO_x O_2	Title V CAM* Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring* MAERT MAERT
Lime Kiln No. 1 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop	Title V CAM * Title V CAM* Title V Periodic Monitoring*

Unit	Parameter	Limit
	PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring*
Lime Kiln No. 2 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop PM (Opacity) - Liquid flow rate	Title V CAM * Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring*
A-Line Bleach Plant Scrubber	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber North	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber South	PM (opacity) -pH of scrubbing liquid PM (opacity) - Fan motor current PM(Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*

Unit	Parameter	Limit
Recovery Furnace No. 1 Stack[H]	PM - Opacity TRS SO_2 Black liquor solids Opacity	Title V CAM* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 54.5 ton/hr (24-hr average) 20% maximum
Recovery Furnace No. 2 Stack[H]	PM - Opacity PM (Opacity) - Opacity TRS SO_2 Black liquor solids	Title V CAM* Title V Periodic Monitoring* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 99.25 ton/hr (24-hr average)
NCG Oxidation Unit	TRS - Combustion Chamber temperature Excess O_2 in exhaust SO_2 - pH of scrubbing liquid SO_2 - Liquid flow rate	Title V CAM* with a minimum temperature of 1579^{O}F. <20 ppmv of Methanol (3-hour rolling averaging period) 4% minimum 7.0 minimum# 150 gpm minimum#

* The specific limit is included in the “Additional Monitoring Requirements Section” in the Title V permit (Permit No. O-01378).

H-see NSPS BB for recordkeeping requirements.

I-see NSPS D for recordkeeping requirements.

CAM Requirements for SO_2 emissions from NCGO1: In order to maintain adequate SO_2 control for the emissions associated with the NCG Oxidation Unit, the control device associated with this source shall be monitored according to the following:

Table 2: Monitoring Parameters for NCG Oxidation Unit

Control Device	Monitoring Parameter	Minimum Monitoring Frequency**	Deviation limit
NCG Oxidation Unit Scrubber (NCGO1)	pH	once per day	7.0 minimum
	Liquid flow rate	once per day	150 gpm

** International Paper may elect to collect monitoring data on a more frequent basis than is required by the minimum frequency and calculate a daily average for purposes of determining whether a deviation has occurred. However, the additional points must be collected on a regular basis and shall not be collected and used in particular instances in order to avoid reporting deviations.

pH: Each monitoring devices shall be cleaned with an automatic cleaning system, or cleaned weekly using hydraulic, chemical, or mechanical cleaning. Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least weekly, whichever is more frequent, and shall be accurate to within +0.5 pH unit.

Liquid flow rate: Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within one of the following:

- ±2% of span; or
- ±5% of design liquid flow rate

The monitoring parameter must be measured and recorded at the frequency indicated above. Immediate corrective action should be taken if the monitoring parameter falls outside of the range specified in this condition.

22. Disposal of particulate collected in all control devices shall be accomplished in such a manner which will prevent PM from becoming airborne.

23. The permit holder shall install, calibrate, and maintain a continuous emission monitoring system (CEMS) to measure and record the in-stack concentration of NO_x and SO_2 from Power Boiler No. 2 (EPN PBO2), TRS, and SO_2 from Recovery Furnace No. 1 (EPNs RBO1A and RBO1B) and Recovery Furnace No. 2 (EPNs RBO2A and RBO2B), and TRS from Lime Kiln Nos. 1 and 2 (EPNs LKO1 and LKO2).

    A. The CEMS shall meet the design and performance specifications, pass the field tests, and meet the installation requirements and the data analysis and reporting requirements specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B. If there are no applicable performance specifications in 40 CFR Part 60, Appendix B, contact

the TCEQ Office of Permitting, and Registration, Air Permits Division for requirements to be met.

B. Section 1 below applies to sources subject to the quality-assurance requirements of 40 CFR Part 60, Appendix F; section 2 applies to all other sources:

(1) The permit holder shall assure that the CEMS meets the applicable quality-assurance requirements specified in 40 CFR Part 60, Appendix F, Procedure 1. Relative accuracy exceedances, as specified in 40 CFR Part 60, Appendix F, § 5.2.3 and any CEMS downtime shall be reported to the appropriate TCEQ Regional Director, and necessary corrective action shall be taken. Supplemental stack concentration measurements may be required at the discretion of the appropriate TCEQ Tyler Regional Director. Downtime is not considered to include periods when the CEMS is operational but the 24-hour span drift exceeds the allowable amounts.

(2) The system shall be zeroed and spanned daily and corrective action taken when the 24-hour span drift exceeds two times the amounts specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B, or as specified by the TCEQ if not specified in Appendix B. Zero and span are not required on weekends and plant holidays if instrument technicians are not normally scheduled on those days, unless the monitor is required by a subpart of NSPS or NESHAPS in which case zero and span shall be done daily without exception.

Each monitor shall be quality-assured at least quarterly using cylinder gas audits (CGA) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.2, with the following exception: RATAs are not required for these systems. For non-NSPS sources, an equivalent quality-assurance method approved by the TCEQ may also be used and an annual RATA is not required.

C. The monitoring data shall be reduced to hourly average concentrations at least weekly, using a minimum of four equally-spaced data points from each one-hour period. The individual average concentrations shall be reduced to units of the permit allowable ER in pounds per hour (lb/hr) at least once every calendar quarter (except for O_2) as follows:

The measured hourly average concentration from the CEMS shall be multiplied by the gas flow rate (either as measured according to 40 CFR Part 60, Appendix A, Methods 1 through 4, or as calculated by appropriate F factor according to 40 CFR Part 60, Appendix A, Method 19) to determine the hourly ER.

D. All monitoring data and quality-assurance data shall be maintained for a period of 60 months. The data from the CEMS may, at the discretion of the TCEQ, be used to determine compliance with the conditions of this permit.

E. For SO_2 from EPNs RBO1A & RBO1B and EPNs RBO2A & RBO2B, and TRS from EPNs LKO1 and LKO2, up to 5 percent invalid monitoring data on a rolling 12-month basis is acceptable provided it is only generated when the monitor is broken down, out-of-control (producing inaccurate data); being repaired, having maintenance performed, or being calibrated (data not obtained during any daily zero and span performed is not considered invalid data).

The data availability shall be calculated as the total fired unit operating hours for which quality-assured data was recorded divided by the total fired unit operating hours. The measurements missed shall be estimated using engineering judgment and the methods used recorded. Options to increase system reliability to an acceptable value, including a redundant CEMS, may be required by the TCEQ Tyler Regional Director.

24. The holder of this permit shall install, calibrate, and maintain a continuous opacity monitoring system (COMS) to measure and record the in-stack concentration of opacity from PB01. The COMS shall be operated in accordance with 40 CFR § 60.13. This special condition shall only apply when fuel oil is being fired in PB01. **(01/18)**

25. Upon request by the TCEQ Executive Director, the holder of this permit shall be required to perform stack sampling analysis for PM, total volatile organic compounds (VOC), NO_x, CO, SO_2, methanol, and formaldehyde and/or other testing as required to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere from the facilities covered by this permit. Sampling must be conducted in accordance with appropriate procedures of the TCEQ Sampling Procedures Manual or in accordance with applicable U.S. Environmental Protection Agency Code of Federal Regulations procedures. Any deviations from those procedures must be approved by the TCEQ Executive Director prior to sampling. The holder of this permit is responsible for providing sampling and testing facilities and conducting the sampling and testing operations at his expense.

    The facilities shall operate at the maximum achievable fuel-firing rate during stack emission testing. Primary operating parameters that enable determination of fuel-firing rate shall be monitored and recorded during the stack test. These parameters are to be determined at the pretest meeting. If the facilities are unable to operate at maximum fuel-firing rate during testing, then future fuel-firing rate may be limited to the rate established during testing. Additional stack testing may be required when higher fuel-firing rates are achieved.

26. Upon request by the Executive Director of the TCEQ or any local air pollution control program having jurisdiction, the holder of this permit shall provide a sample and/or an analysis of the fuel utilized in this facility or shall allow air pollution control agency representatives to obtain a sample for analysis.

27. Due to the high moisture content in the gas stream exiting the scrubber, a continuous opacity monitor as specified in NSPS D is not feasible. To verify the particulate emissions are within NSPS limits, the Power Boiler No. 2 shall be tested once a year for total suspended particulate and any other pollutant at the request of the TCEQ Regional Office.

Recordkeeping Requirements

28. Records shall be maintained at this facility site and made available at the request of personnel from the TCEQ or any other air pollution control program having jurisdiction to demonstrate compliance with permit limitations. These records shall be totaled for each calendar month, retained for a rolling 60-month period, and include the following:

    A. Records of all production rates, ERs, and operating parameters necessary to demonstrate compliance with this permit on-site for a rolling five-year period. Records shall include certification from all suppliers of used railroad crossties that all railroad crossties received at the site meet the specifications of 40 CFR Part 241, Subpart B, § 241.4(a). The holder shall provide access and/or copies of these records to the Executive Director of the TCEQ and/or his representatives and any local air pollution control program upon request. **(11/22)**

    B. The quantity of each fuel (MMBtu/hr basis) fired per month (PB01 only).

    C. The quantity of calcium oxide (tons) produced per day.

D. Annual report from the natural gas supplier identifying total H_2S content and from the fuel oil supplier identifying total sulfur content of Nos. 2, 4, and 6 fuel oils sold to permit holder to demonstrate compliance with this permit.

E. Copies of stack sampling reports conducted on the facilities covered by this permit. The stack sampling reports shall be kept at the site for a period of at least five years from the time sampling was completed.

F. Preventive maintenance, schedule maintenance, and repairs performed on any abatement devices shall be recorded as they occur.

29. All the records required by this condition shall be maintained for at least five years and made available to representatives of the TCEQ or any local air pollution control program having jurisdiction upon request.

Date: November 15, 2022

Emission Sources - Maximum Allowable Emission Rates

Permit Numbers 2975 and PSDTX778M2

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SM01	No. 1 Smelt Tank Scrubber	PM	10.90	47.74
		PM_{10}	10.90	47.74
		$PM_{2.5}$	10.90	47.74
		VOC (note a)	1.37	6.02
		SO_2	3.28	14.37
		H_2SO_4	0.15	0.66
		TRS (note b)	1.80	7.88
		NO_X	1.80	7.88
		NH_3	2.51	8.99
SM02	No. 2 Smelt Tank Scrubber	PM	19.85	86.94
		PM_{10}	19.85	86.94
		$PM_{2.5}$	19.85	86.94
		VOC	2.50	10.95
		SO_2	6.78	29.70
		H_2SO_4	0.31	1.36
		TRS	3.28	14.35
		NO_X	3.28	14.35
		NH_3	4.57	16.37
LK01** (A^1)	Lime Kiln No. 1	PM	27.60	99.80
		PM_{10}	27.60	99.80
		$PM_{2.5}$	27.60	99.80

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	2.20	8.10
		SO_2	2.30	8.40
		H_2SO_4	0.06	0.13
		TRS	2.60	9.30
		NO_X	18.90	49.50
		CO	6.80	14.20
PB01*** (A^1, A^2)	No. 1 Power Boiler (Natural Gas and Fuel Oil Firing)	PM	61.21	185.22
		PM_{10}	61.21	185.22
		$PM_{2.5}$	61.21	185.22
		VOC	8.26	16.70
		NO_X	567.60	1717.69
		SO_2	841.20	1328.25
		CO	264.88	801.59
		H_2SO_4	4.03	4.43
		TRS	0.67	0.26
LK02** (A^1)	Lime Kiln No. 2	PM	26.30	115.19
		PM_{10}	26.30	115.19
		$PM_{2.5}$	26.30	115.19
		NO_X	38.91	145.90
		SO_2	1.20	5.26
		H_2SO_4	0.25	1.07
		CO	4.44	19.45
		TRS	2.50	10.95
		VOC	4.00	17.52

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
PB02**** (A^1, A^2, A^3)	Power Boiler No. 2 (including MSS) (note c)	PM	108.70	466.58
		PM_{10}	108.70	466.58
		$PM_{2.5}$	108.70	466.58
		VOC	54.81	237.80
		NO_X	326.10	1399.75
		SO_2	770.00	780.66
		CO	1102.55	4732.57
		H_2SO_4	16.57	71.02
		TRS	1.66	6.74
RB01A** (A^1, A^2)	No. 1 Recovery Furnace North Stack (Normal ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01A** (A^4)	No. 1 Recovery Furnace North Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB01B** (A^1, A^2)	No. 1 Recovery Furnace South Stack (Normal Ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01B** (A^4)	No. 1 Recovery Furnace South Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB02A** (A^1, A^2)	No. 2 Recovery Furnace West Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02A** (A^4)	No. 2 Recovery Furnace West Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
RB02B** (A^1, A^2)	No. 2 Recovery Furnace East Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02B** (A^4)	No. 2 Recovery Furnace East Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
BG01 (A^1)	Lime System Baghouse No. 1	PM	0.06	0.21
		PM_{10}	0.06	0.21
		$PM_{2.5}$	0.06	0.21
BG02 (A^1)	Lime System Baghouse No. 2	PM	0.10	0.44
		PM_{10}	0.10	0.44
		$PM_{2.5}$	0.10	0.44
LS01	No. 1 Lime Slaker	PM	0.02	0.08
		PM_{10}	0.02	0.08
		$PM_{2.5}$	0.02	0.08
		VOC	0.39	1.41
		NH_3	9.39	33.63
LS02	No. 2 Lime Slaker	PM	0.02	0.10
		PM_{10}	0.02	0.10
		$PM_{2.5}$	0.02	0.10
		VOC	0.68	2.99

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		NH_3	17.10	61.24
BP0351 (A^5)	Methanol Storage Tank	CH_3OH	19.03	0.73
BP0368 (A^5)	Hydrogen Peroxide Tank	H_2O_2	2.21	0.09
NCG01 (A^1, A^3)	NCG Oxidation Unit Scrubber	PM	2.57	9.19
		PM_{10}	2.57	9.19
		$PM_{2.5}$	2.57	9.19
		VOC (note a)	1.10	3.95
		NO_X	5.57	19.96
		SO_2	15.84	69.37
		CO	9.94	35.61
		H_2SO_4	6.01	26.28
		TRS	0.99	4.36
NCG02 (A^5)	Combined Contaminated Condensate Tank	TRS	<0.10	0.40
NCGF1	NCG Fugitives (4)	TRS	0.36	1.56
DIG1	Batch Digester Fugitives (4)	VOC	4.80	19.19
		TRS	0.87	3.46
WWTS1 (A^6, A^7)	Waste Water Treatment Fugitives (4)	VOC	348.16	740.78
		TRS	22.82	81.72
BP14#	B-Line Bleach Plant Scrubber (North)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BP15#	B-Line Bleach Plant Scrubber (South)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37
BP16#	A-Line Bleach Plant Scrubber (5)	Cl_2	0.20	0.86
		ClO_2	11.31	49.51
		CO	39.00	117.37
		VOC	4.17	12.28
		TRS	0.12	0.37
BP01	Bleach Plant Fugitives (4)	Cl_2	0.20	1.00
		ClO_2	0.20	1.00
CLT01 (A^5)	No. 1 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
CLT02 (A^5)	No. 2 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
WLT01 (A^5)	No. 1 Weak Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLT02 (A^5)	No. 2 Weak Liquor Storage Tank (5)	VOC	0.54	2.34
		TRS	0.12	0.51
HLT01 (A^5)	No. 1 Strong/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
HLT02 (A^5)	No. 2 Storage/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SCT01 (A[5])	No. 1 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SCT02 (A[5])	No. 2 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS01 (A[5])	No. 1 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS02 (A[5])	No. 2 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST01 (A[5])	No. 1 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST02 (A[5])	No. 2 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
BLDF01 (A[5])	Black Liquor Digester Fill Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
CT01 (A[5])	Spill Collection Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
ST01 (A[5])	Swing Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST01 (A[5])	No. 1 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST02 (A[5])	No. 2 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST03 (A[5])	No. 3 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BOT01 (A^5)	Evaporator Boil Out Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
DT01 (A^5)	Black Liquor Dump Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLSC01 (A^5)	Weak Liquor Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
FOT (A^5)	Fuel Oil Tank (5)	VOC	1.52	6.64
		TRS	0.19	0.84
CPFUG (note d)	Caustic Plant Fugitives (4)	NH_3	7.31	26.17
		VOC	16.25	68.30
		TRS	3.18	13.91
CP01 (A^5)	No. 1 Causticizer Tanks (5)	NH_3	2.59	9.28
		VOC	0.01	0.03
CP02 (A^5)	No. 2 Causticizer Tank (5)	NH_3	4.72	16.89
		VOC	0.01	0.06
WLOXT1 (A^5)	White Liquor Oxidation Tank (5)	NH_3	0.10	0.44
		VOC	0.26	1.16
		TRS	0.56	2.45
KNCONV	A-and B-Line Knotter Conveyor (4)	VOC	0.01	0.04
AQS	A-Line Quaternary Screen (4)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
BQS	B-Line Quaternary Screen (4)	VOC	0.01	0.03
		TRS	<0.01	<0.01
ASDT (A^5)	A-Line Screen Dilution	VOC	0.01	0.02

Project Number: 262778

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
	Tank (5)	TRS	<0.01	<0.01
BSDT (A^5)	B-Line Screen Dilution Tank (5)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
ADHV1/ADSP1	A-Line Decker Hood Vent and A-Line Decker Seal Pit Vent (5)	VOC	9.24	27.20
		TRS	4.06	11.95
BDHV1/BDSP1	B-Line Decker Hood Vent and B-Line Decker Seal Pit Vent (5)	VOC	13.55	54.41
		TRS	5.95	23.89
CPS1 (note e)	Chip/Bark Handling Fugitives (4)	PM	3.35	13.59
		PM_{10}	1.58	6.43
		$PM_{2.5}$	1.58	6.43
REJBIN2	Reject Bin	CH_3OH	0.03	0.10
LOG-1A	Log Processing 1A (4)	PM	0.73	3.20
		PM_{10}	0.22	0.96
		$PM_{2.5}$	0.22	0.96
HDST1 (A^5)	No. 1 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
HDST2 (A^5)	No. 2 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
ALDST (A^5)	A-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
BLDST (A^5)	B-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
AWTST (A^5)	A-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94

Project Number: 262778

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BWTST (A[5])	B-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
(note f)	Extruder No. 5 Vents and Fugitives (4)	PM	3.18	13.91
		PM_{10}	3.18	13.91
		$PM_{2.5}$	3.18	13.91
		VOC	2.07	9.05
		NO_X	0.29	1.29
		CO	0.25	1.08
		SO_2	<0.01	0.01
(note f)	Extruder No. 7 Vents and Fugitives (4)	PM	3.18	13.92
		PM_{10}	3.18	13.92
		$PM_{2.5}$	3.18	13.92
		VOC	2.07	9.05
		NO_X	0.30	1.33
		CO	0.26	1.12
		SO_2	<0.01	0.01
(note g)	Nos. 1 and 3 Paper Machines and Dryer Exhaust (5)	PM	0.19	0.83
		PM_{10}	0.19	0.83
		$PM_{2.5}$	0.19	0.83
		VOC	8.74	38.27
		NO_X	2.50	10.93
		CO	2.10	9.18
		SO_2	0.01	0.07
TNK0115, TNK0116,	Starch Silo Nos. 1 -3	PM	0.02	0.02

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
and TNK0175 (A[1])		PM_{10}	0.02	0.02
		$PM_{2.5}$	0.02	0.02
PAINTYD (A[8])	Sitewide Painting Activities (4)	PM	70.31	32.72
		PM_{10}	70.31	32.72
		$PM_{2.5}$	70.31	32.72
		VOC	96.05	28.94
BSS1 – BSS5 (A[5])	Nos. 1-5 Bleached Stock Storage Tanks (4)	VOC	0.04	0.17
(note h)	Paper Machine Tanks and Chests (4)	VOC	0.16	0.68
HVLC-1	HVLC Vent	VOC	157.78	23.09
		CO	3.19	0.51
		TRS	33.30	4.77
AWSST (A[5])	A-Line Washed Stock Chest (5)	VOC	0.72	3.16
		TRS	0.28	1.21
BWSST (A[5])	B-Line Washed Stock Chest (5)	VOC	0.74	3.26
		TRS	0.28	1.21

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) PM - particulate matter, suspended in the atmosphere, including PM_{10}
PM_{10} - total particulate matter equal to or less than 10 microns in diameter, including $PM_{2.5}$, as represented
$PM_{2.5}$ - particulate matter equal to or less than 2.5 microns in diameter
Emissions of $PM_{2.5}$ is added to the Maximum Allowable Emission Rates Table (MAERT) upon issuance of the permit. These emissions were previously quantified and authorized as PM or PM_{10}, but were not speciated in the MAERT.
VOC - volatile organic compounds as defined in Title 30 Texas Administrative Code §101.1
SO_2 - sulfur dioxide
H_2SO_4 - sulfuric acid
TRS - total reduced sulfur
NO_x - nitrogen oxides
NH_3 - ammonia
Cl_2 - chlorine
ClO_2 - chlorine dioxide (chlorine peroxide)

Emission Sources - Maximum Allowable Emission Rates

CO - carbon monoxide
H_2S - hydrogen sulfide
CH_3OH - methanol
H_2O_2 - hydrogen peroxide
$CHCl_3$ - chloroform
$CHBrCl_2$ - bromodichloromethane

(4) Fugitive emissions are an estimate only and should not be considered as a maximum allowable emission rate.
(5) The VOC and TRS emission rates for this point are considered to be estimates only and are not intended to be enforceable limits.
(6) Planned startup and shutdown emissions are included, as well as planned maintenance activities identified as part of permit alteration issued on April 24, 2013.
A^1 Emissions from planned startup and shutdown activities included.
A^2 Emissions from soot blowing included.
A^3 Emissions from control device for evaporator and concentrators boil outs included.
A^4 Emissions from planned MSS activities included.
A^5 Emissions from draining/degassing included.
A^6 Emissions from dredging and other maintenance (e.g., ponds and collection system) included.
A^7 Emissions from maintenance throughout the mill included.
A^8 Emissions from maintenance painting included.

* Unless otherwise specified, emission rates are based on operating 8,760 hours per year or 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

** Pound per hour rates, TRS emissions based on a 12-hour averaging time, PM/PM_{10} and SO_2 based on a 3-hour averaging time, all other pollutants are based on a 24-hour averaging time.

*** Pound per hour rates, SO_2 and NO_x emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

**** Pounds per hour rates, SO_2 emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

Emissions from the Bleach Plant Scrubbers (EPNs BP14, BP15, and BP16) should be summed up when determining compliance since individual emissions may vary.

Notes:

(a) All VOCs are reported as carbon unless otherwise specified.
(b) All TRS emission rates are reported as H_2S unless otherwise specified.
(c) The SO_2 hourly rates for the Power Boiler No. 2 include combustion of total reduced sulfur compounds during periods when the NCG oxidizer is inoperable.
(d) Green liquor clarifiers (2), green liquor storage tanks (3), weak wash storage tanks (2), white liquor clarifiers (2), white liquor storage tanks (4), white liquor/digestor fill tank, mud washers (2), mud storage tanks (2), mud precoat filters (2), and dregs filter.
(e) These fugitives occur from the chip and RDF handling operations.
(f) Includes the pre-treater stacks (EX5PRE1, EX5PRE2, EX7PRE1, EX7PRE2), the laminator stack (EX5LAM1, EX5LAM2, EX7LAM1, EX7LAM2), the post-treater stack (EX5POSTTR, EX7POSTTR), and fugitives (EXFUG5, EXFUG7) for each extruder.
(g) The Paper Machine Nos.1 and 3 consist of 18 exhaust vents and fugitive emissions.
(h) Includes pine tanks (PINETK3, PINETK1S, PINETK1), hardwood tanks (HDWD1, HDWD3), machine chests (MACHCH1, MACHCH3), and broke storage tanks (BRST1A, BRST1B, BRST3A).

Date: August 10, 2017

Last Page of Report

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source Tested:
No. 2 Smelt Tank Scrubber (SM02)

Test Date:
October 28, 2025

Project No. AST-2025-3989

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citations	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
W Graphic Packaging International Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Timothy Branham
timothy.branham@alliancetg.com
(479) 206-1993

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewers
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

COMPANY:		Graphic Packaging International		SOURCE:		SM02	
REVIEWER:				DATE OF SAMPLING:		October 28, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. D	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. D	Operating parameters of the pollution control equipment					
13.	App. D	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. C	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	N.A.	Chain of custody of samples					
31.	N.A.	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. C	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the sources and operating conditions that were tested during the specific test date and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections of this test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

November 17, 2025

Riley Wilson – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

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Appendix D Facility Data
Appendix E SSTP and Associated Documentation
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Appendix G Illustrations
Appendix H Resume of Field Team Leader

Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to the provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing was conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Tested Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-2: Project Team

Facility Personnel	John Fussell
Alliance Personnel	Riley Wilson Timothy Branham

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) that was developed by Alliance and approved by GPI. The SSTP is presented in Appendix E.

1.3 Technical Discussion

No operational or sampling pauses were recorded, and no technical difficulties or protocol deviations were encountered during this test program.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on October 28, 2025. Testing consisted of determining the concentration and emission rate of TRS at the exhaust of SM02.

Table 2-1 provides a summary of the emission testing results with comparisons to the applicable NSPS or TCEQ permit limits. Any difference between the summary of results listed in the following table and the detailed results contained in the appendices is due to rounding for presentation.

Table 2-1: Summary of Results

Run Number	Run 1	Run 2	Run 3	Average
Date	**10/28/25**	**10/28/25**	**10/28/25**	**--**
Total Reduced Sulfur (as H_2S) Data				
Emission Rate, lb/hr	0.70	0.91	0.91	0.84
Permit Limit, lb/hr	--	--	--	3.28
Percent of Limit, %	--	--	--	**26**
Emission Factor, lb/ton of black liquor solids	0.0075	0.0097	0.0097	0.0089
NSPS Limit, lb/ton of black liquor solids	--	--	--	0.033
Percent of Limit, %				**27**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods that are listed in Table 3-1. Method descriptions are provided below, and quality assurance/quality control data is provided in Appendix C.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Total Reduced Sulfur	16	Instrumental Analysis
Gas Dilution System Certification	205	---

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1 requirements. The inside diameter of the stack was determined. The upstream and downstream distances between the sampling point and the nearest flow disturbance were measured. The distance between each flow disturbance and the sampling point was expressed in units of stack diameters or stack equivalent diameter. In order to determine the minimum number of traverse points, the upstream and downstream distances were compared to Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas pressure differential (impact pressure vs. static pressure), static pressure and temperature at each measurement point. Pressure differential and static pressure were determined using an S-type pitot tube, an inclined manometer and flexible tubing used to connect both parts of the system. Stack gas temperature was determined using a K-type thermocouple and a pyrometer. The sensor tip of the K-type thermocouple was aligned with the nozzles of the S-type pitot tube in accordance with method requirements.

Stack gas pressure differential, static pressure and temperature measurements were recorded during each test run and were utilized to calculate stack gas velocity in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A –Oxygen and Carbon Dioxide Concentrations – Instrumental

The oxygen (O_2) and carbon dioxide (CO_2) concentrations were determined in accordance with U.S. EPA Reference Test Method 3A. Data was continuously collected and reported as one-minute averages. The sampling system consisted of a stainless-steel probe, unheated Teflon sample line(s), a gas conditioning system and the identified gas analyzer. The gas conditioning system consisted of a filter to remove particulate matter, and a non-contact condenser used to remove moisture from the stack gas. A portable non-contact condenser was placed in the system directly after the probe. A single-point sampling location was used for the determination of the stack gas molecular weight. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 16 – Total Reduced Sulfur

The total reduced sulfur testing was conducted in accordance with U.S. EPA Reference Test Method 16. The total reduced sulfur compounds consisted of hydrogen sulfide (H_2S), methyl mercaptan (MeSH), dimethyl sulfide (DMS), and dimethyl disulfide (DMDS).

The sampling system consisted of a heated Teflon probe, heated Teflon sample line, gas conditioning system, leak-free pump, unheated Teflon sample line, and a gas chromatograph (GC), which was equipped with a flame photometric detector (FPD). The gas conditioning system consisted of three (3) Teflon impingers. The first two (2) impingers each contained 100 mL of citrate buffer (for SO_2 removal), and the third impinger was empty. Each test run consisted of 16 injections, which were performed over a period of at least 3 hours.

The GC/FPD was calibrated for each reduced sulfur compound (H_2S, COS and CS_2) with a certified calibration gas, which was diluted with a dilution system. The dilution system was validated in accordance with EPA Method 205 to produce three (3) or more concentration levels, which spanned the linear range of the FPD. Calibration precision and calibration drift test values were maintained in accordance with EPA Method 16 requirements.

3.4 U.S. EPA Reference Test Method 205 – Gas Dilution System Certification

A calibration gas dilution system field check was conducted in accordance with U.S. EPA Reference Test Method 205. An initial three-point calibration was conducted with individual Protocol 1 gases on the analyzer used to complete the dilution system field check. Multiple dilution rates and total gas flow rates were utilized to force the dilution system to perform two (2) dilutions on each mass flow controller. The diluted calibration gases were sent directly to the analyzer, and the analyzer's response was recorded in an electronic field data sheet. A mid-level supply gas, which was certified to a concentration that was within 10% of one of the gas divider settings described above, was introduced directly to the analyzer, and the analyzer response was recorded in an electronic field data sheet. The analyzer's response was within 2% of the cylinder's concentration. These steps were repeated three (3) times. The average analyzer response was within 2% of the predicted gas concentration. No single injection differed by more than 2% from the average instrument response for its corresponding dilution. The Method 205 data is included in the Quality Assurance/Quality Control Appendix.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Direct Calibration & Calibration Error Test

Direct calibration consisted of introducing Low-Level gas directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration, and once the analyzer reading was stabilized, the analyzer value was recorded. This process was repeated with the High-Level gas. The Calibration Error Test consisted of sequentially introducing Low, Mid, and High-Level calibration gases directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

The system bias and response time were determined by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe, and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it

reached a stable value, and this value was recorded. Next, Low-Level gas was introduced at the probe, and the time that was required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) was recorded. If the Low-Level gas was zero gas, the response was 0.5% or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and the initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

Post test system bias checks were conducted by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe. Once the analyzer reading stabilized, the analyzer value was recorded. Next, Low-Level gas was introduced at the probe, and the analyzer response was recorded once it stabilized. If the System Bias was not within 5.0 percent of the Calibration Span or 0.5% absolute difference, the data was invalidated, and the Calibration Error Test and System Bias were repeated.

Post Test Drift Checks

Drift between pre- and post-run System Bias was within 3 percent of the Calibration Span or 0.5% absolute difference. If the drift exceeded 3 percent or 0.5%, the Calibration Error Test and System Bias were repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check was conducted prior to initiating testing. The pollutant concentrations were measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point was sampled for a minimum of twice the system response time.

The pollutant concentration at each traverse point did not differ more than 5 percent or 0.5 ppmv/0.3% (whichever was less restrictive) of the average pollutant concentration. A single point was sampled during the test runs. Copies of stratification check data can be found in the Quality Assurance/Quality Control Appendix.

Data Collection

A Data Acquisition System equipped with a battery backup was used to record the instrument response as one (1) minute averages. This data was continuously stored as a *.CSV file in Excel format, which was saved to the computer's hard drive. At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

Appendix A - Example Calculations

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	--	= barometric pressure, in. Hg
ΔH	--	= pressure differential of orifice, in H_2O
Pm	--	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	29.63	= barometric pressure, in. Hg
Pg	-0.50	= static pressure, in. H_2O
Ps	29.59	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Vm \times Pm \times Y}{Tm}$$

where,

Y	0.000	= meter correction factor
Vm	--	= meter volume, cf
Pm	--	= absolute meter pressure, in. Hg
Tm	--	= absolute meter temperature, °R
Vmstd	--	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	--	= weight of H_2O collected, g
Vwstd	--	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{\wedge}\left(6.37 - \left(\frac{2{,}827}{Ts + 364.47}\right)\right)}{Ps}$$

where,

Ts	146.6	= stack temperature, °F
Ps	29.6	= absolute stack gas pressure, in. Hg
BWSsat	0.233	= dimensionless

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	--	= standard wet volume, scf
Vmstd	--	= standard meter volume, dscf
BWS	--	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	0.233	= moisture fraction (theoretical at saturated conditions)
BWSmsd	--	= moisture fraction (measured)
BWS	0.233	

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	0.1	= carbon dioxide concentration, %
O_2	20.5	= oxygen concentration, %
Md	28.84	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	28.84	= molecular weight (DRY), lb/lb mol
BWS	0.233	= moisture fraction, dimensionless
Ms	26.32	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.84	= pitot tube coefficient
$\Delta P^{1/2}$	0.619	= average pre/post test velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	606.3	= average pre/post test absolute stack temperature, °R
Ps	29.59	= absolute stack gas pressure, in. Hg
Ms	26.32	= molecular weight of stack gas, lb/lb mol
Vs	39.1	= ft/sec

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	39.1	= stack gas velocity, ft/sec
As	18.99	= cross-sectional area of stack, ft^2
Qa	44,542	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	44,542	= average stack gas flow at stack conditions, acfm
BWS	0.233	= moisture fraction, dimensionless
Ps	29.59	= absolute stack gas pressure, in. Hg
Ts	606.3	= average pre/post test absolute stack temperature, °R
Qs	29,416	= dscfm

Dry Gas Meter Calibration Check (Yqa), percent

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{K \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0	= meter correction factor, dimensionless
Θ	0	= run time, min.
Vm	--	= total meter volume, dcf
K	0.0319	= K-factor, (in. Hg/°R) * cfm^2
Tm	--	= absolute meter temperature, °R
ΔH@	0	= orifice meter calibration coefficient, in. H_2O
Pb	--	= barometric pressure, in. Hg
ΔH avg	--	= average pressure differential of orifice, in H_2O
Md	--	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	#VALUE!	= average square root pressure differential of orifice, $(\text{in. } H_2O)^{1/2}$
Yqa	--	= percent

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	20.1	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.9	= average of pretest & posttest calibration responses, % dry
C_{O_2}	20.5	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	0.2	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.1	= actual concentration of calibration gas, % dry
C_M	9.7	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	0.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 16

TRS - Outlet Concentration (C_{TRS}), ppmvd

$$C_{TRS} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.8	= average analyzer value during test, ppmvd
C_o	NA	= average of pretest & posttest zero responses, ppmvd
C_{MA}	NA	= actual concentration of calibration gas, ppmvd
C_M	NA	= average of pretest & posttest calibration responses, ppmvd
C_{TRS}	4.5	= TRS Concentration, ppmvd

TRS - Outlet Emission Rate (ER_{TRS}), lb/hr

$$ER_{TRS} = \frac{C_{TRS} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 453.592 \frac{g}{lb}}$$

where,

C_{TRSc}	4.5	= TRS - Outlet Concentration, ppmvd
MW	34.081	= TRS molecular weight, g/g-mole
Qs	29,416	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{TRS}	0.70	= lb/hr as H_2S

TRS - Outlet Emission Factor (EF_{TRSPPT}), lb/ton

$$EF_{TRS} = \frac{ER_{TRS} \times 2{,}000 \ \frac{lb}{ton}}{FR}$$

where,

ER_{TRS}	0.70	= TRS - Outlet Emission Rate, lb/hr as H_2S
FR	188,000	= Feed Rate, lb/hr
EF_{TRS}	0.007	= lb/ton

Appendix B - Field Data

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

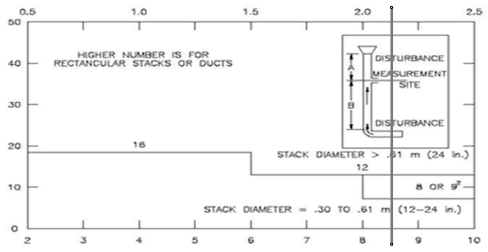
Run Number		Run 1	Run 2	Run 3	Average
Date		10/28/25	10/28/25	10/28/25	--
Start Time		8:15	11:35	14:58	--
Stop Time		11:14	14:34	17:57	--
Source Data					
Feed Rate, ton/hr BLS	FR	94	94	94	94
Input Data - Outlet					
Volumetric Flow Rate (M1-4), dscfm	Qs	29,416	29,913	29,037	29,455
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	20.46	20.48	20.50	20.48
CO_2 Concentration, % dry	C_{CO_2}	0.12	0.09	0.08	0.10
TRS (as SO_2) Concentration, ppmvd	C_{TRS}	4.5	5.7	5.9	5.4
TRS (as H_2S) Emission Rate, lb/hr	ER_{TRSc}	0.70	0.91	0.91	0.84
TRS (as H_2S) Emission Factor, lb/ton BLS	EF_{TRSc}	0.0075	0.0097	0.0097	0.0089

Method 1 Data

Location	Graphic Packaging International Texarkana Mill - Queen City, TX
Source	No. 2 Smelt Tank Scrubber (SM02)
Project No.	AST-2025-4218
Date	10/28/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Measurer (Initial and Date):	TJB 10/28/25	
Reviewer (Initial and Date):	RW 10/28/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall (in)	Distance from outside of port (in)
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

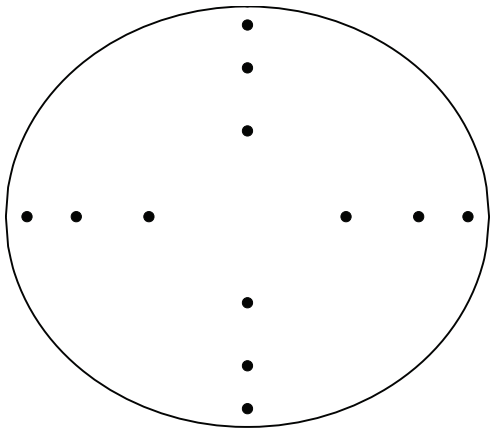
Stack Diagram

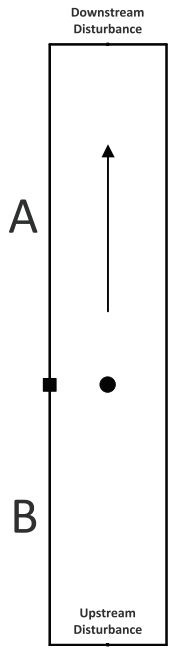
A = 55 ft.

B = 42 ft.

Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Date 10/28/25

Sample Point	Angle (ΔP=0)
1	2
2	5
3	5
4	1
5	6
6	8
7	5
8	2
9	2
10	0
11	8
12	5
Average	4.1

Field Data
Method 2 Data

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Run No.	1		2		3	
Date	10/28/25		10/28/25		10/28/25	
Status	VALID		VALID		VALID	
Start Time	10:45		11:50		16:20	
Stop Time	10:55		12:00		16:32	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.25	146	0.24	145	0.26	145
2	0.29	146	0.33	145	0.28	146
3	0.37	147	0.39	146	0.35	146
4	0.52	147	0.55	147	0.51	147
5	0.48	147	0.47	147	0.45	147
6	0.45	146	0.42	147	0.40	148
B-1	0.36	145	0.38	146	0.35	145
2	0.31	146	0.33	146	0.33	147
3	0.35	147	0.36	147	0.35	148
4	0.39	147	0.42	147	0.38	148
5	0.45	148	0.47	145	0.45	149
6	0.42	147	0.40	145	0.43	148

					Average
Square Root of ΔP, (in. WC)$^{1/2}$	$(\Delta P)^{1/2}$	0.619	0.627	0.612	0.619
Average ΔP, in. WC	(ΔP)	0.39	0.40	0.38	0.39
Pitot Tube Coefficient	(Cp)	0.838	0.838	0.838	0.838
Barometric Pressure, in. Hg	(Pb)	29.63	29.63	29.63	29.63
Static Pressure, in. WC	(Pg)	-0.50	-0.48	-0.45	-0.48
Stack Pressure, in. Hg	(Ps)	29.59	29.59	29.60	29.59
Average Temperature, °F	(Ts)	146.6	146.1	147.0	146.6
Average Temperature, °R	(Ts)	606.3	605.8	606.7	606.2
Moisture Fraction @ Saturation	(BWSsat)	0.233	0.230	0.235	0.233
Moisture Fraction	(BWS)	0.233	0.230	0.235	0.233
O2 Concentration, %	(O_2)	20.46	20.48	20.50	20.5
CO2 Concentration, %	(CO_2)	0.12	0.09	0.08	0.1
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.83	28.83	28.83
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.32	26.35	26.29	26.32
Velocity, ft/sec	(Vs)	39.1	39.6	38.7	39.1
VFR at stack conditions, acfm	(Qa)	44,542	45,085	44,132	44,586
VFR at standard conditions, scfh	(Qsw)	2,300,688	2,330,761	2,278,220	2,303,223
VFR at standard conditions, scfm	(Qsw)	38,345	38,846	37,970	38,387
VFR at standard conditions, dscfm	(Qsd)	29,416	29,913	29,037	29,455

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.10	0.19	3.83
Cal Gas Concentration (C_{MA})	10.02	10.09	NA
Pretest System Zero Response	0.13	0.07	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.14	0.08	NA
Pretest System Cal Response	9.91	9.78	NA
Posttest System Cal Response	9.92	9.69	NA
Average Cal Response (C_M)	9.92	9.74	NA
Corrected Run Average (Corr)	20.46	0.12	4.49
8:15	20.27	0.19	2.90
8:16	20.27	0.18	2.98
8:17	20.25	0.18	3.06
8:18	20.23	0.18	3.01
8:19	20.19	0.19	3.11
8:20	20.18	0.19	3.10
8:21	20.16	0.19	3.19
8:22	20.13	0.19	3.27
8:23	20.09	0.20	3.35
8:24	20.08	0.20	3.46
8:25	20.07	0.20	3.55
8:26	20.05	0.20	3.64
8:27	20.02	0.20	3.59
8:28	19.97	0.20	3.69
8:29	20.00	0.20	3.97
8:30	20.06	0.19	3.98
8:31	20.07	0.19	3.97
8:32	20.09	0.19	3.90
8:33	20.11	0.19	3.80
8:34	20.12	0.18	3.60
8:35	20.14	0.18	3.38
8:36	20.14	0.18	3.33
8:37	20.15	0.18	3.45
8:38	20.14	0.19	3.33
8:39	20.12	0.19	3.26
8:40	20.09	0.19	3.38
8:41	20.09	0.20	3.48
8:42	20.05	0.20	3.35
8:43	20.04	0.21	3.24
8:44	20.07	0.19	3.17
8:45	20.09	0.18	3.15
8:46	20.09	0.18	3.09
8:47	20.10	0.18	3.04
8:48	20.14	0.17	3.12
8:49	20.16	0.17	3.13

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
8:50	20.15	0.17	3.02
8:51	20.17	0.17	2.96
8:52	20.13	0.18	3.02
8:53	20.13	0.18	3.04
8:54	20.13	0.18	3.05
8:55	20.14	0.18	3.06
8:56	20.15	0.18	3.08
8:57	20.13	0.18	3.04
8:58	20.14	0.18	3.02
8:59	20.14	0.18	3.07
9:00	20.13	0.18	3.12
9:01	20.15	0.18	3.24
9:02	20.15	0.18	3.20
9:03	20.17	0.18	3.12
9:04	20.15	0.18	3.20
9:05	20.15	0.18	3.17
9:06	20.12	0.18	3.17
9:07	20.12	0.18	3.19
9:08	20.13	0.18	3.26
9:09	20.13	0.18	3.21
9:10	20.11	0.18	3.26
9:11	20.06	0.19	3.32
9:12	20.03	0.19	3.34
9:13	20.07	0.19	3.44
9:14	20.07	0.19	3.47
9:15	20.03	0.20	3.49
9:16	20.03	0.20	3.42
9:17	20.09	0.19	3.49
9:18	20.10	0.19	3.48
9:19	20.15	0.18	3.49
9:20	20.18	0.18	3.46
9:21	20.15	0.19	3.47
9:22	20.10	0.19	3.49
9:23	20.12	0.19	3.41
9:24	20.15	0.19	3.40
9:25	20.13	0.19	3.52
9:26	20.15	0.19	3.58
9:27	20.08	0.20	3.54
9:28	19.93	0.22	3.61
9:29	19.90	0.22	3.73
9:30	19.93	0.22	3.78
9:31	19.82	0.24	3.90
9:32	19.80	0.24	4.04
9:33	19.81	0.24	4.04
9:34	19.93	0.22	3.97

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
9:35	20.02	0.21	3.86
9:36	20.06	0.20	3.76
9:37	20.10	0.19	3.72
9:38	20.11	0.19	3.65
9:39	20.10	0.19	3.58
9:40	20.09	0.19	3.58
9:41	20.13	0.18	3.60
9:42	20.14	0.18	3.54
9:43	20.15	0.18	3.53
9:44	20.11	0.19	3.51
9:45	20.11	0.19	3.59
9:46	20.12	0.18	3.68
9:47	20.07	0.19	3.66
9:48	20.03	0.20	3.71
9:49	20.09	0.19	3.71
9:50	20.11	0.19	3.76
9:51	20.16	0.18	3.78
9:52	20.15	0.18	3.81
9:53	20.14	0.18	3.78
9:54	20.11	0.19	3.76
9:55	20.14	0.19	3.75
9:56	20.16	0.19	3.68
9:57	20.14	0.20	3.76
9:58	20.11	0.20	3.80
9:59	20.13	0.20	3.76
10:00	20.17	0.19	3.71
10:01	20.16	0.20	3.73
10:02	20.14	0.22	3.75
10:03	20.16	0.20	3.91
10:04	20.08	0.22	4.02
10:05	20.07	0.23	4.08
10:06	20.09	0.23	4.12
10:07	20.13	0.21	4.14
10:08	20.15	0.19	4.23
10:09	20.15	0.20	4.21
10:10	20.12	0.21	4.29
10:11	20.11	0.22	4.29
10:12	20.10	0.22	4.28
10:13	20.11	0.20	4.31
10:14	20.11	0.21	4.28
10:15	20.05	0.23	4.28
10:16	20.05	0.21	4.33
10:17	20.12	0.20	4.25
10:18	20.10	0.22	4.23
10:19	20.10	0.20	4.25

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
10:20	20.09	0.20	4.26
10:21	20.11	0.20	4.36
10:22	20.15	0.18	4.38
10:23	20.11	0.18	4.34
10:24	20.09	0.19	4.30
10:25	20.09	0.19	4.37
10:26	20.12	0.18	4.49
10:27	20.16	0.18	4.39
10:28	20.16	0.18	4.29
10:29	20.10	0.18	4.25
10:30	20.05	0.19	4.32
10:31	20.02	0.19	4.37
10:32	20.02	0.19	4.43
10:33	20.02	0.20	4.46
10:34	20.03	0.20	4.55
10:35	20.06	0.20	4.61
10:36	20.08	0.19	4.65
10:37	20.11	0.18	4.64
10:38	20.07	0.19	4.61
10:39	20.06	0.18	4.58
10:40	20.10	0.18	4.56
10:41	20.11	0.19	4.60
10:42	20.13	0.18	4.55
10:43	20.12	0.18	4.53
10:44	20.10	0.18	4.51
10:45	20.07	0.19	4.49
10:46	20.08	0.18	4.48
10:47	20.10	0.18	4.56
10:48	20.10	0.18	4.50
10:49	20.12	0.18	4.50
10:50	20.15	0.19	4.37
10:51	20.14	0.19	4.29
10:52	20.11	0.19	4.19
10:53	20.10	0.19	4.34
10:54	20.02	0.20	4.34
10:55	20.04	0.21	4.40
10:56	20.07	0.21	4.41
10:57	20.17	0.19	4.47
10:58	20.11	0.19	4.51
10:59	20.11	0.18	4.41
11:00	20.08	0.20	4.43
11:01	20.08	0.21	4.61
11:02	20.03	0.22	4.64
11:03	20.05	0.20	4.62
11:04	20.10	0.19	4.66

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
11:05	20.11	0.18	4.65
11:06	20.14	0.18	4.58
11:07	20.12	0.20	4.58
11:08	20.14	0.19	4.49
11:09	20.20	0.20	4.44
11:10	20.17	0.19	4.51
11:11	20.20	0.17	4.50
11:12	20.24	0.16	4.47
11:13	20.23	0.17	4.43
11:14	20.23	0.17	4.42

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.12	0.17	4.95
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.08	NA
Posttest System Zero Response	0.15	0.09	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.69	NA
Posttest System Cal Response	9.92	9.68	NA
Average Cal Response (C_M)	9.92	9.69	NA
Corrected Run Average (Corr)	20.48	0.09	5.72
11:35	20.16	0.20	4.78
11:36	20.21	0.20	4.72
11:37	20.21	0.18	4.64
11:38	20.19	0.18	4.57
11:39	20.19	0.18	4.55
11:40	20.19	0.18	4.62
11:41	20.24	0.17	4.52
11:42	20.20	0.19	4.52
11:43	20.20	0.18	4.49
11:44	20.21	0.17	4.46
11:45	20.21	0.17	4.49
11:46	20.23	0.16	4.51
11:47	20.22	0.17	4.52
11:48	20.17	0.18	4.43
11:49	20.07	0.20	4.53
11:50	20.13	0.19	4.48
11:51	20.14	0.20	4.52
11:52	20.15	0.20	4.54
11:53	20.20	0.17	4.54
11:54	20.27	0.16	4.53
11:55	20.26	0.16	4.58
11:56	20.22	0.16	4.56
11:57	20.18	0.16	4.57
11:58	20.16	0.17	4.59
11:59	20.19	0.16	4.63
12:00	20.21	0.16	4.64
12:01	20.23	0.17	4.68
12:02	20.21	0.18	4.70
12:03	20.21	0.17	4.74
12:04	20.21	0.17	4.65
12:05	20.21	0.18	4.60
12:06	20.16	0.20	4.58
12:07	19.99	0.23	4.72
12:08	20.01	0.20	4.81
12:09	20.05	0.19	4.87

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:10	20.06	0.19	5.00
12:11	20.10	0.18	5.06
12:12	20.17	0.17	5.01
12:13	20.22	0.17	4.93
12:14	20.20	0.17	4.87
12:15	20.20	0.17	4.95
12:16	20.23	0.16	4.82
12:17	20.24	0.16	4.73
12:18	20.24	0.16	4.66
12:19	20.27	0.16	4.69
12:20	20.25	0.16	4.68
12:21	20.18	0.17	4.74
12:22	20.20	0.16	4.79
12:23	20.14	0.17	4.67
12:24	20.15	0.17	4.75
12:25	20.19	0.16	4.75
12:26	20.19	0.16	4.78
12:27	20.18	0.17	4.91
12:28	20.17	0.17	4.94
12:29	20.17	0.16	4.90
12:30	20.18	0.16	4.87
12:31	20.16	0.17	4.87
12:32	20.19	0.16	4.95
12:33	20.22	0.16	4.93
12:34	20.23	0.16	4.94
12:35	20.23	0.16	4.91
12:36	20.21	0.16	4.87
12:37	20.22	0.15	4.65
12:38	20.25	0.15	4.35
12:39	20.23	0.15	4.31
12:40	20.22	0.15	4.43
12:41	20.16	0.16	4.53
12:42	20.05	0.18	4.59
12:43	19.92	0.19	4.76
12:44	19.90	0.19	4.86
12:45	19.97	0.18	4.97
12:46	20.06	0.17	4.92
12:47	20.11	0.16	4.93
12:48	20.12	0.16	4.97
12:49	20.18	0.15	4.94
12:50	20.22	0.15	4.96
12:51	20.23	0.15	4.89
12:52	20.21	0.15	4.80
12:53	20.18	0.16	4.72
12:54	20.13	0.16	4.72

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:55	20.11	0.17	4.68
12:56	20.07	0.17	4.74
12:57	20.08	0.17	4.76
12:58	20.02	0.17	4.83
12:59	19.94	0.18	4.96
13:00	19.97	0.18	5.01
13:01	19.94	0.18	4.99
13:02	19.97	0.18	5.08
13:03	20.01	0.17	5.21
13:04	20.05	0.17	5.33
13:05	20.09	0.16	5.35
13:06	20.11	0.16	5.40
13:07	20.11	0.16	5.39
13:08	20.11	0.16	5.35
13:09	20.09	0.16	5.30
13:10	20.07	0.17	5.25
13:11	20.08	0.17	5.24
13:12	20.02	0.18	5.32
13:13	19.98	0.18	5.37
13:14	20.01	0.17	5.39
13:15	19.98	0.18	5.51
13:16	19.95	0.18	5.59
13:17	20.00	0.18	5.53
13:18	20.06	0.17	5.50
13:19	20.06	0.17	5.51
13:20	20.03	0.18	5.42
13:21	20.08	0.18	5.37
13:22	20.08	0.17	5.37
13:23	20.05	0.18	5.35
13:24	20.11	0.17	5.16
13:25	20.15	0.17	5.14
13:26	20.17	0.17	5.14
13:27	20.18	0.17	5.10
13:28	20.18	0.17	5.13
13:29	20.20	0.17	5.22
13:30	20.20	0.17	5.14
13:31	20.17	0.17	5.13
13:32	20.14	0.17	5.16
13:33	20.16	0.18	5.17
13:34	20.17	0.17	5.11
13:35	20.14	0.18	5.15
13:36	20.13	0.18	5.06
13:37	20.10	0.19	5.06
13:38	20.15	0.18	5.10
13:39	20.20	0.17	5.10

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
13:40	20.22	0.16	5.02
13:41	20.21	0.17	4.90
13:42	20.18	0.17	4.88
13:43	20.18	0.17	4.86
13:44	20.13	0.17	4.86
13:45	20.11	0.18	4.87
13:46	20.14	0.18	4.93
13:47	20.12	0.18	4.90
13:48	20.15	0.18	4.87
13:49	20.15	0.17	4.92
13:50	20.16	0.17	4.86
13:51	20.16	0.17	4.86
13:52	20.14	0.17	4.95
13:53	20.13	0.17	4.97
13:54	20.08	0.18	5.00
13:55	20.00	0.19	4.97
13:56	19.97	0.19	5.02
13:57	19.96	0.19	5.07
13:58	19.94	0.19	5.01
13:59	19.96	0.19	5.08
14:00	19.99	0.18	5.17
14:01	20.01	0.18	5.26
14:02	20.01	0.18	5.34
14:03	19.96	0.19	5.33
14:04	19.91	0.19	5.45
14:05	19.97	0.18	5.53
14:06	20.00	0.18	5.32
14:07	19.99	0.18	5.28
14:08	20.02	0.18	5.25
14:09	19.98	0.18	5.25
14:10	20.00	0.18	5.31
14:11	20.03	0.18	5.29
14:12	19.98	0.19	5.24
14:13	20.04	0.18	5.23
14:14	19.97	0.19	5.16
14:15	19.97	0.19	5.25
14:16	20.02	0.18	5.28
14:17	20.01	0.18	5.22
14:18	20.05	0.17	5.17
14:19	20.07	0.17	5.14
14:20	20.06	0.17	5.10
14:21	20.07	0.17	5.18
14:22	20.08	0.17	5.25
14:23	20.07	0.17	5.23
14:24	20.03	0.17	5.07

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
14:25	20.03	0.17	4.96
14:26	20.05	0.17	4.98
14:27	20.13	0.16	4.94
14:28	20.15	0.16	4.93
14:29	20.16	0.16	4.95
14:30	20.19	0.16	4.95
14:31	20.21	0.15	4.90
14:32	20.20	0.16	4.87
14:33	20.22	0.15	4.85
14:34	20.22	0.15	4.70

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.16	0.16	5.31
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.09	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.68	NA
Posttest System Cal Response	9.95	9.65	NA
Average Cal Response (C_M)	9.94	9.67	NA
Corrected Run Average (Corr)	20.50	0.08	5.91
14:58	20.01	0.20	4.79
14:59	19.99	0.20	4.82
15:00	20.00	0.20	4.85
15:01	20.01	0.19	4.81
15:02	20.04	0.19	4.80
15:03	20.06	0.18	4.78
15:04	20.06	0.18	4.78
15:05	20.07	0.18	4.84
15:06	20.12	0.17	4.86
15:07	20.14	0.17	4.96
15:08	20.16	0.17	4.99
15:09	20.13	0.17	4.90
15:10	20.12	0.17	4.93
15:11	20.14	0.17	4.91
15:12	20.18	0.16	4.83
15:13	20.23	0.16	4.77
15:14	20.22	0.16	4.73
15:15	20.26	0.15	4.72
15:16	20.25	0.16	4.59
15:17	20.26	0.15	4.48
15:18	20.28	0.15	4.42
15:19	20.24	0.15	4.41
15:20	20.27	0.14	4.35
15:21	20.28	0.15	4.39
15:22	20.23	0.15	4.53
15:23	20.31	0.14	4.50
15:24	20.18	0.16	4.53
15:25	20.09	0.17	4.67
15:26	20.05	0.18	4.71
15:27	19.95	0.19	4.80
15:28	19.96	0.18	4.93
15:29	19.94	0.19	5.02
15:30	19.96	0.18	5.31
15:31	20.00	0.17	5.56
15:32	20.05	0.17	5.58

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
15:33	20.10	0.16	5.51
15:34	20.16	0.16	5.41
15:35	20.19	0.15	5.40
15:36	20.20	0.15	5.37
15:37	20.21	0.15	5.28
15:38	20.24	0.15	5.17
15:39	20.21	0.15	5.15
15:40	20.20	0.15	5.20
15:41	20.17	0.15	5.15
15:42	20.17	0.15	5.16
15:43	20.19	0.15	5.05
15:44	20.20	0.14	4.97
15:45	20.20	0.14	5.00
15:46	20.21	0.14	4.90
15:47	20.19	0.15	4.92
15:48	20.24	0.14	4.68
15:49	20.22	0.15	4.60
15:50	20.20	0.15	4.63
15:51	20.16	0.16	4.63
15:52	20.15	0.16	4.63
15:53	20.17	0.16	4.66
15:54	20.19	0.15	5.06
15:55	20.22	0.15	5.10
15:56	20.22	0.15	5.13
15:57	20.21	0.15	5.09
15:58	20.20	0.15	4.92
15:59	20.18	0.16	4.91
16:00	20.17	0.16	5.00
16:01	20.19	0.15	4.98
16:02	20.18	0.16	4.89
16:03	20.19	0.15	4.87
16:04	20.21	0.15	4.89
16:05	20.23	0.15	4.84
16:06	20.25	0.15	4.81
16:07	20.27	0.14	4.85
16:08	20.29	0.14	4.91
16:09	20.28	0.14	4.83
16:10	20.28	0.14	4.76
16:11	20.30	0.14	4.85
16:12	20.31	0.14	4.89
16:13	20.28	0.14	4.79
16:14	20.27	0.14	4.70
16:15	20.24	0.15	4.69
16:16	20.24	0.15	4.73
16:17	20.24	0.15	4.93

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
16:18	20.16	0.16	5.01
16:19	20.13	0.16	4.93
16:20	20.15	0.16	4.95
16:21	20.11	0.17	4.98
16:22	20.09	0.17	5.06
16:23	20.04	0.17	5.23
16:24	19.93	0.19	5.39
16:25	19.91	0.20	5.53
16:26	19.96	0.19	5.63
16:27	20.00	0.19	5.72
16:28	20.06	0.18	5.89
16:29	20.12	0.17	6.01
16:30	20.10	0.17	5.94
16:31	20.13	0.17	5.88
16:32	20.11	0.18	5.78
16:33	19.99	0.19	5.78
16:34	19.89	0.21	5.95
16:35	19.91	0.21	6.06
16:36	19.96	0.19	6.07
16:37	20.02	0.18	6.04
16:38	20.07	0.18	6.15
16:39	20.09	0.17	6.07
16:40	20.11	0.16	5.95
16:41	20.17	0.16	5.92
16:42	20.19	0.15	5.79
16:43	20.17	0.16	5.66
16:44	20.21	0.15	5.57
16:45	20.23	0.15	5.43
16:46	20.26	0.15	5.31
16:47	20.26	0.15	5.16
16:48	20.27	0.15	5.07
16:49	20.28	0.15	5.03
16:50	20.26	0.15	4.97
16:51	20.26	0.15	5.08
16:52	20.28	0.15	5.16
16:53	20.28	0.15	5.10
16:54	20.29	0.15	5.06
16:55	20.31	0.15	5.10
16:56	20.30	0.16	5.05
16:57	20.24	0.16	4.98
16:58	20.10	0.18	4.92
16:59	19.97	0.20	4.88
17:00	19.91	0.20	5.33
17:01	19.92	0.20	5.99
17:02	19.96	0.19	6.20

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:03	20.01	0.17	6.25
17:04	20.06	0.17	6.23
17:05	20.07	0.16	6.12
17:06	20.05	0.16	6.12
17:07	20.01	0.17	6.20
17:08	20.09	0.16	6.22
17:09	20.13	0.16	6.13
17:10	20.18	0.15	6.07
17:11	20.19	0.15	6.08
17:12	20.18	0.15	5.96
17:13	20.19	0.15	5.93
17:14	20.17	0.16	5.90
17:15	20.15	0.16	5.90
17:16	20.13	0.16	5.87
17:17	20.17	0.16	5.95
17:18	20.13	0.16	5.84
17:19	20.13	0.16	5.85
17:20	20.14	0.17	6.02
17:21	20.13	0.17	6.18
17:22	20.15	0.17	6.14
17:23	20.16	0.16	6.02
17:24	20.16	0.16	6.00
17:25	20.13	0.17	5.95
17:26	20.15	0.16	5.87
17:27	20.15	0.16	5.84
17:28	20.17	0.16	5.89
17:29	20.23	0.15	5.91
17:30	20.23	0.15	5.89
17:31	20.25	0.14	5.91
17:32	20.24	0.15	5.83
17:33	20.20	0.15	5.74
17:34	20.19	0.15	5.65
17:35	20.18	0.15	5.72
17:36	20.20	0.15	5.73
17:37	20.17	0.16	5.69
17:38	20.15	0.16	5.72
17:39	20.22	0.15	5.71
17:40	20.26	0.15	5.67
17:41	20.27	0.15	5.74
17:42	20.26	0.15	5.72
17:43	20.28	0.15	5.62
17:44	20.30	0.15	5.69
17:45	20.29	0.15	5.61
17:46	20.28	0.15	5.49
17:47	20.29	0.15	5.31

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:48	20.28	0.15	5.42
17:49	20.29	0.15	5.47
17:50	20.27	0.15	5.54
17:51	20.28	0.15	5.25
17:52	20.28	0.15	5.11
17:53	20.28	0.15	5.20
17:54	20.28	0.15	5.17
17:55	20.27	0.15	5.20
17:56	20.26	0.15	5.35
17:57	20.26	0.15	5.40

Appendix C - QA/QC

M205 QA Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date

Method Criteria	EPA
Parameter	O_2
Make	Servomex
Model	4900
S/N	900006
Span	19.9
Cylinder Number ID	
Zero	NA
Mid	CC780763
High	EB0074264
Cylinder Certified Values	
Zero	0.00
Mid	10.02
High	19.90
Instrument Response (% or ppm)	
Zero	0.00
Mid	10.04
High	19.91
Calibration Gas Selection (% of Span)	
Mid	50.4
High	100.0
Calibration Error Performance (% of Span)	
Zero	0.0
Mid	0.1
High	0.1
Linearity (% of Range)	
	0.1

Environics ID:	8033
Environics MFC Configuration:	10L, 10L, 1L
Component/Balance Gas:	O_2/N_2
Cylinder Gas ID (Dilution):	EB0074264
Cylinder Gas Concentration (Dilution), %:	19.90
Cylinder Gas ID (Mid-Level):	CC780763
Cylinder Gas Concentration (Mid-Level), %:	10.02

Target Mass Flow Contollers	Target Dilution (%)	Target Flow Rate lpm	Target Concentration (%)	Actual Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)
10L/10L*	90.0	7.0	17.9	17.9	17.95	18.04	18.08	18.02	0.12
10L/10L*	50.0	7.0	10.0	10.0	10.01	10.06	10.04	10.04	0.04
10L/1L	20.0	4.0	4.0	4.0	3.98	3.98	3.95	3.97	-0.03
10L/1L	10.0	4.0	2.0	2.0	1.99	2.05	2.04	2.03	0.03

*Not all AST Environics Units have 2-10L Mass Flow Controllers. For these units the 90% @ 7lpm and 80% @ 7lpm injections will not be conducted.

Average Analyzer Concentration (%)	Injection 1 Error (±2%)	Injection 2 Error (±2%)	Injection 3 Error (±2%)
18.02	-0.4%	0.1%	0.3%
10.04	-0.3%	0.2%	0.0%
3.97	0.3%	0.3%	-0.5%
2.03	-1.8%	1.2%	0.7%

Mid-Level Supply Gas Calibration Direct to Analyzer

Calibration Gas Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)	Average Error (±2%)
10.02	10.05	10.07	10.04	10.05	0.03	0.3%

Location Graphic Packaging International Texarkana Mill - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
10/28/25	PT-201-7	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
10/28/25	PR-208-1	145.0	147.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
10/28/25	Weather Station	NA	NA	NA	Texarkana, TX

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Make	Servomex	Servomex	Ametek
Model	4900	4900	9900
S/N	900006	900006	S13821
Operating Range	0-25	0-25	0-100
Cylinder ID			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	CC780763	CC780763	CC331726
High	EB0074264	EB0074264	CC331726
Cylinder Certified Values			
Zero	0.0	0.0	0.0
Low	NA	NA	NA
Mid	10.02	10.09	125.6
High	19.9	19.83	125.6
Cylinder Expiration Date			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	9/16/33	9/16/33	3/7/27
High	8/12/32	8/12/32	3/7/27
Type of Sample Line	Unheated Sample Line		

Stratification Check

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	8:15	20.27	0.19
2	8:17	20.25	0.18
3	8:19	20.19	0.19
Average		20.2	0.2
Criteria Met		Single Point	Single Point

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Expected Average Concentration	19.00	1.00	7.00
Span Between			
Low	19.00	1.00	7.00
High	95.00	20.00	35.00
Desired Span	19.90	19.83	30.00
Low Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Mid Range Gas			
Low	7.96	7.93	12.00
High	11.94	11.90	18.00
High Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Actual Concentration (% or ppm)			
Zero	0.00	0.00	0.00
Low	NA	NA	NA
Mid	10.02	10.09	15.00
High	19.90	19.83	30.00
Response Time (seconds)	45.00	45.00	45.00
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid
Instrument Response (% or ppm)			
Zero	-0.03	0.01	0.15
Low	NA	NA	NA
Mid	9.96	9.90	15.61
High	19.88	19.74	30.22
Performance (% of Span or Cal. Gas Conc.)			
Zero	0.15	0.05	0.50
Low	NA	NA	NA
Mid	0.30	0.96	2.03
High	0.10	0.45	0.73
Status			
Zero	PASS	PASS	PASS
Low	NA	NA	NA
Mid	PASS	PASS	PASS
High	PASS	PASS	PASS

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 10/28/25		
Span Value	19.90	19.83
Initial Instrument Zero Cal Response	-0.03	0.01
Initial Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.13	0.07
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.91	9.78
Posttest System Upscale Response	9.92	9.69
Bias (%)		
Pretest Zero	0.80	0.30
Posttest Zero	0.90	0.35
Pretest Span	-0.25	-0.61
Posttest Span	-0.20	-1.06
Drift (%)		
Zero	0.10	0.05
Mid	0.05	-0.45
Run 2 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.08
Posttest System Zero Response	0.15	0.09
Pretest System Upscale Response	9.92	9.69
Posttest System Upscale Response	9.92	9.68
Bias (%)		
Pretest Zero	0.90	0.35
Posttest Zero	0.90	0.40
Pretest Span	-0.20	-1.06
Posttest Span	-0.20	-1.11
Drift (%)		
Zero	0.00	0.05
Mid	0.00	-0.05
Run 3 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.09
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.92	9.68
Posttest System Upscale Response	9.95	9.65
Bias (%)		
Pretest Zero	0.90	0.40
Posttest Zero	0.90	0.35
Pretest Span	-0.20	-1.11
Posttest Span	-0.05	-1.26
Drift (%)		
Zero	0.00	-0.05
Mid	0.15	-0.15

Post Test Calibration Drift Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter		TRS (w SO2 gas) - Outlet
Actual Concentration (ppm)		
Mid		15.0
Instrument Response (ppm)		
Mid	**Initial**	15.6
	Post Test	15.7
Performance (% of Calibration Gas)		
Mid		0.3
Status		
Mid		PASS

Note: TRS calibrations were conducted using SO2/N2 calibration gas. Analyzer calibration drift was calculated by evaluating the initial instrument response versus the final instrument response. Performance is acceptable if this value is less than or equal to 3% or 0.5 ppmv.

System Performance Determinations

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	TRS - Outlet
H2S Gas Concentration, ppm	26
Cylinder Certification Number	CC194342
Run 1	
Pretest System Response, ppm	24.67
Posttest System Response, ppm	22.18
Pretest System Performance (%)	94.9
Posttest System Performance (%)	85.3
Run 2	
Posttest System Response, ppm	22.47
Posttest System Performance (%)	86.4
Run 3	
Posttest System Response, ppm	23.36
Posttest System Performance (%)	89.8

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Response Times, seconds			
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**	**TRS - Outlet**
Zero	35	35	45
Low	NA	NA	NA
Mid	35	35	45
Average	35.0	35.0	45.0

Alliance
SOURCE TESTING

Mass Flow Controller Calibration

Dilution System Make:	Environics
Dilution System Model:	4040
Dilution System S/N:	8033
Calibration Equipment Make:	Alicat Scientific
Calibration Equipment Model:	M-10SLPD/5MM-D/5M, M-1SLPM-D/5
Calibration Equipment S/N:	NC00075907 / NC0007908
Flow Cell S/N:	272121
Flow Cell S/N:	272120
Calibration Gas:	Nitrogen
Barometric Pressure, mmHg:	29.94
Ambient Temperature, °F:	68

Mass Flow Controller ID	#1			# 2			# 3		
Size, ccm:	10,000			10,000			1,000		
Make:	Environics			Environics			Environics		
Model:	EFC 202			EFC 202			EFC 202		
S/N:	455242005			455242006			455238003		
	Set Flow cc/min	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**
5%	500	494	1.2%	500	490	2.0%	50	48	4.0%
10%	1,000	1,006	0.6%	1,000	1,004	0.4%	100	97	3.0%
20%	2,000	2,025	1.3%	2,000	2,025	1.3%	200	195	2.5%
30%	3,000	3,046	1.5%	3,000	3,040	1.3%	300	294	2.0%
40%	4,000	4,050	1.3%	4,000	4,050	1.3%	400	391	2.3%
50%	5,000	5,066	1.3%	5,000	5,070	1.4%	500	490	2.0%
60%	6,000	6,086	1.4%	6,000	6,088	1.5%	600	589	1.8%
70%	7,000	7,103	1.5%	7,000	7,111	1.6%	700	691	1.3%
80%	8,000	8,133	1.7%	8,000	8,130	1.6%	800	795	0.6%
90%	9,000	9,167	1.9%	9,000	9,170	1.9%	900	904	0.4%
100%	10,000	10,202	2.0%	10,000	10,193	1.9%	1,000	1,016	1.6%

Note: The mass flow controller's calibration values are used by the dilution system's operating software to improve accuracy. These calibrations are not necessarily indicative of the systems overall performance. Performance is verified by conducting a Method 205 prior to each field use.

Calibration Performed By Timothy Branham

Date 2/21/25

Equipment Detail

Model: Type S
ID: 201-7

Calibration Detail

Time: 9:18
T_s: 69 °F
Pb: 29.47 in. Hg
Std Pitot ID: DAL 1
C_{pstd}: 0.990

Flow	ΔPstd			High Side - "A"			Low Side - 'B"		
	Standard	Start	End	ΔPs		σ	ΔPs		σ
fps	in. WC	in. WC	in. WC	in. WC	Cp(a)	Deviation	in. WC	Cp(b)	Deviation
20	0.09	0.09	0.09	0.13	0.840	0.002	0.13	0.840	0.007
30	0.20	0.20	0.20	0.29	0.829	-0.009	0.29	0.822	-0.011
40	0.36	0.36	0.36	0.51	0.832	-0.006	0.51	0.832	-0.001
50	0.56	0.56	0.56	0.78	0.839	0.001	0.79	0.834	0.001
60	0.81	0.81	0.81	1.15	0.831	-0.007	1.15	0.831	-0.002
70	1.10	1.10	1.10	1.50	0.848	0.010	1.55	0.834	0.001
80	1.44	1.44	1.44	2.00	0.840	0.002	2.00	0.840	0.007
90	1.82	1.82	1.83	2.50	0.846	0.008	2.60	0.829	-0.004
EPA Method 2 Section 10.1.3 QA/QC									
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.826	-0.007
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.829	-0.004
				Average	0.838	0.006		0.833	0.004
				Acceptability Criteria	--	≤ 0.01		--	≤ 0.01
					|Cp(a)-Cp(b)|≤ 0.01			|Cp(a)-Cp(b)|=	0.005

Personnel

Calibrated By: Alaina Drouin
Calibration Date: 12/30/24
Reviewed By: Timothy Branham

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12025

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC780763	**Certification Date:**	09/18/2025
Product ID Number:	124300	**Expiration Date:**	09/16/2033
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC780763.20250911-0	**Lot Number:**	CC780763.20250911
Customer PO. NO.:		**Tracking Number:**	113447110
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.09 %**	±0.08 %	NDIR	09/18/2025
Oxygen	**10.02 %**	±0.03 %	MPA	09/18/2025
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726840	CC726840.20211123	04/18/2031	GMIS	N2	O2	9.35 %	0.163	SRM 2659a
CC770488	CC770488.20240512	02/02/2033	GMIS	N2	O2	24.01 %	0.145	C2459101.03
EB0073532	EB0073532.20230816	09/17/2032	GMIS	N2	CO2	9.47 %	0.176	C2281801.04
EB0078951	EB0078951.20230816	09/17/2032	GMIS	N2	CO2	12.44 %	0.227	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i-HL	1162980025	09/08/2025
CO2	NDIR	Thermo	410i-HL	1162980025	09/10/2025

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0074264	**Certification Date:**	08/14/2024
Product ID Number:	124240	**Expiration Date:**	08/12/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0074264.20240730-0	**Lot Number:**	EB0074264.20240730
Customer PO. NO.:		**Tracking Number:**	084251978
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.83 %**	±0.08 %	FTIR	08/14/2024
Oxygen	**19.90 %**	±0.04 %	MPA	08/08/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
EB0022009	EB0022009.20201022	04/05/2030	GMIS	N2	CO2	24.76 %	0.237	C1847810.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/07/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	08/14/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Airgas Specialty Gases
Airgas USA LLC
9810 BAY AREA BLVD
Pasadena, TX 77507
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	GRAPHIC PACKAGING INTERNATIONAL		
Part Number:	E02NI99E15A0005	Reference Number:	163-401487138-1
Cylinder Number:	CC331726	Cylinder Volume:	144.4 CF
Laboratory:	124 - Pasadena (SG06) - TX	Cylinder Pressure:	2015 PSIG
PGVP Number:	A32019	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	May 07, 2019

Expiration Date: May 07, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	125.0 PPM	125.6 PPM	G1	+/- 0.8% NIST Traceable	04/30/2019, 05/07/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11010402	KAL004739	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Jul 28, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SO2-L-NICOLET iS50 AUP2010248	FTIR	Apr 13, 2019

Triad Data Available Upon Request

Signature on file

Approved for Release

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE
NORTH LITTLE ROCK, AR

Blend Type:	GAS	MOL	
Pressure:	1800	psia	**Sales Order: 1394449**
Volume:	125.0	cf	
Dew Point:	0 C		**RBTGS Part No.:** 130254

Cylinder Size: I-150
Valve Outlet: CGA 330 SS
Cylinder No.: **CC194342**
Bar Code No.: 040319029

Lot No.: RR2503141153
Analysis Date: March 24, 2025
Date Issued: March 24, 2025
Expiration Date: March 24, 2026

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Hydrogen Sulfide	7783-06-4	25.0	ppm	26.0	31.4	26.0	ppm	2%	G
Oxygen	7782-44-7	5.0	%	5.10	5.78	5.10	%	2%	H
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical H2S Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Appendix D - Facility Data

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	10/28/2025 14:58:00 PM	10/28/25 11:35	10/28/25 8:15	
	End Time:	10/28/25 17:58	10/28/25 14:35	10/28/25 11:15	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	657.19	656.52	663.25	659.0
FIC2037E.pv	Pri. Air load -- Total (kpph)	372.32	377.74	372.32	374.1
FIC2038E.pv	Sec. Air load (kpph)	332.76	331.01	331.99	331.9
FIC2039E.pv	Tertiary Air load (kpph)	195.07	195.46	197.83	196.1
AT2197E.pv	Excess O2	2.64	2.47	2.48	2.5
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.20	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	75.33	75.54	74.73	75.2
SIC2085E.pv	"B" I.D. fan speed (rpm)	76.15	76.37	75.54	76.0
FY2103E.pv	Bl. Liq. Burn flow (gpm)	408.46	408.93	413.13	410.2
NM2102E.pv	Bl. Liq. % density (%)	71.92	71.85	71.32	71.7
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	259.22	258.75	259.05	259.0
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	95.05	95.04	95.07	95.1
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	81.72	78.89	73.06	77.9
FT2004E.pv	Weak Wash flow to scrubber (gpm)	94.46	87.14	87.83	89.8
TT2268E.PV	Precip. Ash Tank Temp. (F)	224.93	224.46	224.04	224.5
IT3028e.pv	Scrubber fan amps	45.79	45.62	45.26	45.6

Appendix E - Test Plan

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source to be Tested:
No. 2 Smelt Tank Scrubber (SM02)

Proposed Test Dates:
October 29, 2025

Project No. AST-2025-4218

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citation	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameter*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Test Plan/Report Reviewer
Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing will be conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NSPS.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NSPS, the facility will conduct a performance test program to determine the compliance status of the No. 2 Smelt Tank Scrubber (SM02).

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3A, 4, and 16C. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the TCEQ Air Permit Nos. 2975 and PSDTX778M2 and 40 CFR 60, Subpart BBa.
- Emissions testing will be conducted on the exhaust of the No. 2 Smelt Tank Scrubber (SM02).
- Performance testing will be conducted at the maximum normal operation load.
- Each of the three (3) test runs will be approximately 3 hours in duration.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – October 29, 2025					
Equipment Setup & Pretest QA/QC Checks					12 hr
No. 2 Smelt Tank Scrubber (SM02)	VFR	1-2	3	180 min	
	O_2/CO_2	3A			
	BWS	4			
	TRS	16C			
DAY 2 – October 30, 2025					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
No. 2 Smelt Tank Scrubber (SM02)	TRS – 0.033 lb/ton of black liquor solids (BLS) as hydrogen sulfide (H_2S)	60, Subpart BBa
	TRS – 3.28 lb/hr	TCEQ Permit Nos. 2975 and PSDTX778M2

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Total Reduced Sulfur	16C	Instrumental Analysis

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with a verification measurement provided by the Field Team Leader.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3A. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line is used, then a portable non-contact condenser will be placed in the system directly after the probe. Otherwise, a heated Teflon sample line will be used. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a

known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Method 16C – Total Reduced Sulfur

The total reduced sulfur testing will be conducted in accordance with U.S. EPA Reference Test Method 16C. Data will be collected online and reported in one-minute averages during each test run. The sampling system will consist of a heated Teflon-lined probe, gas conditioning system, Teflon sample line(s), tube furnace and the identified analyzer. The gas conditioning system will consist of three (3) chilled Teflon impingers. The first and second impingers will contain 100 mL of citrate buffer solution while the third impinger will be empty. The citrate buffer solution will be used to remove any sulfur dioxide that will be present in the stack gas. The tube furnace will be operated at 800°C ±100°C. The quality control measures are described in Section 3.6.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Direct Calibration & Calibration Error Test

Low-Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. Next, Low-Level gas will be introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) will be recorded. If the Low-Level gas is zero gas, the acceptable response must be 5.0 percent of the upscale gas concentration or 0.5% (whichever was less restrictive). The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. The measurement system response time and initial system bias will be determined from these data. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe. After the analyzer response is stable, the value will be recorded. Next, Low-Level gas will be introduced at the probe, and the analyzer value will be recorded once it reaches a stable response. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference or the data is invalidated, and the Calibration Error Test and System Bias must be repeated.

Post Test Drift Checks

The Drift between pre- and post-run System Bias must be within 3 percent of the Calibration Span or 0.5% absolute difference or the Calibration Error Test and System Bias must be repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check will be conducted prior to initiating testing. The pollutant concentrations will be measured at twelve traverse points (as described in Method 1) or three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point will be sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point do not differ more than 5% or 0.3% (whichever is less restrictive) of the average pollutant concentration, then single point sampling will be conducted during the test runs. If the pollutant concentration does not meet these specifications but differs less than 10% or 0.5% from the average concentration, then three (3) point sampling will be conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differs by more than 10% or 0.5% from the average concentration, then sampling will be conducted at a minimum of twelve (12) traverse points. Copies of stratification check data will be included in the Quality Assurance/Quality Control Appendix of the report.

Data Collection

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 16C

EPA Protocol 1 Calibration Gases

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Direct Calibration

Low-Level sulfur dioxide (SO_2) gas will be introduced directly to analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading will be stable, the analyzer value will be recorded. This process will be repeated for the Mid-Level gas. Next, High-Level gas will be introduced directly to the analyzer, and the response recorded when it will be stable. All values will be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

System Performance Check

A system performance check will be completed prior to sample collection and after each run. The post-test system performance check will be conducted prior to making any sampling system modifications. The SO_2 scrubber system will be pre-conditioned with stack gas for approximately 10 minutes at 2 liters/min. Prior to starting the test run, Hydrogen Sulfide calibration gas ($\leq$ 100 ppmv) will be introduced at the probe tip and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever will be less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The system performance check will be repeated after the conclusion of each test run. The system performance must be within 80 and 120 percent of the calibration gas concentration. The raw run data will be corrected using the post-test system performance values.

Post-Test Direct Calibration Drift Check

Following the completion testing, a post-test calibration drift check will be performed. Mid-level SO_2 calibration gas will be introduced directly to the analyzer. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The drift value did not differ from the certified calibration gas value by more than 3% or 0.5 ppmv.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.

- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

Appendix F - Field Raw Data

Scaling	0-25	0-25	0-1000
Daisy Lab Channel	0	1	2
DAQ Channel	1	2	3
Time	O2 A	CO2 A	CO A
10/28/25 18:45	20.63	0.14	5.55
10/28/25 18:46	20.63	0.14	5.52
10/28/25 18:47	20.63	0.15	5.63
10/28/25 18:48	20.63	0.15	5.58
10/28/25 18:49	20.63	0.14	5.69
10/28/25 18:50	20.63	0.14	5.69
10/28/25 18:51	20.63	0.14	5.7
10/28/25 18:52	20.63	0.14	5.48
10/28/25 18:53	20.63	0.14	5.52
10/28/25 18:54	20.63	0.14	5.5
10/28/25 18:55	20.63	0.14	5.46
10/28/25 18:56	20.63	0.14	5.47
10/28/25 18:57	20.63	0.14	5.57
10/28/25 18:58	20.63	0.14	5.53
10/28/25 18:59	20.63	0.14	5.51
10/28/25 19:00	20.63	0.14	5.47
10/28/25 19:01	20.63	0.14	5.76
10/28/25 19:02	20.63	0.14	5.8
10/28/25 19:03	20.63	0.14	5.59
10/28/25 19:04	20.63	0.14	5.8
10/28/25 19:05	20.63	0.14	5.72
10/28/25 19:06	20.63	0.14	5.39
10/28/25 19:07	20.63	0.13	5.42
10/28/25 19:08	20.63	0.14	5.63
10/28/25 19:09	20.63	0.13	5.4
10/28/25 19:10	20.63	0.13	5.52
10/28/25 19:11	20.63	0.13	5.49
10/28/25 19:12	20.63	0.13	5.5
10/28/25 19:13	20.62	0.13	5.31
10/28/25 19:14	20.62	0.13	5.3
10/28/25 19:15	20.62	0.13	5.45
10/28/25 19:16	20.62	0.13	5.61
10/28/25 19:17	20.62	0.13	5.44
10/28/25 19:18	20.62	0.13	5.27
10/28/25 19:19	20.62	0.13	5.28
10/28/25 19:20	20.62	0.13	5.26
10/28/25 19:21	20.62	0.13	5.41
10/28/25 19:22	20.62	0.13	5.45
10/28/25 19:23	20.62	0.13	5.46
10/28/25 19:24	20.63	0.13	5.33
10/28/25 19:25	20.62	0.13	5.25
10/28/25 19:26	20.62	0.13	5.18
10/28/25 19:27	20.62	0.13	5.26
10/28/25 19:28	20.62	0.13	5.18
10/28/25 19:29	20.62	0.13	5.18
10/28/25 19:30	20.62	0.13	5.17
10/28/25 19:31	20.62	0.13	5.2
10/28/25 19:32	20.62	0.13	5.25

10/28/25 19:33	20.62	0.13	5.24
10/28/25 19:34	20.62	0.13	5.23
10/28/25 19:35	20.63	0.13	5.19
10/28/25 19:36	20.62	0.13	5.19
10/28/25 19:37	20.62	0.13	5.07
10/28/25 19:38	20.62	0.12	5.1
10/28/25 19:39	20.62	0.13	5.1
10/28/25 19:40	20.62	0.13	5.07
10/28/25 19:41	20.62	0.13	5.06
10/28/25 19:42	20.62	0.13	5.01
10/28/25 19:43	20.62	0.12	5.02
10/28/25 19:44	20.62	0.13	5.14
10/28/25 19:45	20.63	0.12	5.04
10/28/25 19:46	20.63	0.12	5.01
10/28/25 19:47	20.63	0.12	5.03
10/28/25 19:48	20.63	0.12	5.05
10/28/25 19:49	20.63	0.12	5.06
10/28/25 19:50	20.63	0.12	5.01
10/28/25 19:51	20.63	0.12	5.18
10/28/25 19:52	20.63	0.12	5.22
10/28/25 19:53	20.63	0.12	5.35
10/28/25 19:54	20.63	0.12	5.09
10/28/25 19:55	20.64	0.12	5.16
10/28/25 19:56	20.64	0.12	5.09
10/28/25 19:57	20.64	0.12	5.06
10/28/25 19:58	20.64	0.12	5.04
10/28/25 19:59	20.64	0.12	5.31
10/28/25 20:00	20.64	0.12	5.11
10/28/25 20:01	20.64	0.12	5.21
10/28/25 20:02	20.63	0.12	5.12
10/28/25 20:03	20.63	0.12	5.08
10/28/25 20:04	20.64	0.12	5.46
10/28/25 20:05	20.64	0.12	5.02
10/28/25 20:06	20.64	0.12	4.91
10/28/25 20:07	20.64	0.12	5.04
10/28/25 20:08	20.63	0.12	5.32
10/28/25 20:09	20.64	0.12	5
10/28/25 20:10	20.64	0.12	4.93
10/28/25 20:11	20.63	0.12	4.98
10/28/25 20:12	20.63	0.12	5.05
10/28/25 20:13	20.63	0.12	5.09
10/28/25 20:14	20.63	0.12	5
10/28/25 20:15	20.63	0.12	5.18
10/28/25 20:16	20.63	0.12	5.05
10/28/25 20:17	20.63	0.12	4.89
10/28/25 20:18	20.63	0.12	4.92
10/28/25 20:19	20.63	0.12	4.86
10/28/25 20:20	20.63	0.12	5.13
10/28/25 20:21	20.63	0.12	5.12
10/28/25 20:22	20.63	0.12	5.23
10/28/25 20:23	20.63	0.12	5.12
10/28/25 20:24	20.63	0.12	5.22
10/28/25 20:25	20.63	0.12	4.93
10/28/25 20:26	20.64	0.12	4.95
10/28/25 20:27	20.64	0.12	5.25

10/28/25 20:28	20.63	0.12	4.93
10/28/25 20:29	20.64	0.12	4.96
10/28/25 20:30	20.64	0.11	4.88
10/28/25 20:31	20.64	0.12	4.92
10/28/25 20:32	20.64	0.11	4.91
10/28/25 20:33	20.64	0.12	5.02
10/28/25 20:34	20.64	0.12	4.85
10/28/25 20:35	20.64	0.12	4.89
10/28/25 20:36	20.64	0.12	4.94
10/28/25 20:37	20.64	0.11	4.91
10/28/25 20:38	20.64	0.11	5.16
10/28/25 20:39	20.64	0.11	4.94
10/28/25 20:40	20.64	0.11	4.82
10/28/25 20:41	20.64	0.11	4.86
10/28/25 20:42	20.64	0.12	4.88
10/28/25 20:43	20.64	0.11	4.86
10/28/25 20:44	20.64	0.11	4.87
10/28/25 20:45	20.64	0.11	4.83
10/28/25 20:46	20.64	0.11	4.83
10/28/25 20:47	20.64	0.11	4.81
10/28/25 20:48	20.64	0.11	4.86
10/28/25 20:49	20.64	0.11	4.82
10/28/25 20:50	20.64	0.11	4.84
10/28/25 20:51	20.64	0.11	4.83
10/28/25 20:52	20.63	0.11	4.92
10/28/25 20:53	20.63	0.11	4.84
10/28/25 20:54	20.64	0.11	4.83
10/28/25 20:55	20.63	0.11	4.84
10/28/25 20:56	20.63	0.11	4.86
10/28/25 20:57	20.64	0.11	4.86
10/28/25 20:58	20.64	0.11	4.85
10/28/25 20:59	20.64	0.11	4.83
10/28/25 21:00	20.64	0.11	4.86
10/28/25 21:01	20.64	0.11	4.9
10/28/25 21:02	20.64	0.11	4.85
10/28/25 21:03	20.64	0.11	4.87
10/28/25 21:04	20.64	0.11	4.88
10/28/25 21:05	20.64	0.11	4.86
10/28/25 21:06	20.64	0.11	4.9
10/28/25 21:07	20.64	0.11	4.87
10/28/25 21:08	20.64	0.11	4.85
10/28/25 21:09	20.64	0.11	4.88
10/28/25 21:10	20.64	0.11	4.87
10/28/25 21:11	20.64	0.11	4.84
10/28/25 21:12	20.64	0.11	4.88
10/28/25 21:13	20.64	0.11	4.89
10/28/25 21:14	20.63	0.11	4.86
10/28/25 21:15	20.63	0.11	4.88
10/28/25 21:16	20.63	0.11	4.87
10/28/25 21:17	20.64	0.11	4.89
10/28/25 21:18	20.63	0.11	4.9
10/28/25 21:19	20.63	0.11	4.88
10/28/25 21:20	20.63	0.11	4.88
10/28/25 21:21	20.63	0.11	4.89
10/28/25 21:22	20.63	0.11	4.85

10/28/25 21:23	20.63	0.11	4.89
10/28/25 21:24	20.63	0.11	4.93
10/28/25 21:25	20.63	0.11	4.93
10/28/25 21:26	20.63	0.11	4.95
10/28/25 21:27	20.63	0.11	4.89
10/28/25 21:28	20.64	0.11	4.88
10/28/25 21:29	20.64	0.11	4.96
10/28/25 21:30	20.64	0.11	4.94
10/28/25 21:31	20.64	0.11	4.92
10/28/25 21:32	20.64	0.11	4.85
10/28/25 21:33	20.64	0.11	4.89
10/28/25 21:34	20.64	0.11	4.91
10/28/25 21:35	20.64	0.11	4.93
10/28/25 21:36	20.64	0.11	4.9
10/28/25 21:37	20.64	0.11	4.96
10/28/25 21:38	20.64	0.11	4.93
10/28/25 21:39	20.64	0.11	4.9
10/28/25 21:40	20.64	0.11	4.94
10/28/25 21:41	20.64	0.11	5.06
10/28/25 21:42	20.64	0.11	4.98
10/28/25 21:43	20.64	0.11	4.99
10/28/25 21:44	20.64	0.11	5.02
10/28/25 21:45	20.64	0.11	4.99
10/28/25 21:46	20.64	0.11	4.96
10/28/25 21:47	20.64	0.11	4.98
10/28/25 21:48	20.64	0.11	5.03
10/28/25 21:49	20.64	0.11	5
10/28/25 21:50	20.64	0.11	5.03
10/28/25 21:51	20.64	0.11	4.97
10/28/25 21:52	20.64	0.11	5.06
10/28/25 21:53	20.64	0.11	5.01
10/28/25 21:54	20.63	0.11	5.03
10/28/25 21:55	20.63	0.11	5.03
10/28/25 21:56	20.63	0.11	5.04
10/28/25 21:57	20.63	0.11	5.06
10/28/25 21:58	20.63	0.11	5.04
10/28/25 21:59	20.63	0.11	5.04
10/28/25 22:00	20.64	0.11	5.04
10/28/25 22:01	20.64	0.11	5.09
10/28/25 22:02	20.64	0.11	5.06
10/28/25 22:03	20.65	0.11	5.07
10/28/25 22:04	20.64	0.11	5.08
10/28/25 22:05	20.65	0.11	5.06
10/28/25 22:06	20.64	0.11	5.05
10/28/25 22:07	20.64	0.11	5.07
10/28/25 22:08	20.64	0.11	5.06
10/28/25 22:09	20.64	0.11	5.05
10/28/25 22:10	20.64	0.11	5.02
10/28/25 22:11	20.64	0.11	5.07
10/28/25 22:12	20.64	0.11	5.06
10/28/25 22:13	20.64	0.11	5.07
10/28/25 22:14	20.64	0.11	5.09
10/28/25 22:15	20.64	0.11	5.07
10/28/25 22:16	20.64	0.11	5.06
10/28/25 22:17	20.64	0.11	5.09

10/28/25 22:18	20.64	0.11	5.25
10/28/25 22:19	20.64	0.11	5.06
10/28/25 22:20	20.64	0.11	5.07
10/28/25 22:21	20.64	0.11	5.08
10/28/25 22:22	20.64	0.11	5.1
10/28/25 22:23	20.64	0.11	5.12
10/28/25 22:24	20.64	0.11	5.11
10/28/25 22:25	20.64	0.11	5.09
10/28/25 22:26	20.64	0.11	5.05
10/28/25 22:27	20.64	0.11	5.11
10/28/25 22:28	20.65	0.11	5.28
10/28/25 22:29	20.64	0.11	5.17
10/28/25 22:30	20.65	0.11	5.16
10/28/25 22:31	20.64	0.11	5.23
10/28/25 22:32	20.64	0.11	5.16
10/28/25 22:33	20.64	0.11	5.15
10/28/25 22:34	20.64	0.11	5.12
10/28/25 22:35	20.64	0.11	5.16
10/28/25 22:36	20.64	0.11	5.23
10/28/25 22:37	20.64	0.11	5.09
10/28/25 22:38	20.64	0.1	5.29
10/28/25 22:39	20.64	0.1	5.15
10/28/25 22:40	20.64	0.1	5.17
10/28/25 22:41	20.64	0.11	5.25
10/28/25 22:42	20.64	0.11	5.26
10/28/25 22:43	20.64	0.1	5.18
10/28/25 22:44	20.64	0.1	5.1
10/28/25 22:45	20.64	0.1	5.17
10/28/25 22:46	20.64	0.1	5.13
10/28/25 22:47	20.64	0.1	5.28
10/28/25 22:48	20.64	0.1	5.18
10/28/25 22:49	20.64	0.1	5.26
10/28/25 22:50	20.64	0.1	5.21
10/28/25 22:51	20.64	0.1	5.37
10/28/25 22:52	20.64	0.1	5.47
10/28/25 22:53	20.64	0.1	5.36
10/28/25 22:54	20.64	0.1	5.43
10/28/25 22:55	20.64	0.1	5.45
10/28/25 22:56	20.65	0.1	5.35
10/28/25 22:57	20.65	0.1	5.23
10/28/25 22:58	20.65	0.1	5.33
10/28/25 22:59	20.65	0.1	5.23
10/28/25 23:00	20.65	0.1	5.27
10/28/25 23:01	20.65	0.1	5.22
10/28/25 23:02	20.65	0.1	5.13
10/28/25 23:03	20.65	0.1	5.19
10/28/25 23:04	20.65	0.1	5.4
10/28/25 23:05	20.65	0.1	5.47
10/28/25 23:06	20.65	0.1	5.19
10/28/25 23:07	20.64	0.1	5.13
10/28/25 23:08	20.64	0.1	5.2
10/28/25 23:09	20.64	0.1	5.26
10/28/25 23:10	20.64	0.1	5.4
10/28/25 23:11	20.64	0.1	5.66
10/28/25 23:12	20.64	0.1	5.41

10/28/25 23:13	20.64	0.1	5.27
10/28/25 23:14	20.64	0.1	5.26
10/28/25 23:15	20.64	0.1	5.41
10/28/25 23:16	20.64	0.1	5.47
10/28/25 23:17	20.64	0.1	5.36
10/28/25 23:18	20.64	0.1	5.19
10/28/25 23:19	20.64	0.1	5.18
10/28/25 23:20	20.64	0.1	5.27
10/28/25 23:21	20.64	0.09	5.25
10/28/25 23:22	20.64	0.09	5.18
10/28/25 23:23	20.64	0.09	5.24
10/28/25 23:24	20.64	0.09	5.24
10/28/25 23:25	20.64	0.09	5.19
10/28/25 23:26	20.64	0.1	5.22
10/28/25 23:27	20.64	0.09	5.19
10/28/25 23:28	20.64	0.09	5.34
10/28/25 23:29	20.64	0.09	5.22
10/28/25 23:30	20.65	0.09	5.29
10/28/25 23:31	20.65	0.09	5.25
10/28/25 23:32	20.65	0.09	5.25
10/28/25 23:33	20.65	0.1	5.3
10/28/25 23:34	20.65	0.1	5.27
10/28/25 23:35	20.65	0.1	5.29
10/28/25 23:36	20.65	0.1	5.34
10/28/25 23:37	20.65	0.1	5.33
10/28/25 23:38	20.65	0.1	5.43
10/28/25 23:39	20.65	0.1	5.36
10/28/25 23:40	20.65	0.1	5.34
10/28/25 23:41	20.65	0.1	5.33
10/28/25 23:42	20.65	0.1	5.52
10/28/25 23:43	20.65	0.1	5.38
10/28/25 23:44	20.65	0.1	5.45
10/28/25 23:45	20.65	0.1	5.35
10/28/25 23:46	20.64	0.1	5.36
10/28/25 23:47	20.64	0.1	5.41
10/28/25 23:48	20.65	0.1	5.49
10/28/25 23:49	20.64	0.1	5.51
10/28/25 23:50	20.64	0.1	5.65
10/28/25 23:51	20.65	0.1	5.59
10/28/25 23:52	20.65	0.1	5.56
10/28/25 23:53	20.65	0.1	5.52
10/28/25 23:54	20.65	0.1	5.6
10/28/25 23:55	20.65	0.1	5.57
10/28/25 23:56	20.65	0.1	5.55
10/28/25 23:57	20.66	0.09	5.37
10/28/25 23:58	20.66	0.1	5.51
10/28/25 23:59	20.65	0.09	5.47
10/29/25 0:00	20.65	0.09	5.43
10/29/25 0:01	20.65	0.09	5.37
10/29/25 0:02	20.65	0.09	5.63
10/29/25 0:03	20.65	0.09	5.4
10/29/25 0:04	20.65	0.09	5.55
10/29/25 0:05	20.65	0.1	5.76
10/29/25 0:06	20.65	0.1	5.89
10/29/25 0:07	20.65	0.1	5.52

10/29/25 0:08	20.65	0.09	5.71
10/29/25 0:09	20.65	0.1	6
10/29/25 0:10	20.65	0.1	5.65
10/29/25 0:11	20.65	0.09	5.43
10/29/25 0:12	20.65	0.1	5.51
10/29/25 0:13	20.65	0.1	5.7
10/29/25 0:14	20.65	0.1	6.08
10/29/25 0:15	20.65	0.1	5.57
10/29/25 0:16	20.65	0.09	5.58
10/29/25 0:17	20.65	0.09	5.58
10/29/25 0:18	20.65	0.09	5.74
10/29/25 0:19	20.65	0.09	5.52
10/29/25 0:20	20.65	0.09	5.48
10/29/25 0:21	20.65	0.09	5.47
10/29/25 0:22	20.65	0.09	5.47
10/29/25 0:23	20.65	0.09	5.48
10/29/25 0:24	20.65	0.09	5.48
10/29/25 0:25	20.65	0.09	5.47
10/29/25 0:26	20.65	0.09	5.43
10/29/25 0:27	20.65	0.09	5.46
10/29/25 0:28	20.65	0.09	5.49
10/29/25 0:29	20.65	0.09	5.45
10/29/25 0:30	20.65	0.09	5.56
10/29/25 0:31	20.65	0.09	5.51
10/29/25 0:32	20.64	0.09	5.48
10/29/25 0:33	20.65	0.09	5.53
10/29/25 0:34	20.65	0.09	5.52
10/29/25 0:35	20.65	0.09	5.49
10/29/25 0:36	20.65	0.09	5.54
10/29/25 0:37	20.65	0.09	5.56
10/29/25 0:38	20.65	0.09	5.54
10/29/25 0:39	20.65	0.09	5.5
10/29/25 0:40	20.65	0.09	5.54
10/29/25 0:41	20.65	0.09	5.53
10/29/25 0:42	20.65	0.09	5.53
10/29/25 0:43	20.65	0.09	5.53
10/29/25 0:44	20.65	0.09	5.6
10/29/25 0:45	20.65	0.09	5.56
10/29/25 0:46	20.65	0.09	5.58
10/29/25 0:47	20.65	0.09	5.62
10/29/25 0:48	20.65	0.09	5.54
10/29/25 0:49	20.65	0.09	5.54
10/29/25 0:50	20.65	0.09	5.57
10/29/25 0:51	20.65	0.09	5.63
10/29/25 0:52	20.65	0.09	5.56
10/29/25 0:53	20.65	0.09	5.55
10/29/25 0:54	20.65	0.09	5.6
10/29/25 0:55	20.65	0.09	5.6
10/29/25 0:56	20.65	0.09	5.6
10/29/25 0:57	20.65	0.09	5.58
10/29/25 0:58	20.65	0.09	5.62
10/29/25 0:59	20.66	0.09	5.6
10/29/25 1:00	20.66	0.09	5.61
10/29/25 1:01	20.66	0.09	5.59
10/29/25 1:02	20.66	0.09	5.6

10/29/25 1:03	20.66	0.09	5.6
10/29/25 1:04	20.66	0.09	5.57
10/29/25 1:05	20.66	0.09	5.6
10/29/25 1:06	20.66	0.09	5.62
10/29/25 1:07	20.66	0.09	5.65
10/29/25 1:08	20.66	0.09	5.63
10/29/25 1:09	20.66	0.09	5.6
10/29/25 1:10	20.66	0.09	5.63
10/29/25 1:11	20.66	0.09	5.63
10/29/25 1:12	20.66	0.09	5.64
10/29/25 1:13	20.66	0.09	5.66
10/29/25 1:14	20.66	0.09	5.6
10/29/25 1:15	20.66	0.09	5.65
10/29/25 1:16	20.66	0.09	5.65
10/29/25 1:17	20.66	0.09	5.63
10/29/25 1:18	20.66	0.09	5.62
10/29/25 1:19	20.66	0.09	5.68
10/29/25 1:20	20.66	0.09	5.66
10/29/25 1:21	20.66	0.09	5.65
10/29/25 1:22	20.66	0.09	5.65
10/29/25 1:23	20.66	0.09	5.66
10/29/25 1:24	20.65	0.09	5.66
10/29/25 1:25	20.65	0.09	5.7
10/29/25 1:26	20.66	0.09	5.73
10/29/25 1:27	20.66	0.09	5.68
10/29/25 1:28	20.66	0.09	5.7
10/29/25 1:29	20.66	0.09	5.69
10/29/25 1:30	20.67	0.09	5.7
10/29/25 1:31	20.66	0.09	5.76
10/29/25 1:32	20.67	0.09	5.76
10/29/25 1:33	20.66	0.09	5.76
10/29/25 1:34	20.66	0.09	5.77
10/29/25 1:35	20.66	0.09	5.74
10/29/25 1:36	20.66	0.09	5.74
10/29/25 1:37	20.66	0.09	5.77
10/29/25 1:38	20.66	0.09	5.74
10/29/25 1:39	20.66	0.09	5.78
10/29/25 1:40	20.66	0.09	5.79
10/29/25 1:41	20.66	0.09	5.77
10/29/25 1:42	20.66	0.09	5.79
10/29/25 1:43	20.66	0.09	5.77
10/29/25 1:44	20.66	0.09	5.82
10/29/25 1:45	20.66	0.09	5.84
10/29/25 1:46	20.66	0.09	5.79
10/29/25 1:47	20.66	0.09	5.84
10/29/25 1:48	20.66	0.09	5.82
10/29/25 1:49	20.65	0.09	5.89
10/29/25 1:50	20.65	0.09	5.83
10/29/25 1:51	20.65	0.09	5.8
10/29/25 1:52	20.65	0.09	5.84
10/29/25 1:53	20.65	0.09	5.81
10/29/25 1:54	20.65	0.09	5.89
10/29/25 1:55	20.65	0.09	5.84
10/29/25 1:56	20.65	0.09	5.9
10/29/25 1:57	20.65	0.09	5.86

10/29/25 1:58	20.65	0.09	5.85
10/29/25 1:59	20.65	0.09	5.85
10/29/25 2:00	20.65	0.09	5.85
10/29/25 2:01	20.65	0.09	5.83
10/29/25 2:02	20.65	0.09	5.86
10/29/25 2:03	20.65	0.09	5.9
10/29/25 2:04	20.65	0.09	5.89
10/29/25 2:05	20.65	0.09	5.89
10/29/25 2:06	20.65	0.09	5.88
10/29/25 2:07	20.65	0.09	5.89
10/29/25 2:08	20.65	0.09	5.85
10/29/25 2:09	20.66	0.09	5.95
10/29/25 2:10	20.66	0.09	5.91
10/29/25 2:11	20.66	0.09	5.88
10/29/25 2:12	20.65	0.09	5.92
10/29/25 2:13	20.65	0.09	5.92
10/29/25 2:14	20.65	0.09	5.93
10/29/25 2:15	20.66	0.09	5.95
10/29/25 2:16	20.66	0.09	5.92
10/29/25 2:17	20.66	0.09	5.94
10/29/25 2:18	20.67	0.09	5.92
10/29/25 2:19	20.67	0.08	5.91
10/29/25 2:20	20.67	0.09	5.97
10/29/25 2:21	20.66	0.09	5.89
10/29/25 2:22	20.66	0.08	5.97
10/29/25 2:23	20.67	0.09	5.98
10/29/25 2:24	20.67	0.09	5.97
10/29/25 2:25	20.67	0.09	5.95
10/29/25 2:26	20.67	0.09	5.98
10/29/25 2:27	20.66	0.08	5.99
10/29/25 2:28	20.67	0.08	5.99
10/29/25 2:29	20.66	0.08	5.97
10/29/25 2:30	20.66	0.08	5.99
10/29/25 2:31	20.66	0.08	6.02
10/29/25 2:32	20.66	0.08	6.01
10/29/25 2:33	20.66	0.08	5.98
10/29/25 2:34	20.66	0.08	5.94
10/29/25 2:35	20.66	0.08	6.06
10/29/25 2:36	20.66	0.08	5.99
10/29/25 2:37	20.66	0.08	6.03
10/29/25 2:38	20.66	0.08	6.03
10/29/25 2:39	20.66	0.08	6.03
10/29/25 2:40	20.66	0.08	6
10/29/25 2:41	20.67	0.08	6.02
10/29/25 2:42	20.67	0.08	6
10/29/25 2:43	20.67	0.08	6.05
10/29/25 2:44	20.67	0.08	6.04
10/29/25 2:45	20.67	0.08	6.01
10/29/25 2:46	20.67	0.08	5.99
10/29/25 2:47	20.67	0.08	6.04
10/29/25 2:48	20.67	0.08	6.1
10/29/25 2:49	20.67	0.08	6.1
10/29/25 2:50	20.67	0.08	6.11
10/29/25 2:51	20.67	0.08	6.07
10/29/25 2:52	20.67	0.08	6.11

10/29/25 2:53	20.67	0.08	6.1
10/29/25 2:54	20.67	0.08	6.14
10/29/25 2:55	20.67	0.08	6.09
10/29/25 2:56	20.67	0.08	6.04
10/29/25 2:57	20.66	0.08	6.12
10/29/25 2:58	20.66	0.08	6.14
10/29/25 2:59	20.66	0.08	6.12
10/29/25 3:00	20.66	0.08	6.15
10/29/25 3:01	20.66	0.08	6.07
10/29/25 3:02	20.66	0.08	6.11
10/29/25 3:03	20.66	0.08	6.12
10/29/25 3:04	20.66	0.08	6.14
10/29/25 3:05	20.67	0.08	6.16
10/29/25 3:06	20.66	0.08	6.13
10/29/25 3:07	20.66	0.08	6.14
10/29/25 3:08	20.66	0.08	6.19
10/29/25 3:09	20.66	0.08	6.17
10/29/25 3:10	20.66	0.08	6.13
10/29/25 3:11	20.66	0.08	6.18
10/29/25 3:12	20.66	0.08	6.18
10/29/25 3:13	20.66	0.08	6.21
10/29/25 3:14	20.66	0.08	6.19
10/29/25 3:15	20.66	0.08	6.2
10/29/25 3:16	20.66	0.08	6.14
10/29/25 3:17	20.66	0.08	6.16
10/29/25 3:18	20.66	0.08	6.23
10/29/25 3:19	20.66	0.08	6.24
10/29/25 3:20	20.66	0.08	6.23
10/29/25 3:21	20.66	0.08	6.16
10/29/25 3:22	20.66	0.08	6.21
10/29/25 3:23	20.66	0.08	6.2
10/29/25 3:24	20.66	0.08	6.26
10/29/25 3:25	20.67	0.08	6.22
10/29/25 3:26	20.67	0.08	6.23
10/29/25 3:27	20.67	0.08	6.26
10/29/25 3:28	20.67	0.08	6.25
10/29/25 3:29	20.67	0.08	6.28
10/29/25 3:30	20.67	0.08	6.29
10/29/25 3:31	20.67	0.08	6.31
10/29/25 3:32	20.67	0.08	6.27
10/29/25 3:33	20.67	0.08	6.28
10/29/25 3:34	20.67	0.08	6.23
10/29/25 3:35	20.67	0.08	6.25
10/29/25 3:36	20.67	0.08	6.28
10/29/25 3:37	20.67	0.08	6.3
10/29/25 3:38	20.67	0.08	6.27
10/29/25 3:39	20.67	0.08	6.35
10/29/25 3:40	20.67	0.08	6.29
10/29/25 3:41	20.67	0.08	6.26
10/29/25 3:42	20.67	0.08	6.3
10/29/25 3:43	20.67	0.08	6.32
10/29/25 3:44	20.67	0.08	6.3
10/29/25 3:45	20.67	0.08	6.29
10/29/25 3:46	20.67	0.08	6.28
10/29/25 3:47	20.67	0.08	6.34

10/29/25 3:48	20.67	0.08	6.37
10/29/25 3:49	20.67	0.08	6.38
10/29/25 3:50	20.67	0.08	6.32
10/29/25 3:51	20.67	0.08	6.34
10/29/25 3:52	20.68	0.08	6.32
10/29/25 3:53	20.68	0.08	6.39
10/29/25 3:54	20.68	0.08	6.37
10/29/25 3:55	20.68	0.08	6.42
10/29/25 3:56	20.68	0.08	6.35
10/29/25 3:57	20.68	0.08	6.37
10/29/25 3:58	20.68	0.08	6.38
10/29/25 3:59	20.67	0.08	6.37
10/29/25 4:00	20.67	0.08	6.44
10/29/25 4:01	20.67	0.08	6.4
10/29/25 4:02	20.67	0.08	6.4
10/29/25 4:03	20.67	0.08	6.42
10/29/25 4:04	20.67	0.08	6.38
10/29/25 4:05	20.67	0.08	6.41
10/29/25 4:06	20.67	0.08	6.42
10/29/25 4:07	20.66	0.08	6.44
10/29/25 4:08	20.67	0.08	6.44
10/29/25 4:09	20.67	0.08	6.41
10/29/25 4:10	20.67	0.08	6.42
10/29/25 4:11	20.66	0.08	6.44
10/29/25 4:12	20.66	0.08	6.44
10/29/25 4:13	20.67	0.08	6.46
10/29/25 4:14	20.66	0.08	6.5
10/29/25 4:15	20.66	0.08	6.45
10/29/25 4:16	20.66	0.08	6.43
10/29/25 4:17	20.66	0.08	6.47
10/29/25 4:18	20.66	0.08	6.49
10/29/25 4:19	20.66	0.08	6.46
10/29/25 4:20	20.66	0.08	6.48
10/29/25 4:21	20.66	0.08	6.45
10/29/25 4:22	20.66	0.08	6.49
10/29/25 4:23	20.66	0.08	6.49
10/29/25 4:24	20.67	0.08	6.47
10/29/25 4:25	20.67	0.08	6.53
10/29/25 4:26	20.67	0.08	6.54
10/29/25 4:27	20.67	0.08	6.53
10/29/25 4:28	20.67	0.08	6.52
10/29/25 4:29	20.67	0.08	6.54
10/29/25 4:30	20.67	0.08	6.52
10/29/25 4:31	20.67	0.08	6.55
10/29/25 4:32	20.67	0.08	6.5
10/29/25 4:33	20.67	0.08	6.58
10/29/25 4:34	20.67	0.08	6.57
10/29/25 4:35	20.67	0.08	6.57
10/29/25 4:36	20.67	0.07	6.55
10/29/25 4:37	20.67	0.08	6.56
10/29/25 4:38	20.67	0.08	6.57
10/29/25 4:39	20.67	0.08	6.57
10/29/25 4:40	20.67	0.07	6.56
10/29/25 4:41	20.67	0.07	6.6
10/29/25 4:42	20.67	0.07	6.65

10/29/25 4:43	20.67	0.07	6.63
10/29/25 4:44	20.67	0.08	6.66
10/29/25 4:45	20.67	0.08	6.65
10/29/25 4:46	20.67	0.08	6.6
10/29/25 4:47	20.67	0.08	6.61
10/29/25 4:48	20.67	0.08	6.62
10/29/25 4:49	20.67	0.08	6.64
10/29/25 4:50	20.67	0.08	6.63
10/29/25 4:51	20.67	0.07	6.67
10/29/25 4:52	20.67	0.08	6.69
10/29/25 4:53	20.68	0.08	6.59
10/29/25 4:54	20.67	0.08	6.61
10/29/25 4:55	20.67	0.07	6.64
10/29/25 4:56	20.67	0.08	6.58
10/29/25 4:57	20.67	0.08	6.65
10/29/25 4:58	20.67	0.08	6.66
10/29/25 4:59	20.68	0.08	6.63
10/29/25 5:00	20.67	0.07	6.68
10/29/25 5:01	20.67	0.07	6.68
10/29/25 5:02	20.67	0.07	6.71
10/29/25 5:03	20.67	0.08	6.68
10/29/25 5:04	20.67	0.07	6.7
10/29/25 5:05	20.67	0.07	6.74
10/29/25 5:06	20.67	0.07	6.71
10/29/25 5:07	20.67	0.07	6.73
10/29/25 5:08	20.67	0.08	6.66
10/29/25 5:09	20.67	0.08	6.62
10/29/25 5:10	20.67	0.08	6.68
10/29/25 5:11	20.67	0.07	6.71
10/29/25 5:12	20.67	0.07	6.7
10/29/25 5:13	20.67	0.07	6.7
10/29/25 5:14	20.67	0.07	6.74
10/29/25 5:15	20.67	0.07	6.77
10/29/25 5:16	20.67	0.07	6.75
10/29/25 5:17	20.67	0.07	6.78
10/29/25 5:18	20.68	0.07	6.72
10/29/25 5:19	20.68	0.07	6.74
10/29/25 5:20	20.68	0.07	6.77
10/29/25 5:21	20.68	0.07	6.76
10/29/25 5:22	20.68	0.07	6.77
10/29/25 5:23	20.68	0.07	6.76
10/29/25 5:24	20.67	0.07	6.8
10/29/25 5:25	20.67	0.07	6.78
10/29/25 5:26	20.68	0.07	6.75
10/29/25 5:27	20.67	0.07	6.81
10/29/25 5:28	20.68	0.07	6.81
10/29/25 5:29	20.68	0.07	6.84
10/29/25 5:30	20.68	0.07	6.8
10/29/25 5:31	20.68	0.07	6.86
10/29/25 5:32	20.67	0.07	6.87
10/29/25 5:33	20.67	0.07	6.82
10/29/25 5:34	20.67	0.07	6.84
10/29/25 5:35	20.67	0.07	6.88
10/29/25 5:36	20.67	0.07	6.87
10/29/25 5:37	20.68	0.07	6.85

10/29/25 5:38	20.67	0.07	6.83
10/29/25 5:39	20.67	0.07	6.83
10/29/25 5:40	20.67	0.07	6.82
10/29/25 5:41	20.67	0.07	6.87
10/29/25 5:42	20.67	0.07	6.88
10/29/25 5:43	20.67	0.07	6.9
10/29/25 5:44	20.67	0.07	6.89
10/29/25 5:45	20.67	0.07	6.88
10/29/25 5:46	20.67	0.07	6.89
10/29/25 5:47	20.67	0.07	6.87
10/29/25 5:48	20.67	0.07	6.89
10/29/25 5:49	20.67	0.07	6.87
10/29/25 5:50	20.67	0.07	6.87
10/29/25 5:51	20.67	0.07	6.89
10/29/25 5:52	20.67	0.07	6.93
10/29/25 5:53	20.67	0.07	6.89
10/29/25 5:54	20.67	0.07	6.9
10/29/25 5:55	20.67	0.07	6.93
10/29/25 5:56	20.68	0.07	6.91
10/29/25 5:57	20.68	0.07	6.92
10/29/25 5:58	20.68	0.07	6.96
10/29/25 5:59	20.68	0.07	7.01
10/29/25 6:00	20.68	0.07	6.95
10/29/25 6:01	20.68	0.07	6.93
10/29/25 6:02	20.68	0.07	6.95
10/29/25 6:03	20.68	0.07	6.95
10/29/25 6:04	20.68	0.07	7.01
10/29/25 6:05	20.68	0.07	7.02
10/29/25 6:06	20.68	0.07	6.96
10/29/25 6:07	20.68	0.07	6.98
10/29/25 6:08	20.68	0.07	6.98
10/29/25 6:09	20.68	0.07	7.01
10/29/25 6:10	20.67	0.07	7
10/29/25 6:11	20.68	0.07	7.02
10/29/25 6:12	20.67	0.07	7.03
10/29/25 6:13	20.67	0.07	7.01
10/29/25 6:14	20.67	0.07	7.01
10/29/25 6:15	20.67	0.07	7
10/29/25 6:16	20.67	0.07	7.02
10/29/25 6:17	20.67	0.07	7.06
10/29/25 6:18	20.67	0.07	7.01
10/29/25 6:19	20.67	0.07	7.03
10/29/25 6:20	20.67	0.07	7.02
10/29/25 6:21	20.67	0.07	6.99
10/29/25 6:22	20.67	0.07	7.02
10/29/25 6:23	20.68	0.07	7.12
10/29/25 6:24	20.68	0.07	7.07
10/29/25 6:25	20.68	0.07	7.11
10/29/25 6:26	20.68	0.07	7.07
10/29/25 6:27	20.68	0.07	7.11
10/29/25 6:28	20.68	0.07	7.09
10/29/25 6:29	20.68	0.07	7.07
10/29/25 6:30	20.68	0.07	7.08
10/29/25 6:31	20.68	0.07	7.08
10/29/25 6:32	20.68	0.07	7.06

10/29/25 6:33	20.68	0.07	7.13
10/29/25 6:34	20.68	0.07	7.14
10/29/25 6:35	20.68	0.07	7.13
10/29/25 6:36	20.68	0.07	7.13
10/29/25 6:37	20.68	0.07	7.09
10/29/25 6:38	20.68	0.07	7.06
10/29/25 6:39	20.68	0.07	7.13
10/29/25 6:40	20.68	0.07	7.12
10/29/25 6:41	20.68	0.07	7.11
10/29/25 6:42	20.68	0.07	7.13
10/29/25 6:43	20.68	0.07	7.11
10/29/25 6:44	20.68	0.07	7.17
10/29/25 6:45	20.68	0.07	7.09
10/29/25 6:46	20.68	0.07	7.1
10/29/25 6:47	20.68	0.07	7.17
10/29/25 6:48	20.68	0.07	7.15
10/29/25 6:49	20.68	0.07	7.18
10/29/25 6:50	20.68	0.07	7.12
10/29/25 6:51	20.68	0.07	7.18
10/29/25 6:52	20.67	0.07	7.21
10/29/25 6:53	20.68	0.07	7.19
10/29/25 6:54	20.68	0.07	7.13
10/29/25 6:55	20.68	0.07	7.14
10/29/25 6:56	20.68	0.07	7.16
10/29/25 6:57	20.68	0.07	7.2
10/29/25 6:58	20.67	0.07	7.24
10/29/25 6:59	20.67	0.07	7.2
10/29/25 7:00	20.67	0.07	7.22
10/29/25 7:01	20.67	0.07	7.18
10/29/25 7:02	20.67	0.07	7.17
10/29/25 7:03	20.67	0.07	7.18
10/29/25 7:04	20.67	0.07	7.21
10/29/25 7:05	20.68	0.07	7.16
10/29/25 7:06	20.68	0.07	7.21
10/29/25 7:07	20.68	0.07	7.29
10/29/25 7:08	20.67	0.07	7.23
10/29/25 7:09	20.68	0.07	7.22
10/29/25 7:10	20.68	0.07	7.28
10/29/25 7:11	20.68	0.06	7.26
10/29/25 7:12	20.68	0.06	7.28
10/29/25 7:13	20.68	0.06	7.21
10/29/25 7:14	20.67	0.06	7.24
10/29/25 7:15	20.67	0.07	7.26
10/29/25 7:16	20.67	0.06	7.27
10/29/25 7:17	20.68	0.07	7.3
10/29/25 7:18	20.67	0.07	7.24
10/29/25 7:19	20.68	0.07	7.25
10/29/25 7:20	20.68	0.07	7.22
10/29/25 7:21	20.68	0.07	7.21
10/29/25 7:22	20.68	0.06	7.29
10/29/25 7:23	20.68	0.06	7.26
10/29/25 7:24	20.68	0.06	7.34
10/29/25 7:25	20.68	0.07	7.28
10/29/25 7:26	20.68	0.06	7.28
10/29/25 7:27	20.68	0.07	7.27

10/29/25 7:28	20.68	0.06	7.3
10/29/25 7:29	20.68	0.06	7.33
10/29/25 7:30	20.68	0.06	7.3
10/29/25 7:31	20.68	0.07	7.32
10/29/25 7:32	20.69	0.06	7.33
10/29/25 7:33	20.68	0.06	7.35
10/29/25 7:34	20.68	0.06	7.36
10/29/25 7:35	20.68	0.07	7.33
10/29/25 7:36	20.67	0.06	7.4
10/29/25 7:37	1.55	0	7
10/29/25 7:38	0.01	-0.04	0.57
10/29/25 7:39	0.64	0.62	-0.31
10/29/25 7:40	19.82	20.37	-2.23
10/29/25 7:41	19.93	20.06	-0.95
10/29/25 7:42	19.91	19.84	-1
10/29/25 7:43	19.85	18.85	-0.72
10/29/25 7:44	13.6	9.81	-0.27
10/29/25 7:45	9.96	9.9	-0.93
10/29/25 7:46	13.12	7.43	-0.51
10/29/25 7:47	4.95	0.79	374.64
10/29/25 7:48	0.01	0	508.49
10/29/25 7:49	5.45	0.01	376.72
10/29/25 7:50	0.08	0.01	245
10/29/25 7:51	0	0	250.39
10/29/25 7:52	12.62	0.02	93.49
10/29/25 7:53	4.68	0.1	0.84
10/29/25 7:54	0.14	0.07	0.75
10/29/25 7:55	0.13	0.07	0.79
10/29/25 7:56	7.09	6.93	10.06
10/29/25 7:57	9.9	9.75	0.07
10/29/25 7:58	9.91	9.8	-0.22
10/29/25 7:59	4.02	4.07	134.83
10/29/25 8:00	0.14	0.17	245.75
10/29/25 8:01	0.28	0.38	246.27
10/29/25 8:02	7.18	10.59	118.02
10/29/25 8:03	7.48	11.08	105.74
10/29/25 8:04	7.11	11.45	97.46
10/29/25 8:05	6.94	11.6	101.63
10/29/25 8:06	6.66	11.92	108.9
10/29/25 8:07	6.5	12.08	103.51
10/29/25 8:08	6.46	12.11	99.21
10/29/25 8:09	6.44	12.13	97.83
10/29/25 8:10	6.41	12.17	103.77
10/29/25 8:11	6.52	12.06	102.59
10/29/25 8:12	6.45	12.13	95.36
10/29/25 8:13	6.15	12.43	91.71
10/29/25 8:14	6.07	12.52	100.52
10/29/25 8:15	6.02	12.51	100.74
10/29/25 8:16	6.03	12.58	100.01
10/29/25 8:17	6.07	12.48	96.08
10/29/25 8:18	5.93	12.64	113.7
10/29/25 8:19	5.84	12.67	122.24
10/29/25 8:20	5.82	12.83	143.96
10/29/25 8:21	5.89	12.8	152.03
10/29/25 8:22	6.33	12.6	133.36

10/29/25 8:23	6.99	12.06	111.26
10/29/25 8:24	6.93	12.12	109.96
10/29/25 8:25	7.22	11.83	108.88
10/29/25 8:26	6.76	12.22	104.57
10/29/25 8:27	7.06	12.12	108.43
10/29/25 8:28	7.32	11.73	102.05
10/29/25 8:29	7.16	11.73	106.7
10/29/25 8:30	6.44	12.2	103.21
10/29/25 8:31	6.33	12.31	93.73
10/29/25 8:32	6.61	12.14	97.91
10/29/25 8:33	6.76	11.95	104.8
10/29/25 8:34	6.5	12.18	104.31
10/29/25 8:35	6.84	11.96	112.74
10/29/25 8:36	6.92	11.89	120.98
10/29/25 8:37	6.94	11.93	127.88
10/29/25 8:38	6.96	11.9	123.12
10/29/25 8:39	7.23	11.68	116.59
10/29/25 8:40	7.1	11.78	102.97
10/29/25 8:41	6.94	11.86	98.76
10/29/25 8:42	6.92	11.95	97.81
10/29/25 8:43	7.01	11.88	94.02
10/29/25 8:44	6.37	12.27	85.88
10/29/25 8:45	6.06	12.69	117.2
10/29/25 8:46	6.19	12.57	99.4
10/29/25 8:47	6.26	12.56	97.01
10/29/25 8:48	6.34	12.5	101.28
10/29/25 8:49	6.48	12.38	98.39
10/29/25 8:50	6.6	12.26	106.15
10/29/25 8:51	7.23	11.7	117
10/29/25 8:52	7.27	11.49	110.87
10/29/25 8:53	7.73	11.08	114.55
10/29/25 8:54	7.7	11.01	119.61
10/29/25 8:55	7.54	11.2	115.1
10/29/25 8:56	7.38	11.3	109.92
10/29/25 8:57	7.71	11.16	113.74
10/29/25 8:58	8.22	10.63	112.26
10/29/25 8:59	8.63	10.19	113.78
10/29/25 9:00	8.61	10.2	112.03
10/29/25 9:01	8.58	10.22	117.38
10/29/25 9:02	8.74	10.03	130.19
10/29/25 9:03	8.48	10.28	123.51
10/29/25 9:04	8.27	10.47	125.77
10/29/25 9:05	8.43	10.37	126.13
10/29/25 9:06	8.45	10.34	123.98
10/29/25 9:07	2.66	2.93	80.51
10/29/25 9:08	0.12	0.17	1.25
10/29/25 9:09	0.45	0.45	3.82
10/29/25 9:10	9.64	9.27	6.47
10/29/25 9:11	9.89	9.82	0.26
10/29/25 9:12	5.11	5.07	111.86
10/29/25 9:13	0.13	0.2	246.08
10/29/25 9:14	1.04	1.18	237.16
10/29/25 9:15	8.67	9.75	110.4
10/29/25 9:16	8.56	10.17	104.76
10/29/25 9:17	8.4	10.32	108.36

10/29/25 9:18	8.55	10.18	107.87
10/29/25 9:19	8.07	10.31	87.08
10/29/25 9:20	7.21	10.9	75.09
10/29/25 9:21	6.99	11.15	77.89
10/29/25 9:22	7.01	11.14	87.09
10/29/25 9:23	6.75	11.38	93.57
10/29/25 9:24	6.5	11.58	92.06
10/29/25 9:25	6.08	11.97	105.13
10/29/25 9:26	5.9	12.19	124.1
10/29/25 9:27	5.92	12.16	111.41
10/29/25 9:28	5.81	12.2	123.78
10/29/25 9:29	5.38	12.57	192.52
10/29/25 9:30	5.14	12.84	298.1
10/29/25 9:31	4.87	13.04	451.86
10/29/25 9:32	4.65	13.27	667.98
10/29/25 9:33	4.73	13.24	720.14
10/29/25 9:34	4.82	13.14	659.46
10/29/25 9:35	4.88	13.07	495.39
10/29/25 9:36	4.77	13.11	505.47
10/29/25 9:37	4.89	13.11	502.15
10/29/25 9:38	4.92	13.07	432.78
10/29/25 9:39	4.9	13.08	541.3
10/29/25 9:40	4.79	13.29	268.14
10/29/25 9:41	4.73	13.53	346.34
10/29/25 9:42	5.41	13.16	125.42
10/29/25 9:43	5.54	13.11	137.51
10/29/25 9:44	5.84	12.95	155.19
10/29/25 9:45	6.07	12.63	116.18
10/29/25 9:46	5.72	12.96	155.28
10/29/25 9:47	5.73	12.94	132.63
10/29/25 9:48	5.8	12.8	151.02
10/29/25 9:49	5.63	12.87	176.23
10/29/25 9:50	5.4	12.97	220.92
10/29/25 9:51	5.49	12.9	250.12
10/29/25 9:52	5.34	12.73	488.76
10/29/25 9:53	4.79	13.21	446.14
10/29/25 9:54	4.93	13.11	426.5
10/29/25 9:55	5.01	12.99	463.16
10/29/25 9:56	5.09	12.87	496.5
10/29/25 9:57	5.12	12.92	507.97
10/29/25 9:58	4.99	12.95	458.33
10/29/25 9:59	5.18	12.88	505.37
10/29/25 10:00	5.1	12.98	499.24
10/29/25 10:01	5.07	13.04	477.39
10/29/25 10:02	5.34	12.83	342.41
10/29/25 10:03	5.65	12.57	217.28
10/29/25 10:04	5.45	12.73	303.13
10/29/25 10:05	5.22	13.01	374.23
10/29/25 10:06	5.24	12.96	422.22
10/29/25 10:07	5.02	13.2	472.75
10/29/25 10:08	5.12	13.12	479.64
10/29/25 10:09	5.31	12.95	275.07
10/29/25 10:10	5.75	12.6	140.9
10/29/25 10:11	5.87	12.42	142.68
10/29/25 10:12	6.04	12.29	129.79

10/29/25 10:13	5.86	12.43	160.52
10/29/25 10:14	5.79	12.53	172.32
10/29/25 10:15	5.45	12.79	232.78
10/29/25 10:16	5.36	12.92	209.37
10/29/25 10:17	5.2	13	330.03
10/29/25 10:18	5.25	13.01	262.69
10/29/25 10:19	5.18	13.1	324.51
10/29/25 10:20	5.34	13.03	244.33
10/29/25 10:21	5.24	13.05	285.74
10/29/25 10:22	4.8	13.45	449.33
10/29/25 10:23	5.45	13.16	137.64
10/29/25 10:24	5.78	12.81	90.75
10/29/25 10:25	6.2	12.48	85.14
10/29/25 10:26	6.44	12.4	92.94
10/29/25 10:27	6.62	12.21	97.2
10/29/25 10:28	6.48	12.31	91.74
10/29/25 10:29	6.33	12.45	88.69
10/29/25 10:30	6.4	12.42	94.54
10/29/25 10:31	6.45	12.31	90.21
10/29/25 10:32	6.3	12.44	88.04
10/29/25 10:33	6.51	12.24	92.9
10/29/25 10:34	6.56	12.14	83.19
10/29/25 10:35	6.68	12.02	89.65
10/29/25 10:36	6.73	11.96	83.19
10/29/25 10:37	6.82	11.86	84.09
10/29/25 10:38	6.76	11.92	80.68
10/29/25 10:39	6.95	11.75	86.73
10/29/25 10:40	6.86	11.84	90.97
10/29/25 10:41	7.03	11.72	101.99
10/29/25 10:42	7.3	11.47	107.6
10/29/25 10:43	7.55	11.22	100.07
10/29/25 10:44	7.48	11.28	104.97
10/29/25 10:45	7.49	11.26	112.86
10/29/25 10:46	7.46	11.34	123.89
10/29/25 10:47	7.74	11.08	134.37
10/29/25 10:48	8.1	10.73	152.96
10/29/25 10:49	8.35	10.44	164.43
10/29/25 10:50	8.53	10.28	169.92
10/29/25 10:51	8.61	10.21	168.64
10/29/25 10:52	8.1	10.62	155.16
10/29/25 10:53	0.78	0.94	51.89
10/29/25 10:54	0.11	0.16	1.35
10/29/25 10:55	2.32	2.26	8.17
10/29/25 10:56	9.8	9.49	2.21
10/29/25 10:57	9.88	9.83	0.39
10/29/25 10:58	3	3	164.51
10/29/25 10:59	0.12	0.18	246.57
10/29/25 11:00	2.21	3.82	197.04
10/29/25 11:01	6.73	11.77	75.99
10/29/25 11:02	6.48	12.13	68.31
10/29/25 11:03	6.68	11.93	69.49
10/29/25 11:04	6.41	12.18	68.69
10/29/25 11:05	6.42	12.21	69.49
10/29/25 11:06	6.42	12.2	66.82
10/29/25 11:07	6.57	12.07	68.15

10/29/25 11:08	6.73	11.95	71.54
10/29/25 11:09	7.02	11.63	74.48
10/29/25 11:10	6.87	11.74	70.39
10/29/25 11:11	6.66	11.91	72.12
10/29/25 11:12	6.55	12.06	65.52
10/29/25 11:13	6.61	12.02	65.71
10/29/25 11:14	6.49	12.13	73.96
10/29/25 11:15	6.97	11.78	80.42
10/29/25 11:16	6.97	11.7	82.58
10/29/25 11:17	6.95	11.7	82.88
10/29/25 11:18	6.82	11.81	88.05
10/29/25 11:19	6.58	12.05	74.05
10/29/25 11:20	6.39	12.21	71.2
10/29/25 11:21	6.33	12.32	66.3
10/29/25 11:22	6.36	12.28	69.97
10/29/25 11:23	6.47	12.13	70.42
10/29/25 11:24	6.02	12.48	63.54
10/29/25 11:25	5.9	12.66	69.42
10/29/25 11:26	5.72	12.84	77.51
10/29/25 11:27	5.88	12.73	73.9
10/29/25 11:28	5.79	12.74	71.42
10/29/25 11:29	5.81	12.78	68.31
10/29/25 11:30	5.65	12.85	61.19
10/29/25 11:31	5.69	12.94	69.6
10/29/25 11:32	5.82	12.74	64.59
10/29/25 11:33	6.18	12.48	61.15
10/29/25 11:34	6.09	12.53	61.58
10/29/25 11:35	6.3	12.36	59.63
10/29/25 11:36	6.23	12.36	59.1
10/29/25 11:37	6.25	12.35	60.69
10/29/25 11:38	6.21	12.39	65.46
10/29/25 11:39	6.11	12.48	69.07
10/29/25 11:40	6.1	12.51	68.52
10/29/25 11:41	6.25	12.39	69.68
10/29/25 11:42	6.15	12.42	69.98
10/29/25 11:43	6.15	12.49	71.15
10/29/25 11:44	6.64	12.06	75.24
10/29/25 11:45	6.82	11.78	74.62
10/29/25 11:46	7	11.69	85.95
10/29/25 11:47	7.39	11.29	91.23
10/29/25 11:48	7.24	11.37	89.26
10/29/25 11:49	7.1	11.49	83.81
10/29/25 11:50	7.04	11.62	82.07
10/29/25 11:51	7.38	11.34	88.55
10/29/25 11:52	7.2	11.4	83.02
10/29/25 11:53	7.16	11.5	76.27
10/29/25 11:54	7.26	11.41	82.19
10/29/25 11:55	7.31	11.34	75.45
10/29/25 11:56	7.06	11.55	78.39
10/29/25 11:57	7.12	11.53	80.1
10/29/25 11:58	7.22	11.42	79.95
10/29/25 11:59	6.92	11.68	75.06
10/29/25 12:00	6.67	11.94	77.39
10/29/25 12:01	6.78	11.85	71.09
10/29/25 12:02	6.87	11.77	70.75

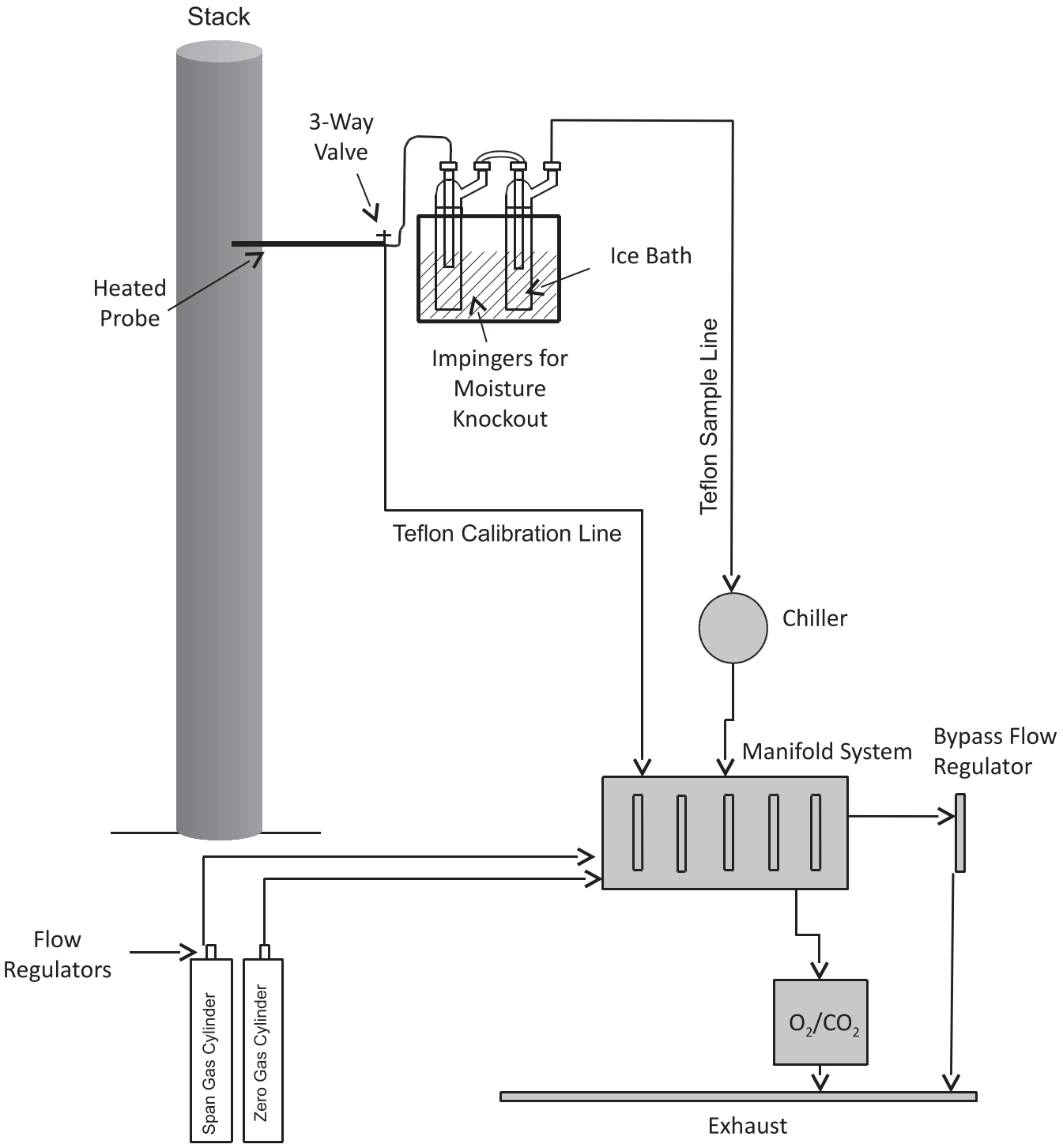
10/29/25 12:03	6.74	11.86	70.52
10/29/25 12:04	6.64	11.98	72.06
10/29/25 12:05	6.54	12.09	75.47
10/29/25 12:06	6.27	12.24	75.6
10/29/25 12:07	6.29	12.33	73.28
10/29/25 12:08	5.93	12.52	62.8
10/29/25 12:09	5.82	12.7	62.04
10/29/25 12:10	5.99	12.56	66.77
10/29/25 12:11	6.32	12.33	73.55
10/29/25 12:12	6.42	12.19	75
10/29/25 12:13	6.69	11.96	81.43
10/29/25 12:14	6.87	11.76	79.58
10/29/25 12:15	6.76	11.83	76.43
10/29/25 12:16	6.59	11.96	73.49
10/29/25 12:17	6.31	12.25	68.89
10/29/25 12:18	6.33	12.24	66.36
10/29/25 12:19	6.08	12.49	66.6
10/29/25 12:20	6.11	12.52	62.54
10/29/25 12:21	6.18	12.53	59.56
10/29/25 12:22	6	12.7	62.08
10/29/25 12:23	6.03	12.87	66.62
10/29/25 12:24	6.15	12.81	73.16
10/29/25 12:25	6.51	12.59	80.26
10/29/25 12:26	6.63	12.42	81.18
10/29/25 12:27	6.59	12.51	82.03
10/29/25 12:28	6.85	12.3	87.4
10/29/25 12:29	6.78	12.32	89.7
10/29/25 12:30	6.92	12.17	92.66
10/29/25 12:31	6.76	12.23	92.53
10/29/25 12:32	6.84	12.1	87.96
10/29/25 12:33	6.59	12.21	70.61
10/29/25 12:34	6.5	12.17	66.5
10/29/25 12:35	1.12	2.01	48.93
10/29/25 12:36	0.11	0.19	1.06
10/29/25 12:37	1.41	1.42	6.94
10/29/25 12:38	9.75	9.39	3.01
10/29/25 12:39	9.87	9.81	0.2
10/29/25 12:40	3.78	3.8	144.62
10/29/25 12:41	0.12	0.2	245.87
10/29/25 12:42	5.17	0.16	193.14
10/29/25 12:43	20.49	0.17	2.71
10/29/25 12:44	20.58	0.17	1.32
10/29/25 12:45	20.6	0.16	1.07
10/29/25 12:46	20.6	0.16	1.06
10/29/25 12:47	14.98	0.16	37.83
10/29/25 12:48	0.06	0.1	3.81
10/29/25 12:49	1.28	1.04	20.66
10/29/25 12:50	-0.02	0.04	0.97
10/29/25 12:51	-0.02	0.01	0.11
10/29/25 12:52	0.69	0.06	25.34
10/29/25 12:53	-0.02	0.01	49.78
10/29/25 12:54	-0.02	0	44.14
10/29/25 12:55	-0.02	0	24.69
10/29/25 12:56	-0.02	0	18.39
10/29/25 12:57	-0.02	0	11.58

10/29/25 12:58	3.1	0.08	7.17
10/29/25 12:59	0.8	0.26	2
10/29/25 13:00	0.08	0.08	0.17
10/29/25 13:01	0.69	0.73	4.9
10/29/25 13:02	9.73	9.52	5.26
10/29/25 13:03	9.87	9.76	0.44
10/29/25 13:04	4.61	4.53	3.62
10/29/25 13:05	0.11	0.17	11.98
10/29/25 13:06	2.12	0.51	12
10/29/25 13:07	14.65	3.36	2.28
10/29/25 13:08	15.1	3.24	1
10/29/25 13:09	15.16	3.23	0.98
10/29/25 13:10	14.7	3.49	0.6
10/29/25 13:11	14.48	3.61	0.48
10/29/25 13:12	14.55	3.57	0.56
10/29/25 13:13	14.74	3.47	0.57
10/29/25 13:14	14.6	3.55	0.48
10/29/25 13:15	14.27	3.73	0.42
10/29/25 13:16	13.83	3.98	0.37
10/29/25 13:17	13.46	4.19	0.32
10/29/25 13:18	13.77	4.01	0.3
10/29/25 13:19	13.71	4.05	0.36
10/29/25 13:20	13.5	4.17	0.29
10/29/25 13:21	13.09	4.4	0.29
10/29/25 13:22	13.06	4.41	0.24
10/29/25 13:23	12.61	4.66	0.27
10/29/25 13:24	12.52	4.71	0.24
10/29/25 13:25	12.57	4.68	0.21
10/29/25 13:26	12.63	4.65	0.26
10/29/25 13:27	12.7	4.61	0.24
10/29/25 13:28	12.72	4.61	0.24
10/29/25 13:29	12.73	4.6	0.24
10/29/25 13:30	12.68	4.63	0.23
10/29/25 13:31	12.71	4.62	0.25
10/29/25 13:32	12.6	4.67	0.23
10/29/25 13:33	12.64	4.65	0.18
10/29/25 13:34	12.68	4.63	0.17
10/29/25 13:35	12.68	4.63	0.21
10/29/25 13:36	12.68	4.62	0.17
10/29/25 13:37	12.65	4.64	0.2
10/29/25 13:38	12.81	4.55	0.18
10/29/25 13:39	12.83	4.54	0.12
10/29/25 13:40	12.69	4.62	0.07
10/29/25 13:41	12.68	4.62	0.1
10/29/25 13:42	12.65	4.64	0.09
10/29/25 13:43	12.87	4.51	0.09
10/29/25 13:44	12.94	4.48	0.05
10/29/25 13:45	12.77	4.57	0.06
10/29/25 13:46	12.7	4.61	0.03
10/29/25 13:47	12.64	4.64	0.02
10/29/25 13:48	12.65	4.63	0.07
10/29/25 13:49	12.7	4.61	0.06
10/29/25 13:50	12.68	4.62	0.07
10/29/25 13:51	12.69	4.62	0.03
10/29/25 13:52	12.86	4.52	0.07

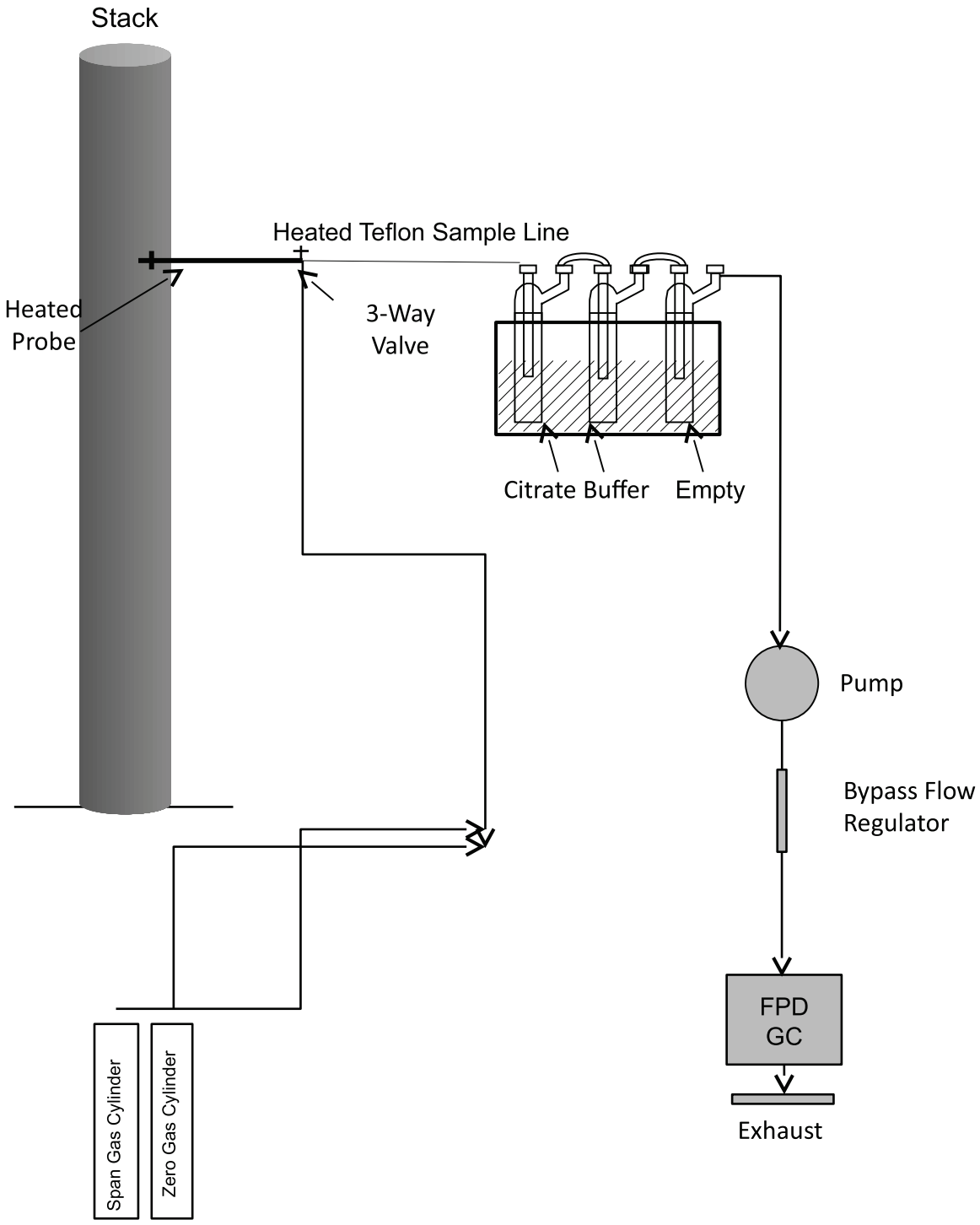
10/29/25 13:53	12.77	4.58	0.04
10/29/25 13:54	12.64	4.66	0.01
10/29/25 13:55	12.6	4.68	0.05
10/29/25 13:56	12.57	4.69	0.01
10/29/25 13:57	12.62	4.66	0.03
10/29/25 13:58	12.63	4.66	0.04
10/29/25 13:59	12.63	4.66	0.04
10/29/25 14:00	12.64	4.65	0.07
10/29/25 14:01	12.6	4.67	0.02
10/29/25 14:02	12.61	4.66	0.05
10/29/25 14:03	12.6	4.68	0.04
10/29/25 14:04	12.57	4.69	0.04
10/29/25 14:05	12.59	4.67	0
10/29/25 14:06	12.6	4.66	0
10/29/25 14:07	12.63	4.65	0
10/29/25 14:08	12.69	4.61	0
10/29/25 14:09	12.67	4.62	0.05
10/29/25 14:10	12.62	4.65	0
10/29/25 14:11	12.62	4.67	0.37
10/29/25 14:12	12.58	4.7	0.44
10/29/25 14:13	12.66	4.57	0.03
10/29/25 14:14	12.73	4.54	0.01
10/29/25 14:15	12.62	4.58	0.04
10/29/25 14:16	12.63	4.58	0
10/29/25 14:17	12.65	4.59	0
10/29/25 14:18	12.59	4.61	0.06
10/29/25 14:19	12.54	4.65	0.07
10/29/25 14:20	12.61	4.61	0.09
10/29/25 14:21	12.71	4.55	0.09
10/29/25 14:22	13.06	4.35	0.04
10/29/25 14:23	13.17	4.3	0.03
10/29/25 14:24	13.19	4.29	0.04
10/29/25 14:25	13.01	4.37	0.08
10/29/25 14:26	1.18	0.53	2.94
10/29/25 14:27	0.08	0.08	0.13
10/29/25 14:28	2.27	2.19	7.35
10/29/25 14:29	9.75	9.42	1.37
10/29/25 14:30	9.84	9.72	-0.5
10/29/25 14:31	2.9	2.88	4.67
10/29/25 14:32	0.08	0.13	11.88
10/29/25 14:33	6.19	0.09	10.72
10/29/25 14:34	20.53	0.11	0.81
10/29/25 14:35	20.6	0.1	0.41
10/29/25 14:36	20.61	0.1	0.45
10/29/25 14:37	20.6	0.1	0.57
10/29/25 14:38	18.89	0.1	0.57

Appendix G - Illustrations

Reference Method Monitors Sampling System
(EPA Method 3A)



Reference Method Monitor Sampling System
(EPA Method 16)



Appendix H - Resume of FTL

CAREER SUMMARY

Mr. Branham is a Project Scientist who has worked in the environmental fieldfor over 7 years. He has been involved with field testing activities on a broad scale and within several different industry types. Over this time, he has developed skills in several areas of emission testing including mobile laboratory operation, meter box operation, and field team supervision.

Education

BS, Parks, Recreation, and Hospitality Administration; Emphasis – Natural Resource Management

Arkansas Tech University

Russellville, AR

Certifications

Visible Emissions Evaluator

Joined Firm

2015

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

Lake City Army Ammunition – Independence, Missouri

Project included sampling for Dioxins and Furans on a hazardous waste combustor via U.S. EPA Reference Test Method 0023a, as well as a RATA to determine relative accuracy of a CO/O2 analyzer they had onsite to monitor emissions from that combustor. Testing was observed by the state regulatory agency. Responsibilities included field organization as well as general field operations.

Martin Marietta Materials – Malvern, Arkansas

Conducted and field managed EPA Method 9 testing at the Jones Mill Quarry location. Responsibilities included project coordination and field operations. Testing parameters included the determination of plume and fugitive emissions opacity.

Clean Harbors – El Dorado, Arkansas

Project included sampling for Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, Total Hydrocarbons, Particulate Matter, Metals, Chlorobenzene, and Hydrogen Cyanide on a hazardous waste incinerator in support of a Comprehensive Performance Test. This project included U.S. EPA Reference Test Methods 6C, 10, 7E, 25A, 5/202, 0030, 29, and OTM-29. Responsibilities included meter box operation, field organization, and general field operations.

Nucor Yamato Steel– Blytheville, Arkansas

Conducted annual compliance and performance specification testing on sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods and instrumental analysis including U.S. EPA Reference Test Methods 5/202 (particulate matter & condensable particulate matter), 12 (lead), 25A (volatile organic compounds), 7E (nitrogen oxides), 6C (sulfur dioxide) and 10 (carbon monoxide). Responsibilities included meter box operation, field organization, and general field operations.

Acme Brick

Conducted and assisted with BMACT testing at multiple locations in Texas and Arkansas. Responsibilities included meter box operation and field organization. Testing parameters included Oxygen, Carbon Dioxide, Nitrogen Oxides, Carbon Monoxide, Non-Methane Volatile Organic Compounds and Total Hydrocarbons, Halide testing with isokinetic train and FTIR, Metals, and Mercury. EPA Methods 3A, 7E, 10, 25A, 26, 29, 30B, and 320. Responsibilities included meter box operation, general field operations, and field organization.

Training

- TVTC Training
- CPR and First Aid
- MSHA Part 46
- Safeland

Last Page of Report

Site Operating Permit Revision Application

Graphic Packaging International, LLC

Texarkana, TX

Submitted by:

Graphic Packaging International

June 2026

Submitted to:

Graphic Packaging International, LLC
9978 FM Road 3129
Queen City, Texas 75572

Texas Commission on Environmental Quality
Air Permits Division
12100 Park 35 Circle, MC-163
Austin, Texas 78753

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Appendix A - PM and TRS Source Testing Results

1. INTRODUCTION

Graphic Packaging International, LLC (GPI) owns and operates a kraft pulp and paper mill near Texarkana, Texas (Texarkana Mill, Mill, or Facility). The Texarkana Mill is located in Cass County, Texas, which is in attainment with the National Ambient Air Quality Standards (NAAQS) for ozone and all criteria pollutants. The Texarkana Mill produces pulp and paper through the following operations: woodyard, power, chemical recovery, caustic plant, non-condensable gas system, pulping, bleaching, papermaking, wastewater treatment, miscellaneous support operations and extruders.

The Facility operates in accordance with Texas Commission on Environmental Quality (TCEQ) Site Operating Permit (SOP) No. O1378 issued December 23, 2025 (Permit). The Facility is classified as a major source with respect to the TCEQ Title V Program, as defined in Title 30 of the Texas Administrative Code (TAC) Chapter 122. The SOP, or Title V Operating Permit (TVOP), expires on December 23, 2030.

GPI conducted particulate matter (PM) testing in February of 2025 and total reduced sulfur (TRS) testing in October of 2025. GPI is requesting to update the Compliance Assurance Monitoring (CAM) deviation limit for the wet scrubbers associated with Nos. 1 and 2 Smelt Dissolving Tanks (Unit IDs SM01 and SM02) to be consistent with the most recent source testing performed. In addition, SM02 was rebuilt in 2019, making SM02 subject to New Source Performance Standards (NSPS) Subpart BBa, Standards of Performance for Kraft Pulp Mill Affected Sources for Which Construction, Reconstruction, or Modification Commenced after May 23, 2013. Permitting was not completed to incorporate the applicable standards. GPI conducted an audit in 2025 under the Texas Audit Privilege Act (TAPA) to voluntarily disclose any violations at the Facility. Findings of the audit, along with the information required under TAPA, have been submitted to the TCEQ on December 10, 2025.

GPI is submitting this minor revision application (Application) to incorporate updates to the CAM and periodic monitoring requirements for the Unit IDs SM01 and SM02 and to add positive applicability for United States Environmental Protection Agency (U.S. EPA) Title 40 Code of Federal Regulations Part 60, Subpart BBa (40 CFR Part 60, Subpart BBa) to unit ID SM02 (Project). The Unit IDs and their associated regulatory updates are summarized in **Table 1-1**.

Table 1-1
Summary of Regulatory Updates by Unit ID

Unit ID	Description	Regulation	Revision
SM01	No. 1 Smelt Dissolving Tank - Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BBa	Add positive applicability of 40 CFR Part 60, Subpart BBa.
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BB	Remove applicability of 40 CFR Part 60, Subpart BB.
SM02	No. 2 Smelt Dissolving Tank – Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).

This Application contains all required forms and supporting information for the revision of the Permit. The following forms are included in this Application: Form OP-2, Form OP-CRO1, Form OP-UA1, Form OP-REQ3, and Form OP-MON. The certification by a responsible official is included in Form OP-CRO1. Form OP-REQ3 is included to document the detailed citations associated with emissions unit that require a revision at the Facility. Tables 1a and 1b of Form OP-REQ3 show the applicable requirements for emissions units undergoing revisions.

There were no off-permit changes or operational flexibility notifications submitted since the last renewal. Therefore, there are no minor new source review (NSR) authorizations that need to be incorporated with this Application.

2. IDENTIFYING AND ADMINISTRATIVE INFORMATION

This section contains identifying and administrative information for the Mill. The following forms are included in this section:

- OP-2: Application for Permit Revision/Renewal

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1)

Date: **6/5/2026**	
Permit No.: **O1378**	
Regulated Entity No.: **RN100543115**	
Company Name: **Graphic Packaging International, LLC**	
For Submissions to EPA	
Has an electronic copy of this application been submitted (or is being submitted) to EPA?	☒ YES ☐ NO
I. Application Type	
Indicate the type of application:	
☐ Renewal	
☒ Streamlined Revision (Must include provisional terms and conditions as explained in the instructions.)	
☐ Significant Revision	
☐ Revision Requesting Prior Approval	
☐ Administrative Revision	
☐ Response to Reopening	
II. Qualification Statement	
For SOP Revisions Only	☒ YES ☐ NO
For GOP Revisions Only	☐ YES ☐ NO

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1 *continued*)

III.	**Major Source Pollutants (Complete this section if the permit revision is due to a change at the site or change in regulations.)**					
Indicate all pollutants for which the site is a major source based on the site's potential to emit: *(Check the appropriate box[es].)*						
☒ VOC	☒ NO_X	☒ SO_2	☒ PM_{10}	☒ CO	☐ Pb	☒ HAP
Other:						
IV.	**Reference Only Requirements** *(For reference only)*					
Has the applicant paid emissions fees for the most recent agency fiscal year (September 1 - August 31)?					☒ YES ☐ NO ☐ N/A	
V.	**Delinquent Fees and Penalties**					
Notice: This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ are paid in accordance with the Delinquent Fee and penalty protocol.						

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 2
Texas Commission on Environmental Quality

Date: **6/5/2026**
Permit No.: **O1378**
Regulated Entity No.: **RN100543115**
Company Name: **Graphic Packaging International, LLC**

Using the table below, provide a description of the revision.

Revision No.	Revision Code	Unit/Group Process			NSR Authorization	Description of Change and Provisional Terms and Conditions
		New Unit	ID No.	Applicable Form		
1	MS-C	NO	SM01	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM01 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
2	MS-C	NO	SM02	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM02 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
3	MS-C	NO	SM02	OP-UA1	N/A	GPI is requesting to add positive applicability for 40 CFR Part 60, Subpart BBa to SM02. In addition, GPI is requesting to remove 40 CFR Part 60, Subpart BB applicability for SM02. No additional emissions unit, emission point, or process is being added or deleted. Suggested regulations to be added to the Permit are found in Form OP-REQ3.

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 3
Texas Commission on Environmental Quality

Date: **6/5/2026**		
Permit No.: **O1378**		
Regulated Entity No.: **RN100543115**		
Company Name: **Graphic Packaging International, LLC**		
I.	**Significant Revision** *(Complete this section if you are submitting a significant revision application or a renewal application that includes a significant revision.)*	
A.	Is the site subject to bilingual requirements pursuant to 30 TAC § 122.322?	☐ YES ☐ NO
B.	Indicate the alternate language(s) in which public notice is required:	
C.	Will, there be a change in air pollutant emissions as a result of the significant revision?	☐ YES ☐ NO

Using the table below, indicate the air pollutant(s) that will be changing and include a brief description of the change in pollutant emissions for each pollutant:

Pollutant	Description of the Change in Pollutant Emissions

3. RESPONSIBLE OFFICIAL CERTIFICATION

This section contains certification requirements of this Application for the Mill. The following forms are included in this section:

- Form OP-CRO1: Certification by Responsible Official

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program

All initial permit application, revision, renewal, and reopening submittals requiring certification must be addressed using this form. Updates to site operating permit (SOP) and temporary operating permit (TOP) applications, other than public notice verification materials, must be certified prior to authorization of public notice or start of public announcement. Updates to general operating permit (GOP) applications must be certified prior to receiving an authorization to operate under a GOP.

I. Identifying Information	
RN: **RN100543115**	
CN: **CN601710460**	
Account No.: **CG-0010-G**	
Permit No.: **O1378**	
Project No.: **TBA**	
Area Name: **Texarkana Mill**	
Company Name: **Graphic Packaging International, LLC**	
II. Certification Type *(Please mark appropriate box)*	
☒ Responsible Official Representative	☐ Duly Authorized Representative
III. Submittal Type *(Please mark appropriate box) (Only one response can be accepted per form)*	
☐ SOP/TOP Initial Permit Application	☒ Permit Revision, Renewal, or Reopening
☐ GOP Initial Permit Application	☐ Update to Permit Application
☐ Other: _____	

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program
Texas Commission on Environmental Quality

All initial issuance, revision, and renewal permit application submittals requiring certification must be accompanied by this form. Updates to acid rain or CSAPR (other than public notice verification materials) must be certified prior to authorization of public notice for the draft permit.

IV. Certification of Truth
This certification does not extend to information which is designated by TCEQ as information for reference only.
I, **Jeffery Suelzer** certify that I am the **RO** *(Certifier Name printed or typed)* *(RO or DAR)* and that, based on information and belief formed after reasonable inquiry, the statements and information dated during the time period or on the specific date(s) below, are true, accurate, and complete: *Note: Enter Either a Time Period or Specific Date(s) for each certification. This section must be completed. The certification is not valid without documentation date(s).*
Time Period: From _____ to _____ *(Start Date)* *(End Date)*
Specific Dates: **6/5/2026** _____ _____ _____ *(Date 1)* *(Date 2)* *(Date 3)* *(Date 4)*
_____ _____ *(Date 5)* *(Date 6)*
Signature: _____ Signature Date: _____ Title: **Manufacturing Director**

4. PROCESS DESCRIPTION

The Texarkana Mill produces bleached kraft pulp that is used to make paperboard for packaging materials. The operations with air emissions sources at the Texarkana Mill include the following:

- Woodyard
- Power
- Chemical Recovery
- Caustic Plant
- Non-Condensable Gas System
- Pulping
- Bleaching
- Papermaking
- Wastewater Treatment
- Miscellaneous Support Operations
- Extruders

GPI woodyard operations debark logs, process chips, and intake purchased chips as raw materials to the process, which are digested under elevated temperature and pressure in an alkaline solution of sodium sulfide and sodium hydroxide, called “white liquor.” The two pulping lines process hardwood and softwood to produce a pulp slurry which is bleached and sent to the paper machines. The final product is dried and can be laminated through extruders that combine it with polyethylene.

This Application only concerns the smelt dissolving tanks used in the chemical recovery operations. There have been no additional changes to the Mill’s operations since the last renewal of the TVOP application; therefore, only a discussion of the chemical recovery operations is included.

CHEMICAL RECOVERY OPERATIONS

The Texarkana Mill operates two liquor recovery systems that process kraft black liquor from the hardwood and softwood pulping operations. Weak liquor from the pulping process is collected in separate weak black liquor storage tanks, one for the No. 1 System and one for the No. 2 System. The liquor from each system is sent to the multiple effect evaporator set associated with that system. Black liquor from these evaporators is then sent to heavy liquor storage before being further processed in the concentrators. Emissions from the No. 1 and No. 2 Multiple Effect Evaporator Sets and No. 1 and No. 2

Concentrators are collected and controlled by the non-condensable gas (NCG) system. The foul condensates are collected in the evaporator hotwells and routed to the sewer and wastewater treatment system. The combined contaminated condensate is collected and may be used as shower water in the brown stock washers or sewered.

Tall oil soap is produced as a byproduct of the evaporation process. Liquor is extracted from an intermediate stage of each evaporator system and sent to No. 2 Weak Liquor Storage Tank. The soap is then concentrated and kept in the No. 1 and No. 2 Soap Storage Tanks prior to loading into trucks for offsite processing.

The Texarkana Mill recovers cooking chemicals by firing concentrated black liquor into either of the two indirect contact recovery furnaces, No. 1 Recovery Furnace (RB01) and No. 2 Recovery Furnace (RB02). The organics from the liquor are combusted to generate heat for process steam, while the inorganic chemicals collect in the bottom of the furnaces in the form of molten smelt. The recovery furnaces are also permitted to fire natural gas, primarily during start-up operations. Each furnace operates as an independent system that includes: a smelt tank, electrostatic precipitator (ESP) for PM control, and two exhaust stacks. Ash from the ESPs is returned to the system in the Precipitator Ash Tanks (one for each recovery furnace) that are vented to the smelt dissolving tank scrubbers. The molten smelt from each recovery furnace is directed to one of two dedicated smelt tanks, where it is dissolved into weak wash or water to form green liquor, a preliminary step to regenerating white liquor in the causticizing operation. SM01 and SM02 are equipped with scrubbers. The control devices are designed to capture particulates and TRS compounds and return them to the smelt tanks. Weak wash, an aqueous solution of sodium hydroxide, sodium sulfide, and sodium carbonate, is used as the scrubbing medium.

5. PROJECT DESCRIPTION

GPI is requesting to update the CAM deviation limit for the wet scrubbers associated with SM01 and SM02 to be consistent with the most recent source testing performed. Pursuant to 40 CFR §63.864(j)(5)(i)(B)(1), "the minimum fan amperage operating limit must be set as the midpoint between the lowest of the 1-hour average fan amperage values associated with each test run demonstrating compliance with the applicable emission limit in §63.862 and the no-load amperage value." The no-load amperage value is determined using manufacturers specifications, or by performing a no-load test of the fan motor for each smelt dissolving tank scrubber. In 2025, GPI completed PM source testing of SM01 and SM02, on February 11 and 12, respectively. TRS source testing was also performed on SM02 on October 28, 2025. While both pollutants were tested under the applicable NSPS BBa requirements for SM02, the operating parameters (i.e., fan amps and scrubber flow) are established based on the PM performance tests as the operating parameter values were higher than those observed during the TRS test. Therefore, SM01 and SM02 utilize the PM source testing results for the 1-hour average fan amperages of the wet scrubber. The no-load fan amperage value for SM01 and SM02 have been obtained from no-load tests performed in 2015 and 2023, respectively. Therefore, GPI has calculated the lowest 1-hour average fan amperage, as provided in the Source Test Report, and the no-load value, and is requesting the value be used for the CAM deviation limit. Please see Table 5-1 for current Permit values and proposed values. The suggested permit revisions can be found in strikethrough and red text in Form OP-MON.

Table 5-1
Smelt Dissolving Tank Test Results and Proposed Values

Unit Name	No. 1 Smelt Dissolving Tank	No. 2 Smelt Dissolving Tank
Unit ID No.	SM01	SM02
Current Permit Average Fan Amp Value	77	36
No Load Fan Amp Values	50.2	28
Minimum 1-Hour Average Fan Amp	81.8	43.19
Proposed Average Fan Amp Value	66	36
Current Permit Weak Wash Flow to Fan (gpm)	48	75
Proposed Weak Wash Flow to Fan (gpm)	48	77
Current Permit Weak Wash Flow to Scrubber (gpm)	88	95
Proposed Weak Wash Flow to Scrubber (gpm)	87	90

In addition, SM02 was rebuilt in 2019 and is therefore subject to NSPS Subpart BBa. Permitting was not completed to incorporate the applicable Subpart BBa standards associated with SM02. Pursuant to Section 10(G) of the Environmental, Health and Safety Audit Privilege Act, which provides immunity for violations voluntarily disclosed as a result of a compliance audit, the Mill conducted an audit under the TAPA, commencing April 30, 2025, to voluntarily disclose any violations at the Facility. The audit was complete on November 18, 2025 and the audit findings were submitted on December 10, 2025. In addition, a source test for TRS was performed on SM02 on October 28, 2025 to demonstrate compliance with Subpart BBa. Since there were no additions or deletions of an emissions unit, emissions point, or process, Form OP-SUMR is not required per form instructions. However, GPI is requesting to update the Unit Summary of the Permit to include a row for 40 CFR Part 60, Subpart BBa requirements for SM02. An example of the row to include, in red, is found below.

Unit/Group/Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
SM02	KRAFT PULP MILLS	N/A	60BBa-01	40 CFR Part 60, Subpart BBa	No changing attributes.

40 CFR Part 60, Subpart BBa lists additional requirements for sources constructed, reconstructed, or modified after May 23, 2013. SM02 was reconstructed in 2019 and is now regulated by Subpart BBa, rather than Subpart BB. GPI is requesting that the Applicable Requirements Summary also be updated to include the regulations applicable to SM02 in Subpart BBa and to delete regulatory requirements of Subpart BB. The suggested regulations applicable to SM02 to include (in red) and delete (in strikethrough) in the Permit can be found in the example on the following page and in Form OP-REQ3.

Applicable Requirements Summary

Unit Group Process ID No.	Unit Group Process Type	SOP Index No.	Pollutant	State Rule or Federal Regulation Name	Emission Limitation, Standard or Equipment Specification Citation	Textual Description (See Special term and Condition 1.B.)	Monitoring and Testing Requirements	Recordkeeping Requirements (30 TAC §122.144)	Reporting Requirements (30 TAC §122.145)
~~SM02~~	~~EU~~	~~60BB-01~~	~~PM~~	~~40 CFR Part 60, Subpart BB~~	~~§60.282(a)(2)~~	~~On and after the test completion no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases containing PM > 0.1 g/kg black liquor solids (dry weight).~~	~~§ 60.285(a) [G]§ 60.285(c) § 60.285(f)(1) ** See CAM Summary~~	~~None~~	~~None~~

~~SM02~~	~~EU~~	~~60BB-01~~	~~TRS~~	~~40 CFR Part 60, Subpart BB~~	~~§60.283(a)(4)~~	~~On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.~~	~~§ 60.284(b) [G]§ 60.284(b)(2) § 60.284(c)(4) § 60.284(f) § 60.285(a) [G]§ 60.285(e) § 60.285(f)(2)~~	~~§60.284(c)(4)~~	~~None~~
SM02	EU	60BBa-01	PM	40 CFR Part 60, Subpart BBa	§60.282a(a)(3)	On and after the performance test completion no owner/operation shall discharge to the atmosphere from any new smelt dissolving tank that is not associated with a new or reconstructed	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

						recovery furnace subject to the provisions of 60.282a(a)(2) any gases which contain filterable particulate matter in excess of 0.1 gram per kilogram (g/kg) of black liquor solids (dry weight).			
SM02	EU	60BBa-01	TRS	40 CFR Part 60, Subpart BBa	§60.283a(a)(4)	On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7) §60.285a(e) §60.285a(f)(2)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

6. UNIT ATTRIBUTE INFORMATION

This section contains the applicable unit attribute forms to document regulatory applicability. The following forms are included in this section:

- OP-UA1: Miscellaneous and Generic Unit Attributes

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

General Information

Requested Information	Response
Date:	06/05/2026
Customer Reference No.:	CN601710460
Regulated Entity No.:	RN100543115
Permit No.:	O1378
Permit Area Name:	Texarkana Mill
Permit Type:	SOP
Project Type:	Revision
Submission Type:	Existing Application Update
Project Number (if available):	TBD
Form Information	**TCEQ Entry Only**
Title V Form Release Date:	10/1998
Form Number:	10044
APD ID Number:	35v1.0
Version Revised Date:	07/2025
	This form is for use by facilities subject to air quality permit requirements and may be revised periodically.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table of Contents

Table	Regulation	Page	Data Submitted
N/A	N/A	OP-SUM Table 1	Yes
N/A	N/A	OP-REQ2	Yes
Table 1	N/A	Page 1	Yes

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-SUM - Individual Unit Summary
Table 1

Unit AI	Revision No.	Unit ID No.	Group ID No.	Unit Name/Description	CAM	PCA AI	Preconstruction Authorization (PCA) Category	Authorization/ Registration Number	Permit By Rule (PBR) Number	PBR Effective Date
	1	SM01		NO. 1 SMELT TANK	Y			2975		
	1	SM01		NO. 1 SMELT TANK	Y			PSDTX778M2		
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.261	03/14/1997
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.262	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			2975		
	2	SM02		NO. 2 SMELT TANK	Y			PSDTX778M2		
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.261	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.262	03/14/1997

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-REQ2 - Negative Applicable/Superseded Requirement Determinations

Unit AI	Revision No.	Unit ID No.	Potentially Applicable Regulatory Name	Negative Applicability/Superseded Requirement Citation	Negative Applicability/Superseded Requirement Reason
	3	SM02	**40 CFR Part 60, Subpart BBa**	40 CFR Part 60, Subpart BB	SM02 has been rebuilt and is now subject to 40 CFR Part 60, Subpart BBa, which promulgates requirements for sources that have been constructed, reconstructed, or modified after May 23, 2013. 40 CFR Part 60, Subpart BB no longer applies.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table 1

Unit ID No.	SOP/GOP Index No.	Unit Type	Date Constructed/Placed in Service	Functionally Identical Replacement	Maximum Rated Capacity	Technical Information and Unit Description
SM02	60BBa-01	EU	**10/03/2019**			No. 2 Smelt Tank was rebuilt in 2019 and is therefore subject to 40 CFR Part 60, Subpart BBa.

Go to the Table of Contents

7. APPLICABLE REQUIREMENT INFORMATION

This section contains forms that document potentially applicable requirements. The following forms are included in this section:

- OP-REQ3: Applicable Requirements Summary

Applicable Requirements Summary
Form OP-REQ3
(Page 1)
Federal Operating Permit Program
Table 1a: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	Unit/Group/Process Applicable Form	SOP/GOP Index No	Pollutant	Applicable Regulatory Requirement Name	Applicable Regulatory Requirement Standard(s)
3	*SM02*	OP-UA1	*60BBa-01*	*PM & TRS*	*40 CFR Part 60, Subpart BBa*	*§ 60.280a* *§ 60.282a(a)(3)* *§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)* *§ 60.287a(a)* *§ 60.287a(b)(4)* *§ 60.287a(b)(7)* *§ 60.287a(c)* *§60.288a*

Applicable Requirements Summary
Form OP-REQ3 (Page 2)
Federal Operating Permit Program
Table 1b: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	SOP/GOP Index No.	Pollutant	Monitoring and Testing Requirements	Recordkeeping Requirements	Reporting Requirements
2	SM02	60BBa-01	PM & TRS	*§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)*	§ 60.287a(a) § 60.287a(b)(4) § 60.287a(b)(7) § 60.287a(c)	§60.288a

8. COMPLIANCE ASSURANCE MONITORING AND PERIODIC MONITORING

CAM is a Federal program established under 40 CFR Part 64 regulations. The regulatory requirements governing implementation of CAM in Texas are also established in 30 TAC Chapter 122, Subchapter G. CAM applies to an emissions unit located at a major source that meets all of the following:

- The emissions unit is subject to an emissions limitation or standard for an air pollutant in an applicable requirement;
- The emissions unit uses a control device to achieve compliance with the applicable emissions limitation or standard; and
- The emissions unit has the pre-control potential-to-emit greater than or equal to the amount in tons per year required for the site to be classified as a major source.

CAM applicability is determined on a pollutant-by-pollutant basis. Please note that 30 TAC §122.604(c) and (d) include CAM exemptions for certain emissions limitations or standards and certain utility units. For example, CAM does not apply to emissions limitations or standards proposed by U.S. EPA after November 15, 1990 under the Federal Clean Air Act Sections §111 (Standards of Performance for New Stationary Sources) or §112 (Hazardous Air Pollutants). Additionally, CAM does not apply to emissions limitations or standards for which the applicable requirement specifies a continuous compliance determination method.

CAM applicability is determined for the emissions unit, not the control device. Sites are required to address CAM as part of the Title V application process. As such, GPI has reviewed the applicable existing CAM plans for accuracy. Form OP-MON has been included with this Application for the CAM plans that require revisions.

Periodic monitoring is a Federal monitoring program established under 40 CFR Part 70 regulations. The regulatory requirements governing implementation of periodic monitoring in Texas are also established in 30 TAC Chapter 122, Subchapter G. An emissions unit will require periodic monitoring for an emissions limitation or standard when the regulation does not specify sufficient monitoring to determine compliance with the applicable requirement. Form OP-MON has been included to document revisions of the periodic monitoring at the Mill.

Pursuant to 40 CFR §64.2(b)(1), the CAM requirements under 40 CFR Part 64 do not apply to SM02. §64.2(b)(1) exempts units subject to emissions limitations or standards in NSPS promulgated after

November 15, 1990. Subpart BBa lists its own monitoring, performance testing, and compliance provisions for PM and TRS, satisfying the intent of CAM. GPI is requesting to remove CAM requirements that no longer apply to SM02 and has included the suggested strikethrough in Form OP-MON.

Texas Commission on Environmental Quality
Monitoring Requirements
Form OP-MON
(PAGE 3)
Federal Operating Permit Program
Table 1c: CAM/PM Case-By-Case Additions

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**1**		
Unit/EPN/Group/Process ID No.: **SM01**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: **30 TAC Chapter 111, Nonagricultural Processes & 30 TAC Chapter 111, Visible Emissions**		
SOP/GOP Index No.: **R1151-01 & R1111-01**		
Pollutant: **PM & Opacity**		
Main Standard: **§111.151(a) & §111.111(a)(1)(B)**		
Monitoring Type: **CAM & Periodic Monitoring**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 66 ~~77~~ amps; [ii] Minimum liquid flow rate = 87.17 ~~88~~ gpm to scrubber and 47.99 ~~48~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM01**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: **Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**		

Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:
± 2% of span; or
± 5% of design liquid flow rate

Verification Procedures:
N/A

Representative Date: **N/A**

VI. Periodic Monitoring Case-by-case: N/A - No changes to periodic monitoring

Indicator: **[I] Fan motor current; [II] Liquid flow rate**	Minimum Frequency: **Four times per hour**

Averaging Period: **3 hour**

Periodic Monitoring Text:
[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**2**		
Unit/EPN/Group/Process ID No.: **SM02**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: ~~**40 CFR Part 60, Subpart BB &**~~ **30 TAC Chapter 111, Nonagricultural Processes**		
SOP/GOP Index No.: ~~**60BB-01 &**~~ **R1111-01**		
Pollutant: ~~**PM &**~~ **Opacity**		
Main Standard: ~~**§60.282(a)(2) &**~~ **§111.11(a)(1)(B)**		
Monitoring Type: **CAM**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 35.6 ~~36~~ amps; [ii] Minimum liquid flow rate = 89.62 ~~95~~ gpm to scrubber and 76.54 ~~75~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM02**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: ~~**Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**~~ ~~**Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:**~~ ~~**± 2% of span; or**~~ ~~**± 5% of design liquid flow rate**~~		

Verification Procedures: **N/A**	
Representative Date: **N/A**	
VI. Periodic Monitoring Case-by-case	
Indicator: **Fan Amperage & Liquid Flow Rate**	Minimum Frequency: **Four times per hour**
Averaging Period: **3 hour**	
Periodic Monitoring Text: **[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.** **[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.**	

APPENDIX A -
PM AND TRS SOURCE TESTING RESULTS

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Test Dates:
February 11-13, 2025

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subparts MM & S

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Lucas Hotubbee
lucas.hotubbee@alliancetg.com
(479) 206-1157

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewer
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

COMPANY:		Graphic Packaging International		SOURCE:		LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, NCG01	
REVIEWER:				DATE OF SAMPLING:		February 11-13, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. E	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. E	Operating parameters of the pollution control equipment					
13.	App. E	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. D	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	App. C	Chain of custody of samples					
31.	App. C	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. D	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the source) tested and operating conditions for the specific test dates and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections in the test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

March 11, 2025

Riley Wilson, QSTI – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

Appendix A Sample Calculations
Appendix B Field Data
Appendix C Laboratory Data
Appendix D Quality Assurance/Quality Control Data
Appendix E Process Operating/Control System Data
Appendix F CSV Data
Appendix G Illustrations
Appendix H Resume of Field Team Leader
Appendix I Laboratory NELAP Certification
Appendix J SSTP and Associated Documentation
Appendix K TCEQ Permit Sections

Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing was conducted to determine the concentrations and emission rates of particulate matter (PM), particulate matter no more than 10 microns in diameter (PM_{10}), particulate matter no more than 2.5 microns in diameter ($PM_{2.5}$), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	$PM/PM_{10}/PM_{2.5}$
No. 2 Lime Kiln	LK02	$PM/PM_{10}/PM_{2.5}$
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	$PM/PM_{10}/PM_{2.5}$
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	$PM/PM_{10}/PM_{2.5}$
No. 1 Smelt Tank Scrubber	SM01	$PM/PM_{10}/PM_{2.5}$
No. 2 Smelt Tank Scrubber	SM02	$PM/PM_{10}/PM_{2.5}$
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John T. Fussell
Alliance Personnel	Riley Wilson Dominic Bradley Ethan Dobbs Lucas Hotubbee Joshua Moore Marcus Nichols Chris Shepard Calvin Standridge

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) developed by Alliance.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on February 11-13, 2025. Testing consisted of determining the concentration and emission rate of CH_3OH at the exhaust of NCG01 and of $PM/PM_{10}/PM_{2.5}$ at the exhausts of LK1, LK2, RB01A/RB01B, RB02A/RB02B, SM01, and SM02.

Tables 2-1 through 2-4 provide a summary of the emission testing results with comparisons to the applicable NESHAP or TCEQ permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Table 2-1: Summary of Results – Nos. 1 and 2 Lime Kilns

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
LK01 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.015	0.015	0.013	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**22**
Total PM[1] Emission Rate, lb/hr	4.7	4.6	4.4	4.5
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	27.60
Percent of Limit, %	--	--	--	**16**
LK02 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.018	0.006	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**21**
Total PM[1] Emission Rate, lb/hr	6.6	6.6	2.8	5.3
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	26.30
Percent of Limit, %	--	--	--	**20**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-2: Summary of Results – Nos. 1 and 2 Recovery Furnaces

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
RB01A (North Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0082	0.0051	0.0074	0.0069
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**16**
Total PM[1] Emission Rate, lb/hr	6.5	3.6	5.2	5.1
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**19**
RB01B (South Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0013	0.0012	0.0010	0.0011
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**3**
Total PM[1] Emission Rate, lb/hr	1.2	1.2	1.1	1.2
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**4**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
RB02A (West Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.014	0.043	0.025
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**56**
Total PM[1] Emission Rate, lb/hr	21.2	19.9	53.2	31.5
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**74**
RB02B (East Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.030	0.012	0.014	0.019
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**43**
Total PM[1] Emission Rate, lb/hr	36.2	16.2	18.4	23.6
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**55**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-3: Summary of Results – Nos. 1 and 2 Smelt Tank Scrubbers

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
SM01 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.15	0.083	0.073	0.10
NESHAP PM Limit, lb/ton	--	--	--	0.40
Percent of Limit, %	--	--	--	
Total PM[1] Emission Rate, lb/hr	7.8	4.4	3.9	5.4
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	10.9
Percent of Limit, %	--	--	--	**49**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
SM02 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.077	0.063	0.060	0.067
NESHAP PM Limit, lb/ton	--	--	--	0.20
Percent of Limit, %	--	--	--	**33**
Total PM[1] Emission Rate, lb/hr	8.0	7.4	6.4	7.3
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	19.85
Percent of Limit, %	--	--	--	**37**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-4: Summary of Results – NCG Oxidation Unit Scrubber

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
Methanol Data				
Concentration, ppmvd @ 10% O_2	1.1	1.1	0.97	1.1
NESHAP Limit, ppmvd @ 10% O_2	--	--	--	20
Percent of Limit, %	--	--	--	**5**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture	320	FTIR – Continuous Sampling

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated to equivalent diameters and compared to Figure 1-1 in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and an inclined manometer. The stack gas temperature was measured with a K-type thermocouple and a pyrometer.

The O_2 and CO_2 concentrations were assumed to be ambient for the molecular weight and volumetric flow rate calculations at the Nos. 1 and 2 Smelt Tank Scrubbers (SM01 and SM02).

Stack gas velocity pressure and temperature readings were recorded during each test run and were utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing were conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on-site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content (BWS) was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to the testing, each impinger was filled with a known quantity of water or silica gel. Each impinger was analyzed gravimetrically before and after each test run to determine the amount of condensed moisture. All gravimetric analyses were performed on the same balance.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing was conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system consisted of a stainless-steel nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, an un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and five (5) chilled impingers. The first and second impingers were initially empty, the third impinger contained 100 mL of de-ionized water, the fourth impinger was initially empty, and the fifth impinger contained 200-300 grams of silica gel. The un-weighed, 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of 248 ±25°F, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained at a temperature that was greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The nitrogen purge was omitted because the amount of condensate that was collected in the dry impingers was minimal. After the leak check, the impinger contents were measured for moisture gain.

The front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 120-minute purge was conducted at a rate of 14 liters per minute. The nitrogen purge was started within 30 minutes of the conclusion of sampling. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. Condensate was collected in the first dry impinger; therefore, the front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 60-minute purge was conducted at a rate of 14 liters per minute. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder were rinsed six (6) times with acetone to remove any adhering particulate matter, and the resulting rinses were recovered in container 2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water, then with acetone and then with hexane. The resulting water rinse was recovered in container CPM Cont. #1, and the acetone and hexane rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed sequentially

with DIUF water, acetone, and hexane. The resulting water rinse was added to container CPM Cont. #1, and the resulting acetone and hexane rinses were added to container CPM Cont. #2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for condensable particulate matter analysis. The total moles of sulfate and ammonium were determined in the sample fraction and the maximum mass adjustment factor (MMAF) was calculated to correct for residual ammonia in accordance with OTM-59.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture were determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream was extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 FTIR, which was operated with a portable computer. FTIR spectra for each calibration gas were stored on the computer's hard drive, and these single component calibration spectra were used to analyze the spectra of the measured samples. The gas components to be measured were selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio were measured and recorded to document the analyzer's performance. A leak check was performed on the sample cell. The instrument path length was verified by using ethylene as the Calibration Transfer Standard. Dynamic spiking was performed by using a certified standard of the target compound or appropriate surrogate, which was balanced in nitrogen with sulfur hexafluoride blended as a tracer, to calculate the dilution factor. All test spectra, interferograms, and analytical method information were recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at the Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) was introduced directly to the instrument sample port. The signal amplitude was recorded, a background spectra was taken, a linearity check was performed and recorded, the peak-to-peak noise and the root mean square in the spectral region of interest were measured and a screenshot was recorded, all while the nitrogen was flowing.

Following the zero gas checks, room air was pulled through the sample chamber, the line width and resolution were verified to be at 1879 cm-1, the peak position was entered and a screenshot of the FWHH was recorded. Following these checks, another background spectra was recorded, and the calibration transfer standard (CTS) was introduced directly to the instrument sample port. The CTS instrument recovery was recorded, and the instrument mechanical response time was measured.

Next, stack gas was introduced to the FTIR through the sampling system and several scans were taken until a stable reading was achieved. The native concentration of our target spiking analyte (methanol) was recorded. Spike gas was introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate, and a corresponding dilution ratio and a system response time were calculated. Matrix spike recovery spectra were recorded and were within ± 30% of the calculated value of the spike concentration in accordance with the method's requirements.

The matrix spike recovery was conducted one (1) time at the beginning of the testing, and the CTS recovery procedures were repeated following each test run. The corresponding values were recorded.

Appendix A

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	13.3	= average analyzer value during test, % dry
C_o	0.2	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	10.1	= average of pretest & posttest calibration responses, % dry
C_{O_2}	13.2	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.1	= average analyzer value during test, % dry
C_o	0.0	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.8	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	3.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
ΔH	2.158	= pressure differential of orifice, in H_2O
Pm	30.19	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
Pg	-0.48	= static pressure, in. H_2O
Ps	29.99	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Y \times Vm \times Pm}{Tm}$$

where,

Y	0.999	= meter correction factor
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Tm	523.5	= absolute meter temperature, °R
Vmstd	48.077	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	506	= weight of H_2O collected, g
Vwstd	23.863	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37} - \left(\frac{2,827}{Ts + 365}\right)}{Ps}$$

where,

Ts	363.9	= stack temperature, °F
Ps	29.99	= absolute stack gas pressure, in. Hg
BWSsat	1.000	= dimensionless

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	23.863	= standard wet volume, scf
Vmstd	48.077	= standard meter volume, dscf
BWS	0.332	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	1.000	= moisture fraction (theoretical at saturated conditions)
BWSmsd	0.332	= moisture fraction (measured)
BWS	0.332	

Excess Air (EA), %

$$EA = \frac{(\%O_2 - [0.5 \times \%CO]) \times 100}{(0.264 \times \%N_2) - \%O_2 - (0.5 \times \%CO)}$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
CO	0.0	= carbon monoxide concentration, % (assumed zero)
N_2	79.5	= nitrogen concentration, %
EA	40.97259538	= %

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
Md	30.55	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	30.55	= molecular weight (DRY), lb/lb mol
BWS	0.332	= moisture fraction, dimensionless
Ms	26.39	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.804	= pitot tube coefficient
$\Delta P^{1/2}$	0.713	= velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Ms	26.39	= molecular weight of stack gas, lb/lb mol
Vs	50.0	= ft/sec

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	50.0	= stack gas velocity, ft/sec
As	46.16	= cross-sectional area of stack, ft^2
Qa	138,543	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	138,543	= average stack gas flow at stack conditions, acfm
BWS	0.332	= moisture fraction, dimensionless
Ps	29.99	= absolute stack gas pressure, in. Hg
Ts	823.5	= absolute stack temperature, °R
Qs	59,472	= dscfm

Dry Gas Meter Calibration Check (Yqa), dimensionless

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{0.0319 \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0.999	= meter correction factor, dimensionless
Θ	60	= run time, min.
Vm	47.32	= total meter volume, dcf
Tm	523.5	= absolute meter temperature, °R
ΔH@	1.832	= orifice meter calibration coefficient, in. H_2O
Pb	30.03	= barometric pressure, in. Hg
ΔH avg	2.158	= average pressure differential of orifice, in H_2O
Md	30.55	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	1.469	= average squareroot pressure differential of orifice, $(in. H2O)^{1/2}$
Yqa	0.2	= percent

Volume of Nozzle (Vn), ft^3

$$Vn = \frac{Ts \times \left(0.002669 \times Vlc + \frac{Vm \times Pm \times Y}{Tm} \right)}{Ps}$$

where,

Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Vlc	506.0	= volume of H_2O collected, ml
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Y	0.999	= meter correction factor, unitless
Tm	523.5	= absolute meter temperature, °R
Vn	111.928	= volume of nozzle, ft^3

Isokinetic Sampling Rate (I), %

$$I = \left(\frac{Vn}{\theta \times 60 \times An \times Vs} \right) \times 100$$

where,

Vn	111.928	= nozzle volume, ft3
θ	60.0	= run time, minutes
An	0.00059	= area of nozzle, ft^2
Vs	50.0	= average velocity, ft/sec
I	104.7	= %

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Filterable PM Concentration (C_s), grain/dscf

$$C_s = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn	29.2	= filterable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_s	0.0094	= grain/dscf

Filterable PM Emission Rate (PMR), lb/hr

$$PMR = \frac{C_s \times Qs \times 60}{7.0E+03}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
PMR	4.78	= lb/hr

Condensable PM Concentration (C_{CPM}), grain/dscf

$$C_{CPM} = \frac{M_{CPM} \times 0.0154}{Vmstd}$$

where,

M_{CPM}	10.7	= condensable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_{CPM}	0.0034	= grain/dscf

Condensable PM Emission Rate (ER_{CPM}), lb/hr

$$ER_{CPM} = \frac{C_{CPM} \times Qs \times 60\frac{min}{hr}}{7.0E+03}$$

where,

C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
ER_{CPM}	1.75	= lb/hr

Total PM Concentration (C_{TPM}), grain/dscf

$$C_{TPM} = C_S + C_{CPM}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
C_{TPM}	0.0128	= grain/dscf

Total PM Emission Rate (ER_{TPM}), lb/hr

$$ER_{TPM} = PMR + ER_{CPM}$$

where,

PMR	4.78	= filterable PM emission rate, lb/hr
ER_{CPM}	1.75	= condensable PM emission rate, lb/hr
ER_{TPM}	6.53	= lb/hr

Location:	Graphic Packaging International - Queen City, TX
Source:	NCG Oxidation Unti Scrubber (NCG01)
Project No.:	AST-2024-4204
Run No. /Method	Run 1 / Method 320
Run No.	1
Target	35

Methanol - Outlet Concentration (C_{CH_3OH}), ppmvd

$$C_{CH_3OH} = \frac{C_{CH_3OHw}}{1 - BWS}$$

where,

C_{CH_3OHw}	0.5	= Methanol - Outlet Concentration, ppmvw
BWS	0.444	= moisture fraction, unitless
C_{CH_3OH}	0.8	= ppmvd

Methanol - Outlet Concentration (C_{CH_3OHw}), ppmvw

$$C_{CH_3OHw} = C_{CH_3OH} \times (1 - BWS)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
BWS	0.444	= moisture fraction, unitless
C_{CH_3OHw}	0.5	= ppmvw

Methanol - Outlet Concentration (C_{CH_3OHc10}), ppmvd @ 10% O_2

$$C_{CH_3OHc10} = C_{CH_3OH} \times \left(\frac{20.9 - 10}{20.9 - O_2}\right)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
C_{O_2}	13.2	= oxygen concentration, %
C_{CH_3OHc10}	1.1	= ppmvd @10% O_2

Methanol - Outlet Emission Rate (ER_{CH_3OH}), lb/hr

$$ER_{CH_3OH} = \frac{C_{CH_3OH} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 454 \frac{g}{lb}}$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
MW	32.04	= CH_3OH molecular weight, g/g-mole
Qs	6,235	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{CH_3OH}	2.65	= lb/hr

Location Graphic Packaging
Source(s) NCG Incinerator
Project No. AST-2024-4204
Date(s) 2/5/2025

CTS Recovery Value (CTS_R), %

$$\frac{CTS_{avg}}{CTS_{cyl}} \times 100$$

Where,

CTS_{avg}	98.17	= average of all CTS calibration gas readings, ppm
CTS_{cyl}	103	= CTS bottle certified gas value, ppm
CTS_R	95.3%	= CTS recovery value, %

Spike Dilution Factor (DF), %

$$\frac{SF6_{spike} - SF6_{nat}}{SF6_{dir}} \times 100$$

Where,

$SF6_{dir}$	12.03	= average of direct tracer gas value readings
$SF6_{nat}$	0.01	= average of native tracer gas value readings
$SF6_{spike}$	0.759135	= average of dynamic spike tracer gas value readings
DF	6.23%	= spike dilution factor, %

Calculated Spike ($Spike_{calc}$), ppm

$$(DF \times Analyte_{dir}) + (Analyte_{nat} \times (1 - DF))$$

Where,

%DF	6.23%	= spike dilution factor, %
$Analyte_{dir}$	100.07	= average of direct analyte gas values, ppm
Analyte $_{nat}$	0.49	= average of native analyte gas values, ppm
$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm

Spike Recovery Value ($Spike_R$), %

$$\frac{Analyte_{spike}}{Spike_{calc}} \times 100$$

Where,

$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm
$Analyte_{spike}$	5.39	= average of spiked analyte gas values, ppm
$Spike_R$	80.55%	= spike recovery value, %

Appendix B

LK01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

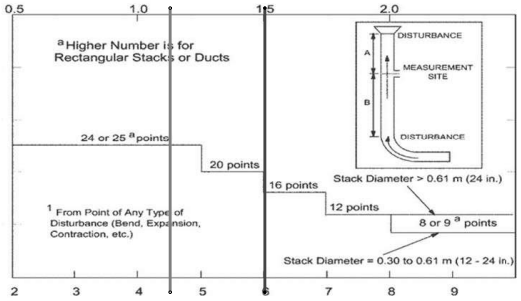
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	160.00	160.10	160.06	160.05
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	42.600	42.370	39.800	41.590
Meter Temperature, °F	(Tm)	47.5	48.5	48.3	48.1
Meter Temperature, °R	(Tm)	507.2	508.2	508.0	507.8
Meter Orifice Pressure, in. WC	(ΔH)	1.633	1.583	1.600	1.606
Volume H_2O Collected, mL	(Vlc)	190.2	195.2	196.8	194.1
Nozzle Diameter, in	(Dn)	0.247	0.247	0.247	0.247
Area of Nozzle, ft^2	(An)	0.0003	0.0003	0.0003	0.0003
Filterable PM Mass, mg	(Mn)	53.7	55.5	44.9	51.4
Condensable PM Mass, mg	(M_{CPM})	4.6	1.8	5.9	4.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.028	44.691	41.999	43.906
Standard Water Volume, ft^3	(Vwstd)	8.970	9.206	9.281	9.152
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
Meter Pressure, in Hg	(Pm)	30.46	30.46	30.46	30.46
Volume at Nozzle, ft^3	(Vn)	59.617	59.606	56.658	58.63
Isokinetic Sampling Rate, (%)	(I)	103.3	103.8	97.1	101.4
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	2.2	3.2	-3.6	0.6
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.019	0.016	0.018
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.015	0.015	0.013	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	4.3	4.5	3.8	4.2
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0016	0.0006	0.0022	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.37	0.14	0.51	0.34
Total PM Concentration, grain/dscf	(C_{TPM})	0.020	0.020	0.019	0.019
Total PM Emission Rate, lb/hr	(ER_{TPM})	4.7	4.6	4.4	4.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Lime Kiln (LK01)
Project No.: AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	56.50	in
Nipple Length:	8.50	in
Depth of Duct:	48.00	in
Cross Sectional Area of Duct:	12.57	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	1.5	(must be ≥ 0.5)
Distance B:	18.0	ft
Distance B Duct Diameters:	4.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/13/25	
Reviewer (Initial and Date):	CAL 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

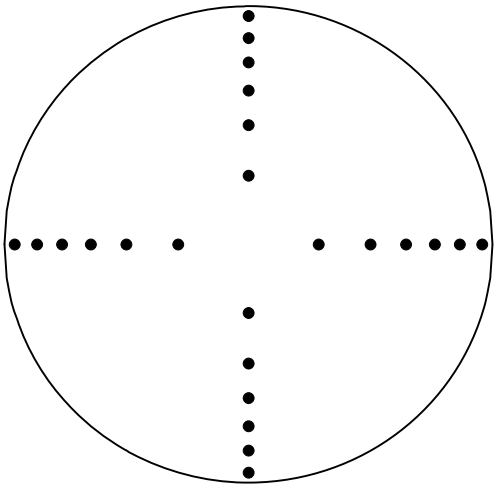
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

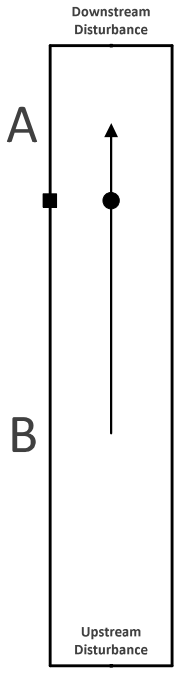
*Percent of stack diameter from inside wall to traverse point.

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.01	9 1/2
2	6.7	3.22	11 11/16
3	11.8	5.66	14 3/16
4	17.7	8.50	17
5	25.0	12.00	20 1/2
6	35.6	17.09	25 9/16
7	64.4	30.91	39 7/16
8	75.0	36.00	44 1/2
9	82.3	39.50	48
10	88.2	42.34	50 13/16
11	93.3	44.78	53 5/16
12	97.9	46.99	55 1/2

Stack Diagram
A = 6 ft.
B = 18 ft.
Depth of Duct = 48 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	6
2	4
3	3
4	5
5	5
6	3
7	2
8	0
9	5
10	2
11	6
12	8
13	2
14	10
15	6
16	5
17	0
18	6
19	6
20	8
21	2
22	3
23	3
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.44	0.42	0.43	0.43
Point 2		0.69	0.69	0.70	0.69
Point 3		0.76	0.67	0.73	0.72
Point 4		0.68	0.66	0.67	0.67
Point 5		0.70	0.70	0.69	0.70
Point 6		0.73	0.71	0.72	0.72
Point 7		0.74	0.72	0.74	0.73
Point 8		0.74	0.75	0.75	0.75
Point 9		0.66	0.66	0.67	0.66
Point 10		0.64	0.64	0.65	0.64
Point 11		0.58	0.56	0.57	0.57
Point 12		0.55	0.54	0.53	0.54
Point 13		0.45	0.45	0.44	0.45
Point 14		0.71	0.72	0.71	0.71
Point 15		0.75	0.73	0.73	0.74
Point 16		0.69	0.70	0.70	0.70
Point 17		0.70	0.70	0.69	0.70
Point 18		0.73	0.74	0.73	0.73
Point 19		0.72	0.73	0.72	0.72
Point 20		0.74	0.71	0.71	0.72
Point 21		0.65	0.66	0.66	0.66
Point 22		0.65	0.64	0.65	0.65
Point 23		0.59	0.60	0.60	0.60
Point 24		0.55	0.54	0.53	0.54
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.810	0.805	0.807	0.808
Pitot Tube Coefficient	(Cp)	0.832	0.832	0.832	0.832
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.66	-0.66	-0.65	-0.66
Stack Pressure, in. Hg	(Ps)	30.29	30.29	30.29	30.29
Stack Cross-sectional Area, ft^2	(As)	12.57	12.57	12.57	12.57
Stack Temperature, °F	(Ts)	130.3	131.3	130.8	130.8
Stack Temperature, °R	(Ts)	590.0	591.0	590.5	590.5
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
O_2 Concentration, %	(O_2)	7.3	7.1	6.9	7.10
CO_2 Concentration, %	(CO_2)	16.5	16.9	17.2	16.87
N_2 Concentration, %	(N_2)	76.2	76	75.9	76.03
Excess Air, %	(EA)	56.96	54.77	52.52	54.75
Molecular Weight, lb/lb-mole (dry)	(Md)	30.93	30.99	31.03	30.98
Molecular Weight, lb/lb-mole (wet)	(Ms)	29.00	28.99	29.06	29.02
Velocity, ft/sec	(Vs)	47.2	47.0	47.0	47.1
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	35,619	35,424	35,457	35,500
At Standard Conditions, scfm	(Qsw)	32,251	32,021	32,080	32,117
At Standard Conditions, dscfm	(Qs)	27,423	27,097	27,218	27,246

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	14:50	2/13/2025	16:38	2/13/2025	18:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	7.32	16.48	7.07	16.92	6.90	17.15
Analysis #2	7.32	16.49	7.05	16.92	6.90	17.15
Analysis #3	7.32	16.49	7.06	16.92	6.90	17.15
Average	7.3	16.5	7.1	16.9	6.9	17.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.7	815.0	689.0	654.7	1014.9	3533.3
Final Mass, g	498.0	852.6	692.8	656.7	1023.4	3723.5
Gain	138.3	37.6	3.8	2.0	8.5	190.2
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.6	641.4	687.6	557.7	939.6	3320.9
Final Mass, g	633.7	680.7	691.3	558.4	952.0	3516.1
Gain	139.1	39.3	3.7	0.7	12.4	195.2
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.4	662.6	692.8	656.7	1023.4	3533.9
Final Mass, g	631.5	701.3	706.4	657.9	1033.6	3730.7
Gain	133.1	38.7	13.6	1.2	10.2	196.8

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	13:20	**Source:** No.1 Lime Kiln (LK01)
Date:	2/13/25	Run 1 VALID	**End Time:**	14:26	**Project No.:** AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	14.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26962-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	190.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.3 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.237	in.		CO_2:	16.5 %	2.505
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- -- 8			Mid 3 (cf)	--
Ms:	28.94	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. 45	Amb. 45	Ideal	Actual		Amb. 45	Amb. 45	Amb. 45	Amb. 45		
A1	0.00	2.50	168.410	0.44	49	129	1.09	1.10	3	255	257	38	66	93.6	38.66
2	2.50	5.00	169.750	0.69	48	129	1.71	1.70	4	255	254	39	70	92.4	48.42
3	5.00	7.50	171.400	0.76	47	129	1.88	1.90	4	256	256	39	69	103.2	50.81
4	7.50	10.00	173.330	0.68	47	129	1.68	1.70	5	252	253	39	72	104.0	48.06
5	10.00	12.50	175.170	0.70	47	129	1.73	1.70	5	253	255	39	70	102.5	48.77
6	12.50	15.00	177.010	0.73	47	128	1.81	1.80	5	251	255	38	69	103.0	49.76
7	15.00	17.50	178.900	0.74	47	129	1.83	1.80	5	250	254	39	71	101.9	50.14
8	17.50	20.00	180.780	0.74	47	129	1.83	1.80	5	249	256	39	73	101.3	50.14
9	20.00	22.50	182.650	0.66	47	129	1.63	1.60	5	247	255	39	72	102.1	47.35
10	22.50	25.00	184.430	0.64	47	131	1.58	1.60	5	243	253	40	68	103.9	46.71
11	25.00	27.50	186.210	0.58	47	130	1.43	1.40	4	251	255	41	67	103.4	44.43
12	27.50	30.00	187.900	0.55	47	130	1.36	1.40	4	244	254	41	66	104.3	43.26
B1	30.00	32.50	189.560	0.45	48	131	1.11	1.10	4	252	255	41	68	105.4	39.17
2	32.50	35.00	191.080	0.71	47	131	1.75	1.80	5	250	255	41	69	102.5	49.20
3	35.00	37.50	192.930	0.75	47	131	1.85	1.90	5	250	250	42	71	103.0	50.56
4	37.50	40.00	194.840	0.69	48	131	1.70	1.70	5	254	256	42	72	101.5	48.50
5	40.00	42.50	196.650	0.70	48	132	1.72	1.70	5	257	254	42	73	102.0	48.89
6	42.50	45.00	198.480	0.73	48	131	1.80	1.80	6	251	258	43	73	100.4	49.88
7	45.00	47.50	200.320	0.72	48	132	1.77	1.80	6	250	251	42	74	101.7	49.58
8	47.50	50.00	202.170	0.74	48	131	1.82	1.80	6	244	255	43	76	101.3	50.23
9	50.00	52.50	204.040	0.65	48	132	1.60	1.60	5	243	255	43	76	102.4	47.11
10	52.50	55.00	205.810	0.65	48	132	1.60	1.60	5	245	255	43	78	101.8	47.11
11	55.00	57.50	207.570	0.59	48	132	1.45	1.50	5	249	255	43	79	106.2	44.88
12	57.50	60.00	209.320	0.55	48	131	1.36	1.40	5	253	256	44	81	106.1	43.30
	Final DGM:		211.010												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.600	ft^3	0.66	in. WC	47.5	°F	130.3	°F	6	1.633	in. WC	103.3	0.150	2.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	15:05	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	16:10	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26961-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	195.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.1 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	16.9 %	2.42
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.007	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	211.150	0.42	46	130	1.02	1.00	3	261	257	43	67	102.5	37.89
2	2.50	5.00	212.560	0.69	47	131	1.67	1.70	4	248	255	44	69	102.7	48.61
3	5.00	7.50	214.370	0.67	47	131	1.62	1.60	4	248	256	46	69	102.5	47.90
4	7.50	10.00	216.150	0.66	47	131	1.59	1.60	4	244	253	46	70	106.7	47.54
5	10.00	12.50	217.990	0.70	47	130	1.69	1.70	4	244	256	46	70	95.1	48.92
6	12.50	15.00	219.680	0.71	47	130	1.72	1.70	4	248	255	47	71	101.7	49.26
7	15.00	17.50	221.500	0.72	48	131	1.74	1.70	4	250	256	48	71	100.3	49.65
8	17.50	20.00	223.310	0.75	48	130	1.82	1.80	5	248	254	48	71	102.1	50.63
9	20.00	22.50	225.190	0.66	48	131	1.60	1.60	4	241	254	48	71	104.2	47.54
10	22.50	25.00	226.990	0.64	49	131	1.55	1.60	4	249	259	48	70	105.0	46.81
11	25.00	27.50	228.780	0.56	49	131	1.36	1.40	4	253	256	48	71	106.6	43.79
12	27.50	30.00	230.480	0.54	49	133	1.31	1.30	4	245	255	49	72	102.9	43.07
B1	30.00	32.50	232.090	0.45	49	132	1.09	1.10	3	253	257	49	74	99.3	39.29
2	32.50	35.00	233.510	0.72	49	133	1.74	1.70	5	251	255	49	75	102.5	49.74
3	35.00	37.50	235.360	0.73	49	133	1.76	1.80	5	252	255	49	76	104.1	50.08
4	37.50	40.00	237.250	0.70	49	132	1.69	1.70	5	256	254	49	78	103.3	49.00
5	40.00	42.50	239.090	0.70	49	132	1.69	1.70	5	254	255	50	78	102.8	49.00
6	42.50	45.00	240.920	0.74	49	132	1.79	1.80	5	252	252	50	77	101.1	50.38
7	45.00	47.50	242.770	0.73	49	131	1.77	1.80	5	247	252	50	74	103.3	49.99
8	47.50	50.00	244.650	0.71	49	132	1.72	1.70	5	246	256	51	72	102.0	49.35
9	50.00	52.50	246.480	0.66	50	132	1.60	1.60	5	250	256	51	69	104.5	47.58
10	52.50	55.00	248.290	0.64	50	131	1.56	1.60	5	252	256	51	69	109.5	46.81
11	55.00	57.50	250.160	0.60	50	131	1.46	1.50	5	253	255	51	70	99.8	45.33
12	57.50	60.00	251.810	0.54	51	131	1.32	1.30	5	256	255	52	70	108.7	43.00
	Final DGM:		253.520												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.370	ft^3	0.65	in. WC	48.5	°F	131.3	°F	5	1.583	in. WC	103.8	0.154	3.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	16:25	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	17:45	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	49	°F	26970-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	131	°F		Pg:	-0.65 in. WC	196.8
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.65	in. WC		O_2:	6.9 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	17.2 %	2.421
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.004	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	253.680	0.43	49	130	1.05	1.10	3	252	244	46	70	105.0	38.34
2	2.50	5.00	255.150	0.70	49	129	1.70	1.70	5	246	252	46	68	95.8	48.87
3	5.00	7.50	256.860	0.73	49	129	1.78	1.80	5	250	257	46	68	94.9	49.91
4	7.50	10.00	258.590	0.67	48	128	1.63	1.60	5	253	255	45	69	97.4	47.77
5	10.00	12.50	260.290	0.69	48	130	1.67	1.70	5	243	248	45	73	98.5	48.56
6	12.50	15.00	262.030	0.72	49	130	1.75	1.80	5	251	251	45	76	97.3	49.61
7	15.00	17.50	263.790	0.74	49	131	1.79	1.80	5	251	247	45	74	92.3	50.34
8	17.50	20.00	265.480	0.75	48	129	1.82	1.80	5	252	245	45	69	100.3	50.59
9	20.00	22.50	267.330	0.67	49	130	1.63	1.60	4	253	251	45	68	98.5	47.86
10	22.50	25.00	269.050	0.65	48	132	1.57	1.60	6	253	258	43	67	94.0	47.22
11	25.00	27.50	270.660	0.57	48	131	1.38	1.40	5	247	260	43	67	93.4	44.18
12	27.50	30.00	272.160	0.53	47	131	1.28	1.30	4	254	263	43	68	95.7	42.60
B1	30.00	32.50	273.640	0.44	47	131	1.06	1.10	3	255	259	43	68	98.6	38.81
2	32.50	35.00	275.030	0.71	47	132	1.71	1.70	5	254	262	43	68	98.5	49.35
3	35.00	37.50	276.790	0.73	48	131	1.77	1.80	6	254	260	43	69	96.4	49.99
4	37.50	40.00	278.540	0.70	48	131	1.69	1.70	5	255	254	44	69	96.7	48.96
5	40.00	42.50	280.260	0.69	48	132	1.67	1.70	5	253	260	44	70	95.8	48.65
6	42.50	45.00	281.950	0.73	48	131	1.77	1.80	6	252	263	45	71	92.0	49.99
7	45.00	47.50	283.620	0.72	48	131	1.74	1.70	5	251	259	46	72	92.6	49.65
8	47.50	50.00	285.290	0.71	49	132	1.72	1.70	5	250	259	47	72	98.7	49.35
9	50.00	52.50	287.060	0.66	49	132	1.60	1.60	5	249	258	48	73	99.5	47.58
10	52.50	55.00	288.780	0.65	49	132	1.57	1.60	5	248	259	48	75	95.6	47.22
11	55.00	57.50	290.420	0.60	49	132	1.45	1.50	4	258	261	49	78	98.8	45.36
12	57.50	60.00	292.050	0.53	49	132	1.28	1.30	4	253	258	50	83	92.2	42.64
	Final DGM:		293.480												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	39.800	ft^3	0.66	in. WC	48.3	°F	130.8	°F	6	1.600	in. WC	97.1	0.152	-3.6

LK02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

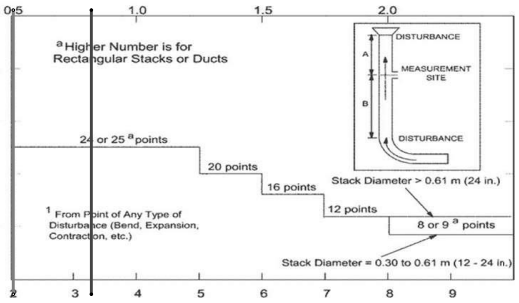
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	309.82	309.98	310.00	309.93
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.375	44.885	45.085	43.782
Meter Temperature, °F	(Tm)	53.6	54.0	57.1	54.9
Meter Temperature, °R	(Tm)	513.3	513.6	516.8	514.6
Meter Orifice Pressure, in. WC	(ΔH)	1.554	1.846	1.838	1.746
Volume H_2O Collected, mL	(Vlc)	336.8	374.0	370.4	360.4
Nozzle Diameter, in	(Dn)	0.416	0.416	0.416	0.416
Area of Nozzle, ft^2	(An)	0.0009	0.0009	0.0009	0.0009
Filterable PM Mass, mg	(Mn)	51.7	64.4	23.3	46.5
Condensable PM Mass, mg	(M_{CPM})	10.4	2.3	5.6	6.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	43.210	46.875	46.794	45.626
Standard Water Volume, ft^3	(Vwstd)	15.883	17.638	17.468	16.996
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
Meter Pressure, in Hg	(Pm)	30.45	30.48	30.48	30.47
Volume at Nozzle, ft^3	(Vn)	67.623	73.830	73.701	71.72
Isokinetic Sampling Rate, (%)	(I)	91.2	98.8	99.9	96.6
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.8	0.5	0.9	0.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.021	0.008	0.016
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.017	0.018	0.006	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	5.5	6.4	2.3	4.7
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.004	0.001	0.002	0.002
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.11	0.23	0.55	0.63
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.022	0.010	0.018
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.6	6.6	2.8	5.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	89.50	in
Nipple Length:	2.00	in
Depth of Duct:	87.50	in
Cross Sectional Area of Duct:	41.76	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	0.8	**(must be ≥ 0.5)**
Distance B:	15.0	ft
Distance B Duct Diameters:	2.1	**(must be ≥ 2)**
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/13/25	
Reviewer (Initial and Date):	EDO 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

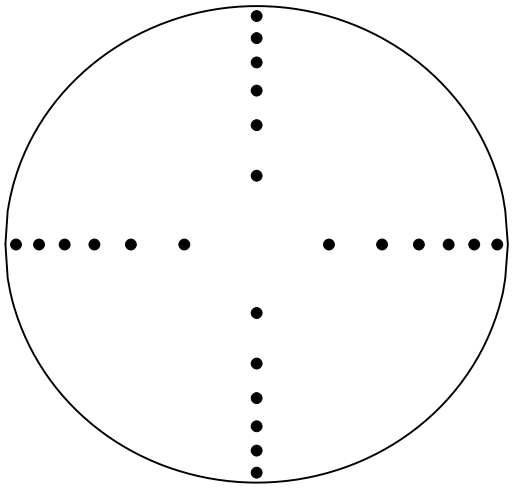
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.84	3 13/16
2	6.7	5.86	7 7/8
3	11.8	10.33	12 5/16
4	17.7	15.49	17 1/2
5	25.0	21.88	23 7/8
6	35.6	31.15	33 1/8
7	64.4	56.35	58 3/8
8	75.0	65.63	67 5/8
9	82.3	72.01	74
10	88.2	77.18	79 3/16
11	93.3	81.64	83 5/8
12	97.9	85.66	87 11/16

Stack Diagram
A = 6 ft.
B = 15 ft.
Depth of Duct = 87.5 in.

Cross Sectional Area



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	4
2	3
3	8
4	2
5	0
6	1
7	-2
8	-3
9	4
10	3
11	2
12	0
13	3
14	3
15	1
16	-3
17	3
18	4
19	2
20	1
21	0
22	0
23	3
24	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.13	0.12	0.12	0.12
Point 2		0.12	0.13	0.13	0.13
Point 3		0.14	0.14	0.12	0.13
Point 4		0.13	0.13	0.14	0.13
Point 5		0.15	0.12	0.13	0.13
Point 6		0.14	0.14	0.13	0.14
Point 7		0.13	0.13	0.13	0.13
Point 8		0.12	0.12	0.14	0.13
Point 9		0.15	0.13	0.13	0.14
Point 10		0.13	0.12	0.14	0.13
Point 11		0.11	0.14	0.12	0.12
Point 12		0.12	0.13	0.13	0.13
Point 13		0.14	0.12	0.15	0.14
Point 14		0.13	0.14	0.13	0.13
Point 15		0.12	0.14	0.14	0.13
Point 16		0.14	0.13	0.12	0.13
Point 17		0.13	0.12	0.11	0.12
Point 18		0.15	0.13	0.13	0.14
Point 19		0.14	0.13	0.12	0.13
Point 20		0.11	0.13	0.11	0.12
Point 21		0.12	0.15	0.14	0.14
Point 22		0.14	0.14	0.13	0.14
Point 23		0.12	0.15	0.15	0.14
Point 24		0.13	0.13	0.14	0.13
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.361	0.363	0.361	0.362
Pitot Tube Coefficient	(Cp)	0.819	0.819	0.819	0.819
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.08	-0.06	-0.07	-0.07
Stack Pressure, in. Hg	(Ps)	30.33	30.34	30.33	30.33
Stack Cross-sectional Area, ft^2	(As)	41.76	41.76	41.76	41.76
Stack Temperature, °F	(Ts)	152.8	152.9	154.2	153.3
Stack Temperature, °R	(Ts)	612.5	612.6	613.9	613.0
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
O_2 Concentration, %	(O_2)	8.8	7.9	8	8.23
CO_2 Concentration, %	(CO_2)	15.1	16.4	16.2	15.90
N_2 Concentration, %	(N_2)	76.1	75.7	75.8	75.87
Excess Air, %	(EA)	77.94	65.37	66.60	69.97
Molecular Weight, lb/lb-mole (dry)	(Md)	30.77	30.94	30.91	30.87
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.39	27.51	27.41	27.43
Velocity, ft/sec	(Vs)	21.7	21.8	21.7	21.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	54,429	54,507	54,393	54,443
At Standard Conditions, scfm	(Qsw)	47,539	47,604	47,403	47,515
At Standard Conditions, dscfm	(Qs)	34,943	34,965	34,517	34,809

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	9:40	2/13/2025	11:22	2/13/2025	12:45
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	8.81	15.09	7.88	16.36	7.95	16.18
Analysis #2	8.80	15.10	7.90	16.39	7.96	16.19
Analysis #3	8.80	15.10	7.89	16.39	7.96	16.19
Average	8.8	15.1	7.9	16.4	8.0	16.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.3	816.2	718.0	651.0	1012.3	3556.8
Final Mass, g	557.1	923.9	733.1	655.4	1024.1	3893.6
Gain	197.8	107.7	15.1	4.4	11.8	336.8
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.8	641.0	743.5	560.0	982.0	3421.3
Final Mass, g	685.5	741.6	787.0	578.6	1002.6	3795.3
Gain	190.7	100.6	43.5	18.6	20.6	374.0
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.7	671.0	731.0	617.3	975.2	3504.2
Final Mass, g	699.5	772.5	774.0	634.1	994.5	3874.6
Gain	189.8	101.5	43.0	16.8	19.3	370.4

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	8:15	**Source:**	No.2 Lime Kiln (LK02)	
Date:	2/13/25	Run 1 VALID	**End Time:**	9:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26973-A	Pb:	30.34	in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	148	°F		Pg:	-0.08	in. WC	336.8
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.14	in. WC		O_2:	8.8	%	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.428	in.		CO_2:	15.1	%	11.960
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	26.35	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
					50	50	Ideal	Actual		50	50	50	50		
A1	0.00	2.50	36.145	0.13	50	152	1.53	1.50	4	259	254	44	66	99.7	22.08
2	2.50	5.00	37.830	0.12	50	153	1.41	1.40	4	256	255	43	66	102.0	21.24
3	5.00	7.50	39.485	0.14	51	152	1.65	1.70	4	254	260	40	67	102.2	22.92
4	7.50	10.00	41.280	0.13	51	153	1.53	1.50	4	253	257	41	67	101.6	22.10
5	10.00	12.50	43.000	0.15	51	153	1.76	1.80	4	255	253	41	67	101.8	23.74
6	12.50	15.00	44.850	0.14	51	153	1.65	1.70	4	251	255	41	67	101.4	22.94
7	15.00	17.50	46.630	0.13	51	152	1.53	1.50	4	254	255	41	68	100.7	22.08
8	17.50	20.00	48.335	0.12	52	152	1.42	1.40	4	251	250	41	68	102.1	21.22
9	20.00	22.50	50.000	0.15	52	153	1.77	1.80	4	253	255	42	69	101.1	23.74
0	22.50	25.00	51.840	0.13	53	153	1.54	1.50	4	250	254	42	70	100.6	22.10
11	25.00	27.50	53.550	0.11	53	153	1.30	1.30	4	252	260	43	71	100.4	20.33
12	27.50	30.00	55.120	0.12	53	152	1.42	1.40	4	258	256	44	73	101.6	21.22
B1	30.00	32.50	56.780	0.14	54	153	1.66	1.70	4	251	259	45	73	101.1	22.94
2	32.50	35.00	58.565	0.13	54	154	1.54	1.50	4	255	256	45	73	101.1	22.12
3	35.00	37.50	60.285	0.12	55	153	1.42	1.40	4	255	254	45	74	100.4	21.24
4	37.50	40.00	61.930	0.14	55	153	1.66	1.70	4	254	258	46	74	100.6	22.94
5	40.00	42.50	63.710	0.13	55	152	1.54	1.60	4	251	252	46	75	101.4	22.08
6	42.50	45.00	65.440	0.15	55	153	1.78	1.80	5	253	254	47	76	101.6	23.74
7	45.00	47.50	67.300	0.14	56	153	1.66	1.70	5	255	257	47	78	101.0	22.94
8	47.50	50.00	69.090	0.11	56	154	1.31	1.30	5	255	255	47	78	101.5	20.35
9	50.00	52.50	70.685	0.12	57	153	1.43	1.40	5	250	256	47	78	102.1	21.24
10	52.50	55.00	72.365	0.14	57	154	1.66	1.70	5	256	258	46	80	101.1	22.96
11	55.00	57.50	74.160	0.12	57	153	1.43	1.40	5	258	251	46	80	100.9	21.24
12	57.50	60.00	75.820	0.13	57	152	1.55	1.60	5	256	254	47	82	99.2	22.08
	Final DGM:		77.520												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.375	ft^3	0.13	in. WC	53.6	°F	152.8	°F	5	1.554	in. WC	91.2	0.265	0.8

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	9:55	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	11:00	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26960-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.06 in. WC	374.0
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	7.9 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.419	in.		CO_2:	16.4 %	14.03
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	77.745	0.12	53	153	1.68	1.70	4	258	255	42	65	101.0	20.88
2	2.50	5.00	79.540	0.13	53	154	1.82	1.80	4	254	256	42	66	100.9	21.75
3	5.00	7.50	81.405	0.14	53	154	1.96	2.00	4	256	254	42	67	100.2	22.57
4	7.50	10.00	83.325	0.13	53	154	1.82	1.80	4	253	258	43	68	100.7	21.75
5	10.00	12.50	85.185	0.12	53	154	1.68	1.70	4	253	259	43	68	99.9	20.90
6	12.50	15.00	86.960	0.14	53	153	1.96	2.00	4	254	256	43	68	100.6	22.56
7	15.00	17.50	88.890	0.13	53	153	1.82	1.80	4	256	253	43	68	100.3	21.74
8	17.50	20.00	90.745	0.12	53	153	1.68	1.70	5	258	250	44	68	99.3	20.88
9	20.00	22.50	92.510	0.13	54	152	1.83	1.80	5	253	255	45	70	98.9	21.72
0	22.50	25.00	94.345	0.12	54	152	1.69	1.70	5	254	259	45	71	99.9	20.87
11	25.00	27.50	96.125	0.14	54	152	1.97	2.00	5	253	260	45	69	100.3	22.54
12	27.50	30.00	98.055	0.13	54	153	1.82	1.80	5	252	254	45	69	99.6	21.74
B1	30.00	32.50	99.900	0.12	54	153	1.68	1.70	5	259	257	48	72	100.0	20.88
2	32.50	35.00	101.680	0.14	54	154	1.96	2.00	5	260	255	47	73	100.0	22.57
3	35.00	37.50	103.600	0.14	54	153	1.96	2.00	5	253	255	48	73	100.4	22.56
4	37.50	40.00	105.530	0.13	54	153	1.82	1.80	5	255	256	48	75	100.9	21.74
5	40.00	42.50	107.400	0.12	54	151	1.69	1.70	5	253	255	49	75	100.9	20.85
6	42.50	45.00	109.200	0.13	55	152	1.83	1.80	5	251	255	50	75	101.4	21.72
7	45.00	47.50	111.085	0.13	55	152	1.83	1.80	5	253	255	51	75	100.9	21.72
8	47.50	50.00	112.960	0.13	55	153	1.83	1.80	5	256	254	52	75	100.7	21.74
9	50.00	52.50	114.830	0.15	55	153	2.11	2.00	5	257	251	53	75	99.8	23.35
10	52.50	55.00	116.820	0.14	55	153	1.97	2.00	5	254	250	53	77	100.7	22.56
11	55.00	57.50	118.760	0.15	55	153	2.11	2.10	5	255	253	55	77	100.9	23.35
12	57.50	60.00	120.770	0.13	55	153	1.83	1.80	5	255	259	55	79	100.2	21.74
	Final DGM:		122.630												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.885	ft^3	0.13	in. WC	54.0	°F	152.9	°F	5	1.846	in. WC	98.8	0.265	0.5

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	12:20	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26972-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.07 in. WC	370.4
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.418	in.		CO_2:	16.2 %	14.042
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	-- -- --	0.000		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	122.895	0.12	56	153	1.69	1.70	4	258	258	48	68	101.0	20.88
2	2.50	5.00	124.700	0.13	56	155	1.83	1.80	4	250	259	45	66	99.9	21.77
3	5.00	7.50	126.555	0.12	56	154	1.69	1.70	4	258	252	45	66	100.5	20.90
4	7.50	10.00	128.350	0.14	56	155	1.97	2.00	4	257	252	46	68	101.5	22.59
5	10.00	12.50	130.305	0.13	56	155	1.83	1.80	4	255	253	47	69	101.0	21.77
6	12.50	15.00	132.180	0.13	56	154	1.83	1.80	4	258	256	47	69	100.9	21.75
7	15.00	17.50	134.055	0.13	56	155	1.83	1.80	4	258	255	47	70	100.1	21.77
8	17.50	20.00	135.915	0.14	57	154	1.97	2.00	4	258	256	48	70	100.9	22.57
9	20.00	22.50	137.865	0.13	57	155	1.83	1.80	4	257	250	49	70	101.8	21.77
0	22.50	25.00	139.760	0.14	57	154	1.97	2.00	4	254	258	49	70	101.2	22.57
11	25.00	27.50	141.715	0.12	57	153	1.69	1.70	4	256	257	51	72	101.0	20.88
12	27.50	30.00	143.525	0.13	57	154	1.83	1.80	4	258	259	53	72	101.5	21.75
B1	30.00	32.50	145.415	0.15	57	155	2.11	2.00	4	258	252	54	72	100.4	23.39
2	32.50	35.00	147.420	0.13	57	154	1.83	1.80	4	257	253	55	73	100.9	21.75
3	35.00	37.50	149.300	0.14	57	154	1.97	2.00	4	256	254	55	73	100.2	22.57
4	37.50	40.00	151.235	0.12	57	155	1.69	1.70	4	255	257	58	74	98.7	20.92
5	40.00	42.50	153.000	0.11	57	155	1.55	1.60	5	257	256	57	74	100.4	20.03
6	42.50	45.00	154.720	0.13	58	154	1.84	1.80	5	255	255	58	74	101.0	21.75
7	45.00	47.50	156.605	0.12	58	154	1.70	1.70	5	257	256	59	75	101.8	20.90
8	47.50	50.00	158.430	0.11	58	154	1.55	1.60	5	258	259	59	75	101.3	20.01
9	50.00	52.50	160.170	0.14	58	154	1.98	2.00	5	256	260	59	75	101.3	22.57
10	52.50	55.00	162.130	0.13	59	153	1.84	1.90	5	252	260	59	75	100.5	21.74
11	55.00	57.50	164.010	0.15	59	154	2.12	2.10	5	250	254	60	75	101.7	23.37
12	57.50	60.00	166.050	0.14	59	154	1.98	2.00	5	251	257	60	76	99.5	22.57
	Final DGM:		167.980												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.085	ft^3	0.13	in. WC	57.1	°F	154.2	°F	5	1.838	in. WC	99.9	0.272	0.9

RB01A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

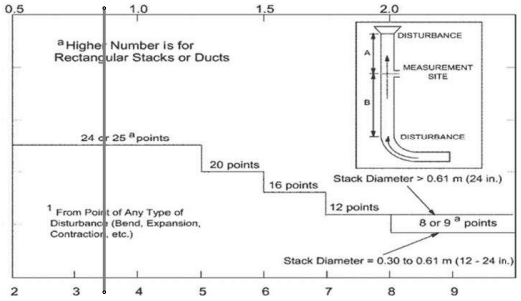
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	47.320	47.695	47.820	47.612
Meter Temperature, °F	(Tm)	63.8	65.7	68.5	66.0
Meter Temperature, °R	(Tm)	523.5	525.4	528.1	525.7
Meter Orifice Pressure, in. WC	(ΔH)	2.158	2.179	2.183	2.174
Volume H_2O Collected, mL	(Vlc)	506.0	450.5	464.3	473.6
Nozzle Diameter, in	(Dn)	0.330	0.330	0.330	0.330
Area of Nozzle, ft^2	(An)	0.0006	0.0006	0.0006	0.0006
Filterable PM Mass, mg	(Mn)	29.2	18.1	26.2	24.5
Condensable PM Mass, mg	(M_{CPM})	10.7	3.3	4.6	6.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.077	48.287	48.162	48.175
Standard Water Volume, ft^3	(Vwstd)	23.863	21.246	21.896	22.335
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
Meter Pressure, in Hg	(Pm)	30.19	30.19	30.19	30.19
Volume at Nozzle, ft^3	(Vn)	111.928	108.082	108.829	109.61
Isokinetic Sampling Rate, (%)	(I)	104.7	101.2	102.2	102.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.2	0.3	0.2	0.2
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0094	0.0058	0.0084	0.0079
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0082	0.0051	0.0074	0.0069
Filterable PM Emission Rate, lb/hr	(PMR)	4.8	3.1	4.4	4.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0034	0.0011	0.0015	0.0020
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.75	0.56	0.77	1.03
Total PM Concentration, grain/dscf	(C_{TPM})	0.013	0.007	0.010	0.010
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.5	3.6	5.2	5.1

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/24	
Reviewer (Initial and Date):	EDO 2/11/24	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

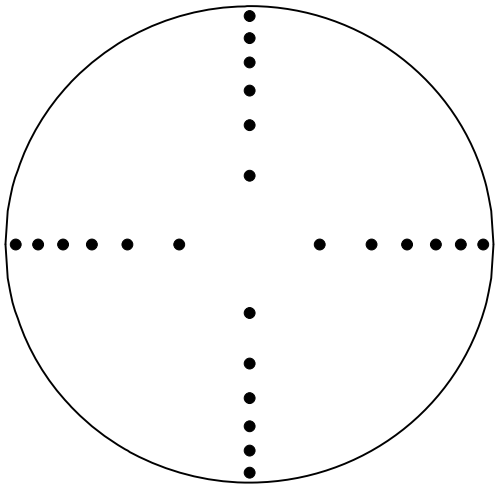
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

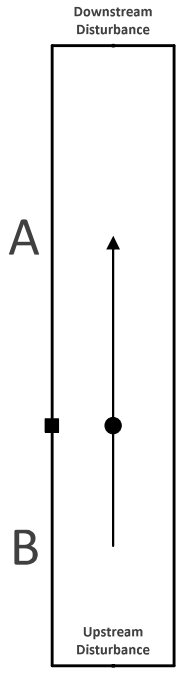
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	5
5	4
6	0
7	3
8	6
9	-2
10	0
11	4
12	1
13	5
14	4
15	2
16	9
17	7
18	4
19	5
20	2
21	3
22	6
23	5
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.51	0.52	0.50	0.51
Point 2		0.48	0.53	0.53	0.51
Point 3		0.49	0.51	0.51	0.50
Point 4		0.53	0.53	0.49	0.52
Point 5		0.52	0.52	0.52	0.52
Point 6		0.49	0.49	0.51	0.50
Point 7		0.51	0.48	0.49	0.49
Point 8		0.53	0.51	0.50	0.51
Point 9		0.51	0.52	0.48	0.50
Point 10		0.48	0.50	0.51	0.50
Point 11		0.52	0.53	0.52	0.52
Point 12		0.54	0.54	0.54	0.54
Point 13		0.52	0.54	0.50	0.52
Point 14		0.51	0.53	0.51	0.52
Point 15		0.48	0.49	0.53	0.50
Point 16		0.53	0.50	0.52	0.52
Point 17		0.51	0.48	0.48	0.49
Point 18		0.49	0.52	0.50	0.50
Point 19		0.53	0.51	0.53	0.52
Point 20		0.50	0.53	0.54	0.52
Point 21		0.53	0.55	0.55	0.54
Point 22		0.51	0.53	0.52	0.52
Point 23		0.49	0.50	0.49	0.49
Point 24		0.51	0.48	0.48	0.49
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.713	0.717	0.714	0.715
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.48	-0.45	-0.46	-0.46
Stack Pressure, in. Hg	(Ps)	29.99	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	363.9	363.1	362.6	363.2
Stack Temperature, °R	(Ts)	823.5	822.8	822.3	822.9
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
O_2 Concentration, %	(O_2)	6.1	6.2	6.2	6.17
CO_2 Concentration, %	(CO_2)	14.4	14.2	14.3	14.30
N_2 Concentration, %	(N_2)	79.5	79.6	79.5	79.53
Excess Air, %	(EA)	40.97	41.85	41.93	41.58
Molecular Weight, lb/lb-mole (dry)	(Md)	30.55	30.52	30.54	30.53
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.39	26.70	26.62	26.57
Velocity, ft/sec	(Vs)	50.0	49.9	49.8	49.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	138,543	138,342	137,991	138,292
At Standard Conditions, scfm	(Qsw)	88,990	88,949	88,779	88,906
At Standard Conditions, dscfm	(Qs)	59,472	61,771	61,032	60,758

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:25	2/11/2025	12:50	2/11/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.10	14.34	6.20	14.22	6.16	14.25
Analysis #2	6.10	14.36	6.19	14.24	6.16	14.25
Analysis #3	6.11	14.36	6.19	14.24	6.16	14.26
Average	6.1	14.4	6.2	14.2	6.2	14.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.4	640.6	698.9	644.3	934.1	3411.3
Final Mass, g	705.0	761.1	722.3	779.6	949.3	3917.3
Gain	211.6	120.5	23.4	135.3	15.2	506.0
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.6	656.8	740.2	636.0	941.0	3472.6
Final Mass, g	686.4	748.9	774.0	762.4	951.4	3923.1
Gain	187.8	92.1	33.8	126.4	10.4	450.5
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.0	639.8	722.0	648.9	942.2	3446.9
Final Mass, g	711.2	731.2	743.7	771.2	953.9	3911.2
Gain	217.2	91.4	21.7	122.3	11.7	464.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	50	°F	26987-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	350	°F		Pg:	-0.48 in. WC	506.0
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.47	in. WC		O_2:	6.1 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.333	in.		CO_2:	14.4 %	4.162
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	771.740	0.51	62	359	2.15	2.20	4	257	251	39	73	101.1	49.52
2	2.50	5.00	773.720	0.48	62	361	2.02	2.00	4	258	256	41	73	99.0	48.10
3	5.00	7.50	775.600	0.49	62	363	2.05	2.10	4	254	258	43	74	100.7	48.66
4	7.50	10.00	777.530	0.53	62	366	2.21	2.20	4	254	257	45	75	100.6	50.69
5	10.00	12.50	779.530	0.52	63	365	2.18	2.20	4	255	258	46	75	101.3	50.18
6	12.50	15.00	781.530	0.49	63	365	2.05	2.10	4	258	256	48	75	99.1	48.71
7	15.00	17.50	783.430	0.51	63	364	2.14	2.20	4	256	256	48	75	101.4	49.67
8	17.50	20.00	785.415	0.53	63	366	2.22	2.20	4	258	254	48	76	100.9	50.69
9	20.00	22.50	787.425	0.51	63	365	2.14	2.20	4	254	255	50	76	101.2	49.70
0	22.50	25.00	789.405	0.48	63	364	2.01	2.00	4	256	251	50	76	101.6	48.19
11	25.00	27.50	791.335	0.52	63	363	2.18	2.20	4	253	253	51	76	100.6	50.12
12	27.50	30.00	793.325	0.54	64	360	2.28	2.30	4	255	258	59	78	100.4	50.98
1	30.00	32.50	795.355	0.52	64	362	2.19	2.20	4	257	257	56	78	99.6	50.09
2	32.50	35.00	797.330	0.51	64	364	2.14	2.20	4	257	256	54	79	100.7	49.67
3	35.00	37.50	799.305	0.48	64	365	2.02	2.00	4	257	255	53	80	100.4	48.21
4	37.50	40.00	801.215	0.53	64	368	2.22	2.20	4	253	253	53	80	100.8	50.76
5	40.00	42.50	803.225	0.51	65	366	2.14	2.20	4	252	254	53	80	100.9	49.73
6	42.50	45.00	805.205	0.49	65	365	2.06	2.10	4	251	251	53	79	100.0	48.71
7	45.00	47.50	807.130	0.53	65	365	2.23	2.20	4	250	250	55	76	100.4	50.66
8	47.50	50.00	809.140	0.50	65	363	2.11	2.10	4	258	255	55	74	101.2	49.15
9	50.00	52.50	811.110	0.53	65	365	2.23	2.20	5	257	256	56	74	100.4	50.66
10	52.50	55.00	813.120	0.51	66	365	2.15	2.20	5	259	258	57	72	100.9	49.70
11	55.00	57.50	815.105	0.49	66	362	2.07	2.10	5	258	259	57	72	100.2	48.63
12	57.50	60.00	817.040	0.51	66	362	2.16	2.20	5	253	259	57	72	102.5	49.61
	Final DGM:		819.060												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.320	ft^3	0.51	in. WC	63.8	°F	363.9	°F	5	2.158	in. WC	104.7	0.332	0.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	11:15	**Source:**	No.1 Recovery Furnace (RB01A) North Stack	
Date:	2/11/25	Run 2 VALID	**End Time:**	12:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	64	°F	26988-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	364	°F		Pg:	-0.45 in. WC	450.5
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.323	in.		CO_2:	14.2 %	4.21
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- --	0.002		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	819.395	0.52	64	360	2.20	2.20	4	251	254	40	71	101.3	50.03
2	2.50	5.00	821.405	0.53	64	361	2.24	2.20	4	252	254	41	71	100.6	50.54
3	5.00	7.50	823.420	0.51	64	361	2.15	2.20	4	255	255	41	71	100.8	49.58
4	7.50	10.00	825.400	0.53	64	361	2.23	2.30	4	258	253	41	73	100.7	50.54
5	10.00	12.50	827.415	0.52	64	361	2.19	2.20	4	256	258	41	73	99.1	50.06
6	12.50	15.00	829.380	0.49	65	362	2.07	2.10	4	253	256	45	73	100.6	48.63
7	15.00	17.50	831.320	0.48	65	362	2.03	2.00	4	256	253	45	73	100.8	48.13
8	17.50	20.00	833.245	0.51	65	362	2.15	2.20	4	259	251	46	74	99.9	49.61
9	20.00	22.50	835.210	0.52	65	363	2.19	2.20	4	254	250	46	74	100.5	50.12
0	22.50	25.00	837.205	0.50	65	363	2.11	2.10	4	251	258	50	74	100.7	49.15
11	25.00	27.50	839.165	0.53	66	364	2.24	2.30	4	252	259	51	74	101.5	50.63
12	27.50	30.00	841.200	0.54	66	364	2.28	2.30	4	255	254	51	75	101.3	51.11
1	30.00	32.50	843.250	0.54	66	363	2.28	2.30	4	255	256	52	75	101.4	51.08
2	32.50	35.00	845.305	0.53	66	365	2.23	2.30	5	255	254	52	76	99.5	50.66
3	35.00	37.50	847.300	0.49	66	365	2.07	2.00	5	256	255	53	77	98.5	48.71
4	37.50	40.00	849.200	0.50	66	364	2.11	2.10	5	258	255	51	77	101.6	49.18
5	40.00	42.50	851.180	0.48	67	365	2.03	2.00	5	253	256	50	76	101.4	48.21
6	42.50	45.00	853.120	0.52	67	365	2.20	2.20	5	254	256	49	78	100.5	50.18
7	45.00	47.50	855.120	0.51	67	365	2.15	2.20	5	257	258	49	78	100.5	49.70
8	47.50	50.00	857.100	0.53	67	365	2.24	2.30	5	252	254	49	79	100.3	50.66
9	50.00	52.50	859.115	0.55	67	364	2.32	2.30	5	254	253	53	80	101.4	51.58
10	52.50	55.00	861.190	0.53	67	364	2.24	2.20	5	256	252	52	79	99.7	50.63
11	55.00	57.50	863.195	0.50	67	363	2.12	2.10	5	255	259	53	78	100.6	49.15
12	57.50	60.00	865.160	0.48	67	363	2.03	2.00	5	255	253	53	77	100.8	48.16
	Final DGM:		867.090												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.695	ft^3	0.51	in. WC	65.7	°F	363.1	°F	5	2.179	in. WC	101.2	0.306	0.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	66	°F	26696-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	363	°F		Pg:	-0.46	in. WC	464.3
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2	%	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.322	in.		CO_2:	14.3	%	4.224
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial	Final	Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	--	--	0.001	Mid 1 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf)			--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)			--
												Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	867.500	0.50	67	358	2.13	2.10	3	254	255	42	69	102.0	49.00
2	2.50	5.00	869.500	0.53	67	359	2.25	2.30	3	255	256	42	69	101.4	50.48
3	5.00	7.50	871.545	0.51	67	359	2.17	2.20	3	251	258	42	69	100.6	49.52
4	7.50	10.00	873.535	0.49	67	361	2.08	2.10	3	253	257	42	69	101.5	48.60
5	10.00	12.50	875.500	0.52	67	360	2.21	2.20	3	256	256	42	71	100.7	50.03
6	12.50	15.00	877.510	0.51	68	361	2.17	2.20	3	258	259	43	70	100.8	49.58
7	15.00	17.50	879.505	0.49	68	361	2.08	2.10	4	256	258	45	71	100.2	48.60
8	17.50	20.00	881.450	0.50	68	361	2.13	2.10	4	259	258	45	70	99.5	49.09
9	20.00	22.50	883.400	0.48	68	361	2.04	2.10	4	259	253	43	72	98.9	48.10
0	22.50	25.00	885.300	0.51	68	361	2.17	2.20	4	260	250	43	72	101.1	49.58
11	25.00	27.50	887.300	0.52	68	364	2.20	2.20	4	251	260	45	73	101.0	50.15
12	27.50	30.00	889.315	0.54	68	364	2.29	2.30	4	252	251	44	73	99.4	51.11
1	30.00	32.50	891.335	0.50	68	365	2.12	2.10	4	255	254	45	76	99.7	49.21
2	32.50	35.00	893.285	0.51	68	365	2.16	2.20	4	256	258	45	76	100.8	49.70
3	35.00	37.50	895.275	0.53	68	365	2.24	2.30	4	257	259	46	76	101.4	50.66
4	37.50	40.00	897.315	0.52	69	365	2.20	2.20	5	253	253	48	77	99.4	50.18
5	40.00	42.50	899.300	0.48	69	364	2.04	2.10	5	252	255	48	75	100.2	48.19
6	42.50	45.00	901.225	0.50	69	363	2.12	2.10	5	257	258	50	75	100.7	49.15
7	45.00	47.50	903.200	0.53	69	363	2.25	2.30	5	258	254	51	74	100.8	50.60
8	47.50	50.00	905.235	0.54	69	363	2.29	2.30	5	256	257	53	73	101.4	51.08
9	50.00	52.50	907.300	0.55	70	365	2.33	2.30	5	259	256	52	70	101.1	51.61
10	52.50	55.00	909.380	0.52	71	364	2.21	2.20	5	252	258	55	70	100.9	50.15
11	55.00	57.50	911.405	0.49	71	365	2.08	2.10	5	255	259	55	71	99.9	48.71
12	57.50	60.00	913.350	0.48	71	365	2.04	2.10	5	253	255	56	72	102.2	48.21
	Final DGM:		915.320												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.820	ft^3	0.51	in. WC	68.5	°F	362.6	°F	5	2.183	in. WC	102.2	0.313	0.2

RB01B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

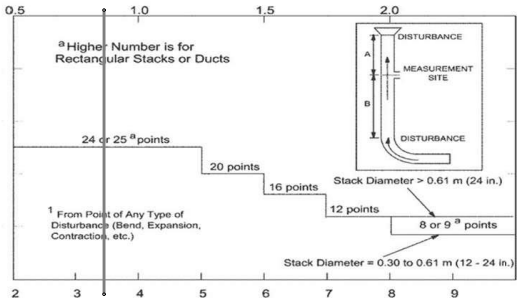
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	40.100	43.045	41.880	41.675
Meter Temperature, °F	(Tm)	62.2	68.3	63.0	64.5
Meter Temperature, °R	(Tm)	521.8	528.0	522.7	524.2
Meter Orifice Pressure, in. WC	(ΔH)	1.621	1.838	1.792	1.750
Volume H_2O Collected, mL	(Vlc)	261.9	266.2	247.8	258.6
Nozzle Diameter, in	(Dn)	0.362	0.362	0.362	0.362
Area of Nozzle, ft^2	(An)	0.0007	0.0007	0.0007	0.0007
Filterable PM Mass, mg	(Mn)	3.4	3.2	2.7	3.1
Condensable PM Mass, mg	(M_{CPM})	4.4	5.1	4.6	4.7
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	40.450	42.936	42.193	41.860
Standard Water Volume, ft^3	(Vwstd)	12.351	12.554	11.686	12.197
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
Meter Pressure, in Hg	(Pm)	30.15	30.17	30.16	30.16
Volume at Nozzle, ft^3	(Vn)	82.136	86.257	83.691	84.03
Isokinetic Sampling Rate, (%)	(I)	93.7	98.3	96.8	96.2
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.3	0.5	-0.4	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0013	0.0012	0.0010	0.0011
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0013	0.0012	0.0010	0.0011
Filterable PM Emission Rate, lb/hr	(PMR)	0.52	0.46	0.40	0.46
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0017	0.0018	0.0017	0.0017
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.67	0.74	0.68	0.69
Total PM Concentration, grain/dscf	(C_{TPM})	0.0030	0.0030	0.0027	0.0029
Total PM Emission Rate, lb/hr	(ER_{TPM})	1.2	1.2	1.1	1.2

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01B) South Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/25	
Reviewer (Initial and Date):	EDO 2/11/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

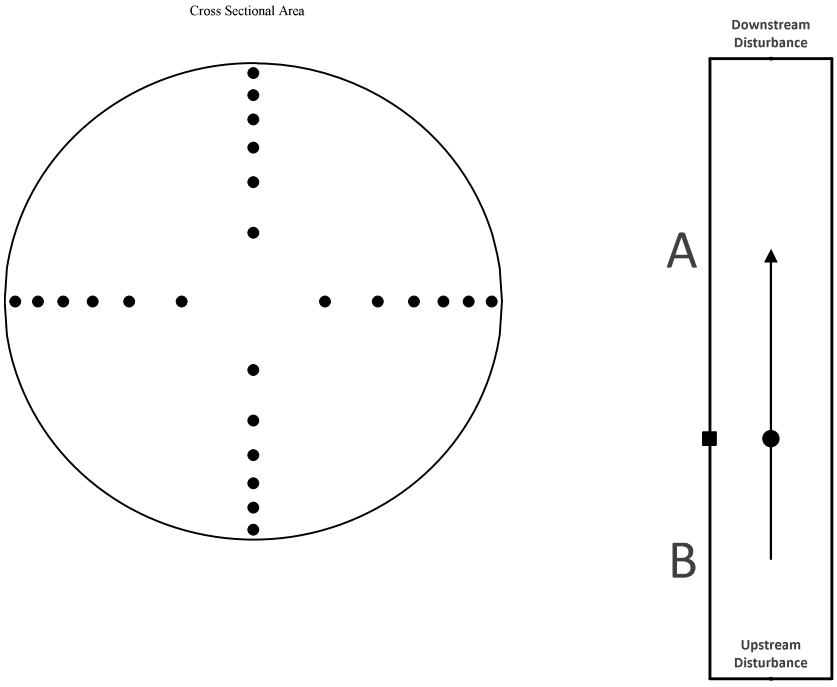
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	2
2	6
3	8
4	4
5	1
6	0
7	2
8	3
9	0
10	-2
11	1
12	8
13	4
14	2
15	6
16	3
17	2
18	3
19	4
20	7
21	5
22	9
23	5
24	2
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.21	0.21	0.20	0.21
Point 2		0.23	0.24	0.21	0.23
Point 3		0.24	0.23	0.23	0.23
Point 4		0.25	0.24	0.25	0.25
Point 5		0.23	0.22	0.24	0.23
Point 6		0.21	0.20	0.20	0.20
Point 7		0.22	0.24	0.21	0.22
Point 8		0.24	0.22	0.25	0.24
Point 9		0.21	0.25	0.23	0.23
Point 10		0.22	0.23	0.22	0.22
Point 11		0.24	0.21	0.24	0.23
Point 12		0.23	0.24	0.21	0.23
Point 13		0.22	0.23	0.23	0.23
Point 14		0.24	0.21	0.25	0.23
Point 15		0.23	0.24	0.23	0.23
Point 16		0.21	0.22	0.20	0.21
Point 17		0.25	0.24	0.21	0.23
Point 18		0.20	0.23	0.21	0.21
Point 19		0.23	0.25	0.21	0.23
Point 20		0.25	0.24	0.22	0.24
Point 21		0.23	0.24	0.25	0.24
Point 22		0.22	0.25	0.23	0.23
Point 23		0.24	0.22	0.24	0.23
Point 24		0.25	0.23	0.23	0.24
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.478	0.480	0.474	0.477
Pitot Tube Coefficient	(Cp)	0.836	0.836	0.836	0.836
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.12	-0.13	-0.12	-0.12
Stack Pressure, in. Hg	(Ps)	30.02	30.02	30.02	30.02
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	364.3	363.7	363.1	363.7
Stack Temperature, °R	(Ts)	824.0	823.3	822.8	823.4
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
O_2 Concentration, %	(O_2)	8	8	8	8.00
CO_2 Concentration, %	(CO_2)	14	14	14	14.00
N_2 Concentration, %	(N_2)	78	78	78	78.00
Excess Air, %	(EA)	63.53	63.53	63.53	63.53
Molecular Weight, lb/lb-mole (dry)	(Md)	30.56	30.56	30.56	30.56
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.63	27.72	27.84	27.73
Velocity, ft/sec	(Vs)	34.1	34.1	33.6	33.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	94,410	94,473	93,103	93,996
At Standard Conditions, scfm	(Qsw)	60,665	60,750	59,913	60,443
At Standard Conditions, dscfm	(Qs)	46,475	47,006	46,918	46,800

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:33	2/11/2025	12:58	2/11/2025	16:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.91	13.52	7.11	13.23	7.18	13.38
Analysis #2	6.92	13.55	7.11	13.25	7.19	13.39
Analysis #3	6.91	13.53	7.11	13.25	7.19	13.38
Average	6.9	13.5	7.1	13.2	7.2	13.4

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.4	670.7	716.5	642.3	942.1	3482.0
Final Mass, g	651.4	760.2	733.5	646.2	952.6	3743.9
Gain	141.0	89.5	17.0	3.9	10.5	261.9
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	507.8	644.0	779.4	644.1	933.3	3508.6
Final Mass, g	639.0	740.2	803.0	648.1	944.5	3774.8
Gain	131.2	96.2	23.6	4.0	11.2	266.2
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.5	672.4	733.4	645.7	952.0	3514.0
Final Mass, g	689.0	723.0	740.1	647.8	961.9	3761.8
Gain	178.5	50.6	6.7	2.1	9.9	247.8

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26697-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	346	°F		Pg:	-0.12 in. WC	261.9
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.27	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.376	in.		CO_2:	14 %	6.965
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	-- -- -- 0.000			Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- -- -- 5			Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	293.420	0.21	61	360	1.47	1.50	3	259	259	40	72	100.6	33.06
2	2.50	5.00	295.015	0.23	61	361	1.61	1.60	3	255	251	41	72	101.9	34.62
3	5.00	7.50	296.705	0.24	61	363	1.67	1.70	3	254	251	42	73	101.4	35.41
4	7.50	10.00	298.420	0.25	61	365	1.74	1.80	3	253	254	42	73	100.9	36.18
5	10.00	12.50	300.160	0.23	61	366	1.60	1.60	3	252	258	43	73	101.3	34.73
6	12.50	15.00	301.835	0.21	61	363	1.47	1.50	3	258	259	43	73	100.1	33.12
7	15.00	17.50	303.420	0.22	61	365	1.53	1.50	3	257	259	45	78	101.3	33.94
8	17.50	20.00	305.060	0.24	61	366	1.67	1.70	3	255	256	48	78	98.9	35.47
9	20.00	22.50	306.730	0.21	61	365	1.46	1.50	3	256	255	48	78	102.5	33.16
10	22.50	25.00	308.351	0.22	61	365	1.53	1.50	3	252	252	48	78	101.9	33.94
11	25.00	27.50	310.000	0.24	62	366	1.67	1.70	3	250	254	48	78	100.5	35.47
12	27.50	30.00	311.700	0.23	62	365	1.60	1.60	4	251	255	50	76	101.1	34.71
B1	30.00	32.50	313.375	0.22	62	366	1.53	1.50	4	255	253	51	75	101.5	33.96
2	32.50	35.00	315.020	0.24	62	364	1.68	1.70	4	256	258	51	74	100.7	35.43
3	35.00	37.50	316.725	0.23	63	363	1.61	1.60	4	253	257	50	74	101.4	34.66
4	37.50	40.00	318.410	0.21	63	365	1.47	1.50	4	255	256	51	72	101.4	33.16
5	40.00	42.50	320.020	0.25	63	366	1.74	1.80	4	258	258	52	73	98.3	36.21
6	42.50	45.00	321.720	0.20	63	365	1.40	1.40	4	252	259	56	74	100.7	32.36
7	45.00	47.50	323.280	0.23	63	364	1.61	1.60	4	259	260	56	76	100.5	34.69
8	47.50	50.00	324.950	0.25	63	363	1.75	1.80	4	256	260	55	76	101.3	36.14
9	50.00	52.50	326.705	0.23	63	365	1.61	1.60	4	252	256	54	77	101.2	34.71
10	52.50	55.00	328.385	0.22	64	364	1.54	1.70	4	254	254	52	78	105.4	33.92
11	55.00	57.50	330.100	0.24	64	364	1.68	1.70	4	255	255	52	79	100.9	35.43
12	57.50	60.00	331.815	0.25	65	364	1.75	1.80	4	255	253	52	79	98.1	36.16
	Final DGM:		333.520												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	40.100 ft^3	0.23 in. WC	62.2 °F	364.3 °F	4	1.621 in. WC	93.7	0.234	0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	11:15	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 2	VALID	End Time:	12:20	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	62	°F	26698-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.13	in. WC	266.2
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.377	in.		CO_2:	14	%	7.82
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	334.150	0.21	66	362	1.66	1.70	4	255	253	40	68	100.1	32.72
2	2.50	5.00	335.845	0.24	66	363	1.89	1.90	4	254	258	40	68	100.4	35.00
3	5.00	7.50	337.660	0.23	67	363	1.82	1.80	4	255	254	41	68	101.2	34.27
4	7.50	10.00	339.455	0.24	67	363	1.90	1.90	4	254	256	42	70	105.7	35.00
5	10.00	12.50	341.370	0.22	67	363	1.74	1.80	4	258	258	42	70	100.0	33.51
6	12.50	15.00	343.105	0.20	67	363	1.58	1.60	4	260	259	42	71	99.7	31.95
7	15.00	17.50	344.755	0.24	67	363	1.90	1.90	4	256	254	45	71	100.8	35.00
8	17.50	20.00	346.580	0.22	68	364	1.74	1.80	4	253	257	45	70	101.6	33.53
9	20.00	22.50	348.345	0.25	68	365	1.98	2.00	4	258	256	45	71	100.9	35.77
10	22.50	25.00	350.210	0.23	68	365	1.82	1.80	4	254	251	45	72	100.9	34.31
11	25.00	27.50	352.000	0.21	68	365	1.66	1.70	4	255	257	48	71	101.4	32.78
12	27.50	30.00	353.720	0.24	68	364	1.90	1.90	5	255	254	48	73	100.4	35.02
B1	30.00	32.50	355.540	0.23	68	364	1.82	1.80	5	256	258	47	73	101.7	34.29
2	32.50	35.00	357.345	0.21	68	363	1.67	1.70	5	253	256	47	75	99.2	32.74
3	35.00	37.50	359.030	0.24	69	363	1.91	1.90	5	257	258	50	75	100.1	35.00
4	37.50	40.00	360.850	0.22	69	363	1.75	1.80	5	254	259	50	75	100.8	33.51
5	40.00	42.50	362.605	0.24	69	362	1.91	1.90	5	255	254	50	75	100.1	34.98
6	42.50	45.00	364.425	0.23	70	362	1.83	1.80	5	258	251	51	76	100.3	34.24
7	45.00	47.50	366.215	0.25	70	362	1.99	2.00	5	256	255	52	78	100.3	35.70
8	47.50	50.00	368.080	0.24	70	365	1.90	1.90	5	259	258	55	78	100.0	35.04
9	50.00	52.50	369.900	0.24	70	365	1.90	1.90	5	251	259	55	80	101.1	35.04
10	52.50	55.00	371.740	0.25	70	365	1.98	2.00	5	250	256	56	80	101.0	35.77
11	55.00	57.50	373.615	0.22	70	366	1.74	1.80	5	253	257	56	80	102.5	33.57
12	57.50	60.00	375.400	0.23	70	365	1.83	1.80	5	251	254	57	80	100.8	34.31
	Final DGM:		377.195												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.045	ft^3	0.23	in. WC	68.3	°F	363.7	°F	5	1.838	in. WC	98.3	0.226	0.5

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	68	°F	26699-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.12	in. WC	247.8
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.374	in.		CO_2:	14	%	7.923
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 / Mid 2 / Mid 3	Post	Mid 1 (cf)			--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.002	-- / -- / --	0.000	Mid 2 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- / -- / --	6	Mid 3 (cf)			--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- / -- / --	Pass	Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	377.420	0.20	60	360	1.57	1.60	4	254	255	41	75	99.7	31.89
2	2.50	5.00	379.050	0.21	60	361	1.64	1.70	4	251	252	42	75	98.5	32.70
3	5.00	7.50	380.700	0.23	60	362	1.80	1.80	4	253	251	42	75	100.5	34.24
4	7.50	10.00	382.460	0.25	61	363	1.95	2.00	4	258	254	42	76	101.3	35.72
5	10.00	12.50	384.310	0.24	61	365	1.87	1.90	4	254	252	42	76	100.7	35.04
6	12.50	15.00	386.110	0.20	61	365	1.56	1.60	4	257	256	43	76	98.6	31.99
7	15.00	17.50	387.720	0.21	61	364	1.64	1.70	4	256	259	44	76	101.2	32.76
8	17.50	20.00	389.415	0.25	61	365	1.95	2.00	4	258	258	45	76	100.6	35.77
9	20.00	22.50	391.250	0.23	61	365	1.79	1.80	4	256	257	45	76	99.9	34.31
10	22.50	25.00	393.000	0.22	61	363	1.72	1.70	4	253	255	45	77	99.1	33.51
11	25.00	27.50	394.700	0.24	62	363	1.88	1.90	4	256	255	46	77	100.9	35.00
12	27.50	30.00	396.510	0.21	62	363	1.65	1.70	4	254	253	47	78	101.3	32.74
B1	30.00	32.50	398.210	0.23	62	364	1.80	1.80	4	254	254	47	78	100.3	34.29
2	32.50	35.00	399.970	0.25	62	365	1.95	2.00	4	255	256	47	78	100.6	35.77
3	35.00	37.50	401.810	0.23	63	365	1.80	1.80	4	256	258	46	79	101.8	34.31
4	37.50	40.00	403.600	0.20	63	362	1.57	1.60	4	258	256	47	75	98.6	31.93
5	40.00	42.50	405.220	0.21	65	361	1.66	1.70	4	256	251	48	75	100.6	32.70
6	42.50	45.00	406.920	0.21	65	360	1.66	1.70	4	258	252	48	71	100.5	32.68
7	45.00	47.50	408.620	0.21	66	361	1.66	1.70	4	254	258	49	71	99.2	32.70
8	47.50	50.00	410.300	0.22	67	362	1.74	1.80	5	251	256	47	71	101.1	33.49
9	50.00	52.50	412.055	0.25	67	362	1.98	2.00	5	250	257	48	72	100.3	35.70
10	52.50	55.00	413.910	0.23	67	363	1.82	1.80	5	252	258	49	73	100.9	34.27
11	55.00	57.50	415.700	0.24	67	365	1.89	1.90	5	256	254	49	73	100.6	35.04
12	57.50	60.00	417.520	0.23	68	365	1.82	1.80	5	253	255	50	75	100.3	34.31
	Final DGM:		419.300												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.880	ft^3	0.23	in. WC	63.0	°F	363.1	°F	5	1.792	in. WC	96.8	0.217	-0.4

RB02A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

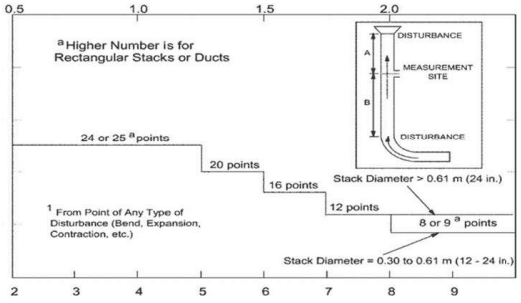
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.020	42.440	43.385	42.282
Meter Temperature, °F	(Tm)	48.3	61.7	68.3	59.4
Meter Temperature, °R	(Tm)	507.9	521.3	528.0	519.1
Meter Orifice Pressure, in. WC	(ΔH)	1.533	1.608	1.650	1.597
Volume H_2O Collected, mL	(Vlc)	251.0	250.6	288.0	263.2
Nozzle Diameter, in	(Dn)	0.292	0.292	0.292	0.292
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	57.8	51.0	152.4	87.1
Condensable PM Mass, mg	(M_{CPM})	2.9	5.9	3.7	4.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	42.463	42.810	43.215	42.829
Standard Water Volume, ft^3	(Vwstd)	11.837	11.818	13.582	12.413
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
Meter Pressure, in Hg	(Pm)	29.87	29.88	29.88	29.88
Volume at Nozzle, ft^3	(Vn)	88.809	86.910	90.386	88.70
Isokinetic Sampling Rate, (%)	(I)	96.9	96.7	99.4	97.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.2	0.1	0.0
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.021	0.018	0.054	0.031
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.017	0.014	0.043	0.025
Filterable PM Emission Rate, lb/hr	(PMR)	20.2	17.9	52.0	30.0
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0011	0.0021	0.0013	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.01	2.07	1.26	1.45
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.021	0.056	0.033
Total PM Emission Rate, lb/hr	(ER_{TPM})	21.2	19.9	53.2	31.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.2 Recovery Furnace (RB02A) West Stack
Project No.: AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	(must be ≥ 0.5)
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

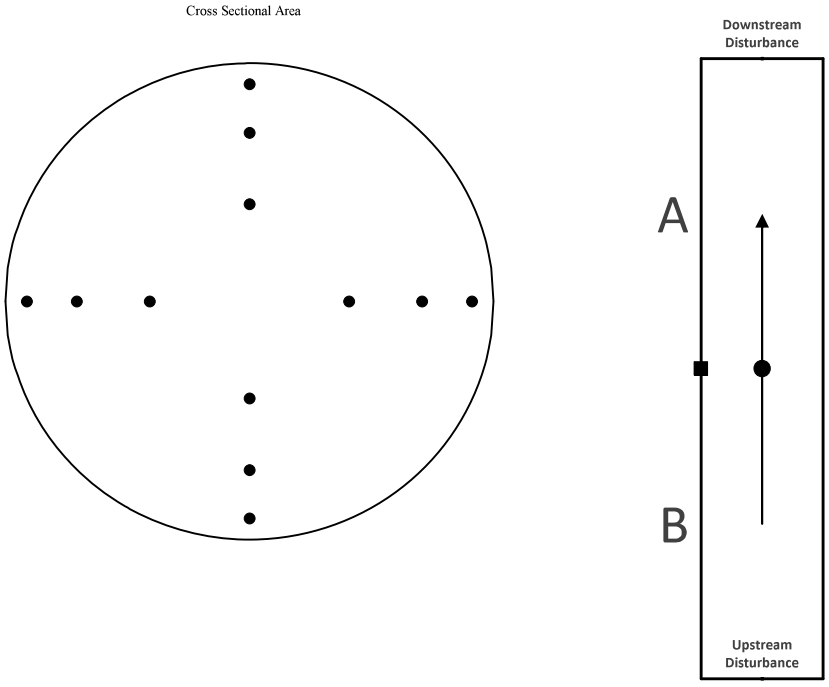
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	8
5	2
6	3
7	6
8	7
9	4
10	0
11	2
12	5
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.57	0.59	0.61	0.59
Point 2		0.59	0.63	0.63	0.62
Point 3		0.60	0.60	0.60	0.60
Point 4		0.63	0.61	0.63	0.62
Point 5		0.62	0.59	0.65	0.62
Point 6		0.64	0.61	0.61	0.62
Point 7		0.61	0.63	0.59	0.61
Point 8		0.63	0.60	0.62	0.62
Point 9		0.64	0.64	0.63	0.64
Point 10		0.60	0.61	0.61	0.61
Point 11		0.65	0.62	0.64	0.64
Point 12		0.60	0.59	0.59	0.59
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.784	0.781	0.786	0.784
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.63	-0.61	-0.62	-0.62
Stack Pressure, in. Hg	(Ps)	29.71	29.72	29.71	29.71
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	397.8	374.4	374.7	382.3
Stack Temperature, °R	(Ts)	857.4	834.1	834.3	841.9
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
O_2 Concentration, %	(O_2)	4.6	4.3	4.5	4.47
CO_2 Concentration, %	(CO_2)	16.2	16.5	16.3	16.33
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	28.21	25.89	27.42	27.17
Molecular Weight, lb/lb-mole (dry)	(Md)	30.78	30.81	30.79	30.79
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.99	28.04	27.73	27.92
Velocity, ft/sec	(Vs)	54.7	53.7	54.3	54.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	234,751	230,403	233,140	232,765
At Standard Conditions, scfm	(Qsw)	143,473	144,762	146,434	144,890
At Standard Conditions, dscfm	(Qs)	112,196	113,444	111,417	112,352

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:42	2/12/2025	14:15	2/12/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	4.58	16.15	4.25	16.51	4.46	16.22
Analysis #2	4.58	16.16	4.26	16.53	4.46	16.26
Analysis #3	4.59	16.17	4.26	16.52	4.46	16.27
Average	4.6	16.2	4.3	16.5	4.5	16.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.2	657.7	740.5	636.8	944.1	3478.3
Final Mass, g	679.7	704.2	750.9	639.5	955.0	3729.3
Gain	180.5	46.5	10.4	2.7	10.9	251.0
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	671.2	509.7	740.2	647.4	1008.0	3576.5
Final Mass, g	691.1	714.7	756.8	651.6	1012.9	3827.1
Gain	19.9	205.0	16.6	4.2	4.9	250.6
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.5	645.8	775.5	650.6	924.3	3505.7
Final Mass, g	734.8	665.7	802.7	653.5	937.0	3793.7
Gain	225.3	19.9	27.2	2.9	12.7	288.0

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02A) West Stack	
Date:	2/12/25	Run 1 VALID	End Time:	11:07	Project No.:	AST-2024-4204	Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26705-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	399	°F		Pg:	-0.63 in. WC	251.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.6 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.304	in.		CO_2:	16.2 %	2.505
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	--	-- --	0.000	Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	-- --	5	Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 55	Stack Amb. 55	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 55	Filter Amb. 55	Imp Exit Amb. 55	CPM Amb. 55	% ISO	Vs (fps)
A1	0.00	5.00	907.840	0.57	45	394	1.41	1.40	4	256	257	44	69	100.2	53.09
2	5.00	10.00	911.120	0.59	46	395	1.46	1.50	4	254	255	45	70	100.3	54.05
3	10.00	15.00	914.465	0.60	46	395	1.48	1.50	4	256	254	47	71	100.8	54.51
4	15.00	20.00	917.855	0.63	47	396	1.56	1.60	4	258	257	48	71	99.8	55.88
5	20.00	25.00	921.300	0.62	47	399	1.53	1.50	4	259	256	48	73	100.9	55.54
6	25.00	30.00	924.750	0.64	48	401	1.58	1.60	4	260	253	48	73	99.3	56.49
B1	30.00	35.00	928.200	0.61	48	400	1.51	1.50	4	260	252	50	72	100.0	55.12
2	35.00	40.00	931.595	0.63	50	400	1.56	1.60	4	254	258	50	71	99.9	56.02
3	40.00	45.00	935.055	0.64	50	399	1.59	1.60	5	256	259	49	73	100.5	56.43
4	45.00	50.00	938.565	0.60	50	398	1.49	1.50	5	258	260	49	74	100.6	54.60
5	50.00	55.00	941.970	0.65	51	398	1.62	1.60	5	255	256	51	75	100.2	56.83
6	55.00	60.00	945.505	0.60	51	398	1.49	1.50	5	254	254	53	78	98.9	54.60
	Final DGM:		948.860												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.020	ft^3	0.62	in. WC	48.3	°F	397.8	°F	5	1.533	in. WC	96.9	0.218	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26706-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	398	°F		Pg:	-0.61	in. WC	250.6
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.3	%	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.307	in.		CO_2:	16.5	%	2.48
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 / Mid 2 / Mid 3 / Post				Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	-- / -- / -- / 0.000				Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	-- / -- / -- / 5				Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	-- / -- / -- / Pass				Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	949.090	0.59	59	374	1.54	1.50	4	253	256	40	76	99.2	53.38
2	5.00	10.00	952.525	0.63	60	375	1.64	1.70	4	253	256	42	73	100.4	55.19
3	10.00	15.00	956.120	0.60	60	374	1.56	1.60	4	253	257	43	75	99.5	53.83
4	15.00	20.00	959.600	0.61	61	375	1.59	1.60	4	257	255	41	68	100.1	54.31
5	20.00	25.00	963.135	0.59	61	375	1.54	1.50	4	255	256	42	69	99.7	53.41
6	25.00	30.00	966.600	0.61	62	376	1.59	1.60	4	254	251	44	71	100.8	54.34
B1	30.00	35.00	970.165	0.63	62	375	1.65	1.70	4	255	254	46	72	100.1	55.19
2	35.00	40.00	973.765	0.60	62	374	1.57	1.60	4	254	256	46	73	100.6	53.83
3	40.00	45.00	977.300	0.64	63	375	1.68	1.70	5	256	258	45	75	100.1	55.63
4	45.00	50.00	980.935	0.61	63	374	1.60	1.60	5	256	257	48	76	100.2	54.28
5	50.00	55.00	984.490	0.62	63	373	1.63	1.60	5	259	254	49	78	99.5	54.69
6	55.00	60.00	988.050	0.59	64	373	1.55	1.60	5	260	255	51	78	99.5	53.35
	Final DGM:		991.530												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	42.440 ft^3	0.61 in. WC	61.7 °F	374.4 °F	5	1.608 in. WC	96.7	0.216	-0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	62	°F	26709-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	374	°F		Pg:	-0.62 in. WC	288.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.61	in. WC		O_2:	4.5 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.301	in.		CO_2:	16.3 %	2.613
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. --	Filter Amb. --	Imp Exit Amb. --	CPM Amb. --	% ISO	Vs (fps)
A1	0.00	5.00	992.320	0.61	67	373	1.61	1.60	3	254	252	48	70	100.3	54.25
2	5.00	10.00	995.910	0.63	67	373	1.67	1.70	3	254	258	48	71	99.7	55.13
3	10.00	15.00	999.535	0.60	67	374	1.58	1.60	3	258	256	48	71	100.5	53.83
4	15.00	20.00	1003.100	0.63	67	374	1.66	1.70	3	253	254	47	71	100.6	55.16
5	20.00	25.00	1006.755	0.65	68	374	1.72	1.70	3	256	257	46	73	99.4	56.03
6	25.00	30.00	1010.430	0.61	68	375	1.61	1.60	3	253	259	46	74	99.7	54.31
B1	30.00	35.00	1014.000	0.59	68	375	1.56	1.60	3	258	260	46	75	100.8	53.41
2	35.00	40.00	1017.550	0.62	69	376	1.64	1.70	3	256	260	49	75	100.9	54.79
3	40.00	45.00	1021.195	0.63	69	375	1.67	1.70	4	255	260	49	76	100.7	55.19
4	45.00	50.00	1024.865	0.61	70	376	1.62	1.60	4	254	258	51	78	100.4	54.34
5	50.00	55.00	1028.470	0.64	70	376	1.70	1.70	4	258	255	52	78	100.2	55.66
6	55.00	60.00	1032.155	0.59	70	375	1.57	1.60	4	256	256	52	78	100.4	53.41
	Final DGM:		1035.705												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.385	ft^3	0.62	in. WC	68.3	°F	374.7	°F	4	1.650	in. WC	99.4	0.239	0.1

RB02B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

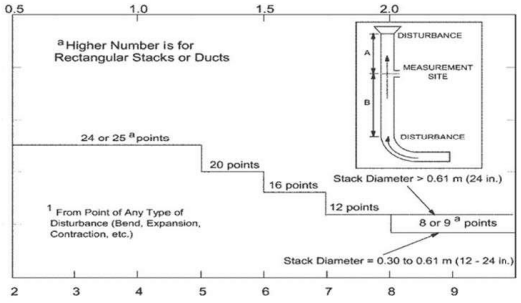
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	44.125	45.125	44.820	44.690
Meter Temperature, °F	(Tm)	53.3	72.4	62.2	62.6
Meter Temperature, °R	(Tm)	512.9	532.1	521.8	522.3
Meter Orifice Pressure, in. WC	(ΔH)	1.908	1.942	1.942	1.931
Volume H_2O Collected, mL	(Vlc)	319.2	291.3	328.1	312.9
Nozzle Diameter, in	(Dn)	0.295	0.295	0.295	0.295
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	105.1	43.2	51.4	66.6
Condensable PM Mass, mg	(M_{CPM})	4.0	4.8	4.5	4.4
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.319	44.680	45.250	45.083
Standard Water Volume, ft^3	(Vwstd)	15.053	13.738	15.473	14.755
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
Meter Pressure, in Hg	(Pm)	29.90	29.90	29.90	29.90
Volume at Nozzle, ft^3	(Vn)	96.813	95.419	99.108	97.11
Isokinetic Sampling Rate, (%)	(I)	100.1	98.4	100.8	99.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.3	0.0	-0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.036	0.015	0.018	0.023
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.030	0.012	0.014	0.019
Filterable PM Emission Rate, lb/hr	(PMR)	34.8	14.6	16.9	22.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0014	0.0017	0.0015	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.33	1.62	1.48	1.48
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.017	0.019	0.024
Total PM Emission Rate, lb/hr	(ER_{TPM})	36.2	16.2	18.4	23.6

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	**(must be ≥ 0.5)**
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

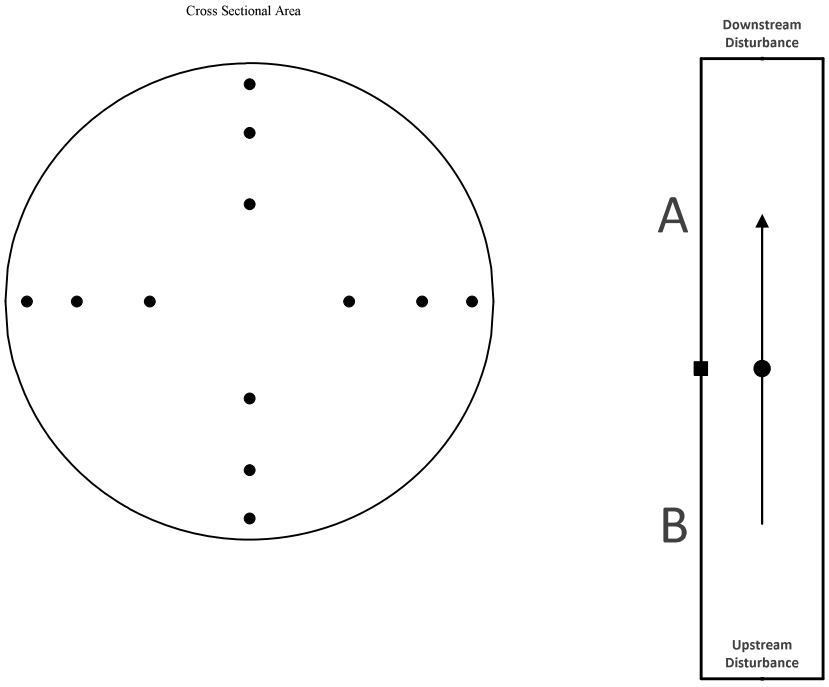
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	4
3	1
4	3
5	2
6	1
7	0
8	-2
9	-3
10	-1
11	0
12	6
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.62	0.60	0.59	0.60
Point 2		0.63	0.63	0.63	0.63
Point 3		0.65	0.61	0.65	0.64
Point 4		0.61	0.62	0.61	0.61
Point 5		0.59	0.64	0.64	0.62
Point 6		0.63	0.63	0.63	0.63
Point 7		0.61	0.59	0.61	0.60
Point 8		0.59	0.61	0.63	0.61
Point 9		0.61	0.63	0.64	0.63
Point 10		0.64	0.62	0.65	0.64
Point 11		0.65	0.59	0.61	0.62
Point 12		0.59	0.61	0.63	0.61
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.786	0.784	0.792	0.787
Pitot Tube Coefficient	(Cp)	0.830	0.830	0.830	0.830
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.54	-0.55	-0.53	-0.54
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	381.3	396.8	396.3	391.4
Stack Temperature, °R	(Ts)	840.9	856.5	855.9	851.1
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
O_2 Concentration, %	(O_2)	5.6	5.1	5.3	5.33
CO_2 Concentration, %	(CO_2)	15.2	15.7	15.5	15.47
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	36.58	32.26	33.96	34.27
Molecular Weight, lb/lb-mole (dry)	(Md)	30.66	30.72	30.69	30.69
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.50	27.73	27.46	27.56
Velocity, ft/sec	(Vs)	56.6	56.7	57.5	56.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	242,764	243,366	246,763	244,298
At Standard Conditions, scfm	(Qsw)	151,315	148,927	151,116	150,453
At Standard Conditions, dscfm	(Qs)	113,585	113,905	112,609	113,366

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:35	2/12/2025	14:07	2/12/2025	15:53
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	5.58	15.23	5.08	15.66	5.25	15.51
Analysis #2	5.59	15.23	5.10	15.67	5.25	15.49
Analysis #3	5.58	15.22	5.10	15.67	5.25	15.49
Average	5.6	15.2	5.1	15.7	5.3	15.5

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.9	645.2	748.0	647.7	933.7	3484.5
Final Mass, g	687.3	741.5	776.2	651.5	947.2	3803.7
Gain	177.4	96.3	28.2	3.8	13.5	319.2
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.7	640.3	746.6	649.0	961.2	3490.8
Final Mass, g	698.7	686.5	771.7	649.5	975.7	3782.1
Gain	205.0	46.2	25.1	0.5	14.5	291.3
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.9	658.1	750.2	639.4	952.3	3499.9
Final Mass, g	691.0	735.7	785.2	644.8	971.3	3828.0
Gain	191.1	77.6	35.0	5.4	19.0	328.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 1	VALID	End Time:	11:17	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	55	°F	26704-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	380	°F		Pg:	-0.54	in. WC	319.2
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.6	%	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.2	%	3.091
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.001	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 2 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					55	55				55	55	55	55		
A1	0.00	5.00	915.775	0.62	52	376	1.91	1.90	3	254	251	42	75	100.7	56.56
2	5.00	10.00	919.480	0.63	52	378	1.94	2.00	3	256	252	42	75	100.4	57.08
3	10.00	15.00	923.200	0.65	52	380	2.00	2.00	3	256	256	43	76	100.5	58.05
4	15.00	20.00	926.975	0.61	52	382	1.87	1.90	3	258	260	43	78	99.7	56.30
5	20.00	25.00	930.600	0.59	53	383	1.81	1.80	3	259	258	45	78	100.5	55.40
6	25.00	30.00	934.200	0.63	53	385	1.93	1.90	3	253	257	46	78	100.2	57.32
B1	30.00	35.00	937.905	0.61	53	385	1.87	1.90	3	254	256	48	78	99.7	56.40
2	35.00	40.00	941.530	0.59	54	383	1.81	1.80	4	253	253	49	81	100.4	55.40
3	40.00	45.00	945.135	0.61	54	383	1.88	1.90	4	257	252	50	81	100.5	56.33
4	45.00	50.00	948.800	0.64	54	381	1.97	2.00	4	255	255	52	83	100.1	57.63
5	50.00	55.00	952.545	0.65	55	380	2.01	2.00	4	255	254	52	83	100.3	58.05
6	55.00	60.00	956.335	0.59	55	379	1.83	1.80	4	256	251	53	82	98.9	55.27
	Final DGM:		959.900												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.125	ft^3	0.62	in. WC	53.3	°F	381.3	°F	4	1.908	in. WC	100.1	0.249	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	53	°F	26707-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	381	°F		Pg:	-0.55 in. WC	291.3
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.1 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.7 %	3.08
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.000	--	--	--	0.002	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	959.925	0.60	70	396	1.87	1.90	4	251	252	45	76	99.3	56.30
2	5.00	10.00	963.600	0.63	70	396	1.97	2.00	4	260	251	43	75	99.7	57.69
3	10.00	15.00	967.380	0.61	70	397	1.90	1.90	4	256	254	45	76	100.1	56.80
4	15.00	20.00	971.115	0.62	71	396	1.94	2.00	5	253	250	51	75	100.8	57.23
5	20.00	25.00	974.915	0.64	71	396	2.00	2.00	5	255	258	51	71	100.4	58.15
6	25.00	30.00	978.760	0.63	72	395	1.98	2.00	5	254	253	52	73	100.3	57.66
B1	30.00	35.00	982.580	0.59	73	397	1.85	1.90	5	255	258	53	75	99.6	55.86
2	35.00	40.00	986.255	0.61	74	397	1.92	1.90	5	252	253	53	76	99.6	56.80
3	40.00	45.00	990.000	0.63	74	398	1.98	1.90	5	252	255	54	78	100.8	57.76
4	45.00	50.00	993.850	0.62	74	398	1.95	2.00	5	254	254	55	80	100.7	57.30
5	50.00	55.00	997.665	0.59	75	399	1.85	1.90	5	256	257	56	80	100.5	55.93
6	55.00	60.00	1001.385	0.61	75	397	1.92	1.90	5	258	255	56	81	97.3	56.80
	Final DGM:		1005.050												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.125	ft^3	0.62	in. WC	72.4	°F	396.8	°F	5	1.942	in. WC	98.4	0.235	-0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	72	°F	26708-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	397	°F		Pg:	-0.53 in. WC	328.1
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.3 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.295	in.		CO_2:	15.5 %	3.133
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Mid 1 (cf) --
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 2 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 3 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	6.280	0.59	61	393	1.82	1.80	4	254	251	43	70	100.2	55.73
2	5.00	10.00	9.905	0.63	61	395	1.94	1.90	4	256	252	43	71	101.0	57.66
3	10.00	15.00	13.675	0.65	61	396	1.99	2.00	4	258	250	43	72	99.7	58.60
4	15.00	20.00	17.450	0.61	61	396	1.87	1.90	4	254	256	45	72	100.4	56.77
5	20.00	25.00	21.135	0.64	61	396	1.96	2.00	4	258	258	45	73	100.6	58.15
6	25.00	30.00	24.915	0.63	62	397	1.93	1.90	4	257	259	45	73	100.1	57.72
B1	30.00	35.00	28.655	0.61	62	397	1.87	1.90	4	256	260	46	74	100.7	56.80
2	35.00	40.00	32.355	0.63	63	397	1.94	2.00	4	258	254	48	75	100.5	57.72
3	40.00	45.00	36.115	0.64	63	397	1.97	2.00	4	259	257	49	78	99.7	58.18
4	45.00	50.00	39.875	0.65	63	398	2.00	2.00	5	257	255	50	79	99.8	58.67
5	50.00	55.00	43.665	0.61	64	397	1.88	1.90	5	256	255	51	79	100.2	56.80
6	55.00	60.00	47.360	0.63	64	396	1.94	2.00	5	255	256	51	82	99.7	57.69
	Final DGM:		51.100												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.820	ft^3	0.63	in. WC	62.2	°F	396.3	°F	5	1.942	in. WC	100.8	0.255	0.0

SM01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

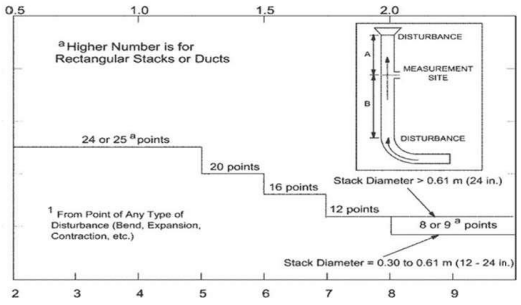
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	49.70	49.70	49.69	49.70
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	48.040	48.100	53.630	49.923
Meter Temperature, °F	(Tm)	51.4	49.9	53.6	51.6
Meter Temperature, °R	(Tm)	511.1	509.6	513.3	511.3
Meter Orifice Pressure, in. WC	(ΔH)	1.950	1.958	2.417	2.108
Volume H_2O Collected, mL	(Vlc)	806.2	438.4	456.0	566.9
Nozzle Diameter, in	(Dn)	0.382	0.382	0.382	0.382
Area of Nozzle, ft^2	(An)	0.0008	0.0008	0.0008	0.0008
Filterable PM Mass, mg	(Mn)	245.4	122.5	118.9	162.3
Condensable PM Mass, mg	(M_{CPM})	13.8	7.9	9.3	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	49.919	50.129	55.555	51.868
Standard Water Volume, ft^3	(Vwstd)	38.020	20.675	21.505	26.733
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
Meter Pressure, in Hg	(Pm)	30.17	30.17	30.21	30.19
Volume at Nozzle, ft^3	(Vn)	103.488	81.841	88.953	91.43
Isokinetic Sampling Rate, (%)	(I)	101.3	91.2	100.1	97.5
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	1.7	1.7	1.7	1.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.076	0.038	0.033	0.049
Filterable PM Emission Rate, lb/hr	(PMR)	7.4	4.1	3.6	5.1
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.15	0.083	0.073	0.10
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0043	0.0024	0.0026	0.0031
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.42	0.26	0.28	0.32
Total PM Concentration, grain/dscf	(C_{TPM})	0.080	0.040	0.036	0.052
Total PM Emission Rate, lb/hr	(ER_{TPM})	7.8	4.4	3.9	5.4

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Smelt Tank Scrubber (SM01)
Project No.: AST-2024-4204
Date: 02/10/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	54.00	in
Nipple Length:	9.00	in
Depth of Duct:	45.00	in
Cross Sectional Area of Duct:	11.04	ft^2
No. of Test Ports:	1	
Distance A:	112.0	ft
Distance A Duct Diameters:	29.9	(must be ≥ 0.5)
Distance B:	60.0	ft
Distance B Duct Diameters:	16.0	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/10/25	
Reviewer (Initial and Date):	CAL 2/10/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

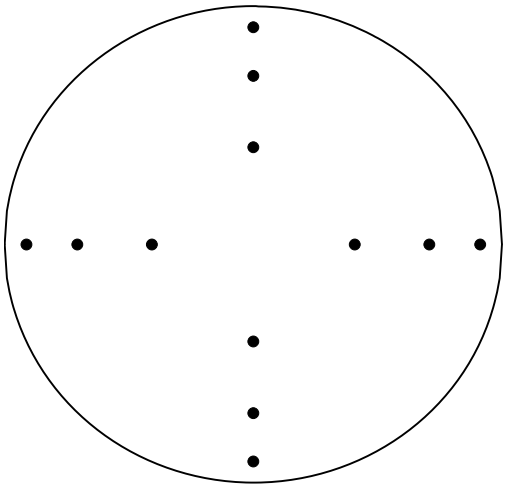
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

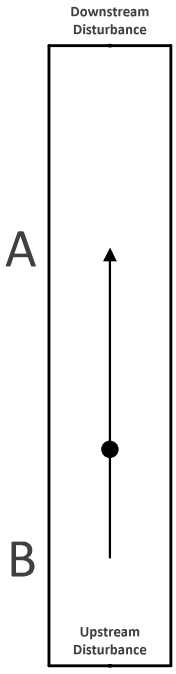
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	1.98	11
2	14.6	6.57	15 9/16
3	29.6	13.32	22 5/16
4	70.4	31.68	40 11/16
5	85.4	38.43	47 7/16
6	95.6	43.02	52
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 112 ft.
B = 60 ft.
Depth of Duct = 45 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	-4
2	-2
3	-1
4	1
5	0
6	2
7	3
8	5
9	4
10	3
11	-1
12	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.16	0.16	0.17	0.16
Point 2		0.17	0.18	0.18	0.18
Point 3		0.23	0.22	0.23	0.23
Point 4		0.32	0.31	0.30	0.31
Point 5		0.29	0.28	0.27	0.28
Point 6		0.27	0.28	0.27	0.27
Point 7		0.40	0.35	0.36	0.37
Point 8		0.29	0.34	0.33	0.32
Point 9		0.28	0.29	0.28	0.28
Point 10		0.24	0.23	0.25	0.24
Point 11		0.19	0.18	0.19	0.19
Point 12		0.16	0.17	0.17	0.17
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.495	0.495	0.496	0.495
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.39	-0.39	-0.39	-0.39
Stack Pressure, in. Hg	(Ps)	30.00	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	11.04	11.04	11.04	11.04
Stack Temperature, °F	(Ts)	163.5	152.3	151.4	155.7
Stack Temperature, °R	(Ts)	623.2	611.9	611.1	615.4
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	25.10	25.98	26.04	25.70
Velocity, ft/sec	(Vs)	31.0	30.1	30.2	30.4
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	20,517	19,971	19,993	20,160
At Standard Conditions, scfm	(Qsw)	17,420	17,268	17,310	17,333
At Standard Conditions, dscfm	(Qs)	11,402	12,707	12,830	12,313

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.2	648.2	744.6	544.8	948.7	3244.5
Final Mass, g	873.1	888.1	769.2	557.9	962.4	4050.7
Gain	514.9	239.9	24.6	13.1	13.7	806.2
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.0	799.4	763.4	637.7	942.4	3637.9
Final Mass, g	819.0	864.0	792.7	644.0	956.6	4076.3
Gain	324.0	64.6	29.3	6.3	14.2	438.4
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.9	828.8	768.8	556.4	956.3	3469.2
Final Mass, g	735.9	871.4	789.3	560.3	968.3	3925.2
Gain	377.0	42.6	20.5	3.9	12.0	456.0

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	Run 1	VALID	End Time:	9:40	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	160	°F	26974-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	163	°F		Pg:	-0.39 in. WC	806.2
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.313	in.		CO_2:	0 %	9.461
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- -- 12			Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					45	45				45	45	45	45		
1	0.00	5.00	756.890	0.16	48	167	1.23	1.20	3	254	255	43	68	100.6	25.11
2	5.00	10.00	760.060	0.17	49	163	1.32	1.30	3	256	254	35	73	101.1	25.80
3	10.00	15.00	763.360	0.23	49	167	1.77	1.80	4	254	254	35	69	99.5	30.10
4	15.00	20.00	767.120	0.32	50	168	2.46	2.50	7	256	256	36	67	99.4	35.54
5	20.00	25.00	771.550	0.29	50	168	2.24	2.20	6	255	253	38	80	101.8	33.83
6	25.00	30.00	775.870	0.27	51	164	2.10	2.10	6	255	257	40	83	102.5	32.54
7	30.00	35.00	780.090	0.40	52	162	3.12	3.10	9	255	257	41	78	99.0	39.54
8	35.00	40.00	785.060	0.29	53	163	2.27	2.30	8	256	254	41	73	103.8	33.70
9	40.00	45.00	789.510	0.28	53	162	2.19	2.20	7	255	256	41	68	100.3	33.08
10	45.00	50.00	793.740	0.24	54	160	1.89	1.90	7	256	249	40	72	103.8	30.58
11	50.00	55.00	797.810	0.19	54	159	1.50	1.50	7	255	256	39	74	105.0	27.19
12	55.00	60.00	801.480	0.16	54	159	1.26	1.30	6	253	250	40	71	107.5	24.95
	Final DGM:		804.930												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.040 ft^3	0.25 in. WC	51.4 °F	163.5 °F	9	1.950 in. WC	101.3	0.345	1.7

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 2**	**VALID**	**End Time:**	12:15	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	51	°F	26989-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	164	°F		Pg:	-0.39 in. WC	438.4
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.345	in.		CO_2:	0 %	7.80
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.005	-- -- --	0.002		Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
1	0.00	5.00	805.210	0.16	49	146	1.28	1.30	3	254	249	46	66	102.8	24.68
2	5.00	10.00	808.510	0.18	50	153	1.42	1.40	4	255	256	37	68	99.4	26.33
3	10.00	15.00	811.880	0.22	49	152	1.74	1.70	5	254	256	39	82	100.5	29.09
4	15.00	20.00	815.640	0.31	49	153	2.44	2.40	7	253	259	40	84	101.8	34.56
5	20.00	25.00	820.150	0.28	48	151	2.21	2.20	6	256	255	40	75	102.8	32.79
6	25.00	30.00	824.480	0.28	49	148	2.23	2.20	6	255	255	42	67	100.9	32.71
7	30.00	35.00	828.750	0.35	49	147	2.78	2.80	8	255	256	43	66	101.1	36.54
8	35.00	40.00	833.530	0.34	50	147	2.71	2.70	8	256	256	46	75	100.9	36.01
9	40.00	45.00	838.240	0.29	51	149	2.31	2.30	7	255	254	49	82	101.9	33.32
10	45.00	50.00	842.640	0.23	51	158	1.81	1.80	7	256	255	49	73	103.3	29.89
11	50.00	55.00	846.590	0.18	52	160	1.41	1.40	6	255	255	48	69	101.3	26.48
12	55.00	60.00	850.020	0.17	52	163	1.33	1.30	6	256	255	46	72	100.2	25.80
	Final DGM:		853.310												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.100 ft^3	0.25 in. WC	49.9 °F	152.3 °F	8	1.958 in. WC	91.2	0.264	1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	14:05	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 3**	**VALID**	**End Time:**	15:05	**Project No.:**	AST-2024-4204 — **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	27.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	50	°F	26700-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	152	°F		Pg:	-0.39 in. WC	456.0
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.328	in.		CO_2:	0 %	9.650
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm				
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 / Mid 3	Post	Check Pt. / Initial / Final / Corr.	
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- / --	0.002	Mid 1 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	--	-- / --	9	Mid 2 (cf)	--
Ms:	25.91	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	--	-- / --	Pass	Mid 3 (cf)	--
											Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
1	0.00	5.00	853.490	0.17	52	154	1.64	1.60	4	254	254	51	67	100.8	25.18
2	5.00	10.00	857.170	0.18	50	150	1.74	1.70	4	254	254	43	69	102.9	25.83
3	10.00	15.00	861.030	0.23	51	148	2.24	2.20	5	256	256	42	68	99.5	29.14
4	15.00	20.00	865.260	0.30	52	148	2.92	2.90	6	255	255	44	70	100.7	33.29
5	20.00	25.00	870.150	0.27	53	147	2.64	2.60	5	255	256	44	66	101.9	31.55
6	25.00	30.00	874.860	0.27	54	146	2.65	2.70	6	256	255	47	65	102.1	31.53
7	30.00	35.00	879.590	0.36	55	146	3.53	3.50	8	256	255	48	72	99.4	36.40
8	35.00	40.00	884.910	0.33	55	154	3.20	3.20	8	255	256	48	69	100.5	35.08
9	40.00	45.00	890.030	0.28	55	155	2.71	2.70	8	256	256	46	73	101.2	32.34
10	45.00	50.00	894.780	0.25	55	156	2.42	2.40	7	256	254	45	68	101.9	30.59
11	50.00	55.00	899.300	0.19	55	158	1.83	1.80	7	255	254	44	76	103.2	26.71
12	55.00	60.00	903.290	0.17	56	155	1.65	1.70	6	254	256	45	78	104.3	25.20
	Final DGM:		907.120												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	53.630 ft^3	0.25 in. WC	53.6 °F	151.4 °F	8	2.417 in. WC	100.1	0.259	1.7

SM02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

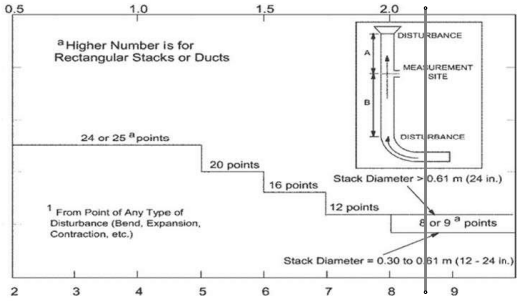
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	97.01	96.99	96.99	97.00
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	48.530	39.450	39.950	42.643
Meter Temperature, °F	(Tm)	61.0	63.1	64.0	62.7
Meter Temperature, °R	(Tm)	520.7	522.8	523.7	522.4
Meter Orifice Pressure, in. WC	(ΔH)	2.317	1.467	1.458	1.747
Volume H_2O Collected, mL	(Vlc)	467.7	380.9	370.7	406.4
Nozzle Diameter, in	(Dn)	0.344	0.305	0.305	0.318
Area of Nozzle, ft^2	(An)	0.0006	0.0005	0.0005	0.0006
Filterable PM Mass, mg	(Mn)	108.2	73.4	71.1	84.2
Condensable PM Mass, mg	(M_{CPM})	8.0	16.2	6.8	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.707	39.354	39.782	42.615
Standard Water Volume, ft^3	(Vwstd)	22.057	17.963	17.482	19.167
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
Meter Pressure, in Hg	(Pm)	29.93	29.87	29.87	29.89
Volume at Nozzle, ft^3	(Vn)	82.478	67.206	67.182	72.29
Isokinetic Sampling Rate, (%)	(I)	93.9	99.1	100.3	97.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	-1.7	0.2	1.6	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.034	0.029	0.028	0.030
Filterable PM Emission Rate, lb/hr	(PMR)	7.5	6.1	5.8	6.5
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.077	0.063	0.060	0.067
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0025	0.0064	0.0026	0.0038
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.55	1.35	0.56	0.82
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.035	0.030	0.034
Total PM Emission Rate, lb/hr	(ER_{TPM})	8.0	7.4	6.4	7.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN	
Reviewer (Initial and Date):	CAL	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

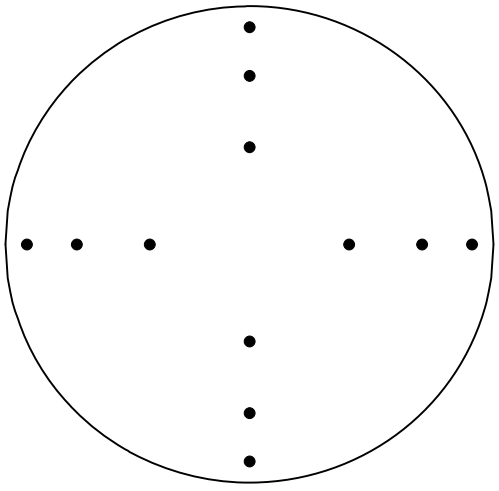
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

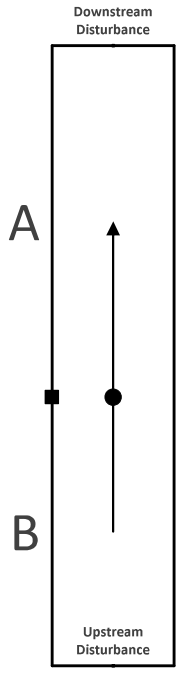
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 55 ft.
B = 42 ft.
Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	2
3	1
4	0
5	1
6	2
7	-3
8	-2
9	0
10	1
11	-1
12	3
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.36	0.35	0.34	0.35
Point 2		0.34	0.34	0.34	0.34
Point 3		0.31	0.30	0.32	0.31
Point 4		0.32	0.30	0.31	0.31
Point 5		0.34	0.33	0.35	0.34
Point 6		0.35	0.36	0.36	0.36
Point 7		0.35	0.36	0.35	0.35
Point 8		0.33	0.34	0.34	0.34
Point 9		0.32	0.33	0.31	0.32
Point 10		0.30	0.32	0.32	0.31
Point 11		0.33	0.33	0.34	0.33
Point 12		0.35	0.36	0.35	0.35
CALCULATED DATA					
Square Root of ΔP, $(in. WC)^{1/2}$	(ΔP)	0.577	0.579	0.579	0.578
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.61	-0.61	-0.61	-0.61
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	18.99	18.99	18.99	18.99
Stack Temperature, °F	(Ts)	151.5	155.2	155.5	154.1
Stack Temperature, °R	(Ts)	611.2	614.8	615.2	613.7
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.00	25.74	25.71	25.82
Velocity, ft/sec	(Vs)	35.3	35.7	35.7	35.6
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	40,191	40,629	40,702	40,507
At Standard Conditions, scfm	(Qsw)	34,462	34,630	34,673	34,589
At Standard Conditions, dscfm	(Qs)	25,439	24,719	24,670	24,942

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.9	799.9	724.0	643.3	951.8	3613.9
Final Mass, g	847.9	880.1	741.1	647.1	965.4	4081.6
Gain	353.0	80.2	17.1	3.8	13.6	467.7
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.7	829.0	790.1	560.5	971.9	3510.2
Final Mass, g	696.1	854.5	797.1	561.2	982.2	3891.1
Gain	337.4	25.5	7.0	0.7	10.3	380.9
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.2	799.1	740.3	641.5	938.2	3614.3
Final Mass, g	806.2	832.5	753.1	643.9	949.3	3985.0
Gain	311.0	33.4	12.8	2.4	11.1	370.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 1	VALID	End Time:	11:18	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26702-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	154	°F		Pg:	-0.61 in. WC	467.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.308	in.		CO_2:	0 %	6.815
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	-- --	0.002	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-344-3	SS	Vacuum (in Hg):	15	--	-- --	10	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.344		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 45	Stack Amb. 45	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 45	Filter Amb. 45	Imp Exit Amb. 45	CPM Amb. 45	% ISO	Vs (fps)
A1	0.00	5.00	420.260	0.36	55	154	2.47	2.50	6	248	246	41	68	96.9	37.04
2	5.00	10.00	424.350	0.34	54	151	2.34	2.30	6	247	257	40	72	99.8	35.91
3	10.00	15.00	428.450	0.31	54	149	2.14	2.10	5	246	256	46	70	95.2	34.23
4	15.00	20.00	432.190	0.32	60	149	2.24	2.20	6	254	257	47	68	98.1	34.78
5	20.00	25.00	436.150	0.34	63	149	2.39	2.40	6	250	252	47	67	97.8	35.85
6	25.00	30.00	440.240	0.35	64	148	2.47	2.50	7	251	248	46	69	99.6	36.35
B1	30.00	35.00	444.480	0.35	63	150	2.46	2.50	7	254	253	45	70	100.7	36.41
2	35.00	40.00	448.750	0.33	63	151	2.31	2.30	6	255	248	42	76	99.6	35.38
3	40.00	45.00	452.850	0.32	63	152	2.24	2.20	6	255	251	38	81	98.0	34.87
4	45.00	50.00	456.820	0.30	64	153	2.10	2.10	5	253	255	40	67	100.3	33.79
5	50.00	55.00	460.760	0.33	64	154	2.31	2.30	6	255	254	40	68	98.4	35.47
6	55.00	60.00	464.810	0.35	65	158	2.43	2.40	7	256	254	41	74	94.1	36.64
	Final DGM:		468.790												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	48.530	ft^3	0.33	in. WC	61.0	°F	151.5	°F	7	2.317	in. WC	93.9	0.262	-1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	61	°F	26703-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	152	°F		Pg:	-0.61 in. WC	380.9
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.33	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.307	in.		CO_2:	0 %	4.34
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- --	0.003	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	--	-- --	6	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	468.950	0.35	62	158	1.51	1.50	3	254	255	42	67	97.0	36.64
2	5.00	10.00	472.170	0.34	60	155	1.46	1.50	4	260	263	43	83	103.7	36.03
3	10.00	15.00	475.560	0.30	61	156	1.29	1.30	4	261	254	43	76	102.8	33.87
4	15.00	20.00	478.720	0.30	61	158	1.29	1.30	4	260	251	45	66	101.0	33.93
5	20.00	25.00	481.820	0.33	61	160	1.41	1.40	4	260	249	45	74	98.3	35.64
6	25.00	30.00	484.980	0.36	62	154	1.56	1.60	5	260	252	47	81	102.4	37.04
B1	30.00	35.00	488.440	0.36	63	151	1.57	1.60	4	246	244	47	73	98.7	36.95
2	35.00	40.00	491.790	0.34	64	153	1.48	1.50	4	257	252	51	68	101.5	35.97
3	40.00	45.00	495.140	0.33	64	152	1.45	1.50	4	259	250	49	72	101.3	35.57
4	45.00	50.00	498.450	0.32	66	154	1.40	1.40	4	260	241	49	72	102.1	34.92
5	50.00	55.00	501.730	0.33	66	156	1.44	1.40	4	258	246	50	69	99.8	35.52
6	55.00	60.00	504.980	0.36	67	155	1.57	1.60	5	261	254	51	67	100.4	37.07
	Final DGM:		508.400												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	39.450 ft^3	0.34 in. WC	63.1 °F	155.2 °F	5	1.467 in. WC	99.1	0.286	0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 3	VALID	End Time:	15:28	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	63	°F	26971-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	155	°F		Pg:	-0.61 in. WC	370.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.306	in.		CO_2:	0 %	4.327
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.007	-- -- --	0.009		Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	511.870	0.34	64	154	1.48	1.50	3	258	253	46	73	99.5	36.00
2	5.00	10.00	515.150	0.34	65	151	1.49	1.50	5	260	253	46	74	100.9	35.91
3	10.00	15.00	518.490	0.32	65	153	1.40	1.40	5	260	245	46	84	103.5	34.90
4	15.00	20.00	521.810	0.31	64	156	1.34	1.30	4	260	247	47	82	101.8	34.43
5	20.00	25.00	525.010	0.35	64	155	1.52	1.50	5	259	250	47	79	102.9	36.56
6	25.00	30.00	528.450	0.36	64	158	1.55	1.60	5	259	252	49	66	102.7	37.16
B1	30.00	35.00	531.920	0.35	64	158	1.51	1.50	5	259	249	47	67	102.0	36.64
2	35.00	40.00	535.320	0.34	64	158	1.47	1.50	4	261	251	47	70	103.8	36.12
3	40.00	45.00	538.730	0.31	63	156	1.34	1.30	4	260	246	48	69	100.7	34.43
4	45.00	50.00	541.890	0.32	63	155	1.39	1.40	4	263	248	47	68	101.3	34.95
5	50.00	55.00	545.120	0.34	64	156	1.47	1.50	4	257	255	47	67	99.4	36.06
6	55.00	60.00	548.390	0.35	64	156	1.52	1.50	4	261	251	46	66	102.7	36.58
	Final DGM:		551.820												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	39.950	ft^3	0.34	in. WC	64.0	°F	155.5	°F	5	1.458	in. WC	100.3	0.289	1.6

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

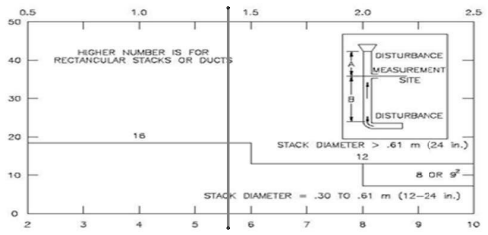
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		9:10	10:42	11:57	--
Stop Time		10:09	11:41	12:56	--
Input Data - Outlet					
Moisture Fraction, dimensionless	BWS	0.444	0.442	0.442	0.443
Volumetric Flow Rate (M1-4), dscfm	Qs	6,235	6,311	6,345	6,297
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	13.20	13.24	13.06	13.17
CO_2 Concentration, % dry	C_{CO_2}	3.13	3.20	3.19	3.17
Methanol - Outlet Concentration, ppmvd	C_{CH_3OH}	0.81	0.77	0.70	0.76
Methanol - Outlet Concentration, ppmvw	C_{CH_3OHw}	0.45	0.43	0.39	0.42
Methanol - Outlet Concentration, ppmvd @ 10 % O_2	C_{CH_3OHc15}	1.1	1.1	0.97	1.1
Methanol - Outlet Emission Rate, lb/hr	ER_{CH_3OH}	0.03	0.02	0.02	0.02

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unit Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	in
Nipple Length:	7.00	in
Depth of Duct:	29.00	in
Cross Sectional Area of Duct:	4.59	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	ft
Distance A Duct Diameters:	23.4	**(must be > 0.5)**
Distance B:	13.5	ft
Distance B Duct Diameters:	5.6	**(must be > 2)**
Actual Number of Traverse Points:	16	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	3.2	1.00	8
2	10.5	3.05	10 1/16
3	19.4	5.63	12 5/8
4	32.3	9.37	16 3/8
5	67.7	19.63	26 5/8
6	80.6	23.37	30 3/8
7	89.5	25.96	32 15/16
8	96.8	28.00	35
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

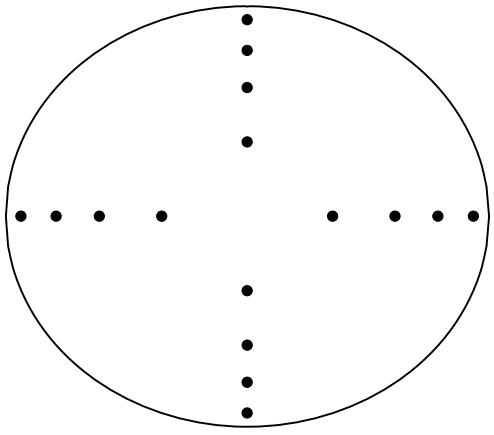
Stack Diagram

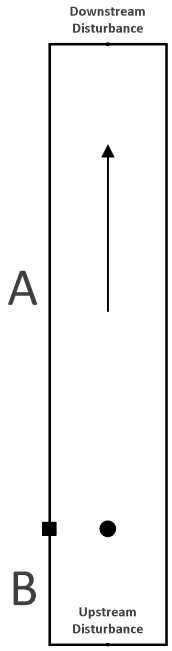
A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX

Source NCG Oxidation Unit Scrubber (NCG01)

Project No. AST-2024-4204

Date 2/13/25

Sample Point	Angle (ΔP=0)
1	3
2	5
3	2
4	6
5	5
6	2
7	8
8	5
9	10
10	5
11	12
12	8
13	8
14	2
15	2
16	5
Average	5.5

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204

Run No.	1		2		3	
Date	2/13/25		2/13/25		2/13/25	
Status	VALID		VALID		VALID	
Start Time	9:20		10:55		12:40	
Stop Time	9:30		11:05		12:50	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.54	174	0.58	176	0.55	177
2	0.53	175	0.55	176	0.54	177
3	0.51	175	0.54	176	0.55	178
4	0.46	175	0.51	177	0.56	178
5	0.46	176	0.49	177	0.52	177
6	0.45	176	0.46	178	0.51	177
7	0.46	176	0.49	178	0.48	178
8	0.43	177	0.52	178	0.45	178
B-1	0.54	176	0.55	176	0.49	176
2	0.55	177	0.58	177	0.56	177
3	0.56	177	0.56	177	0.59	178
4	0.59	178	0.54	178	0.60	178
5	0.55	178	0.54	178	0.61	177
6	0.57	177	0.57	178	0.56	178
7	0.58	178	0.54	177	0.52	177
8	0.60	178	0.51	177	0.54	177

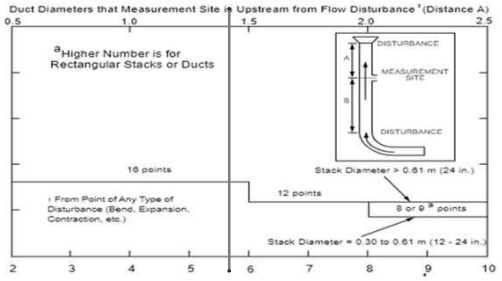
					Average
Square Root of ΔP, (in. WC)$^{1/2}$	**$(\Delta P)^{1/2}$**	0.723	0.730	0.734	0.729
Average ΔP, in. WC	**(ΔP)**	0.52	0.53	0.54	0.53
Pitot Tube Coefficient	**(Cp)**	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	**(Pb)**	30.46	30.46	30.46	30.46
Static Pressure, in. WC	**(Pg)**	-0.48	-0.45	-0.49	-0.47
Stack Pressure, in. Hg	**(Ps)**	30.42	30.43	30.42	30.43
Average Temperature, °F	**(Ts)**	176.4	177.1	177.4	177.0
Average Temperature, °R	**(Ts)**	636.1	636.8	637.0	636.6
Measured Moisture Fraction	**(BWSmsd)**	0.444	0.442	0.442	0.443
Moisture Fraction @ Saturation	**(BWSsat)**	0.457	0.464	0.467	0.463
Moisture Fraction	**(BWS)**	0.444	0.442	0.442	0.443
O2 Concentration, %	**(O2)**	13.20	13.24	13.06	13.17
CO2 Concentration, %	**(CO2)**	3.13	3.20	3.19	3.17
Molecular Weight, lb/lb-mole (dry)	**(Md)**	29.03	29.04	29.03	29.03
Molecular Weight, lb/lb-mole (wet)	**(Ms)**	24.14	24.17	24.16	24.16
Velocity, ft/sec	**(Vs)**	48.3	48.8	49.1	48.7
VFR at stack conditions, acfm	**(Qa)**	13,294	13,422	13,501	13,406
VFR at standard conditions, scfh	**(Qsw)**	672,819	678,628	682,305	677,917
VFR at standard conditions, scfm	**(Qsw)**	11,214	11,310	11,372	11,299
VFR at standard conditions, dscfm	**(Qsd)**	6,235	6,311	6,345	6,297

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unti Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date:	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	**in**
Nipple Length:	7.00	**in**
Depth of Duct:	29.00	**in**
Cross Sectional Area of Duct:	4.59	**ft²**
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	**ft**
Distance A Duct Diameters:	23.4	**(must be ≥ 0.5)**
Distance B:	13.5	**ft**
Distance B Duct Diameters:	5.6	**(must be ≥ 2)**
Minimum Number of Traverse Points:	16	
Actual Number of Traverse Points:	3	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

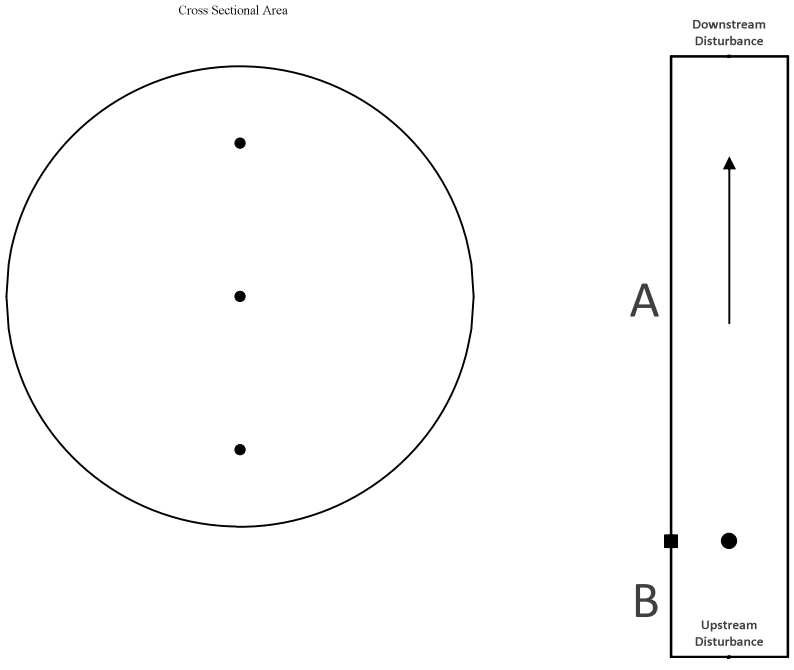
Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	4.84	11.84
2	50.0	14.50	21.50
3	83.3	24.16	31.16
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram

A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.



Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.26	3.08
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Average Zero Response (Co)	0.24	0.02
Pretest System Cal Response	10.10	9.81
Posttest System Cal Response	10.10	9.84
Average Cal Response (C_M)	10.10	9.83
Corrected Run Average (Corr)	13.20	3.13
9:10	13.46	2.95
9:11	13.66	2.75
9:12	13.34	2.77
9:13	13.13	2.98
9:14	13.70	2.72
9:15	13.11	2.92
9:16	13.41	3.01
9:17	13.39	2.88
9:18	13.33	2.91
9:19	12.86	3.11
9:20	13.58	2.83
9:21	13.71	2.67
9:22	12.94	3.14
9:23	13.04	3.23
9:24	13.54	2.92
9:25	13.17	2.91
9:26	13.11	3.07
9:27	13.40	2.93
9:28	13.23	2.87
9:29	13.28	2.97
9:30	12.74	3.15
9:31	13.00	3.24
9:32	13.55	2.90
9:33	13.89	2.64
9:34	13.33	2.94
9:35	13.43	3.07
9:36	13.43	3.05
9:37	13.65	3.07
9:38	13.28	3.13
9:39	12.98	3.54
9:40	13.29	3.31
9:41	13.01	3.64
9:42	13.10	3.53
9:43	12.76	3.54
9:44	13.11	3.51
9:45	12.67	3.43
9:46	12.19	3.68
9:47	12.61	3.60
9:48	13.24	3.12
9:49	13.73	2.71
9:50	13.53	2.80
9:51	12.98	3.19
9:52	12.80	3.23
9:53	13.65	2.74
9:54	13.86	2.61
9:55	13.79	2.60
9:56	13.81	2.67
9:57	13.77	2.73
9:58	13.85	2.86
9:59	13.48	3.05
10:00	12.71	3.50
10:01	13.43	3.36
10:02	13.28	3.26
10:03	12.38	3.78
10:04	12.85	3.65
10:05	13.83	2.98
10:06	13.98	2.74
10:07	13.30	2.97
10:08	12.74	3.27
10:09	12.11	3.76

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.32	3.17
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Average Zero Response (Co)	0.21	0.03
Pretest System Cal Response	10.10	9.84
Posttest System Cal Response	10.13	9.84
Average Cal Response (C_M)	10.12	9.84
Corrected Run Average (Corr)	13.24	3.20
10:42	12.69	3.47
10:43	13.78	2.68
10:44	13.66	2.62
10:45	13.75	2.57
10:46	13.10	3.07
10:47	13.52	2.74
10:48	13.38	2.78
10:49	13.02	3.03
10:50	12.91	3.28
10:51	13.26	3.25
10:52	13.68	3.02
10:53	13.83	2.85
10:54	13.60	2.88
10:55	13.23	3.33
10:56	13.45	3.19
10:57	13.25	3.16
10:58	13.22	3.28
10:59	13.88	3.08
11:00	13.21	3.20
11:01	13.20	3.44
11:02	13.43	3.29
11:03	12.83	3.41
11:04	12.73	3.61
11:05	12.85	3.60
11:06	13.26	3.37
11:07	13.69	3.11
11:08	13.44	3.10
11:09	13.39	3.21
11:10	13.04	3.26
11:11	12.95	3.49
11:12	12.91	3.34
11:13	13.32	3.25
11:14	12.83	3.26
11:15	13.00	3.40
11:16	13.42	3.21
11:17	13.64	3.06
11:18	13.64	2.93
11:19	13.56	2.96
11:20	13.54	3.01
11:21	13.22	3.11
11:22	13.45	3.23
11:23	13.22	3.17
11:24	13.30	3.28
11:25	12.88	3.27
11:26	13.28	3.31
11:27	13.22	3.15
11:28	14.05	2.80
11:29	13.66	2.79
11:30	13.79	3.02
11:31	13.38	3.04
11:32	13.49	3.30
11:33	13.57	3.06
11:34	13.08	3.44
11:35	13.44	3.27
11:36	13.02	3.37
11:37	13.56	3.30
11:38	13.06	3.29
11:39	12.69	3.60
11:40	13.41	3.23
11:41	13.54	3.11

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.16	3.15
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Average Zero Response (Co)	0.22	0.03
Pretest System Cal Response	10.13	9.84
Posttest System Cal Response	10.12	9.81
Average Cal Response (C_M)	10.13	9.83
Corrected Run Average (Corr)	13.06	3.19
11:57	13.24	2.94
11:58	12.96	3.17
11:59	13.51	2.85
12:00	13.07	3.00
12:01	13.43	3.13
12:02	13.15	3.06
12:03	13.55	3.05
12:04	13.64	2.82
12:05	13.53	3.01
12:06	12.69	3.36
12:07	12.85	3.57
12:08	13.00	3.45
12:09	12.44	3.56
12:10	12.67	3.72
12:11	12.83	3.56
12:12	13.24	3.26
12:13	13.12	3.08
12:14	13.17	3.10
12:15	13.37	2.92
12:16	13.30	2.90
12:17	13.01	3.07
12:18	12.88	3.21
12:19	13.43	3.04
12:20	13.60	2.73
12:21	13.35	3.03
12:22	13.23	3.04
12:23	13.02	3.33
12:24	13.43	3.03
12:25	12.54	3.45
12:26	12.79	3.63
12:27	12.54	3.44
12:28	12.82	3.53
12:29	13.21	3.10
12:30	12.76	3.50
12:31	13.11	3.21
12:32	13.04	3.18
12:33	13.14	3.10
12:34	12.97	3.04
12:35	13.14	3.05
12:36	13.33	2.95
12:37	13.49	2.83
12:38	13.59	2.79
12:39	13.45	2.80
12:40	13.72	2.88
12:41	13.64	2.86
12:42	13.58	2.98
12:43	13.07	3.26
12:44	13.05	3.59
12:45	12.84	3.48
12:46	12.54	3.60
12:47	13.55	3.18
12:48	12.87	3.29
12:49	13.38	3.18
12:50	13.09	3.09
12:51	13.50	2.99
12:52	13.36	2.87
12:53	12.84	3.09
12:54	13.22	3.10
12:55	13.38	2.89
12:56	13.18	2.95

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
9:10	191.0	1.037	0.4	45.0
9:11	191.0	1.036	0.5	45.8
9:12	191.0	1.036	0.5	44.7
9:13	191.0	1.036	0.6	45.2
9:14	191.0	1.035	0.5	46.0
9:15	191.0	1.036	0.5	45.8
9:16	191.0	1.036	0.4	45.1
9:17	191.0	1.036	0.5	45.7
9:18	191.0	1.036	0.5	45.8
9:20	190.9	1.037	0.4	44.5
9:21	191.1	1.036	0.5	45.3
9:22	191.1	1.037	0.5	44.5
9:23	191.0	1.036	0.5	44.0
9:24	191.0	1.036	0.5	44.0
9:25	191.0	1.036	0.4	44.1
9:26	191.0	1.037	0.4	45.4
9:27	191.0	1.036	0.4	45.4
9:28	191.1	1.036	0.4	44.6
9:29	191.0	1.036	0.4	45.2
9:30	190.9	1.036	0.4	44.9
9:31	190.9	1.036	0.4	45.5
9:32	191.0	1.036	0.4	46.4
9:33	190.9	1.037	0.4	44.6
9:34	190.9	1.038	0.5	43.1
9:35	191.0	1.036	0.5	43.6
9:36	191.2	1.037	0.5	44.0
9:37	191.1	1.037	0.5	43.8
9:38	191.0	1.037	0.4	43.4
9:39	191.0	1.037	0.4	42.9
9:40	191.0	1.037	0.4	43.0
9:41	191.0	1.037	0.3	42.9
9:43	191.0	1.037	0.3	43.7
9:44	191.0	1.037	0.3	43.0
9:45	191.0	1.037	0.4	45.2
9:46	191.0	1.037	0.3	43.4
9:47	191.0	1.037	0.3	44.3
9:48	191.0	1.037	0.4	45.1
9:49	190.9	1.037	0.4	44.7
9:50	191.0	1.037	0.5	44.1
9:51	191.0	1.037	0.5	43.8
9:52	191.0	1.036	0.5	44.3
9:53	191.0	1.037	0.4	45.6
9:54	191.0	1.037	0.4	45.5
9:55	191.0	1.037	0.5	45.2
9:56	191.0	1.038	0.6	44.4
9:57	191.0	1.037	0.8	43.6
9:58	191.0	1.038	0.7	42.7
9:59	191.0	1.038	0.6	42.6
10:00	191.0	1.038	0.5	43.1
10:01	191.0	1.037	0.5	43.4
10:02	191.0	1.037	0.4	43.4
10:03	191.0	1.037	0.4	42.6
10:05	191.0	1.037	0.3	44.1
10:06	191.0	1.037	0.4	45.6
10:07	191.0	1.037	0.5	43.4
10:08	191.0	1.038	0.6	43.4
10:09	190.9	1.037	0.5	43.9

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.037	0.5	44.4

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
10:42	191.0	1.040	0.5	43.3
10:43	191.0	1.040	0.4	44.8
10:44	191.0	1.039	0.5	45.1
10:45	191.0	1.040	0.6	44.5
10:46	191.0	1.040	0.7	43.6
10:47	191.0	1.040	0.7	43.8
10:48	191.0	1.040	0.6	44.6
10:49	191.0	1.040	0.6	43.9
10:50	191.0	1.040	0.5	44.1
10:51	191.0	1.039	0.4	45.4
10:52	191.0	1.039	0.4	44.9
10:53	191.0	1.040	0.5	43.9
10:54	191.0	1.040	0.5	43.9
10:55	191.0	1.039	0.5	43.4
10:56	191.0	1.039	0.5	44.4
10:57	191.0	1.040	0.3	42.9
10:58	191.0	1.040	0.4	44.0
10:59	191.0	1.040	0.5	43.1
11:00	191.0	1.040	0.4	43.1
11:01	191.0	1.040	0.4	44.1
11:03	190.9	1.040	0.4	44.0
11:04	190.9	1.040	0.5	44.7
11:05	191.0	1.040	0.3	43.5
11:06	191.0	1.040	0.3	43.8
11:07	191.0	1.039	0.3	44.9
11:08	191.0	1.040	0.3	43.8
11:09	191.0	1.040	0.4	43.5
11:10	191.0	1.039	0.4	45.0
11:11	191.0	1.039	0.4	44.6
11:12	191.0	1.039	0.4	45.4
11:13	191.0	1.040	0.4	45.7
11:14	191.0	1.040	0.3	44.5
11:15	191.0	1.039	0.3	45.7
11:16	191.0	1.039	0.3	45.6
11:17	191.0	1.039	0.3	44.4
11:18	190.9	1.040	0.4	43.2
11:19	190.9	1.039	0.4	44.4
11:20	190.9	1.040	0.5	43.0
11:21	190.9	1.040	0.4	43.1
11:22	190.9	1.039	0.5	43.1
11:23	191.0	1.040	0.4	43.3
11:25	191.1	1.039	0.4	43.1
11:26	191.1	1.039	0.4	45.0
11:27	191.0	1.039	0.3	45.4
11:28	191.0	1.039	0.4	45.2
11:29	191.0	1.039	0.4	44.6
11:30	191.0	1.039	0.5	44.8
11:31	191.0	1.040	0.7	43.0
11:32	191.0	1.039	0.5	43.5
11:33	190.9	1.039	0.5	43.9
11:34	190.9	1.039	0.4	43.8
11:35	190.9	1.039	0.4	44.5
11:36	190.9	1.039	0.4	44.7
11:37	190.9	1.038	0.4	44.8
11:38	190.9	1.040	0.3	44.5
11:39	191.0	1.039	0.4	44.5
11:40	191.0	1.039	0.4	45.6
11:41	191.0	1.039	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
11:57	190.9	1.039	0.3	43.3
11:58	190.9	1.039	0.3	43.6
11:59	190.9	1.039	0.4	43.8
12:00	190.9	1.040	0.4	43.5
12:01	190.9	1.039	0.4	43.4
12:02	191.0	1.039	0.4	42.8
12:03	191.0	1.040	0.5	42.8
12:04	191.0	1.040	0.5	43.1
12:05	191.1	1.039	0.5	44.3
12:06	191.1	1.040	0.4	42.2
12:07	191.1	1.040	0.3	41.7
12:09	191.0	1.040	0.3	43.0
12:10	190.9	1.039	0.4	44.6
12:11	190.9	1.039	0.4	44.5
12:12	191.0	1.039	0.3	44.6
12:13	191.1	1.039	0.3	43.5
12:14	191.1	1.040	0.4	43.4
12:15	191.1	1.039	0.3	43.5
12:16	191.0	1.040	0.3	44.2
12:17	191.0	1.039	0.4	43.4
12:18	191.0	1.040	0.3	43.3
12:19	191.0	1.039	0.3	45.1
12:20	190.9	1.039	0.4	44.5
12:21	190.9	1.039	0.4	44.0
12:22	190.8	1.039	0.5	44.1
12:23	190.9	1.039	0.4	43.0
12:24	191.0	1.040	0.4	42.5
12:25	191.1	1.039	0.4	43.6
12:26	191.1	1.039	0.3	45.6
12:27	191.1	1.039	0.4	44.8
12:28	191.0	1.039	0.3	44.6
12:29	191.0	1.039	0.3	44.0
12:31	191.0	1.039	0.3	45.0
12:32	191.0	1.038	0.3	44.7
12:33	191.0	1.038	0.3	46.1
12:34	191.0	1.038	0.4	45.3
12:35	191.0	1.039	0.3	44.7
12:36	191.0	1.038	0.4	45.8
12:37	191.0	1.038	0.4	45.3
12:38	191.0	1.039	0.6	44.8
12:39	190.9	1.038	0.5	44.0
12:40	190.9	1.039	0.5	44.1
12:41	190.9	1.039	0.5	43.1
12:42	190.9	1.039	0.5	44.7
12:43	191.0	1.039	0.5	43.6
12:44	191.1	1.039	0.5	44.3
12:45	191.0	1.038	0.4	45.1
12:46	191.0	1.038	0.3	45.1
12:47	191.0	1.038	0.4	45.9
12:48	191.0	1.039	0.3	44.5
12:49	191.1	1.038	0.4	44.9
12:50	191.0	1.039	0.4	44.5
12:51	191.0	1.038	0.4	46.0
12:53	191.0	1.038	0.3	45.4
12:54	191.0	1.038	0.4	44.7
12:55	191.0	1.038	0.4	45.8
12:56	190.9	1.038	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Appendix C

Alliance Technical Group, LLC
Analytical Services
214 Central Circle
Decatur, AL 35603
(256) 274-4488
www.alliancetg.com

Analytical Laboratory Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, Texas 75572

Project No. AST-2024-4204LS

Version No. LT 2022-00_24.4

Certification Statement

Alliance Technical Group, LLC (ATG) has completed the analysis as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and ATG is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Any deviations or problems are detailed in the relevant sections on the test report.

This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Validation Signature

The analytical data and all QC contained within this report was reviewed and validated by the following individual.

Rebecca Pope

Digitally signed by Rebecca Pope
Reason: I have reviewed this document
Location:
Date: 2025.03.06 12:42:30-06'00'
Foxit PDF Editor Version: 12.1.4

Rebecca Pope
Laboratory Quality Analyst

Date

Project Narrative

Analytical Method(s):	*Method 5 - Determination of Particulate Matter Emissions From Stationary Sources* *Method 202 - Dry Impinger Method for Determining Condensable Particulate Matter Emissions From Stationary Sources*
Filterable	The filter(s) were oven dried and desiccated per the method until a final weight was obtained. The liquid fractions were extracted if required, evaporated and cooled until a final weight was obtained. These fractions were summed together to provide the total Filterable Particulate Matter collected.
Condensable	The filter(s) were cut up and extracted per the method. The organic extract was added to the organic rinse, and the inorganic extract was added to the inorganic rinse. The inorganic fraction was extracted with solvent per the method. Extracts were combined with the organic rinse. The organic and inorganic fractions were evaporated and desiccated until a final weight was obtained.
MDL	The Minimum Detection Level (MDL) is 0.5 mg per fraction. If the measured result for a fraction is less than the MDL, the MDL was used in ensuing calculations.
Blank Correction	If blank correction is performed, only blank values returned higher than the MDL are used. If a blank returns a value less than the MDL, no correction is included. Method 202 Recovery Blank corrections are applied by fraction (inorganic subtracted from inorganic; organic subtracted from organic).
Custody:	The samples were received by Madilyn Golembeck on 02/24/25 in Decatur, AL. The samples were received in good condition with proper Chain-of-Custody documentation. No apparent container problems were noted upon receipt. Prior to analysis, the samples were kept secure with access limited to authorized personnel of ATG.
Number of Samples:	129
Labeling:	Acceptable
Analyst:	Evan Marth-Laboratory Analyst
Equipment:	Ohaus Balance PX224, S/N B919636400. This scale was used for analytical determinations. A&D Weighing AND EJ-1500, S/N 5A2845843. This scale was only used to measure the total mass of rinse collected. Analysis was performed on the same balance as the associated tare. Quincy Lab Inc oven, 40CG, SN G4-007640. Desiccator Number: 2 contained M5 rinse petri dishes.. Desiccator Number: 3 contained M5 filters. Desiccator Number: 4 contained organic rinse tins & inorganic rinse petri dishes. Desiccator Number: 5 contained M5 rinse petri dishes & organic rinse tins.
Lab Reagents:	Acetone Lot Number: 240513 Hexane Lot Number: 240648
QC Notes:	The samples met the minimum criteria established by the relevant method.
Reporting Notes:	The M5 samples were collected in the field using DI water in place of acetone for the rinse. The M202 DI water, hexane, and acetone reagent blanks were HELD. No. 1 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 2 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-E M5 rinse run 3 contains visibly more and darker PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-W M5 rinse run 1 contains visibly more PM than runs 2 and 3. No. 2 Smelt Tank Scrubber M5 rinse run 1 contains visbly more PM than runs 2 and 3.
Certifications:	Primary Accreditation: Louisiana Environmental Laboratory Accreditation Program (LELAP) Agency Interest (AI) No. 194891 Certificate: 05054, Expiration Date: 6/30/25 Secondary Accreditation: Texas Commission on Environmental Quality Certificate: T104704540-TX-C25-00047, Expiration Date: 2/28/26 Virginia Environmental Laboratory Accreditation Program (VELAP) VA Laboratory ID: 460299, Certificate: 13081 Expiration Date: 9/14/2025
State Registrations:	PADEP # 68-04598 NYDOH # 12146

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2294		2295		2296	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Filter ID	26987-A		26988-A		26696-A	
Filter Tare Weight, g	0.4609		0.4591		0.4504	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:00		8:01		8:02	
Filter Weight, g	0.4817		0.4711		0.4723	
Filter PM Mass, mg*	**20.8**		**12.0**		**21.9**	
Front Half Rinse						
Lab ID	2318		2319		2320	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5853		G5854		G5855	
Beaker tare, g	44.4445		46.9315		47.1823	
Field Vessel with DI Water, g	197.0		233.2		170.1	
Empty Field Vessel,g	28.6		28.2		27.4	
DI Water Mass, g	168.4		205.0		142.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:01	8:00	15:02	8:01	15:03	8:02
Weight, g	44.4531	44.4526	46.9378	46.9374	47.1868	47.1864
Rinse PM Mass, mg*	**8.4**		**6.1**		**4.3**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**29.2**		**18.1**		**26.2**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2297		2298		2299	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Filter ID	26697-A		26698-A		26699-A	
Filter Tare Weight, g	0.4586		0.4665		0.4639	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:03		8:04		8:05	
Filter Weight, g	0.4596		0.4688		0.4647	
Filter PM Mass, mg*	**1.0**		**2.3**		**0.8**	
Front Half Rinse						
Lab ID	2321		2322		2323	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5856		G5857		G5858	
Beaker tare, g	40.4982		42.8656		46.6289	
Field Vessel with DI Water, g	192.0		211.2		204.2	
Empty Field Vessel,g	28.1		28.1		28.5	
DI Water Mass, g	163.9		183.1		175.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:04	8:03	15:05	8:04	15:06	8:05
Weight, g	40.5008	40.5003	42.8667	42.8663	46.6309	46.6307
Rinse PM Mass, mg*	**2.4**		**0.9**		**1.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**3.4**		**3.2**		**2.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2300		2301		2302	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Filter ID	26974-A		26989-A		26700-A	
Filter Tare Weight, g	0.4583		0.4533		0.4701	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:06		8:07		8:08	
Filter Weight, g	0.6305		0.5645		0.5783	
Filter PM Mass, mg*	**172.2**		**111.2**		**108.2**	
Front Half Rinse						
Lab ID	2324		2325		2326	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5859		G5860		G5861	
Beaker tare, g	42.6719		40.4452		41.3230	
Field Vessel with DI Water, g	158.0		204.4		141.5	
Empty Field Vessel,g	29.1		28.5		29.0	
DI Water Mass, g	128.9		175.9		112.5	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:07	8:06	15:08	8:07	15:09	8:08
Weight, g	42.7452	42.7450	40.4567	40.4563	41.3338	41.3337
Rinse PM Mass, mg*	**73.2**		**11.3**		**10.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**245.4**		**122.5**		**118.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2303		2304		2305	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Filter ID	26704-A		26707-A		26708-A	
Filter Tare Weight, g	0.4591		0.4513		0.4611	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:09		8:10		8:11	
Filter Weight, g	0.4943		0.4947		0.5073	
Filter PM Mass, mg*	**35.2**		**43.4**		**46.2**	
Front Half Rinse						
Lab ID	2327		2328		2329	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5862		G5863		G5864	
Beaker tare, g	46.6607		33.1419		43.5493	
Field Vessel with DI Water, g	152.5		109.7		148.9	
Empty Field Vessel,g	27.3		27.8		27.0	
DI Water Mass, g	125.2		81.9		121.9	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:10	8:09	15:11	8:10	15:12	8:11
Weight, g	46.6834	46.6832	33.1496	33.1493	43.6557	43.6553
Rinse PM Mass, mg*	**22.6**		**7.6**		**106.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**57.8**		**51.0**		**152.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2306		2307		2308	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Filter ID	26705-A		26706-A		26709-A	
Filter Tare Weight, g	0.4641		0.4546		0.4555	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:12		8:13		8:14	
Filter Weight, g	0.5186		0.4899		0.4912	
Filter PM Mass, mg*	**54.5**		**35.3**		**35.7**	
Front Half Rinse						
Lab ID	2330		2331		2332	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5865		G5866		G5867	
Beaker tare, g	41.4498		46.8473		41.7306	
Field Vessel with DI Water, g	161.9		174.0		175.3	
Empty Field Vessel,g	26.9		28.3		27.2	
DI Water Mass, g	135.0		145.7		148.1	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:13	8:12	15:14	8:13	15:15	8:14
Weight, g	41.5004	41.5005	46.8552	46.8551	41.7462	41.7463
Rinse PM Mass, mg*	**50.6**		**7.9**		**15.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**105.1**		**43.2**		**51.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2309		2310		2311	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Filter ID	26702-A		26703-A		26971-A	
Filter Tare Weight, g	0.4583		0.4611		0.4626	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:15		8:16		8:17	
Filter Weight, g	0.5226		0.5186		0.5168	
Filter PM Mass, mg*	**64.3**		**57.5**		**54.2**	
Front Half Rinse						
Lab ID	2333		2334		2335	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5868		G5869		G5870	
Beaker tare, g	46.0004		38.3894		47.8755	
Field Vessel with DI Water, g	122.8		104.6		118.2	
Empty Field Vessel,g	29.4		27.7		27.9	
DI Water Mass, g	93.4		76.9		90.3	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:16	8:15	15:17	8:16	15:18	8:17
Weight, g	46.0441	46.0444	38.4051	38.4055	47.8925	47.8923
Rinse PM Mass, mg*	**43.9**		**15.9**		**16.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**108.2**		**73.4**		**71.1**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2312		2313		2314	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Filter ID	26962-A		26961-A		26970-A	
Filter Tare Weight, g	0.4713		0.4648		0.4520	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:18		8:19		8:20	
Filter Weight, g	0.5219		0.5158		0.4907	
Filter PM Mass, mg*	**50.6**		**51.0**		**38.7**	
Front Half Rinse						
Lab ID	2336		2337		2338	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5871		G5872		G5873	
Beaker tare, g	43.1226		42.5851		44.9883	
Field Vessel with DI Water, g	108.9		92.3		98.7	
Empty Field Vessel,g	28.2		27.2		28.1	
DI Water Mass, g	80.7		65.1		70.6	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:19	8:18	15:20	8:19	15:21	8:20
Weight, g	43.1258	43.1255	42.5898	42.5894	44.9947	44.9943
Rinse PM Mass, mg*	**3.1**		**4.5**		**6.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**53.7**		**55.5**		**44.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2315		2316		2317	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Filter ID	26973-A		26960-A		26972-A	
Filter Tare Weight, g	0.4544		0.4476		0.4644	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:21		8:22		8:23	
Filter Weight, g	0.4880		0.4856		0.4698	
Filter PM Mass, mg*	**33.6**		**38.0**		**5.4**	
Front Half Rinse						
Lab ID	2339		2340		2341	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5874		G5875		G5876	
Beaker tare, g	45.9829		40.9130		47.1276	
Field Vessel with DI Water, g	123.5		102.2		179.3	
Empty Field Vessel,g	29.2		28.2		27.9	
DI Water Mass, g	94.3		74.0		151.4	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:22	8:21	15:23	8:22	15:24	8:23
Weight, g	46.0011	46.0008	40.9396	40.9391	47.1458	47.1453
Rinse PM Mass, mg*	**18.1**		**26.4**		**17.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**51.7**		**64.4**		**23.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Blank Rinse		
Lab ID	2342	
Field ID	DI Water Blank	
Beaker ID	G5877	
Beaker tare, g	45.4094	
Field Vessel with DI Water, g	386.7	
Empty Field Vessel, g	178.6	
DI Water Mass, g	208.1	
Date - Desiccator	2/25/25	
Time - Desiccator	15:00	
Date of Weighing	2/26/25	2/27/25
Time of Weighing	15:25	8:24
Weight, g	45.4097	45.4097
Measured Blank Mass, mg	**0.3**	
Blank Mass, mg*	**0.3**	
Blank Mass, mg/g	**0.0014**	

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2343		2344		2345	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Organic Fraction						
Lab ID	2367		2368		2369	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	2367		2368		2369	
Beaker tare, g	4.1481		4.1697		4.1752	
Field Vessel w/ Solvent, g	301.0		277.6		261.7	
Empty Field Vessel, g	176.9		176.8		176.8	
Solvent Mass, g	124.1		100.8		84.9	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	4.1533	4.1537	4.1728	4.1731	4.1780	4.1784
Organic Condensable Mass, mg*	**5.4**		**3.3**		**3.0**	
Inorganic Fraction						
Lab ID	2391		2392		2393	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5878		G5879		G5880	
Beaker tare, g	42.8783		39.7638		46.7558	
Field Vessel w/ Water, g	677.1		575.1		654.6	
Empty Field Vessel, g	286.2		286.6		285.8	
Water Mass, g	390.9		288.5		368.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	42.8857	42.8855	39.7660	39.7657	46.7596	46.7592
Inorganic Condensable Mass, mg*	**7.3**		**2.0**		**3.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.7**		**3.3**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2346		2347		2348	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Organic Fraction						
Lab ID	2370		2371		2372	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	2370		2371		2372	
Beaker tare, g	4.1708		4.1859		4.1780	
Field Vessel w/ Solvent, g	292.3		272.5		278.4	
Empty Field Vessel, g	177.5		176.3		176.9	
Solvent Mass, g	114.8		96.2		101.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	4.1753	4.1755	4.1892	4.1891	4.1811	4.1810
Organic Condensable Mass, mg*	**4.6**		**3.2**		**3.1**	
Inorganic Fraction						
Lab ID	2394		2395		2396	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5881		G5882		G5883	
Beaker tare, g	41.1547		42.8616		31.5071	
Field Vessel w/ Water, g	640.1		606.9		636.0	
Empty Field Vessel, g	286.2		286.4		286.1	
Water Mass, g	353.9		320.5		349.9	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	41.1568	41.1563	42.8653	42.8657	31.5107	31.5106
Inorganic Condensable Mass, mg*	**1.8**		**3.9**		**3.5**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.4**		**5.1**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2349		2350		2351	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Organic Fraction						
Lab ID	2373		2374		2375	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	2373		2374		2375	
Beaker tare, g	4.2438		4.2125		4.2150	
Field Vessel w/ Solvent, g	298.4		291.4		220.1	
Empty Field Vessel, g	176.7		176.5		177.7	
Solvent Mass, g	121.7		114.9		42.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	4.2482	4.2485	4.2162	4.2165	4.2184	4.2187
Organic Condensable Mass, mg*	**4.6**		**3.8**		**3.6**	
Inorganic Fraction						
Lab ID	2397		2398		2399	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5884		G5885		G5886	
Beaker tare, g	50.4549		33.9860		42.7755	
Field Vessel w/ Water, g	1135.0		994.8		957.7	
Empty Field Vessel, g	441.2		441.6		439.7	
Water Mass, g	693.8		553.2		518.0	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	50.4661	50.4662	33.9919	33.9922	42.7833	42.7833
Inorganic Condensable Mass, mg*	**11.2**		**6.1**		**7.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**13.8**		**7.9**		**9.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2352		2353		2354	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Organic Fraction						
Lab ID	2376		2377		2378	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	2376		2377		2378	
Beaker tare, g	4.2256		4.2210		4.2251	
Field Vessel w/ Solvent, g	268.5		269.3		261.8	
Empty Field Vessel, g	178.0		178.3		177.5	
Solvent Mass, g	90.5		91.0		84.3	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	4.2289	4.2289	4.2243	4.2245	4.2278	4.2281
Organic Condensable Mass, mg*	**3.3**		**3.4**		**2.8**	
Inorganic Fraction						
Lab ID	2400		2401		2402	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5887		G5888		G5889	
Beaker tare, g	39.6069		45.8132		42.3755	
Field Vessel w/ Water, g	555.9		607.3		602.0	
Empty Field Vessel, g	286.0		286.2		286.3	
Water Mass, g	269.9		321.1		315.7	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	39.6085	39.6086	45.8175	45.8179	42.3783	42.3785
Inorganic Condensable Mass, mg*	**1.6**		**4.5**		**2.9**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**2.9**		**5.9**		**3.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2355		2356		2357	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Organic Fraction						
Lab ID	2379		2380		2381	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	2379		2380		2381	
Beaker tare, g	4.2316		4.2100		4.2438	
Field Vessel w/ Solvent, g	257.7		272.3		295.6	
Empty Field Vessel, g	177.0		177.7		177.2	
Solvent Mass, g	80.7		94.6		118.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	4.2352	4.2352	4.2142	4.2140	4.2464	4.2465
Organic Condensable Mass, mg*	**3.6**		**4.1**		**2.7**	
Inorganic Fraction						
Lab ID	2403		2404		2405	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5890		G5891		G5892	
Beaker tare, g	46.8411		33.4643		41.8922	
Field Vessel w/ Water, g	582.1		593.0		634.4	
Empty Field Vessel, g	286.0		285.9		285.9	
Water Mass, g	296.1		307.1		348.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	46.8433	46.8437	33.4670	33.4670	41.8960	41.8961
Inorganic Condensable Mass, mg*	**2.4**		**2.7**		**3.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.0**		**4.8**		**4.5**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2358		2359		2360	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Organic Fraction						
Lab ID	2382		2383		2384	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	2382		2383		2384	
Beaker tare, g	4.2097		4.2193		4.2603	
Field Vessel w/ Solvent, g	256.4		268.9		265.7	
Empty Field Vessel, g	178.7		177.1		177.3	
Solvent Mass, g	77.7		91.8		88.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	4.2135	4.2132	4.2261	4.2260	4.2634	4.2634
Organic Condensable Mass, mg*	**3.7**		**6.8**		**3.1**	
Inorganic Fraction						
Lab ID	2406		2407		2408	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5893		G5894		G5895	
Beaker tare, g	38.9202		45.5879		41.7805	
Field Vessel w/ Water, g	945.0		956.2		863.2	
Empty Field Vessel, g	440.0		441.8		441.4	
Water Mass, g	505.0		514.4		421.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	38.9267	38.9264	45.5993	45.5994	41.7863	41.7861
Inorganic Condensable Mass, mg*	**6.3**		**11.5**		**5.7**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**8.0**		**16.2**		**6.8**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2361		2362		2363	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Organic Fraction						
Lab ID	2385		2386		2387	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	2385		2386		2387	
Beaker tare, g	4.1945		4.2061		4.2093	
Field Vessel w/ Solvent, g	433.2		399.7		423.8	
Empty Field Vessel, g	285.6		285.0		285.6	
Solvent Mass, g	147.6		114.7		138.2	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	4.1982	4.1982	4.2092	4.2092	4.2125	4.2127
Organic Condensable Mass, mg*	**3.7**		**3.1**		**3.3**	
Inorganic Fraction						
Lab ID	2409		2410		2411	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5896		G5897		G5898	
Beaker tare, g	39.9904		38.9263		47.8517	
Field Vessel w/ Water, g	569.3		575.6		607.9	
Empty Field Vessel, g	285.7		286.1		285.3	
Water Mass, g	283.6		289.5		322.6	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	39.9933	39.9933	38.9268	38.9272	47.8564	47.8563
Inorganic Condensable Mass, mg*	**2.9**		**0.7**		**4.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.6**		**1.8**		**5.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2364		2365		2366	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Organic Fraction						
Lab ID	2388		2389		2390	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	2388		2389		2390	
Beaker tare, g	4.2001		4.2214		4.1849	
Field Vessel w/ Solvent, g	434.2		412.2		432.4	
Empty Field Vessel, g	285.1		284.9		284.9	
Solvent Mass, g	149.1		127.3		147.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	4.2073	4.2077	4.2241	4.2241	4.1891	4.1891
Organic Condensable Mass, mg*	**7.4**		**2.7**		**4.2**	
Inorganic Fraction						
Lab ID	2412		2413		2414	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5899		G5900		G5901	
Beaker tare, g	37.9457		41.3364		44.6145	
Field Vessel w/ Water, g	678.5		673.6		638.3	
Empty Field Vessel, g	285.8		285.7		285.8	
Water Mass, g	392.7		387.9		352.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	37.9508	37.9505	41.3381	41.3380	44.6181	44.6177
Inorganic Condensable Mass, mg*	**4.9**		**1.6**		**3.4**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.4**		**2.3**		**5.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2415		N/A	
Field ID	Field Train Blank		N/A	
Organic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2416		2418	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	2416		2418	
Beaker tare, g	4.2179		4.2326	
Field Vessel w/ Solvent, g	351.6		350.2	
Empty Field Vessel, g	177.2		176.5	
Solvent Mass, g	174.4		173.7	
Date - Desiccator	2/26/25		2/26/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	4.2204	4.2207	4.2328	4.2331
Measured Organic Mass, mg	**2.6**		**0.4**	
Organic Mass, mg*	**2.0**		**0.5**	
Inorganic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2417		2419	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	G5902		G5903	
Beaker tare, g	48.0627		39.1195	
Field Vessel w/ Water, g	321.9		329.5	
Empty Field Vessel, g	177.1		177.2	
Water Mass, g	144.8		152.3	
Date - Desiccator	3/3/25		3/3/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	48.0640	48.0641	39.1200	39.1195
Measured Inorganic Mass, mg	**1.4**		**0.2**	
Inorganic Mass, mg*	**1.4**		**0.5**	

The total results have been calculated based on MDL values for any sample fractions which were below the MDL.

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL
City, State: QUEEN CITY, TX
Source: RB01A-N, RB01B-S, SM01
Project No: AST-2024-4204

Turn Around Time: [✓] Standard [ ] Expedited ____ days
Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079
Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5 — Filter Number - 83mm Quartz	Method 5 — Filter Number - 83mm Teflon	Method 5 — Probe Nozzle Rinse - DIUF	Method 5 — Probe Nozzle Rinse - 1-bromopropane	Method 17 — Filter Number - 47mm Quartz	Method 17 — Nozzle Rinse - Acetone	Method 201A — PM 2.5 Filter Number- 47mm Quartz	Method 201A — PM 2.5 Rinse - Acetone	Method 201A — PM 10 Filter Number- 47mm Quartz	Method 201A — PM 10 Rinse - Acetone	Method 202 — CPM Filter - 83mm Tefon	Method 202 — Condensate Catch - DIUF	Method 202 — Solvent Rinse - DIUF/Hexane
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 1	5	2/11/25	11:30	RW		26987-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 2	5	2/11/25	13:55	RW		26988-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 3	5	2/11/25	17:30	RW		26696-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 1	5	2/11/25	11:40	RW		26697-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 2	5	2/11/25	13:40	RW		26698-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 3	5	2/11/25	17:10	RW		26699-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 1	5	2/11/25	11:20	RW		26974-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 2	5	2/11/25	13:45	RW		26989-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 3	5	2/11/25	17:00	RW		26700-A		✓								✓	✓	✓
M5 ~~ACETONE~~ BLANK DIUF	1	2/11/25	11:00	RW				✓										
M202 FT PROOF BLANK	2	2/11/25	11:15	RW													✓	✓
M202 FT RECOVERY BLANK	3	2/11/25	14:30	RW												✓	✓	✓
M202 ACETONE BLANK	1	2/11/25	11:00	RW														
M202 WATER BLANK	1	2/11/25	11:00	RW														
M202 HEXANE BLANK	1	2/11/25	11:00	RW														

Relinquished By _____ Date 2-14-25 Received By Madilyn Galenbeck Date 2/28/25

Relinquished By _____ Date _____ Received By _____ Date _____

Relinquished By _____ Date _____ Received By _____ Date _____

Sample Container Recieved Temperature (°F) 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL

City, State: QUEEN CITY, TX

Source: RB02A-E, RB02B-W, SM02), LK01, LK02

Project No.: AST-2024-4204

Turn Around Time: [✔] Standard [ ] Expedited ____ days

Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079

Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5: Filter Number - 83mm Quartz	Method 5: Filter Number - 83mm Teflon	Method 5: Probe Nozzle Rinse - DIUF	Method 5: Probe Nozzle Rinse - 1-bromopropane	Method 17: Filter Number - 47mm Quartz	Method 17: Nozzle Rinse - Acetone	Method 201A: PM 2.5 Filter Number - 47mm Quartz	Method 201A: PM 2.5 Rinse - Acetone	Method 201A: PM 10 Filter Number - 47mm Quartz	Method 201A: PM 10 Rinse - Acetone	Method 202: CPM Filter - 83mm Teflon	Method 202: Condensate Catch - DIUF	Method 202: Solvent Rinse - DIUF/Hexane
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 1	5	2/12/25	12:45	RW		26704-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 2	5	2/12/25	15:00	RW		26707-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 3	5	2/12/25	17:00	RW		26708-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 1	5	2/12/25	12:45	RW		26705-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 2	5	2/12/25	15:00	RW		26706-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 3	5	2/12/25	17:00	RW		26709-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 1	5	2/12/25	12:45	RW		26702-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 2	5	2/12/25	15:00	RW		26703-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 3	5	2/12/25	17:00	RW		26971-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 1	5	2/13/25	15:50	RW		26962-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 2	5	2/13/25	17:30	RW		26961-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 3	5	2/13/25	19:00	RW		26970-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 1	5	2/13/25	10:35	RW		26973-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 2	5	2/13/25	12:15	RW		26960-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 3	5	2/13/25	13:45	RW		26972-A		✔								✔	✔	✔

Relinquished By: [signature] Date: 2-14-25 Received By: madelyn Galenkeed Date: 2/24/25

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Sample Container Recieved Temperature (°F): 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-001

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	Ohaus	PA214	B919636400	Balance Room	210 g	0.0001g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000
5	0.0001	5.0000	0.0000	5	0.0001	5.0000	0.0000
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0.2	0.0001	0.2000	0.0000	0.2	0.0001	0.2000	0.0000
1	0.0001	1.0000	0.0000	1	0.0001	1.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
50	0.0003	49.9998	-0.0002	50	0.0003	49.9998	-0.0002
150	0.0003	149.9998	-0.0002	150	0.0003	149.9998	-0.0002

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	YES	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED		*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.00011g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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P.O. Box 266 Decatur, Al. Phone 1-800-461-4153

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-003

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	A&D	EJ-1500	5A2845843	LAB	1500 g	0.1g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0	0.0	0.0	0	0.0	0.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
0	0.0	0.0	0.0	0	0.0	0.0	0.0

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
100	0.1	100.0	0.0	100	0.1	100.0	0.0
200	0.1	200.0	0.0	200	0.1	200.0	0.0
500	0.1	500.0	0.0	500	0.1	500.0	0.0
1000	0.1	1000.0	0.0	1000	0.1	1000.0	0.0

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB-44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	**YES**	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED			*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.11g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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P.O. Box 266 Decatur, Al. Phone 1-800-461-4153

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26680-A	0.4978	11/14/24	MEG	S/N G4-007640	105° C	379990
26681-A	0.4918	11/14/24	MEG	S/N G4-007640	105° C	379990
26682-A	0.4955	11/14/24	MEG	S/N G4-007640	105° C	379990
26683-A	0.4954	11/14/24	MEG	S/N G4-007640	105° C	379990
26684-A	0.4894	11/14/24	MEG	S/N G4-007640	105° C	379990
26685-A	0.4901	11/14/24	MEG	S/N G4-007640	105° C	379990
26686-A	0.4930	11/14/24	MEG	S/N G4-007640	105° C	379990
26687-A	0.4940	11/14/24	MEG	S/N G4-007640	105° C	379990
26688-A	0.4948	11/14/24	MEG	S/N G4-007640	105° C	379990
26689-A	0.4879	11/14/24	MEG	S/N G4-007640	105° C	379990
26690-A	0.4676	11/27/24	MEG	S/N G4-007640	105° C	379990
26691-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26692-A	0.4628	11/27/24	MEG	S/N G4-007640	105° C	379990
26693-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26694-A	0.4669	11/27/24	MEG	S/N G4-007640	105° C	379990
26695-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26696-A	0.4504	11/27/24	MEG	S/N G4-007640	105° C	379990
26697-A	0.4586	11/27/24	MEG	S/N G4-007640	105° C	379990
26698-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26699-A	0.4639	11/27/24	MEG	S/N G4-007640	105° C	379990
26700-A	0.4701	11/27/24	MEG	S/N G4-007640	105° C	379990
26701-A	0.4645	11/27/24	MEG	S/N G4-007640	105° C	379990
26702-A	0.4583	11/27/24	MEG	S/N G4-007640	105° C	379990
26703-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26704-A	0.4591	11/27/24	MEG	S/N G4-007640	105° C	379990
26705-A	0.4641	11/27/24	MEG	S/N G4-007640	105° C	379990
26706-A	0.4546	11/27/24	MEG	S/N G4-007640	105° C	379990
26707-A	0.4513	11/27/24	MEG	S/N G4-007640	105° C	379990
26708-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26709-A	0.4555	11/27/24	MEG	S/N G4-007640	105° C	379990
26710-A	0.4571	11/27/24	MEG	S/N G4-007640	105° C	379990
26711-A	0.4452	11/27/24	MEG	S/N G4-007640	105° C	379990
26712-A	0.4487	11/27/24	MEG	S/N G4-007640	105° C	379990
26713-A	0.4460	11/27/24	MEG	S/N G4-007640	105° C	379990
26714-A	0.4481	11/27/24	MEG	S/N G4-007640	105° C	379990
26715-A	0.4502	11/27/24	MEG	S/N G4-007640	105° C	379990
26716-A	0.4512	11/27/24	MEG	S/N G4-007640	105° C	379990
26717-A	0.4510	11/27/24	MEG	S/N G4-007640	105° C	379990
26718-A	0.4406	11/27/24	MEG	S/N G4-007640	105° C	379990
26719-A	0.4459	11/27/24	MEG	S/N G4-007640	105° C	379990

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26960-A	0.4476	12/09/24	MEG	S/N G4-007640	105° C	379990
26961-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26962-A	0.4713	12/09/24	MEG	S/N G4-007640	105° C	379990
26963-A	0.4658	12/09/24	MEG	S/N G4-007640	105° C	379990
26964-A	0.4577	12/09/24	MEG	S/N G4-007640	105° C	379990
26965-A	0.4503	12/09/24	MEG	S/N G4-007640	105° C	379990
26966-A	0.4683	12/09/24	MEG	S/N G4-007640	105° C	379990
26967-A	0.4473	12/09/24	MEG	S/N G4-007640	105° C	379990
26968-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26969-A	0.4585	12/09/24	MEG	S/N G4-007640	105° C	379990
26970-A	0.4520	12/10/24	MEG	S/N G4-007640	105° C	379990
26971-A	0.4626	12/10/24	MEG	S/N G4-007640	105° C	379990
26972-A	0.4644	12/10/24	MEG	S/N G4-007640	105° C	379990
26973-A	0.4544	12/10/24	MEG	S/N G4-007640	105° C	379990
26974-A	0.4583	12/10/24	MEG	S/N G4-007640	105° C	379990
26975-A	0.4575	12/10/24	MEG	S/N G4-007640	105° C	379990
26976-A	0.4632	12/10/24	MEG	S/N G4-007640	105° C	379990
26977-A	0.4587	12/10/24	MEG	S/N G4-007640	105° C	379990
26978-A	0.4639	12/10/24	MEG	S/N G4-007640	105° C	379990
26979-A	0.4622	12/10/24	MEG	S/N G4-007640	105° C	379990
26980-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26981-A	0.4647	12/10/24	MEG	S/N G4-007640	105° C	379990
26982-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26983-A	0.4535	12/10/24	MEG	S/N G4-007640	105° C	379990
26984-A	0.4513	12/10/24	MEG	S/N G4-007640	105° C	379990
26985-A	0.4568	12/10/24	MEG	S/N G4-007640	105° C	379990
26986-A	0.4582	12/10/24	MEG	S/N G4-007640	105° C	379990
26987-A	0.4609	12/10/24	MEG	S/N G4-007640	105° C	379990
26988-A	0.4591	12/10/24	MEG	S/N G4-007640	105° C	379990
26989-A	0.4533	12/10/24	MEG	S/N G4-007640	105° C	379990
26990-A	0.4506	12/10/24	MEG	S/N G4-007640	105° C	379990
26991-A	0.4612	12/10/24	MEG	S/N G4-007640	105° C	379990
26992-A	0.4482	12/10/24	MEG	S/N G4-007640	105° C	379990
26993-A	0.4480	12/10/24	MEG	S/N G4-007640	105° C	379990
26994-A	0.4560	12/10/24	MEG	S/N G4-007640	105° C	379990
26995-A	0.4564	12/10/24	MEG	S/N G4-007640	105° C	379990
26996-A	0.4534	12/10/24	MEG	S/N G4-007640	105° C	379990
26997-A	0.4525	12/10/24	MEG	S/N G4-007640	105° C	379990
26998-A	0.4501	12/10/24	MEG	S/N G4-007640	105° C	379990
26999-A	0.4491	12/10/24	MEG	S/N G4-007640	105° C	379990

This is the last page of the report.

Appendix D

LK01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-247-1	0.247	0.248	0.247	0.247	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-203-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	P-205-3	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
14:45	70.0	16:30	68.0	18:00	73.0
15:00	70.0	16:45	68.0	18:15	73.0
15:15	70.0	17:00	69.0	18:30	74.0
15:30	70.0	17:15	69.0	18:45	74.0
15:45	71.0	17:30	69.0	19:00	75.0

LK02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-7	0.416	0.416	0.416	0.416	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-206-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	PR-208-3	150.0	150.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
9:40	70.0	11:20	73.0	12:40	73.0
9:55	70.0	11:35	73.0	12:55	73.0
10:10	70.0	11:50	73.0	13:10	74.0
10:25	70.0	12:05	74.0	13:25	74.0
10:40	70.0	12:20	73.0	13:40	74.0

RB01A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS07	0.330	0.330	0.330	0.330	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-2	365.0	365.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	68.0
10:30	73.0	12:55	70.0	16:00	68.0
10:45	73.0	13:10	70.0	16:15	67.0
11:00	74.0	13:25	69.0	16:30	67.0
11:15	74.0	13:40	69.0	16:45	66.0

RB01B

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-36	0.362	0.362	0.362	0.362	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-309-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-0	355.0	355.0	0.0%	± 1.5 % (absolute)	10'

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	66.0	12:40	72.0	15:45	75.0
10:30	66.0	12:55	72.0	16:00	74.0
10:45	67.0	13:10	72.0	16:15	74.0
11:00	67.0	13:25	72.0	16:30	75.0
11:15	68.0	13:40	71.0	16:45	75.0

RB02A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-07	0.292	0.292	0.292	0.292	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-209-2	385.0	384.0	0.1%	± 1.5 % (absolute)	9'

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

RB02B

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-7	0.295	0.295	0.295	0.295	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-202-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-210-2	395.0	395.0	0.0%	± 1.5 % (absolute)	10 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

SM01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-382-2	0.382	0.381	0.382	0.382	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-205-2	160.0	161.0	0.2%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	71.0
10:30	73.0	12:55	69.0	16:00	72.0
10:45	73.0	13:10	68.0	16:15	72.0
11:00	74.0	13:25	68.0	16:30	72.0
11:15	74.0	13:40	69.0	16:45	73.0

SM02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-344-3	0.344	0.344	0.345	0.344	0.001	≤ 0.004 in.	SS
2/12/25	SS-305-2	0.305	0.306	0.305	0.305	0.001		SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-205-2	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
2/13/25	P-203-1	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
2/13/25	P-203-1	176.0	178.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
2/13/25	Weather Station	NA	NA	NA	

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Make	Servomex	Servomex
Model	4900	4900
S/N	653218	653218
Operating Range	25	25
Cylinder ID		
Zero	NA	NA
Low	NA	NA
Mid	EB0096121	EB0096121
High	CC737073	CC737073
Cylinder Certified Values		
Zero	NA	NA
Mid	10	10
High	19.93	19.8
Cylinder Expiration Date		
Zero	NA	NA
Mid	8/18/32	8/18/32
High	9/15/32	9/15/32
Type of Sample Line	Heated Sample Line	

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	9:05	12.85	3.41
2	9:07	13.33	3.29
3	9:09	13.22	3.16
Average		13.1	3.3
Criteria Met		Single Point	Single Point

Alliance TECHNICAL GROUP

Calibration Data

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Parameter	O_2 - Outlet	CO_2 - Outlet
Expected Average Concentration	10.00	10.00
Span Between		
Low	10.00	10.00
High	50.00	50.00
Desired Span	19.93	19.80
Low Range Gas		
Low	NA	NA
High	NA	NA
Mid Range Gas		
Low	7.97	7.92
High	11.96	11.88
High Range Gas		
Low	NA	NA
High	NA	NA
Actual Concentration (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.00	10.00
High	19.93	19.80
Response Time (seconds)	35.00	35.00
Upscale Calibration Gas (C_{MA})	Mid	Mid
Instrument Response (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.10	10.04
High	19.92	19.84
Performance (% of Span or Cal. Gas Conc.)		
Zero	0.00	0.00
Low	NA	NA
Mid	0.50	0.20
High	0.05	0.20
Status		
Zero	PASS	PASS
Low	NA	NA
Mid	PASS	PASS
High	PASS	PASS

Bias/Drift Determinations

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1		
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Run 2		
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Run 3		
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 2/13/25		
Span Value	19.93	19.80
Initial Instrument Zero Cal Response	0.00	0.00
Initial Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Bias (%)		
Pretest Zero	1.30	0.00
Posttest Zero	1.05	0.20
Pretest Span	0.00	-1.16
Posttest Span	0.00	-1.01
Drift (%)		
Zero	-0.25	0.20
Mid	0.00	0.15
Run 2 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Bias (%)		
Pretest Zero	1.05	0.20
Posttest Zero	1.05	0.10
Pretest Span	0.00	-1.01
Posttest Span	0.15	-1.01
Drift (%)		
Zero	0.00	-0.10
Mid	0.15	0.00
Run 3 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81
Bias (%)		
Pretest Zero	1.05	0.10
Posttest Zero	1.15	0.15
Pretest Span	0.15	-1.01
Posttest Span	0.10	-1.16
Drift (%)		
Zero	0.10	0.05
Mid	-0.05	-0.15

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Response Times, seconds		
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**
Zero	35	35
Low	NA	NA
Mid	35	35

Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Date(s)	2/5/2025
Ethylene Cylinder ID	CC768666
Concentration (ppmv)	103.0
Instrument Outlet	MKS 20 (Serial #111455302)

CTS 1	98.03
CTS 2	98.31
CTS 3	98.14
CTS 4	98.19
CTS 5	--
CTS 6	--

CTS 7	--
CTS 8	--
CTS 9	--
CTS 10	--
CTS 11	--
CTS 12	--

AVERAGE	98.17
MAX	98.31
deviation	0.14
MIN	98.03
deviation	0.14

Greatest Deviation from average
0.14%

Agreement with Assumed Pathlength
95.31%
within 5% no correction required

CTS 1

Date	Time	File	Temperature (C	Pressure	Ethylene
2/12/25	17:51:48	24-4204_000007.LAB	191.0	1.002	98.15
2/12/25	17:52:51	24-4204_000008.LAB	191.0	1.002	97.88
2/12/25	17:53:54	24-4204_000009.LAB	191.0	1.002	98.07

CTS 2

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	7:41:32	24-4204_000785.LAB	190.9	1.020	98.26
2/13/25	7:42:35	24-4204_000786.LAB	191.0	1.020	98.36
2/13/25	7:43:38	24-4204_000787.LAB	191.0	1.020	98.31

CTS 3

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	10:32:36	24-4204_000947.LAB	191.0	1.025	97.92
2/13/25	10:33:38	24-4204_000948.LAB	191.0	1.025	98.10
2/13/25	10:34:41	24-4204_000949.LAB	191.0	1.025	98.40

CTS 4

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	13:25:54	24-4204_001111.LAB	191.0	1.026	98.21
2/13/25	13:26:57	24-4204_001112.LAB	191.0	1.026	98.22
2/13/25	13:28:00	24-4204_001113.LAB	191.1	1.025	98.14

CTS 5

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 6

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 7

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 8

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 9

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 10

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 11

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 12

Date	Time	File	Temperature (C	Pressure	Ethylene

Location	Graphic Packaging
Source	NCG Incinerator
Project No.	AST-2024-4204
Date	2/5/2025

Spike Cylinder ID	CC774584	Component
Spike Gas concentration	96.8	Methanol
Tracer Cylinder ID	CC774584	Component
Tracer Gas concentration	10.1	SF6
Instrument ID Outlet	MKS 20 (Serial #111455302)	

Direct Spike Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/12/25	18:06:28	24-4204_000021.LAB	191.0	1.030	98.62	12.006
02/12/25	18:07:30	24-4204_000022.LAB	190.9	1.030	99.29	12.015
02/12/25	18:08:33	24-4204_000023.LAB	190.9	1.030	99.83	12.021
02/12/25	18:09:36	24-4204_000024.LAB	190.9	1.030	100.33	12.027
02/12/25	18:10:39	24-4204_000025.LAB	191.0	1.031	100.46	12.029
02/12/25	18:11:42	24-4204_000026.LAB	190.9	1.031	100.82	12.037
02/12/25	18:12:45	24-4204_000027.LAB	191.0	1.031	101.13	12.049
				Average	**100.07**	**12.026**

Native Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	9:10:34	24-4204_000870.LAB	191.0	1.037	0.44	0.010
02/13/25	9:11:37	24-4204_000871.LAB	191.0	1.036	0.48	0.010
02/13/25	9:12:40	24-4204_000872.LAB	191.0	1.036	0.46	0.010
02/13/25	9:13:42	24-4204_000873.LAB	191.0	1.036	0.56	0.010
02/13/25	9:14:45	24-4204_000874.LAB	191.0	1.035	0.53	0.010
02/13/25	9:15:48	24-4204_000875.LAB	191.0	1.036	0.52	0.010
02/13/25	9:16:51	24-4204_000876.LAB	191.0	1.036	0.43	0.010
				Average	**0.49**	**0.010**

Spiked values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	8:42:17	24-4204_000843.LAB	191.0	1.036	5.14	0.757
02/13/25	8:43:20	24-4204_000844.LAB	191.1	1.035	5.25	0.766
02/13/25	8:44:23	24-4204_000845.LAB	191.1	1.036	5.17	0.757
02/13/25	8:45:26	24-4204_000846.LAB	191.0	1.035	5.38	0.764
02/13/25	8:46:28	24-4204_000847.LAB	191.0	1.034	5.72	0.758
02/13/25	8:47:31	24-4204_000848.LAB	191.0	1.036	5.58	0.763
02/13/25	8:48:34	24-4204_000849.LAB	191.0	1.035	5.50	0.751
				Average	**5.39**	**0.759**

Dilution Factor

6.2%

Calculated Spike

6.69

Spike Recovery

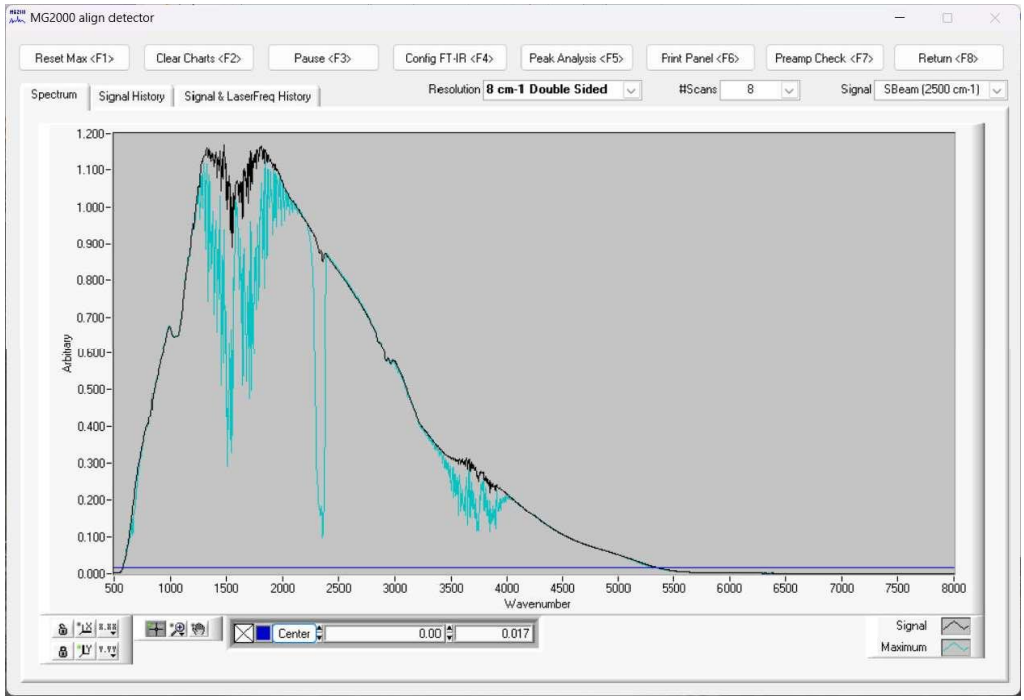
80.55%

Location	Graphic Packaging
Project No.	AST-2024-4204
Instrument	MKS 20 (Serial #111455302)

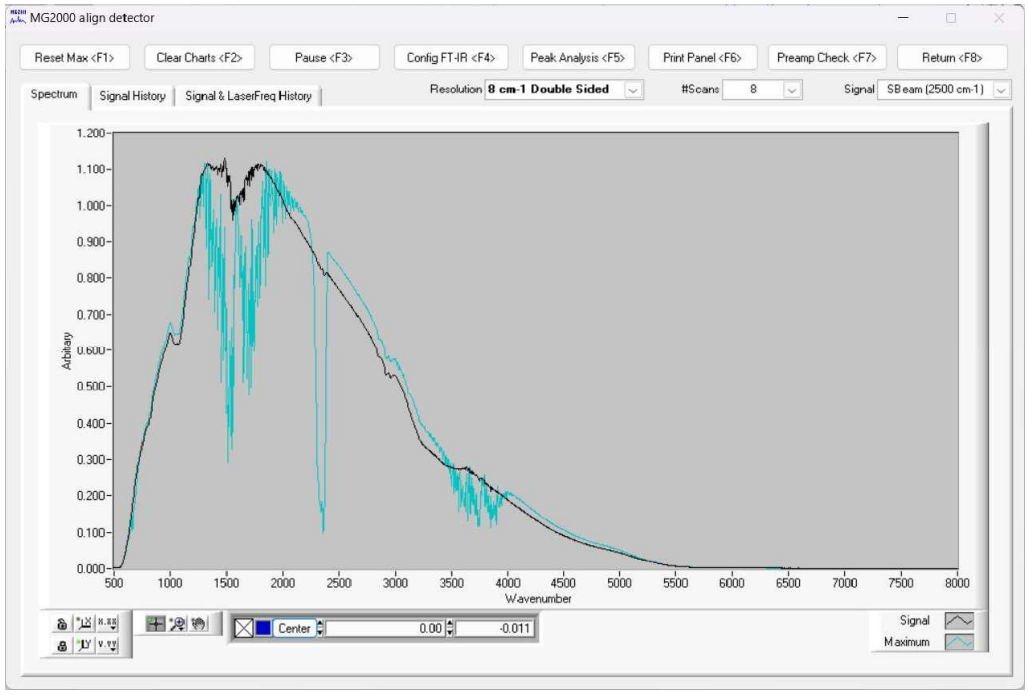
Summary of Spikes

Source	NCG Incinerator
Date	2/5/25
Time	8:42
Analyte	Methanol
Direct	100.07
Native	0.49
Spiked	5.39
Dilution	6.2%
Recovery	81%
Result	PASS

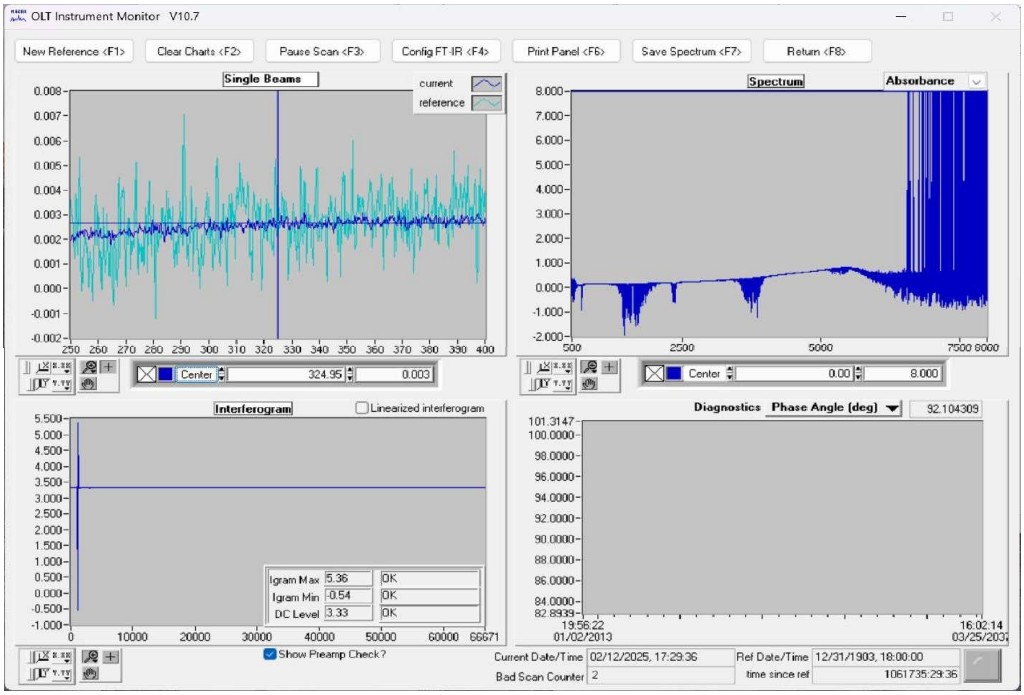
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Pre-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



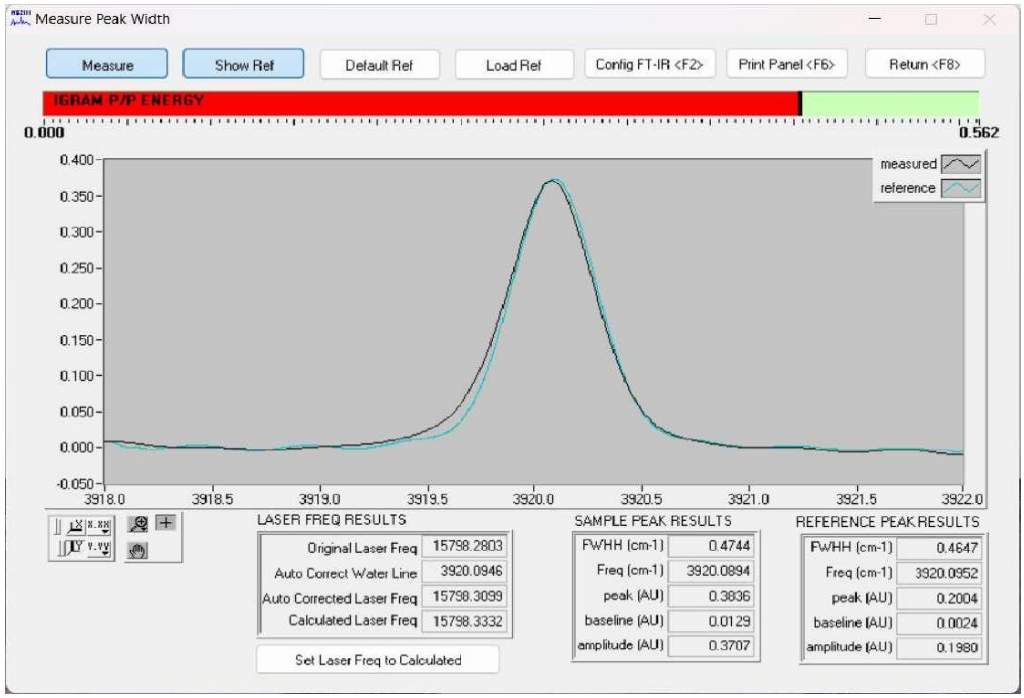
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Post-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/13/2025



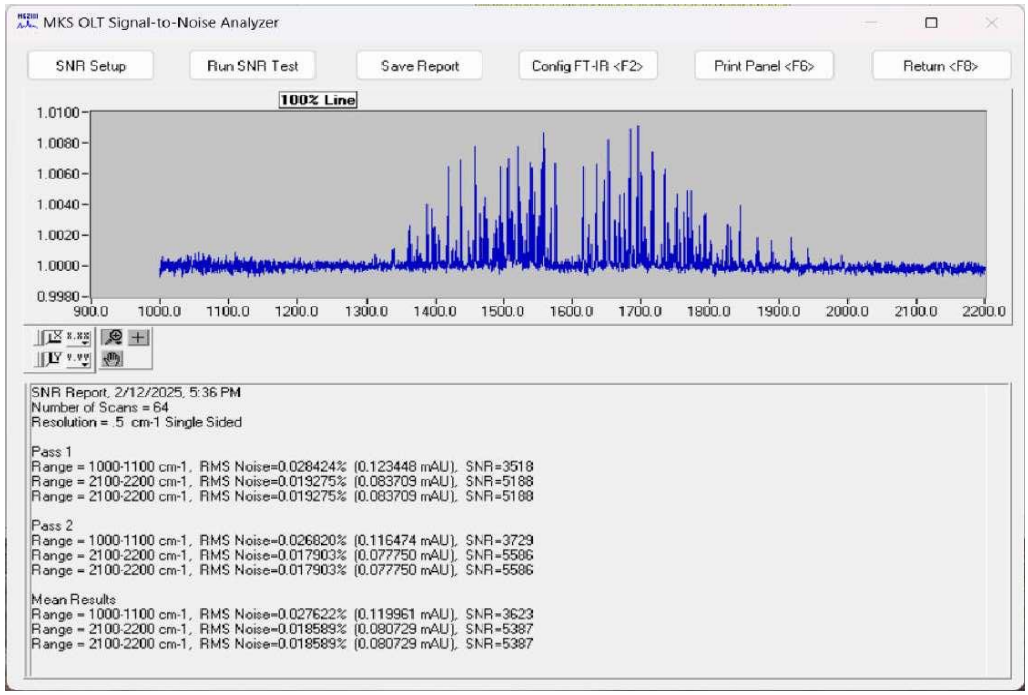
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Detector Linearity
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Peak Analysis
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Signal to Noise Ratio
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Analysis Validation Utility
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025

Analysis Validation Report

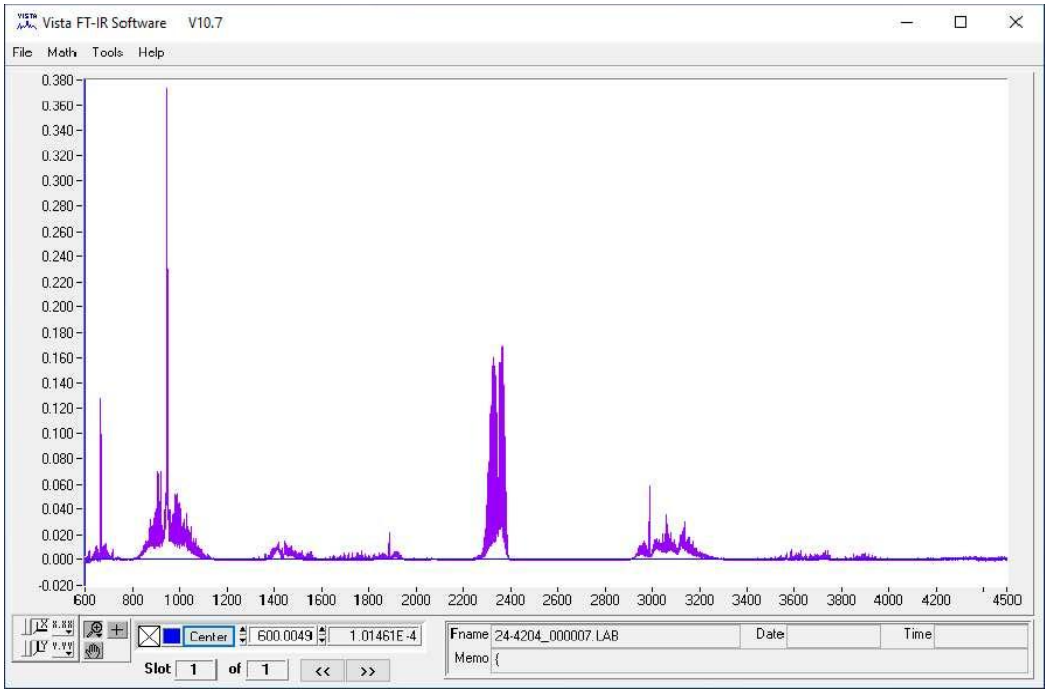
Sample Filename: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_001011.LAB

Filename for noise: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_000945.LAB
Interferences Filenames: C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2C
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #

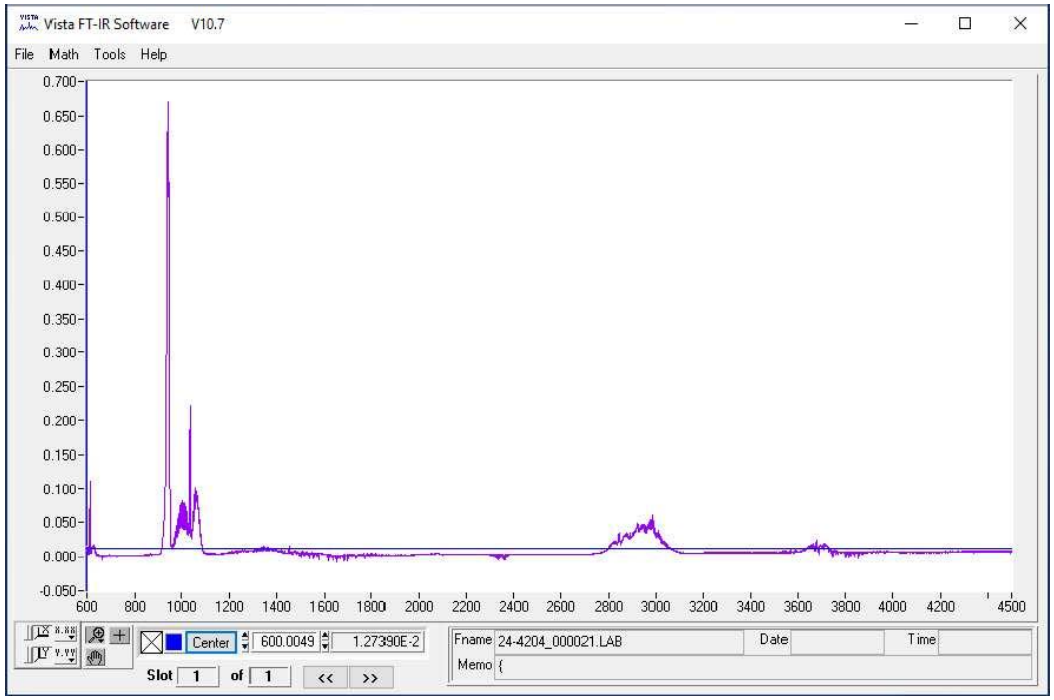
Recipe path: C:\OLT\RECIPES\Coal EGU Testing R3 - Copy DO NOT USE.MGRCP

Gas calibration Name	Conc	MDC3	**MDC2**	MDC1	MAU	FMU*R	OCU
NO (350,3000) 191C	19.47	5.27	**0.17**	0.26	0.36	7.19	7.19
NO2 (150) 191C (1OF2)	1.58	1.46	**0.16**	0.05	0.05	1.52	1.52
NO2 (2000) 191C (2OF2)	1.64	10.16	**0.5**	1.15	1.46	12.94	12.94
N2O (100,200,300) 191C	0.44	0.45	**0.05**	0.05	0.06	0.52	0.52
NH3 (300) 191C (1OF2)	0.07	1.38	**0.04**	0.15	0.25	2.34	2.34
NH3 (3000) 191C (2OF2)	6.47	33.8	**0.58**	1.37	2.59	63.76	63.76
CO (500) 191C (1OF2)	149.62	8.29	**0.1**	0.14	0.31	16.87	16.87
CO% (1) 191C (2OF2)	0.01	0	**0**	0	0	0.01	0.01
H2O% (40) 191C	44.5	0.44	-	0.01	0.02	0.75	0.75
CO2% (40) 191C	1.94	0.16	-	0.01	0.02	0.23	0.23
CH4 (250) 191C (1OF2)	-0.49	2.67	**0.05**	0.49	1.29	7.05	7.05
CH4 (3000) 191C (2OF2)	0.55	18.41	**0.6**	1.36	2.24	30.32	30.32
FORMALDEHYDE (70) 191C	-0.1	0.29	**0.09**	0.24	0.29	0.35	0.35
PROPYLENE (200,1000) 191(	-0.95	4.24	**0.25**	0.55	0.64	4.97	4.97
ETHYLENE (100,3000) 191C	-0.47	1.76	**0.11**	0.21	0.36	3.07	3.07
ACETYLENE (1000) 191C	0.43	4.8	**0.26**	0.83	1	5.78	5.78
PROPANE (100) 191C	0.15	1.01	**0.09**	0.16	0.19	1.2	1.2
ETHANE (500) 191C	-0.27	2.08	**0.16**	0.27	0.3	2.32	2.32
ACETALDEHYDE (1000) 191(	-0.85	1.18	**0.12**	0.42	0.46	1.28	1.28
HCL PPM (100) 191C	0.05	0.32	**0.08**	0.16	0.29	0.59	0.59
HF PPM (10) 191C	0.32	0.95	**0.04**	0.09	0.17	1.7	1.7
HCN (100) 191C	0.28	7.31	**0.13**	0.87	1.49	12.51	12.51
HBR (100) 180C	0.08	1.33	**0.27**	0.73	1.48	2.71	2.71
SO2 (1000) 191C	-1.9	3.46	**0.24**	0.2	0.38	6.66	6.66
SO3 (150) 191C	-749.83	0	-	0.07	0.07	0	0.07
COS (100) 150C	0.42	0.19	**0.01**	0.02	0.02	0.25	0.25
H2SO4 (50) 150C	-0.13	0.2	**0.05**	0.06	0.07	0.22	0.22
SF6 (10) 191C	-0.01	0.02	**0.01**	0.01	0.01	0.02	0.02
MEOH (10) 191C	0.37	0.56	**0.24**	0.15	0.17	0.65	0.65

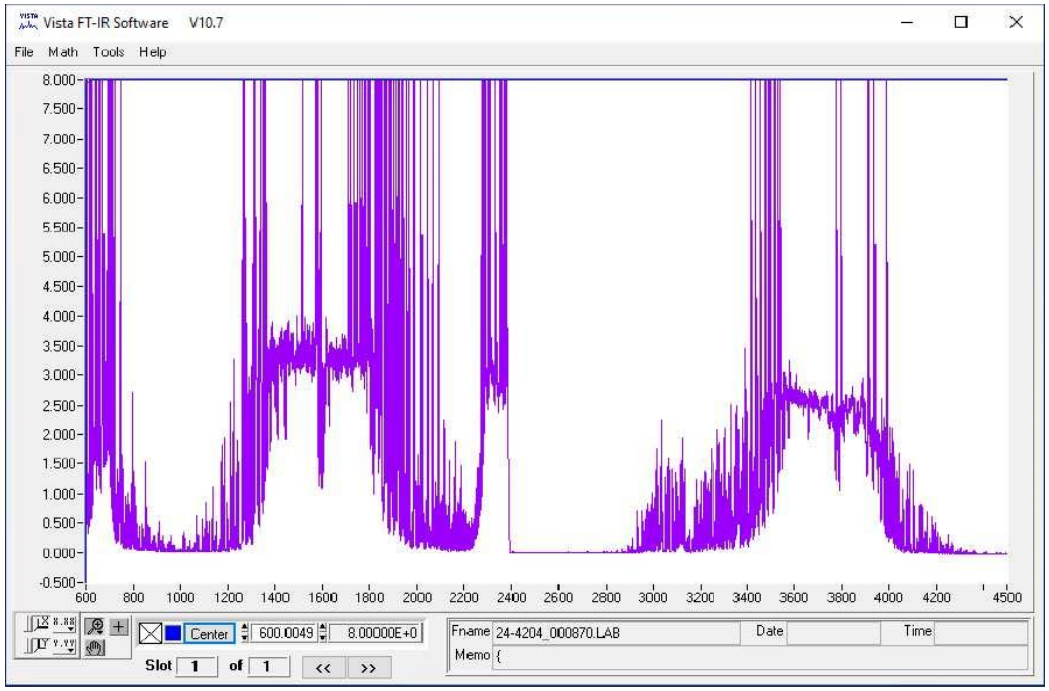
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (CTS)	24-4204_000007.LAB
Date	2/12/2025
Time	5:51:48 PM



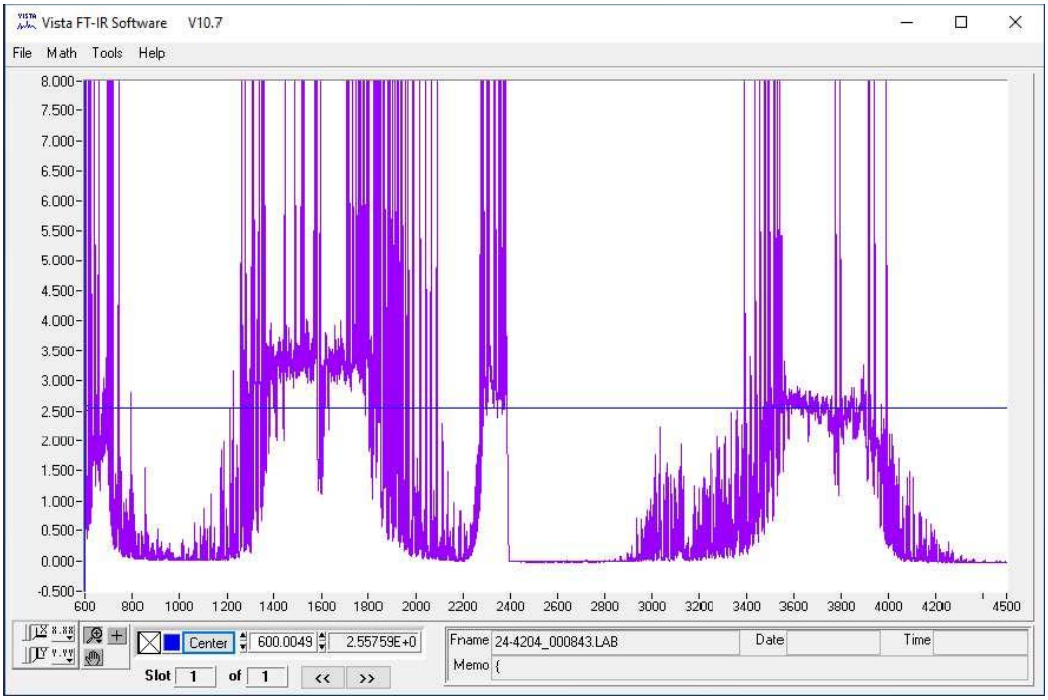
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Analyte Direct)	24-4204_000021.LAB
Date	2/12/2025
Time	6:06:28 PM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Native)	24-4204_000870.LAB
Date	2/13/2025
Time	9:10:34 AM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Spike)	24-4204_000843.LAB
Date	2/13/2025
Time	8:42:17 AM



Certifications & Calibrations

Equipment Detail - Dry Gas Meter

Console ID: MB-210-2447
Meter S/N: 20035533
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	30.17					
Final Barometric Pressure, in. Hg	(Pb_F)	30.20					
Average Barometric Pressure, in. Hg	(Pb)	30.19					
Critifcal Orifice ID	(Y)	29	29	19	19	6	6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	21.0	21.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	738.100	713.100	730.000	705.500	749.350	724.000
Final DGM Volume, ft^3	(Vm_F)	748.955	723.620	736.700	712.200	754.500	729.210
Total DGM Volume, ft^3	(Vm)	10.855	10.520	6.700	6.700	5.150	5.210
Ambient Temperature, °F	(Ta)	64	64	64	64	64	64
Initial DGM Temperature, °F	(Tm_I)	62	62	63	61	62	62
Final DGM Temperature, °F	(Tm_F)	63	63	64	63	63	62
Average DGM Temperature, °F	(Tm)	63	63	64	62	63	62
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.50	3.40	1.40	1.40	0.13	0.13
Standard Meter volume, ft^3	(Vmstd)	11.1629	10.8158	6.8420	6.8617	5.2530	5.3193
Standard Critical Orifice Volume, ft^3	(Vcr)	11.0047	11.0047	6.8537	6.8537	5.2497	5.2497
Meter Correction Factor	(Y)	0.986	1.017	1.002	0.999	0.999	0.987
Tolerance	--	0.013	0.019	0.003	0.000	0.001	0.011
Orifice Calibration Value	(ΔH @)	1.672	1.624	1.712	1.717	1.691	1.693
Tolerance	--	0.013	0.061	0.027	0.032	0.007	0.008
Orifice Cal Check	--	0.85		0.72		0.85	
Meter Correction Factor	**(Y)**	**0.998**					
Orifice Calibration Value	**(ΔH @)**	**1.685**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	99	559	0.2	1
223	683	224	684	-0.1	1
248	708	249	709	-0.1	1
273	733	274	734	-0.1	1
300	760	300	760	0.0	0
400	860	399	859	0.1	1
500	960	498	958	0.2	2
600	1,060	600	1,060	0.0	0
700	1,160	703	1,163	-0.3	3
800	1,260	802	1,262	-0.2	2
900	1,360	903	1,363	-0.2	3
1,000	1,460	1,003	1,463	-0.2	3
1,100	1,560	1,103	1,563	-0.2	3
1,200	1,660	1,203	1,663	-0.2	3

Personnel

Calibration By: EDO
Calibration Date: 2/4/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-211-2613
Meter S/N: MB-211-2613
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.89					
Final Barometric Pressure, in. Hg	(Pb_F)	29.89					
Average Barometric Pressure, in. Hg	(Pb)	29.89					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647s-6	1647s-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	22.0	22.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	59.700	71.250	83.820	91.100	98.000	103.400
Final DGM Volume, ft^3	(Vm_F)	70.545	82.082	90.650	97.904	103.241	108.615
Total DGM Volume, ft^3	(Vm)	10.845	10.832	6.830	6.804	5.241	5.215
Ambient Temperature, °F	(Ta)	55	55	55	55	55	55
Initial DGM Temperature, °F	(Tm_I)	56	56	60	60	67	67
Final DGM Temperature, °F	(Tm_F)	56	56	60	60	67	67
Average DGM Temperature, °F	(Tm)	56	56	60	60	67	67
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	4.10	4.10	1.60	1.60	0.15	0.15
Standard Meter volume, ft^3	(Vmstd)	11.2001	11.1867	6.9568	6.9303	5.2486	5.2226
Standard Critical Orifice Volume, ft^3	(Vcr)	10.9920	10.9920	6.8458	6.8458	5.2437	5.2437
Meter Correction Factor	(Y)	0.981	0.983	0.984	0.988	0.999	1.004
Tolerance	--	0.008	0.007	0.006	0.002	0.009	0.014
Orifice Calibration Value	(ΔH @)	1.971	1.971	1.956	1.956	1.921	1.921
Tolerance	--	0.022	0.022	0.007	0.007	0.029	0.029
Orifice Cal Check	--	1.95		1.56		1.99	
Meter Correction Factor	**(Y)**	**0.990**					
Orifice Calibration Value	**(ΔH @)**	**1.949**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIE
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	66	526	0.4	2
100	560	98	558	0.4	2
223	683	221	681	0.3	2
248	708	246	706	0.3	2
273	733	271	731	0.3	2
300	760	298	758	0.3	2
400	860	395	855	0.6	5
500	960	494	954	0.6	6
600	1,060	595	1,055	0.5	5
700	1,160	696	1,156	0.3	4
800	1,260	795	1,255	0.4	5
900	1,360	895	1,355	0.4	5
1,000	1,460	994	1,454	0.4	6
1,100	1,560	1,094	1,554	0.4	6
1,200	1,660	1,193	1,653	0.4	7

Personnel

Calibration By: David Larru
Calibration Date: 1/3/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-214-2990
Meter S/N: 18392990
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.66					
Final Barometric Pressure, in. Hg	(Pb_F)	29.66					
Average Barometric Pressure, in. Hg	(Pb)	29.66					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647-6	1647-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	16.0	16.0	20.0	20.0	24.0	23.0
Initial DGM Volume, ft^3	(Vm_I)	733.400	721.100	745.400	752.400	759.200	764.600
Final DGM Volume, ft^3	(Vm_F)	744.442	732.054	752.170	759.180	764.418	769.813
Total DGM Volume, ft^3	(Vm)	11.042	10.954	6.770	6.780	5.218	5.213
Ambient Temperature, °F	(Ta)	67	67	67	67	67	67
Initial DGM Temperature, °F	(Tm_I)	73	73	73	73	73	73
Final DGM Temperature, °F	(Tm_F)	73	73	73	73	73	73
Average DGM Temperature, °F	(Tm)	73	73	73	73	73	73
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.80	3.80	1.50	1.50	0.14	0.14
Standard Meter volume, ft^3	(Vmstd)	10.9475	10.8603	6.6741	6.6840	5.1268	5.1219
Standard Critical Orifice Volume, ft^3	(Vcr)	10.7824	10.7824	6.7153	6.7153	5.1437	5.1437
Meter Correction Factor	(Y)	0.985	0.993	1.006	1.005	1.003	1.004
Tolerance	--	0.014	0.007	0.007	0.005	0.004	0.005
Orifice Calibration Value	(ΔH @)	1.823	1.823	1.845	1.845	1.828	1.828
Tolerance	--	0.009	0.009	0.013	0.013	0.004	0.004
Orifice Cal Check	--	1.65		1.67		1.51	
Meter Correction Factor	**(Y)**	**0.999**					
Orifice Calibration Value	**(ΔH @)**	**1.832**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	100	560	0.0	0
223	683	228	688	-0.7	5
248	708	253	713	-0.7	5
273	733	278	738	-0.7	5
300	760	306	766	-0.8	6
400	860	407	867	-0.8	7
500	960	508	968	-0.8	8
600	1,060	612	1,072	-1.1	12
700	1,160	716	1,176	-1.4	16
800	1,260	817	1,277	-1.3	17
900	1,360	920	1,380	-1.5	20
1,000	1,460	1,021	1,481	-1.4	21
1,100	1,560	1,122	1,582	-1.4	22
1,200	1,660	1,224	1,684	-1.4	24

Personnel

Calibration By: David Larru
Calibration Date: 2/7/2025
Reviewed By: Timothy Branham

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE

Blend Type:	GAS	MOL	
Pressure:	2000	psia	**Sales Order: 1354918**
Volume:	138.9	cf	
Dew Point:	0 C		**RBTGS Part No.:** 304930

Cylinder Size: I-150
Valve Outlet: CGA 350
Cylinder No.: **CC774584**
Bar Code No.: 107623038

Lot No.: NV2411081526
Analysis Date: November 13, 2024
Date Issued: November 15, 2024
Expiration Date: November 15, 2028

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Sulfur Hexafluoride	2551-62-4	10.0	ppm	10.1	59.2	10.1	ppm	5%	M
Methanol	67-56-1	100.0	ppm	96.8	110.7	96.8	ppm	2%	B
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical Oxygen Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0096121	**Certification Date:**	08/20/2024
Product ID Number:	124300	**Expiration Date:**	08/18/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0096121.20240814-0	**Lot Number:**	EB0096121.20240814
Customer PO. NO.:		**Tracking Number:**	095703714
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.00 %**	±0.08 %	NDIR	08/20/2024
Oxygen	**10.00 %**	±0.03 %	MPA	08/19/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726207	CC726207.20230109	07/09/2031	GMIS	N2	O2	12.01 %	0.122	SRM 2659a
CC749195	CC749195.20230228	07/09/2031	GMIS	N2	O2	20.01 %	0.112	SRM 2659a
EB0006119	EB0006119.20210412	01/03/2032	GMIS	N2	CO2	19.58 %	0.375	C2190301.03
EB0016852	EB0016852.20210412	01/03/2032	GMIS	N2	CO2	11.92 %	0.235	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	07/29/2024
CO2	NDIR	Thermo	410i	1162980025	08/13/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC737073	**Certification Date:**	09/17/2024
Product ID Number:	124240	**Expiration Date:**	09/15/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC737073.20240903-0	**Lot Number:**	CC737073.20240903
Customer PO. NO.:		**Tracking Number:**	103890438
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.8 %**	±0.13 %	FTIR	09/17/2024
Oxygen	**19.93 %**	±0.03 %	MPA	09/10/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
CC769424	CC769424.20240512	08/05/2032	GMIS	N2	O2	19.98 %	0.155	SRM 2659a
EB0010822	EB0010822.20230816	07/09/2032	GMIS	N2	CO2	24.84 %	0.292	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/21/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	09/17/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

CERTIFIED GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC768666	**Certification Date:**	06/19/2024
Product ID Number:	124838	**Expiration Date:**	06/17/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC768666.20240618-0	**Lot Number:**	CC768666.20240618
Customer PO. NO.:		**Tracking Number:**	108819146
Customer:		**Previous Certification Dates:**	

This mixture is for laboratory use only, not for drug, household or other use.
This mixture is certified in Mole % to be within ±2% of the actual number reported with a confidence of 95%.
This mixture was manufactured by scale; weights traceable to N.I.S.T. Certificate #822/266926-02.
Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Ethylene	**103 PPM**	± 2% NIST	FTIR
Nitrogen	Balance		

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC734580	CC734580	07/26/2024	PS	N2	C2H4	1005 PPM	2	4034426

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
C2H4	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-G, Revised on 2017-07-02

Appendix E

LK01

#1 Lime Kiln Process Data

	Start Time:		2/13/25 16:25	2/13/25 15:05	2/13/25 13:20	
	End Time:		2/13/25 17:46	2/13/25 16:10	2/13/25 14:26	
Run #			3	2	1	Avgs
Tag						
FIC0262G.pv	Mud Flow	gpm	161.25	160.4	160.0	160.5
FYC0262G.pv	Lime Production	tons/day	160.06	160.1	160.0	160.0
FIC0275G.pv	Natural Gas Flow	cfm	832.71	835.0	822.8	830.2
AT0267G.pv	Kiln O2	%	1.96	2.0	2.0	2.0
AM0273BG.pv	Hot End Temp (oil)	°F	1313.76	1326.4	1247.3	1295.8
TT0273G.pv	Hot End Temp (gas)	°F	NA	NA	NA	
TT0269G.pv	Wet End Temp	°F	439.63	438.1	452.9	443.5
FT0296G.pv	Scrubber Recirc Flow	gpm	404.15	403.7	403.6	403.8
DPT0297G.pv	Scrubber delta P	in. H2O	17.16	17.2	17.3	17.2
DIC0260G.pv	Precoat Filter Solids	%	31.86	32.0	32.0	31.9
	Scrubber solids	%	NA	NA	NA	
CAUS-#1kiln.CARE	Carbonate Test	% CaCO3	4.40	4.4	13.0	7.3
H_LK01_TRS.avg	TRS/O2	ppm	8.27	8.2	5.9	7.5
I_LK01_o2.avg.filt	Excess stack O2	%	6.72	6.8	6.8	6.7

LK02

#2 Lime Kiln Process Data

		Start Time:	2/13/2025 11:15	2/13/2025 9:55	2/13/2025 8:15	
		End Time:	2/13/2025 12:20	2/13/2025 11:00	2/13/2025 9:20	
Run #		Units	3	2	1	AVG
Tag						
FIC0035G.pv	Mud Flow	gpm	287.16	287.09	287.02	287.2
FYC0035G.pv	Lime Production	tons/day	310.00	309.98	309.82	310.0
FIC0057G.pv	Natural Gas Flow	cfm	1241.62	1265.10	1175.79	1241.6
FIC3102G.pv	Fuel Oil Flow	gpm	0.00	0.00	0.00	0.0
AT0045G.pv	Excess O2	%	4.00	3.91	5.00	4.0
AM0047BG.pv	Hot End Temp (oil)	°F	1357.95	1226.80	1279.54	1357.9
TT0047G.pv	Hot End Temp (gas)	°F	1357.49	1228.54	1280.14	1357.5
TT0044G.pv	Wet End Temperature	°F	620.79	614.41	599.04	620.8
FT0066G.pv	Scrubber Recirc Flow	gpm	742.60	744.03	743.38	742.6
DPT0065G.pv	Scrubber delta P	in. H2O	32.29	32.57	32.73	32.3
DIC0036G.pv	Precoat Filter Solids	%	34.01	34.01	34.00	34.0
CAUS-#2kiln.CARB	Carbonate Test	% CaCO3	2.20	13.00	12.31	2.2
h_lk02_trs.avg	TRS/O2	ppm	0.30	0.40	0.40	0.3
i_lk02_o2.avg.filt	O2	%	8.12	8.13	9.13	8.1

RB01

#1 Recovery Boiler Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40 AM	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46 AM	
	Run	3	2	1	
Tag					Averages
FT0170E.pv	Steam load (kpph)	354.13	354.04	356.26	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.68	212.46	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.93	201.70	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.77	119.98	120.7
AIC0066E.pv	Excess O2	2.99	3.03	2.92	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.19	0.20	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.78	79.71	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.08	83.90	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.78	211.15	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	
TIC786E.PV	Bl. Liq. Nozzle temp. (F)	[-11059] No Good Data For Calculation	] No Good Data For Cal	] No Good Data For Cal	#DIV/0!
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.69	49.70	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
H_RB1N_TRS.AVG	TRS/O2 -- North (ppm)	1.18	1.46	1.44	1.4
H_RB1S_TRS.AVG	TRS/O2 -- South (ppm)	0.62	0.63	0.07	0.4
H_RB1N_SO2.AVG	SO2/O2 -- North (ppm)	0.05	19.56	3.11	7.6
H_RB1S_SO2.AVG	SO2/O2 -- South (ppm)	-0.17	24.73	4.34	9.6
I_RB1N_O2.FILT	O2 -- North %	5.88	5.92	5.76	5.9
I_RB1S_O2.FILT	O2 -- South %	7.20	7.27	6.75	7.1
AT0421BE.PV	Opacity -- North %	4.85	5.31	4.52	4.9
AT0421CE.PV	Opacity -- South %	4.01	4.21	4.10	4.1

RB02

#2 Recovery Boiler West Stack -- Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.9	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.1	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.7	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.1	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.2	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.2	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.6	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.5	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.2	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.4	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.2	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.0	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.0	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.5	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.1	90.3
H_RB2E_TRS.AVG	TRS/O2 -- East (ppm)	0.66	0.76	0.6	0.7
H_RB2W_TRS.AVG	TRS/O2 -- West (ppm)	0.32	0.26	#VALUE!	#VALUE!
H_RB2E_SO2.AVG	SO2/O2 -- East (ppm)	0.00	0.10	0.2	0.1
H_RB2W_SO2.AVG	SO2/O2 -- West (ppm)	0.00	0.00	0.1	0.0
I_RB2E_O2.FILT	O2 -- East %	4.25	3.90	4.4	4.2
I_RB2W_O2.FILT	O2 -- West %	4.98	4.79	5.3	5.0
AT2083E.PV	Opacity -- East %	9.71	9.61	10.0	9.8
AT2082E.PV	Opacity -- West %	10.90	10.75	11.6	11.1

SM01

#1 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46	
	Run #	3	2	1	**Averages**
Tag					
FT0170E.pv	Steam load (kpph)	354.13	354.0	356.3	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.7	212.5	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.9	201.7	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.8	120.0	120.7
AIC0066E.pv	Excess O2	2.99	3.0	2.9	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.2	0.2	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.8	79.7	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.1	83.9	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.8	211.2	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	Tag not found
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.7	49.7	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.0	0.0	0.0
Ft1024e.pv	Weak Wash flow to fan (gpm)	47.99	48.14	48.32	48.1
FT1030E.pv	Weak Wash flow to scrubber (gpm)	87.37	87.17	87.88	87.5
TIC786E.PV	Precip. Ash Tank Temp. (F)	59] No Good Data For Calcu	o Good Data For C	No Good Data For C	#DIV/0!
IT3025e.pv	Scrubber Fan Amps	83.46	83.5	81.8	82.9

SM02

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.91	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.12	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.72	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.08	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.21	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.19	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.60	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.49	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.22	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.35	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.20	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.01	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.54	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.09	90.3
TT2268E.PV	Precip. Ash Tank Temp. (F)	228.03	228.01	227.36	227.8
IT3028e.pv	Scrubber fan amps	43.19	43.19548758	43.70370315	43.4

NCG01

GRAPHIC PACKAGING INTERNATIONAL - TEXARKANA MILL
INCINERATOR EXHAUST STACK (NCG01)
PROCESS DATA

	Start Time:	2/13/25 11:57	2/13/25 10:42	2/13/25 9:10	
	End Time:	2/13/25 12:57	2/13/25 11:42	2/13/25 10:10	
					Avg
PI Tag No.	**Parameter Description**	**Run 3**	**Run 2**	**Run 1**	
TIC3076H.PV	Incinerator chamber temperature, F	1448.68	1449.0	1446.9	1448.20
AIC3112H.PV	Incinerator SO2 scrubber pH	9.82	9.8	9.6	9.74
FT3104H.PV	Incinerator SO2 scrubber recirc flow, gpm	405.99	405.9	412.0	407.97
	Hardwood blow rate	48	48	48	48.00
	Pine blow rate	67	67	67	67.00
FIC3387C.pv	A-line brown stock flow, gpm	2898.79	2900.7	2697.0	2832.17
FQC3377C.pv	B-line brown stock flow, gpm	4101.42	4036.0	4014.9	4050.79

Notes:
This testing for methanol at the incinerator stack was conducted due to the 40 CFR 63 requirement to retest certain MACT I sources.
The port tested was on west side of stack, approximately 20 feet above the 10th floor of #2 Power Boiler.
Pine and hardwood digesters were blown during the testing.
Several periods of digester double blows occurred during the testing.

Appendix F

Data Log

DAQ #	1.00	2.00
DasyLab #	0.00	1.00
Time	O2	CO2
2/13/2025 7:30	0.03	0.00
2/13/2025 7:31	0.00	0.00
2/13/2025 7:32	0.00	0.00
2/13/2025 7:33	0.00	0.00
2/13/2025 7:34	0.00	0.00
2/13/2025 7:35	7.79	7.03
2/13/2025 7:36	19.92	19.84
2/13/2025 7:37	16.14	16.33
2/13/2025 7:38	10.10	10.04
2/13/2025 7:39	6.34	6.47
2/13/2025 7:40	0.00	0.02
2/13/2025 7:41	0.00	0.01
2/13/2025 7:42	0.00	0.01
2/13/2025 7:43	0.00	0.00
2/13/2025 7:44	0.00	0.00
2/13/2025 7:45	0.00	0.01
2/13/2025 7:46	0.00	0.02
2/13/2025 7:47	2.36	0.04
2/13/2025 7:48	20.59	0.06
2/13/2025 7:49	20.77	0.06
2/13/2025 7:50	6.39	0.06
2/13/2025 7:51	0.36	0.01
2/13/2025 7:52	0.26	0.00
2/13/2025 7:53	5.48	4.91
2/13/2025 7:54	10.10	9.76
2/13/2025 7:55	10.10	9.79
2/13/2025 7:56	10.10	9.81
2/13/2025 7:57	12.21	7.97
2/13/2025 7:58	20.78	0.17
2/13/2025 7:59	20.85	0.08
2/13/2025 8:00	20.86	0.07
2/13/2025 8:01	20.87	0.06
2/13/2025 8:02	20.87	0.06
2/13/2025 8:03	20.87	0.05
2/13/2025 8:04	20.88	0.05
2/13/2025 8:05	20.88	0.05
2/13/2025 8:06	20.88	0.05
2/13/2025 8:07	20.09	0.44
2/13/2025 8:08	12.18	4.21
2/13/2025 8:09	12.22	4.17
2/13/2025 8:10	11.85	4.24
2/13/2025 8:11	11.14	4.55
2/13/2025 8:12	12.16	4.06
2/13/2025 8:13	12.03	3.97
2/13/2025 8:14	12.56	3.94
2/13/2025 8:15	12.66	3.69
2/13/2025 8:16	12.26	3.79
2/13/2025 8:17	11.42	4.21

Data Log

Time	O2	CO2
2/13/2025 8:18	10.55	4.51
2/13/2025 8:19	10.93	4.39
2/13/2025 8:20	12.03	3.71
2/13/2025 8:21	11.74	3.76
2/13/2025 8:22	12.08	3.69
2/13/2025 8:23	12.74	3.29
2/13/2025 8:24	12.54	3.32
2/13/2025 8:25	12.26	3.46
2/13/2025 8:26	11.69	3.75
2/13/2025 8:27	11.75	3.80
2/13/2025 8:28	10.96	4.10
2/13/2025 8:29	11.05	4.13
2/13/2025 8:30	11.35	4.42
2/13/2025 8:31	11.26	3.12
2/13/2025 8:32	10.39	3.27
2/13/2025 8:33	9.55	3.76
2/13/2025 8:34	10.03	3.58
2/13/2025 8:35	10.35	3.35
2/13/2025 8:36	10.20	3.38
2/13/2025 8:37	9.75	3.69
2/13/2025 8:38	9.98	3.69
2/13/2025 8:39	9.60	3.63
2/13/2025 8:40	9.61	3.74
2/13/2025 8:41	9.76	3.66
2/13/2025 8:42	10.02	3.56
2/13/2025 8:43	10.22	3.43
2/13/2025 8:44	10.06	3.31
2/13/2025 8:45	10.29	3.33
2/13/2025 8:46	10.14	3.24
2/13/2025 8:47	9.99	3.31
2/13/2025 8:48	9.83	3.38
2/13/2025 8:49	10.33	3.61
2/13/2025 8:50	11.03	3.86
2/13/2025 8:51	11.51	3.86
2/13/2025 8:52	11.72	3.74
2/13/2025 8:53	11.51	3.87
2/13/2025 8:54	11.71	3.81
2/13/2025 8:55	11.61	3.85
2/13/2025 8:56	11.79	3.89
2/13/2025 8:57	11.57	3.90
2/13/2025 8:58	11.66	3.99
2/13/2025 8:59	12.02	4.04
2/13/2025 9:00	12.52	3.89
2/13/2025 9:01	12.95	3.61
2/13/2025 9:02	12.98	3.57
2/13/2025 9:03	13.49	3.13
2/13/2025 9:04	13.06	3.16
2/13/2025 9:05	12.85	3.41
2/13/2025 9:06	12.94	3.42
2/13/2025 9:07	13.33	3.29
2/13/2025 9:08	13.16	3.17

Data Log

Time	O2	CO2
2/13/2025 9:09	13.22	3.16
2/13/2025 9:10	13.46	2.95
2/13/2025 9:11	13.66	2.75
2/13/2025 9:12	13.34	2.77
2/13/2025 9:13	13.13	2.98
2/13/2025 9:14	13.70	2.72
2/13/2025 9:15	13.11	2.92
2/13/2025 9:16	13.41	3.01
2/13/2025 9:17	13.39	2.88
2/13/2025 9:18	13.33	2.91
2/13/2025 9:19	12.86	3.11
2/13/2025 9:20	13.58	2.83
2/13/2025 9:21	13.71	2.67
2/13/2025 9:22	12.94	3.14
2/13/2025 9:23	13.04	3.23
2/13/2025 9:24	13.54	2.92
2/13/2025 9:25	13.17	2.91
2/13/2025 9:26	13.11	3.07
2/13/2025 9:27	13.40	2.93
2/13/2025 9:28	13.23	2.87
2/13/2025 9:29	13.28	2.97
2/13/2025 9:30	12.74	3.15
2/13/2025 9:31	13.00	3.24
2/13/2025 9:32	13.55	2.90
2/13/2025 9:33	13.89	2.64
2/13/2025 9:34	13.33	2.94
2/13/2025 9:35	13.43	3.07
2/13/2025 9:36	13.43	3.05
2/13/2025 9:37	13.65	3.07
2/13/2025 9:38	13.28	3.13
2/13/2025 9:39	12.98	3.54
2/13/2025 9:40	13.29	3.31
2/13/2025 9:41	13.01	3.64
2/13/2025 9:42	13.10	3.53
2/13/2025 9:43	12.76	3.54
2/13/2025 9:44	13.11	3.51
2/13/2025 9:45	12.67	3.43
2/13/2025 9:46	12.19	3.68
2/13/2025 9:47	12.61	3.60
2/13/2025 9:48	13.24	3.12
2/13/2025 9:49	13.73	2.71
2/13/2025 9:50	13.53	2.80
2/13/2025 9:51	12.98	3.19
2/13/2025 9:52	12.80	3.23
2/13/2025 9:53	13.65	2.74
2/13/2025 9:54	13.86	2.61
2/13/2025 9:55	13.79	2.60
2/13/2025 9:56	13.81	2.67
2/13/2025 9:57	13.77	2.73
2/13/2025 9:58	13.85	2.86
2/13/2025 9:59	13.48	3.05

Data Log

Time	O2	CO2
2/13/2025 10:00	12.71	3.50
2/13/2025 10:01	13.43	3.36
2/13/2025 10:02	13.28	3.26
2/13/2025 10:03	12.38	3.78
2/13/2025 10:04	12.85	3.65
2/13/2025 10:05	13.83	2.98
2/13/2025 10:06	13.98	2.74
2/13/2025 10:07	13.30	2.97
2/13/2025 10:08	12.74	3.27
2/13/2025 10:09	12.11	3.76
2/13/2025 10:10	12.28	3.74
2/13/2025 10:11	13.04	3.36
2/13/2025 10:12	13.47	3.04
2/13/2025 10:13	13.10	3.09
2/13/2025 10:14	13.29	3.22
2/13/2025 10:15	4.55	1.05
2/13/2025 10:16	0.21	0.04
2/13/2025 10:17	0.31	0.14
2/13/2025 10:18	9.35	8.93
2/13/2025 10:19	10.09	9.84
2/13/2025 10:20	10.10	9.84
2/13/2025 10:21	7.54	2.79
2/13/2025 10:22	0.02	0.02
2/13/2025 10:23	0.00	0.02
2/13/2025 10:24	0.00	0.02
2/13/2025 10:25	0.00	0.02
2/13/2025 10:26	0.00	0.02
2/13/2025 10:27	0.00	0.02
2/13/2025 10:28	0.00	0.02
2/13/2025 10:29	0.00	0.02
2/13/2025 10:30	0.05	0.28
2/13/2025 10:31	0.01	0.16
2/13/2025 10:32	0.00	0.03
2/13/2025 10:33	0.00	0.02
2/13/2025 10:34	0.00	0.02
2/13/2025 10:35	0.00	0.02
2/13/2025 10:36	3.68	0.84
2/13/2025 10:37	13.44	3.26
2/13/2025 10:38	13.62	2.92
2/13/2025 10:39	12.79	3.36
2/13/2025 10:40	13.76	2.89
2/13/2025 10:41	13.23	2.98
2/13/2025 10:42	12.69	3.47
2/13/2025 10:43	13.78	2.68
2/13/2025 10:44	13.66	2.62
2/13/2025 10:45	13.75	2.57
2/13/2025 10:46	13.10	3.07
2/13/2025 10:47	13.52	2.74
2/13/2025 10:48	13.38	2.78
2/13/2025 10:49	13.02	3.03
2/13/2025 10:50	12.91	3.28

Data Log

Time	O2	CO2
2/13/2025 10:51	13.26	3.25
2/13/2025 10:52	13.68	3.02
2/13/2025 10:53	13.83	2.85
2/13/2025 10:54	13.60	2.88
2/13/2025 10:55	13.23	3.33
2/13/2025 10:56	13.45	3.19
2/13/2025 10:57	13.25	3.16
2/13/2025 10:58	13.22	3.28
2/13/2025 10:59	13.88	3.08
2/13/2025 11:00	13.21	3.20
2/13/2025 11:01	13.20	3.44
2/13/2025 11:02	13.43	3.29
2/13/2025 11:03	12.83	3.41
2/13/2025 11:04	12.73	3.61
2/13/2025 11:05	12.85	3.60
2/13/2025 11:06	13.26	3.37
2/13/2025 11:07	13.69	3.11
2/13/2025 11:08	13.44	3.10
2/13/2025 11:09	13.39	3.21
2/13/2025 11:10	13.04	3.26
2/13/2025 11:11	12.95	3.49
2/13/2025 11:12	12.91	3.34
2/13/2025 11:13	13.32	3.25
2/13/2025 11:14	12.83	3.26
2/13/2025 11:15	13.00	3.40
2/13/2025 11:16	13.42	3.21
2/13/2025 11:17	13.64	3.06
2/13/2025 11:18	13.64	2.93
2/13/2025 11:19	13.56	2.96
2/13/2025 11:20	13.54	3.01
2/13/2025 11:21	13.22	3.11
2/13/2025 11:22	13.45	3.23
2/13/2025 11:23	13.22	3.17
2/13/2025 11:24	13.30	3.28
2/13/2025 11:25	12.88	3.27
2/13/2025 11:26	13.28	3.31
2/13/2025 11:27	13.22	3.15
2/13/2025 11:28	14.05	2.80
2/13/2025 11:29	13.66	2.79
2/13/2025 11:30	13.79	3.02
2/13/2025 11:31	13.38	3.04
2/13/2025 11:32	13.49	3.30
2/13/2025 11:33	13.57	3.06
2/13/2025 11:34	13.08	3.44
2/13/2025 11:35	13.44	3.27
2/13/2025 11:36	13.02	3.37
2/13/2025 11:37	13.56	3.30
2/13/2025 11:38	13.06	3.29
2/13/2025 11:39	12.69	3.60
2/13/2025 11:40	13.41	3.23
2/13/2025 11:41	13.54	3.11

Data Log

Time	O2	CO2
2/13/2025 11:42	13.67	3.01
2/13/2025 11:43	13.60	2.99
2/13/2025 11:44	3.47	1.05
2/13/2025 11:45	0.21	0.02
2/13/2025 11:46	1.56	1.13
2/13/2025 11:47	10.12	9.83
2/13/2025 11:48	10.13	9.84
2/13/2025 11:49	12.20	5.78
2/13/2025 11:50	13.28	2.93
2/13/2025 11:51	13.24	2.92
2/13/2025 11:52	13.22	2.83
2/13/2025 11:53	13.14	2.85
2/13/2025 11:54	13.31	2.91
2/13/2025 11:55	13.04	2.98
2/13/2025 11:56	13.15	3.19
2/13/2025 11:57	13.24	2.94
2/13/2025 11:58	12.96	3.17
2/13/2025 11:59	13.51	2.85
2/13/2025 12:00	13.07	3.00
2/13/2025 12:01	13.43	3.13
2/13/2025 12:02	13.15	3.06
2/13/2025 12:03	13.55	3.05
2/13/2025 12:04	13.64	2.82
2/13/2025 12:05	13.53	3.01
2/13/2025 12:06	12.69	3.36
2/13/2025 12:07	12.85	3.57
2/13/2025 12:08	13.00	3.45
2/13/2025 12:09	12.44	3.56
2/13/2025 12:10	12.67	3.72
2/13/2025 12:11	12.83	3.56
2/13/2025 12:12	13.24	3.26
2/13/2025 12:13	13.12	3.08
2/13/2025 12:14	13.17	3.10
2/13/2025 12:15	13.37	2.92
2/13/2025 12:16	13.30	2.90
2/13/2025 12:17	13.01	3.07
2/13/2025 12:18	12.88	3.21
2/13/2025 12:19	13.43	3.04
2/13/2025 12:20	13.60	2.73
2/13/2025 12:21	13.35	3.03
2/13/2025 12:22	13.23	3.04
2/13/2025 12:23	13.02	3.33
2/13/2025 12:24	13.43	3.03
2/13/2025 12:25	12.54	3.45
2/13/2025 12:26	12.79	3.63
2/13/2025 12:27	12.54	3.44
2/13/2025 12:28	12.82	3.53
2/13/2025 12:29	13.21	3.10
2/13/2025 12:30	12.76	3.50
2/13/2025 12:31	13.11	3.21
2/13/2025 12:32	13.04	3.18

Data Log

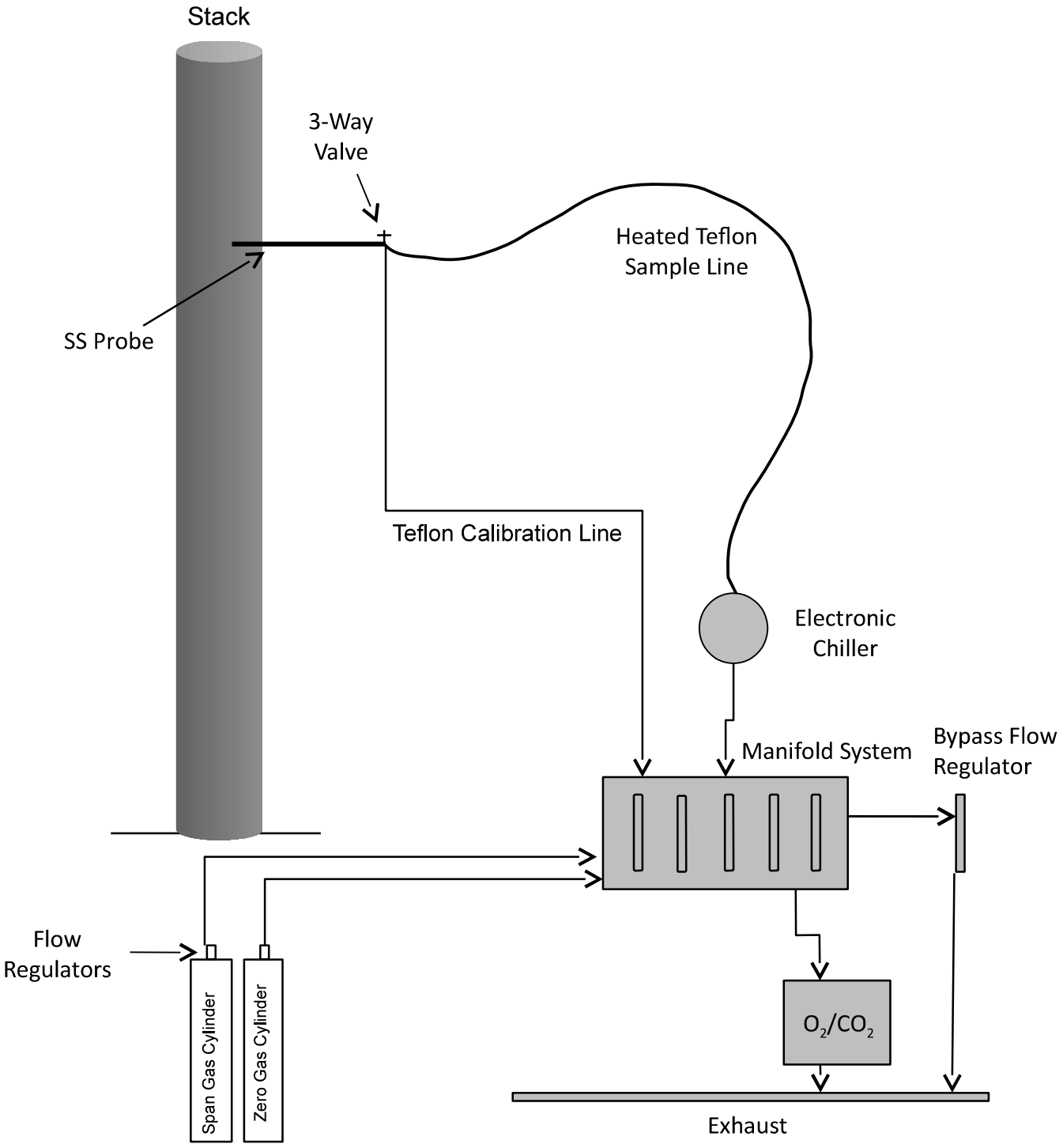
Time	O2	CO2
2/13/2025 12:33	13.14	3.10
2/13/2025 12:34	12.97	3.04
2/13/2025 12:35	13.14	3.05
2/13/2025 12:36	13.33	2.95
2/13/2025 12:37	13.49	2.83
2/13/2025 12:38	13.59	2.79
2/13/2025 12:39	13.45	2.80
2/13/2025 12:40	13.72	2.88
2/13/2025 12:41	13.64	2.86
2/13/2025 12:42	13.58	2.98
2/13/2025 12:43	13.07	3.26
2/13/2025 12:44	13.05	3.59
2/13/2025 12:45	12.84	3.48
2/13/2025 12:46	12.54	3.60
2/13/2025 12:47	13.55	3.18
2/13/2025 12:48	12.87	3.29
2/13/2025 12:49	13.38	3.18
2/13/2025 12:50	13.09	3.09
2/13/2025 12:51	13.50	2.99
2/13/2025 12:52	13.36	2.87
2/13/2025 12:53	12.84	3.09
2/13/2025 12:54	13.22	3.10
2/13/2025 12:55	13.38	2.89
2/13/2025 12:56	13.18	2.95
2/13/2025 12:57	13.44	3.04
2/13/2025 12:58	13.53	3.03
2/13/2025 12:59	13.52	3.05
2/13/2025 13:00	4.47	1.66
2/13/2025 13:01	0.23	0.03
2/13/2025 13:02	1.76	1.36
2/13/2025 13:03	10.12	9.80
2/13/2025 13:04	10.12	9.81
2/13/2025 13:05	11.99	5.97
2/13/2025 13:06	10.57	4.46
2/13/2025 13:07	10.41	4.66
2/13/2025 13:08	10.80	4.42
2/13/2025 13:09	11.56	4.06
2/13/2025 13:10	11.63	3.84
2/13/2025 13:11	9.24	3.35
2/13/2025 13:12	0.05	0.02
2/13/2025 13:13	0.02	0.00
2/13/2025 13:14	0.02	0.00
2/13/2025 13:15	0.01	0.00
2/13/2025 13:16	0.01	0.00
2/13/2025 13:17	0.00	0.00
2/13/2025 13:18	0.00	0.00
2/13/2025 13:19	0.00	0.00
2/13/2025 13:20	0.00	0.00
2/13/2025 13:21	0.00	0.00
2/13/2025 13:22	0.00	0.00
2/13/2025 13:23	0.02	0.28

Data Log

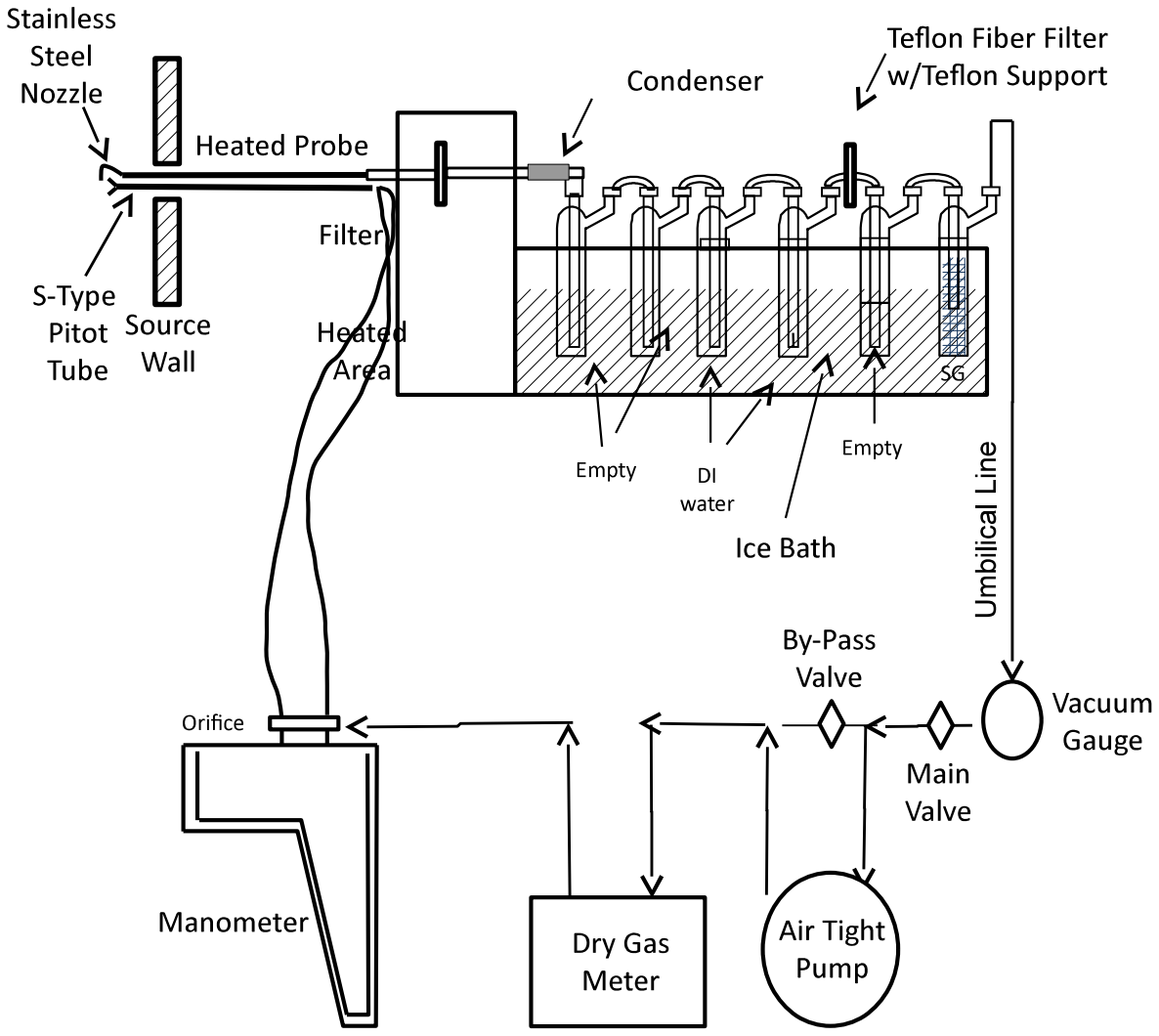
Time	O2	CO2
2/13/2025 13:24	0.02	0.11
2/13/2025 13:25	0.00	0.01
2/13/2025 13:26	0.00	0.00
2/13/2025 13:27	0.00	0.00
2/13/2025 13:28	0.00	0.00
2/13/2025 13:29	0.00	0.00
2/13/2025 13:30	0.00	0.00
2/13/2025 13:31	0.00	0.00
2/13/2025 13:32	0.00	0.00
2/13/2025 13:33	0.00	0.00
2/13/2025 13:34	0.00	0.00
2/13/2025 13:35	0.00	0.00
2/13/2025 13:36	0.00	0.00
2/13/2025 13:37	0.00	0.00
2/13/2025 13:38	0.00	0.00
2/13/2025 13:39	0.00	0.00
2/13/2025 13:40	0.00	0.00
2/13/2025 13:41	0.00	0.00
2/13/2025 13:42	0.00	0.00
2/13/2025 13:43	0.00	0.00
2/13/2025 13:44	0.00	0.00
2/13/2025 13:45	0.00	0.00
2/13/2025 13:46	0.00	0.00
2/13/2025 13:47	0.00	0.00

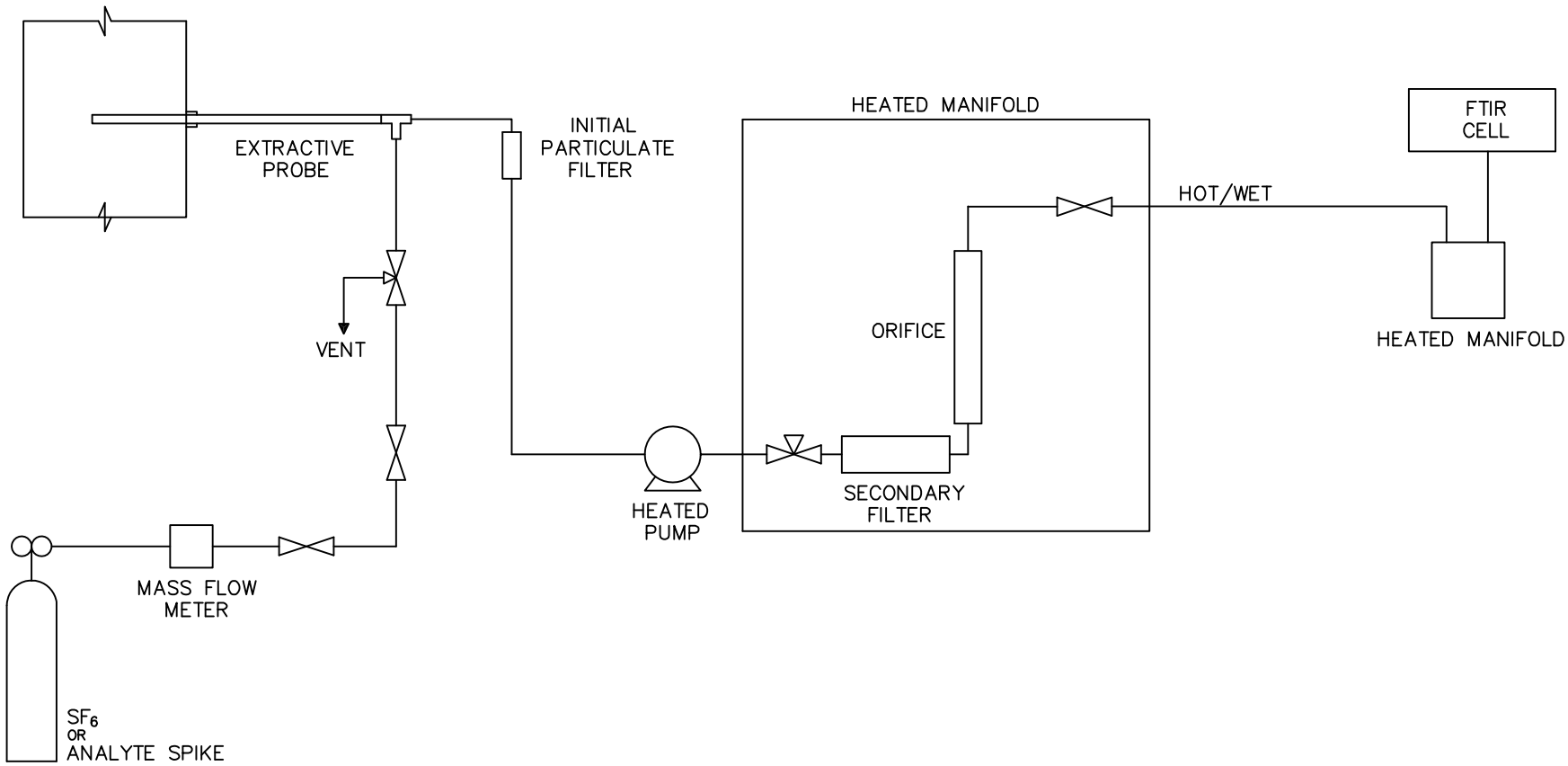
Appendix G

Reference Method Monitors Sampling System
(EPA Method 3A)



Schematic Diagram of the EPA Combined Methods 5/202 Sampling Train for Particulate Matter





EPA METHOD 320 FTIR SAMPLING/SPIKING SYSTEM

DRAWN BY:	KWB	JOB NO.:	2007-0308	REVISION:	1	SCALE:	NTS

E. ROBERTS Alley & Associates INCORPORATED
Environmental Engineering & Consulting
1931 Central Parkway SW Suite S
Decatur, AL 35601
Phone: (615) 351-0121
Fax: (615) 351-0151
www.eralley.com

Appendix H

CAREER SUMMARY

Mr. Wilson is a Project Scientist who has worked in the environmental field approximately four years. He has been involved with field testing activities on a broad scale and within several different industry types. Over the past four years, he has developed skills in several areas of emission testing including mobile laboratory operation and field team supervision.

Education
BS, Emergency Management
Arkansas Tech University
Russellville, AR

Joined Firm
2013

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

DeSoto Gathering Company – Arkansas

Conducted and field managed multiple NSPS, Subpart JJJJ and state permit compliance tests on natural gas-fired compressor engines at multiple stations throughout Arkansas. Responsibilities included project coordination and mobile laboratory and meter box console operation. Testing parameters included nitrogen oxides, carbon monoxide and non-methane volatile organic compounds. EPA Methods 3A, 7E, 10, 19 and 25A.

Saint Gobain – Bryant, Arkansas

Conducted and field managed compliance testing to determine the emission rates of multiple pollutants to demonstrate compliance with federal and state regulations. Testing involved wet chemistry (filterable and condensable particulate matter) and other isokinetic applications. Testing also involved instrumental analysis of sulfur dioxide, carbon monoxide, nitrogen oxides and volatile organic compounds. Mr. Wilson was responsible for operating the dry gas meter consoles and the mobile laboratory equipment as well as coordinating activities with the facility on site contact.

El Dorado Chemical – El Dorado, Arkansas

Conducted compliance testing on multiple sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods, instrumental, and FTIR analysis including U.S. EPA Reference Test Methods 5, 201A/202 (particulate matter & condensable particulate matter), 3A (oxygen and carbon dioxide), 6C (sulfur dioxide) 25A (volatile organic compounds), 7E (nitrogen oxides), 10 (carbon monoxide), and 320 (FTIR). Mr. Wilson was a member of the AST field team for this testing project.

Training

- TVTC Training
- CPR and First Aid
- Safeland
- MSHA Part 46 & Part 48

Appendix I

Brooke T. Paup, *Chairwoman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 13, 2025

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW,
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2025
Expiration Date: 02/28/2026
Certificate ID: TX-C25-00047

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation (FoA) specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Note: For the attached FoA table, matrices may include DW (drinking water), NPW (non-potable water), S (solid and chemical materials), A (air), and/ or BT (biological tissue).

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2025

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix J

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources to be Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Proposed Test Dates:
December 3-5, 2024

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subpart MM and 40 CFR 63, Subpart S

Source Information

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146
(subject to change)

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing will be conducted to determine the emission rates of particulate matter (PM), condensable particulate matter (CPM), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	PM, CPM
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NESHAP.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NESHAP, the facility will conduct a performance test program to determine the compliance status of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01.

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3/3A, 4, 5/202, and 320. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the facility TCEQ Permits, 40 CFR 63, Subpart MM, and 40 CFR 63, Subpart S.
- Emissions testing will be conducted on the exhaust of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01. The No. 1 and No. 2 Recovery Furnaces each exhaust to two (2) stacks: The No. 1 Recovery Furnace to the North (RB01A) and South (RB01B) Stacks, and the No. 2 Recovery Furnace to the West (RB02A) and East (RB02B) Stacks.
- Performance testing will be conducted at the maximum normal operation load for each source.
- Each of the three (3) test runs per source will be approximately 1 hour in duration.
- A minimum of 0.90 dscm (31.8 dscf) will be collected during each PM test run.
- Per Subpart MM, DI water will be used as the sample recovery solvent during PM testing.
- PM sample analysis will be conducted at Alliance's Decatur, AL laboratory.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

LK01 and LK02:

- Lime Production Rate, tons/day
- Scrubber Recirculation Flow, gph
- Scrubber Delta P, WC

RB01A/RB01B and RB02A/RB02B:

- Steam Load, kPPH
- Fuel Data

SM01 and SM02:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

NCG01:

- Chamber Temperature, °F
- Scrubber pH
- Scrubber Recirculation Flow, gph

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – December 2, 2024					
Equipment Setup & Pretest QA/QC Checks					6 hr
DAY 2 – December 3, 2024					
RB01A/RB01B & SM01	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 3 – December 4, 2024					
RB02A/RB02B & SM02	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 4 – December 5, 2024					
All Sources	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
LK01 & LK02	BWS	4			
	PM/CPM	5/202			
NCG01	BWS/CH_3OH	320			
DAY 5 – December 6, 2024					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
LK01	PM, CPM – 27.60 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
LK02	PM, CPM – 26.30 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
RB01A/RB01B	PM, CPM – 26.58 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
RB02A/RB02B	PM, CPM – 42.59 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
SM01	PM, CPM – 10.90 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
SM02	PM, CPM – 19.85 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
NCG01	CH_3OH – 20 ppmvd @ 10% O_2	63, Subpart S

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Laboratory Data* – Copies of laboratory report(s) and chain of custody(s).
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.
- *Photos* – Include stacks being tested and must include all ports and the nearest upstream and downstream disturbances, as well as all equipment being used to conduct the testing (e.g., glassware, meter box, gas cylinders, probe assembly, etc.).

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture Content	320	FTIR – Continuous Sampling

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with an EPA Method 1 verification measurement provided by the Field Team Leader. These measurements will be included in the test report.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample will be collected during each test run. The bags will be collected from the positive pressure side of the sample pump and conditioner. They will be collected through a manifold with a restriction (either rotameter or critical orifice) to ensure even filling throughout the course of the run. Samples will be concurrent with the test runs. The bag samples will be analyzed on site with a gas analyzer. The remaining stack gas constituent will be assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing will be conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system will consist of a glass nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train will consist of a coiled condenser and four (4) chilled impingers. The first and second impingers will be initially empty, the third will contain 100 mL of de-ionized water and the last impinger will contain 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter will be placed between the second and third impingers. The probe liner heating system will be maintained at a temperature of 248 ±25°F, and the impinger temperature will be maintained at 68°F or less throughout testing. The temperature of the Teflon filter will be maintained greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. If condensate is collected in the first dry impinger, then the front-half of the sample train (the nozzle, probe, and heated pre-weighed filter) will be removed in order to purge the back-half of the sample train (coil condenser, first and second impingers and CPM filter). A glass bubbler will be inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water will be added to the first impinger to raise the water level above the bubbler, then the coil condenser will be replaced. Zero nitrogen will be connected to the condenser, and a 60-minute purge at 14 liters per minute will be conducted. After the completion of the nitrogen purge the impinger contents will be measured for moisture gain. The nitrogen purge will be omitted if minimal condensate is collected in the dry impingers.

The pre-weighed quartz filter will be carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder will be rinsed three (3) times with DI water to remove any adhering particulate matter and these rinses will be recovered in container 2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 will be recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, the coil condenser, impingers 1 and 2 and all connecting glassware will be rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses will be added to container CPM Cont. #1 while the solvent rinses will be recovered in container CPM Cont. #2. The Teflon filter will be removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder will be rinsed with DIUF water and then with acetone, followed by hexane. The water rinse will be added to container CPM Cont. #1 while the solvent rinses will be added to container CPM Cont. #2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture will be determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream will be extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 or CAI 600 FTIR operated by a portable computer. The computer has FTIR spectra of calibration gases stored on the hard drive. These single component calibration spectra are used to analyze the measured sample spectra. The gas components to be measured will be selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio will be measured and recorded to document analyzer performance. A leak check will be performed on the sample cell. The instrument path length will be verified using ethylene as the Calibration Transfer Standard. Dynamic spiking will be performed using a certified standard of the target compound or appropriate surrogate in nitrogen with sulfur hexafluoride blended as a tracer to calculate the dilution factor. All test spectra, interferograms, and analytical method information are recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Low Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

EPA Protocol 1 Calibration Gases – Cylinder calibration gases used will meet EPA Protocol 1 (+/- 2%) standards or will be certified standards.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) will be introduced directly to the instrument sample port. While flowing nitrogen the signal amplitude will be recorded, a background spectra will be taken, a linearity check will be performed and recorded, the peak to peak noise and the root mean square in the spectral region of interest will be measured and a screenshot will be recorded.

Following the zero gas checks, room air will be pulled through the sample chamber and the line width and resolution will be verified to be at 1879 cm-1, the peak position will be entered and the FWHH will be recorded (screenshot). Following these checks, another background spectra will be recorded and the calibration transfer standard (CTS) will be introduced directly to the instrument sample port. The CTS instrument recovery will be recorded and the instrument mechanical response time will be measured.

Next, stack gas will be introduced to the FTIR through the sampling system and several scans will be taken until a stable reading will be achieved. The native concentration of our surrogate or target spiking analyte will be recorded. Spike gas will be introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate and a corresponding dilution ratio will be calculated along with a system response time. Matrix spike recovery spectra will be recorded and will be within the ± 30% of the calculated value of the spike concentration that the method requires.

The matrix spike recovery will be conducted once at the beginning of the testing and the CTS recovery procedures will be repeated following each test run. The corresponding values will be recorded.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Nozzles. Nozzles are measured three (3) times prior to initiating sampling with a caliper. The maximum difference between any two (2) dimensions is 0.004 in.
- Digital Calipers. Calipers are calibrated annually by Alliance by using gage blocks that are calibrated annually by an outside laboratory.

- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.
- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. A mass flow controller calibration is conducted on each Environics system annually following the procedures in the Manufacturer's Operation manual. A methane/ethane penetration factor check is conducted on the total hydrocarbon analyzers equipped with non-methane cutters every six (6) months following the procedures in 40 CFR 60, Subpart JJJJ. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- An isokinetic sampling rate of 90-110% will be maintained, as applicable.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

4.3 Analytical Laboratory

Analytical laboratory selection for sample analyses is based on the capabilities, certifications and accreditations that the laboratory possesses. An approved analytical laboratory subcontractor list is maintained with a copy of the certificate and analyte list as evidence of compliance. Alliance assumes responsibility to the client for the subcontractor's work. Alliance maintains a verifiable copy of the results with chain of custody documentation.

Jon Niermann, *Chairman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 14, 2024

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2024
Expiration Date: 02/28/2025
Document ID: TX-C24-00053

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2024

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix K

Special Conditions

Permit Numbers 2975 and PSDTX778M2

Emission Standards

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates," and those sources are limited to the emission limits and other conditions specified in the attached table including emissions from maintenance, startup, and shutdown (MSS) activities represented on pages B-1 and B-2 of the February 11, 2005, amendment application for Recovery Furnace Nos. 1 and 2.

   In addition, this permit authorizes all emissions from planned startup and shutdown activities associated with facilities or groups of facilities that are authorized by this permit.

Fuel Specifications

2. Fuel for mill combustion sources shall be limited as follows:

   A. Fuel for No. 2 Power Boiler (Emission Point Number [PN PB02]) shall be limited to bark and wood materials (defined as any uncontaminated wood materials including but not limited to sawdust, pallets, size-reduced limbs, and any other wood material from a tree such as nut shells); pipeline-quality, sweet natural gas as defined in the General Rules; Nos. 2, 4, and 6 fuel oil containing less than 3 percent sulfur by weight; primary clarifier underflow fiber cake (sludge from the wastewater treatment plant) as defined in the file by correspondence dated October 21, 1994, or used railroad crossties (26.2 tons per hour [tph] based on a 30-day average). All railroad crossties used as fuel in the No. 2 Power Boiler shall meet the specifications of Title 40 Code of Federal Regulations (40 CFR) Part 241, Subpart B, § 241.4(a). **(11/22)**

   The burning rate for bark is limited to 75 tph. Compliance with this rate shall be determined by a 30-day average. Records shall be maintained on-site for a rolling 24-month period and made available to personnel from the TCEQ upon request.

   B. Fuel for the No. 1 Power Boiler (EPN PB01) shall be limited to natural gas. Nos. 2, 4, and 6 fuel oils containing no more than 3 percent sulfur by weight. If the sulfur content of the fuel oil will exceed 3 weight percent, the permit holder must notify the TCEQ Regional Office and propose a fuel mixing plan that will not cause an exceedance of the maximum allowable emission rates; otherwise, the permit holder must obtain approval from the Executive Director.

   Annual fuel firing rates (MMBtu/yr, HHV) are limited as follows: Natural Gas - 5,725,625; No. 6 Fuel Oil - 681,120; Total Fuel Oils (Nos. 2, 4, and 6 Fuel Oils) - 3,300,910; Total - All Fuels (Natural Gas and Fuel Oils) - 5,725,625.

   While firing only No. 6 fuel oil, the total hours of operation for the No. 1 Power Boiler over any consecutive 12-month period shall not exceed a maximum of 720 hours.

   C. The Nos. 1 and 2 Lime Kilns (EPNs LK01 and LK02) shall burn only pipeline-quality, sweet natural gas as defined in the General Rule and Nos. 2, 4, and 6 fuel oils containing less than 3 percent sulfur by weight.

   D. Auxiliary fuel for the Recovery Furnace Nos. 1 and 2 shall be only pipeline-quality, sweet natural gas as defined in the General Rules.

   E. Auxiliary fuel for the NCG Oxidation Unit shall be sweet natural gas. This fuel shall be used, as necessary, to maintain the required minimum temperature in the NCG Oxidation Unit.

Use of any other fuel shall require prior approval from the Executive Director of the Texas Commission on Environmental Quality (TCEQ).

Federal Applicability

3. These facilities shall comply with all applicable requirements of the U.S. Environmental Protection Agency (EPA) regulations on Standards of Performance for New Stationary Sources in 40 CFR Part 60, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart BB - Kraft Paper Mills (The Smelt Dissolving Tank No. 2, the non-condensable gas (NCG) oxidation unit, the Recovery Furnace Nos. 1 and 2, and all affected facilities);

   C. Subpart D - Commercial Steam Generating Units (Power Boiler No. 2 [EPN PB02]); and

   D. Subparts A and BB, § 60.283 (a)(1)(iii) only - Kraft Pulp Mills (Power Boiler No. 2 [EPN PB02]).

4. These facilities shall comply with all applicable requirements of the EPA regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 63, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart S – Pulp and Paper Industry;

   C. Subpart MM - Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (Lime Kiln Nos. 1 and 2 (Emission Point Nos. [EPN] LK01 and LK02), Recovery Furnace Nos. 1 and 2 (EPNs RB01 and RB02), and Smelt Dissolving Tank Nos. 1 and 2 (EPNs SM01 and SM02); and

   D. Subpart DDDDD - Industrial, Commercial, and Institutional Boilers (Power Boiler No. 1 [EPN PB01] and Power Boiler No. 2 [EPN PB02], and all affected facilities).

5. These facilities shall comply with all applicable requirements of the EPA Regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 61, specifically the following:

   A. Subpart A - General Provisions; and

   B. Subpart E – Mercury (Power Boiler No. 2 [EPN PB02]).

Opacity/Visible Emission Limitations

6. Opacity of emissions from Power Boiler No. 1, the Smelt Tank Scrubber Nos. 1 and 2, the Lime Kiln Stack Nos. 1 and 2, the NCG oxidation unit scrubber, and the Recovery Furnace Stack Nos. 1 and 2 shall not exceed 20 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in Title 30 Texas Administrative Code (30 TAC) §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

7. Opacity of emissions from any uncontrolled stationary vent shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS. If this condition is violated, further controls may be required to be installed and/or implemented to limit visible emissions.

8. Opacity of emissions from the A-Line and B-Line Bleach Plant Scrubbers shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

Operational Limitations, Work Practice, and Plant Design

9. Power Boiler No. 1 (EPN PB01) emission concentrations are limited as follows during production operations:

   A. Nitrogen oxides (NO_x): 0.6 lb/ million British Thermal Unit (MMBtu) (24-hour average).

   B. Carbon monoxide (CO): 400 parts per million dry volume (ppmv), corrected to 3 percent dry oxygen. (24-hour average).

   C. Sulfur dioxide (SO_2): 440 ppmv (3-hour average) for fuel oil firing.

10. In-stack concentration of sulfur dioxide (SO_2) from Recovery Furnace Nos. 1 and 2 shall not exceed 300 parts per million by volume (ppmv) and 100 ppmv during production operations, averaged over a three-hour and a yearly period, respectively, and corrected to a dry 8 percent oxygen (O_2) basis. Compliance with the SO_2 concentrations provided in this condition may be determined by the use of continuous monitoring data.

11. The No. 1 Lime Kiln shall comply with the following limitations during production operations:

   A. The maximum total reduced sulfur (TRS) shall be 20 parts per million by volume (ppmv) corrected to 10 percent oxygen (O_2) (measured as hydrogen sulfide, 12-hour average).

   B. The maximum total carbon monoxide shall be 0.064lb/MMBtu (short term)(24-hr average) and 0.051 lb/MMBtu (annual).

   C. The maximum nitrogen oxides shall be 0.17 lb/MMBtu (fuel oil) (24-hour average) and 0.18 lb/MMBtu (natural gas) (24-hour average).

12. PB01 shall be equipped with multi-cyclones to control emissions of PM, and shall be equipped with at least a 218.9-foot tall stack, as measured from the ground level, to provide adequate dispersion of the boiler exhaust and shall have no raincaps or other similar devices that will prevent adequate dispersion of the boiler exhaust. The permit holder shall install stack testing port in the boiler stack.

13. The EPN PB02 shall be equipped with multi-cyclones and a scrubber with the following control efficiencies: 95 percent removal efficiency for hydrogen chloride, 98.5 percent for total particulate matter (PM) and 90 percent for SO_2.

14. Maximum hourly emission rates (ER) for EPN PB02 shall be based on 24-hour averages (except for SO_2 when firing fuel oil, which shall be based on a three-hour averaging time according to 30 TAC §112.9 and NO_x, which shall also be based on a three-hour averaging time according to 40 CFR Part 60, Subpart D).

    The mill is authorized to operate:

    24 hours/day, 7 days/week, 52 weeks/year, and 8,760 hours /year and 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

15. Emissions of chlorine (Cl_2) and chlorine dioxide (ClO2) from the bleaching plant shall be minimized by the use of weak wash (sodium sulfide solution) scrubbers equipped with a pH monitor and control system. The solution of the scrubbers shall be maintained at a minimum pH of eight in order to insure that the emission control efficiencies are maintained at the following values:

Scrubber and Emission Point No.	Emission Control Efficiencies
B-line (BP14)	95 percent (Cl_2/ClO2)
B-line (BP15)	95 percent (Cl_2/ClO2)
A-line (BP16)	95 percent (Cl_2/ClO2)

    The bleach plant lines are also authorized to operate as follows:

    A. When both the A- and B-lines are operating, the B-line bleach plant vents can be routed to the A-line bleach plant scrubber (EPN BP16).

    B. When the B-line is not operating, the A-line bleach plant vents can be routed to the B-line bleach plant scrubbers (EPNs BP14 and BP15).

        This is in line with MAERT statement that emissions from all three scrubbers shall be summed for compliance.

16. In order to maintain the maximum combustion efficiency for TRS compounds and NCGs, the NCG oxidation unit shall be operated as shown in Special Condition No. 21 with a residence time of 0.11 seconds (minimum) and a TRS removal efficiency of 99.9 percent. Immediate corrective action shall be taken when the O_2 deviates below 4 percent per (3-hour rolling average).

17. The SO_2 packed tower scrubber on the NCG oxidation unit shall use a recirculating sodium hydroxide solution. The solution shall be maintained at the minimum pH to ensure good SO_2 removal.

18. Recovery Furnace No. 1 (EPNs RB01A and RB01B) shall be limited to 54.5 tph of black liquor solids and a natural gas firing rate of 375 MMBtu/per hour (hr). Recovery Furnace No. 2 (EPNs RB02A and RB02B) is limited to 99.25 tph of black liquor solids and a natural gas firing rate of 750 MMBtu/hr. The maximum hourly ER for most pollutants from Recovery Furnace Nos.1 and 2 are based on a 24-hour averaging time except for TRS (as hydrogen sulfide [H_2S]) which is based on a 12-hour averaging time while PM and SO_2 are based on a 3-hour averaging time.

    The maximum ER for the Recovery Furnace Nos. 1 and 2 shall be split between the two stacks in the MAERT for accounting purposes only. To determine compliance with the MAERT, the

emission rates listed for each stack shall be summed since each furnace is a single facility and the individual stack emissions may vary.

In order to comply with the PM/PM_{10} MSS emission limits represented in the MAERT for the four Recovery Furnace Stacks (EPNs RB01A, RB01B, RB02A, and RB02B) during planned MSS activities, the planned MSS activities shall be limited to 25 hours per year for each of the four Recovery Furnace Stacks.

19. Lime Kiln No. 1 (LK01) is limited to 228 tons per day and 68,620 tons per year. The maximum firing rate for LK01 using either Nos. 2, 4, or 6 fuel oils shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 420,480 MMBtu/yr. The maximum firing rate for LK01 using natural gas shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 550,000 MMBtu/yr.

20. Lime Kiln No. 2 (LK02) shall be limited to 400 tons per day of lime with a burner rating of 132.3 MMBtu/hr for short-term oil firing or 113.3 MMBtu/hr for sustained oil firing, and 113.3 MMBtu/hr for both short-term and sustained firing for natural gas. The maximum hourly ER for most pollutants from EPN LK02 shall be based on a 24-hour averaging time except for TRS (as H_2S) which is based on a 12-hour averaging time while PM and SO_2 shall be based on a three-hour averaging time.

Demonstration of Continuous Compliance

21. The following parameters shall be monitored and recorded:

Table 1: Monitoring Parameters and Limits

Unit	Parameter	Limit
Smelt Tank Scrubber No. 1	PM - Fan motor current	Title V Compliance Assurance
	PM - Liquid flow rate to scrubber	Monitoring (CAM)*
	PM - Liquid flow rate to fan	Title V CAM*
	PM (Opacity) - Fan motor current	Title V CAM*
	PM (Opacity) - Liquid flow rate to scrubber	Title V Periodic Monitoring*
	PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring*
		Title V Periodic Monitoring*

Unit	Parameter	Limit
Smelt Tank Scrubber No. 2[H]	PM - Fan motor current PM - Liquid flow rate to scrubber PM - Liquid flow rate to fan PM (Opacity) - Fan motor current	Title V CAM * Title V CAM* Title V CAM* TitleV Periodic Monitoring*
Smelt Tank Scrubber No. 2[H]	PM (Opacity) - Liquid flow rate to scrubber PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring* Title V Periodic Monitoring*
Precipitator Ash Tank No. 2	Temperature	235^{O}F maximum, daily average
No. 2 Recovery Boiler Ash Tank	Temperature	235^{O}F maximum, daily average
Power Boiler No. 1	Opacity SO_2 - Fuel sulfur content	20 percent Title V Periodic Monitoring*
Power Boiler No. 2[I]	PM - Liquid flow rate PM - Pressure drop PM (Opacity) - Liquid flow rate PM (Opacity) - Pressure drop SO_2 NO_x O_2	Title V CAM* Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring* MAERT MAERT
Lime Kiln No. 1 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop	Title V CAM * Title V CAM* Title V Periodic Monitoring*

Unit	Parameter	Limit
	PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring*
Lime Kiln No. 2 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop PM (Opacity) - Liquid flow rate	Title V CAM * Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring*
A-Line Bleach Plant Scrubber	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber North	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber South	PM (opacity) -pH of scrubbing liquid PM (opacity) - Fan motor current PM(Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*

Unit	Parameter	Limit
Recovery Furnace No. 1 Stack[H]	PM - Opacity TRS SO_2 Black liquor solids Opacity	Title V CAM* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 54.5 ton/hr (24-hr average) 20% maximum
Recovery Furnace No. 2 Stack[H]	PM - Opacity PM (Opacity) - Opacity TRS SO_2 Black liquor solids	Title V CAM* Title V Periodic Monitoring* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 99.25 ton/hr (24-hr average)
NCG Oxidation Unit	TRS - Combustion Chamber temperature Excess O_2 in exhaust SO_2 - pH of scrubbing liquid SO_2 - Liquid flow rate	Title V CAM* with a minimum temperature of 1579^{O}F. <20 ppmv of Methanol (3-hour rolling averaging period) 4% minimum 7.0 minimum# 150 gpm minimum#

* The specific limit is included in the “Additional Monitoring Requirements Section” in the Title V permit (Permit No. O-01378).

H-see NSPS BB for recordkeeping requirements.

I-see NSPS D for recordkeeping requirements.

CAM Requirements for SO_2 emissions from NCGO1: In order to maintain adequate SO_2 control for the emissions associated with the NCG Oxidation Unit, the control device associated with this source shall be monitored according to the following:

Table 2: Monitoring Parameters for NCG Oxidation Unit

Control Device	Monitoring Parameter	Minimum Monitoring Frequency**	Deviation limit
NCG Oxidation Unit Scrubber (NCGO1)	pH	once per day	7.0 minimum
	Liquid flow rate	once per day	150 gpm

** International Paper may elect to collect monitoring data on a more frequent basis than is required by the minimum frequency and calculate a daily average for purposes of determining whether a deviation has occurred. However, the additional points must be collected on a regular basis and shall not be collected and used in particular instances in order to avoid reporting deviations.

pH: Each monitoring devices shall be cleaned with an automatic cleaning system, or cleaned weekly using hydraulic, chemical, or mechanical cleaning. Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least weekly, whichever is more frequent, and shall be accurate to within +0.5 pH unit.

Liquid flow rate: Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within one of the following:

- ±2% of span; or
- ±5% of design liquid flow rate

The monitoring parameter must be measured and recorded at the frequency indicated above. Immediate corrective action should be taken if the monitoring parameter falls outside of the range specified in this condition.

22. Disposal of particulate collected in all control devices shall be accomplished in such a manner which will prevent PM from becoming airborne.

23. The permit holder shall install, calibrate, and maintain a continuous emission monitoring system (CEMS) to measure and record the in-stack concentration of NO_x and SO_2 from Power Boiler No. 2 (EPN PBO2), TRS, and SO_2 from Recovery Furnace No. 1 (EPNs RBO1A and RBO1B) and Recovery Furnace No. 2 (EPNs RBO2A and RBO2B), and TRS from Lime Kiln Nos. 1 and 2 (EPNs LKO1 and LKO2).

    A. The CEMS shall meet the design and performance specifications, pass the field tests, and meet the installation requirements and the data analysis and reporting requirements specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B. If there are no applicable performance specifications in 40 CFR Part 60, Appendix B, contact

the TCEQ Office of Permitting, and Registration, Air Permits Division for requirements to be met.

B. Section 1 below applies to sources subject to the quality-assurance requirements of 40 CFR Part 60, Appendix F; section 2 applies to all other sources:

(1) The permit holder shall assure that the CEMS meets the applicable quality-assurance requirements specified in 40 CFR Part 60, Appendix F, Procedure 1. Relative accuracy exceedances, as specified in 40 CFR Part 60, Appendix F, § 5.2.3 and any CEMS downtime shall be reported to the appropriate TCEQ Regional Director, and necessary corrective action shall be taken. Supplemental stack concentration measurements may be required at the discretion of the appropriate TCEQ Tyler Regional Director. Downtime is not considered to include periods when the CEMS is operational but the 24-hour span drift exceeds the allowable amounts.

(2) The system shall be zeroed and spanned daily and corrective action taken when the 24-hour span drift exceeds two times the amounts specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B, or as specified by the TCEQ if not specified in Appendix B. Zero and span are not required on weekends and plant holidays if instrument technicians are not normally scheduled on those days, unless the monitor is required by a subpart of NSPS or NESHAPS in which case zero and span shall be done daily without exception.

Each monitor shall be quality-assured at least quarterly using cylinder gas audits (CGA) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.2, with the following exception: RATAs are not required for these systems. For non-NSPS sources, an equivalent quality-assurance method approved by the TCEQ may also be used and an annual RATA is not required.

C. The monitoring data shall be reduced to hourly average concentrations at least weekly, using a minimum of four equally-spaced data points from each one-hour period. The individual average concentrations shall be reduced to units of the permit allowable ER in pounds per hour (lb/hr) at least once every calendar quarter (except for O_2) as follows:

The measured hourly average concentration from the CEMS shall be multiplied by the gas flow rate (either as measured according to 40 CFR Part 60, Appendix A, Methods 1 through 4, or as calculated by appropriate F factor according to 40 CFR Part 60, Appendix A, Method 19) to determine the hourly ER.

D. All monitoring data and quality-assurance data shall be maintained for a period of 60 months. The data from the CEMS may, at the discretion of the TCEQ, be used to determine compliance with the conditions of this permit.

E. For SO_2 from EPNs RBO1A & RBO1B and EPNs RBO2A & RBO2B, and TRS from EPNs LKO1 and LKO2, up to 5 percent invalid monitoring data on a rolling 12-month basis is acceptable provided it is only generated when the monitor is broken down, out-of-control (producing inaccurate data); being repaired, having maintenance performed, or being calibrated (data not obtained during any daily zero and span performed is not considered invalid data).

The data availability shall be calculated as the total fired unit operating hours for which quality-assured data was recorded divided by the total fired unit operating hours. The measurements missed shall be estimated using engineering judgment and the methods used recorded. Options to increase system reliability to an acceptable value, including a redundant CEMS, may be required by the TCEQ Tyler Regional Director.

24. The holder of this permit shall install, calibrate, and maintain a continuous opacity monitoring system (COMS) to measure and record the in-stack concentration of opacity from PB01. The COMS shall be operated in accordance with 40 CFR § 60.13. This special condition shall only apply when fuel oil is being fired in PB01. **(01/18)**

25. Upon request by the TCEQ Executive Director, the holder of this permit shall be required to perform stack sampling analysis for PM, total volatile organic compounds (VOC), NO_x, CO, SO_2, methanol, and formaldehyde and/or other testing as required to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere from the facilities covered by this permit. Sampling must be conducted in accordance with appropriate procedures of the TCEQ Sampling Procedures Manual or in accordance with applicable U.S. Environmental Protection Agency Code of Federal Regulations procedures. Any deviations from those procedures must be approved by the TCEQ Executive Director prior to sampling. The holder of this permit is responsible for providing sampling and testing facilities and conducting the sampling and testing operations at his expense.

    The facilities shall operate at the maximum achievable fuel-firing rate during stack emission testing. Primary operating parameters that enable determination of fuel-firing rate shall be monitored and recorded during the stack test. These parameters are to be determined at the pretest meeting. If the facilities are unable to operate at maximum fuel-firing rate during testing, then future fuel-firing rate may be limited to the rate established during testing. Additional stack testing may be required when higher fuel-firing rates are achieved.

26. Upon request by the Executive Director of the TCEQ or any local air pollution control program having jurisdiction, the holder of this permit shall provide a sample and/or an analysis of the fuel utilized in this facility or shall allow air pollution control agency representatives to obtain a sample for analysis.

27. Due to the high moisture content in the gas stream exiting the scrubber, a continuous opacity monitor as specified in NSPS D is not feasible. To verify the particulate emissions are within NSPS limits, the Power Boiler No. 2 shall be tested once a year for total suspended particulate and any other pollutant at the request of the TCEQ Regional Office.

Recordkeeping Requirements

28. Records shall be maintained at this facility site and made available at the request of personnel from the TCEQ or any other air pollution control program having jurisdiction to demonstrate compliance with permit limitations. These records shall be totaled for each calendar month, retained for a rolling 60-month period, and include the following:

    A. Records of all production rates, ERs, and operating parameters necessary to demonstrate compliance with this permit on-site for a rolling five-year period. Records shall include certification from all suppliers of used railroad crossties that all railroad crossties received at the site meet the specifications of 40 CFR Part 241, Subpart B, § 241.4(a). The holder shall provide access and/or copies of these records to the Executive Director of the TCEQ and/or his representatives and any local air pollution control program upon request. **(11/22)**

    B. The quantity of each fuel (MMBtu/hr basis) fired per month (PB01 only).

    C. The quantity of calcium oxide (tons) produced per day.

D. Annual report from the natural gas supplier identifying total H_2S content and from the fuel oil supplier identifying total sulfur content of Nos. 2, 4, and 6 fuel oils sold to permit holder to demonstrate compliance with this permit.

E. Copies of stack sampling reports conducted on the facilities covered by this permit. The stack sampling reports shall be kept at the site for a period of at least five years from the time sampling was completed.

F. Preventive maintenance, schedule maintenance, and repairs performed on any abatement devices shall be recorded as they occur.

29. All the records required by this condition shall be maintained for at least five years and made available to representatives of the TCEQ or any local air pollution control program having jurisdiction upon request.

Date: November 15, 2022

Emission Sources - Maximum Allowable Emission Rates

Permit Numbers 2975 and PSDTX778M2

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SM01	No. 1 Smelt Tank Scrubber	PM	10.90	47.74
		PM_{10}	10.90	47.74
		$PM_{2.5}$	10.90	47.74
		VOC (note a)	1.37	6.02
		SO_2	3.28	14.37
		H_2SO_4	0.15	0.66
		TRS (note b)	1.80	7.88
		NO_X	1.80	7.88
		NH_3	2.51	8.99
SM02	No. 2 Smelt Tank Scrubber	PM	19.85	86.94
		PM_{10}	19.85	86.94
		$PM_{2.5}$	19.85	86.94
		VOC	2.50	10.95
		SO_2	6.78	29.70
		H_2SO_4	0.31	1.36
		TRS	3.28	14.35
		NO_X	3.28	14.35
		NH_3	4.57	16.37
LK01** (A^1)	Lime Kiln No. 1	PM	27.60	99.80
		PM_{10}	27.60	99.80
		$PM_{2.5}$	27.60	99.80

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	2.20	8.10
		SO_2	2.30	8.40
		H_2SO_4	0.06	0.13
		TRS	2.60	9.30
		NO_X	18.90	49.50
		CO	6.80	14.20
PB01*** (A^1, A^2)	No. 1 Power Boiler (Natural Gas and Fuel Oil Firing)	PM	61.21	185.22
		PM_{10}	61.21	185.22
		$PM_{2.5}$	61.21	185.22
		VOC	8.26	16.70
		NO_X	567.60	1717.69
		SO_2	841.20	1328.25
		CO	264.88	801.59
		H_2SO_4	4.03	4.43
		TRS	0.67	0.26
LK02** (A^1)	Lime Kiln No. 2	PM	26.30	115.19
		PM_{10}	26.30	115.19
		$PM_{2.5}$	26.30	115.19
		NO_X	38.91	145.90
		SO_2	1.20	5.26
		H_2SO_4	0.25	1.07
		CO	4.44	19.45
		TRS	2.50	10.95
		VOC	4.00	17.52

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
PB02**** (A^1, A^2, A^3)	Power Boiler No. 2 (including MSS) (note c)	PM	108.70	466.58
		PM_{10}	108.70	466.58
		$PM_{2.5}$	108.70	466.58
		VOC	54.81	237.80
		NO_X	326.10	1399.75
		SO_2	770.00	780.66
		CO	1102.55	4732.57
		H_2SO_4	16.57	71.02
		TRS	1.66	6.74
RB01A** (A^1, A^2)	No. 1 Recovery Furnace North Stack (Normal ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01A** (A^4)	No. 1 Recovery Furnace North Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB01B** (A^1, A^2)	No. 1 Recovery Furnace South Stack (Normal Ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01B** (A^4)	No. 1 Recovery Furnace South Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB02A** (A^1, A^2)	No. 2 Recovery Furnace West Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02A** (A^4)	No. 2 Recovery Furnace West Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
RB02B** (A^1, A^2)	No. 2 Recovery Furnace East Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02B** (A^4)	No. 2 Recovery Furnace East Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
BG01 (A^1)	Lime System Baghouse No. 1	PM	0.06	0.21
		PM_{10}	0.06	0.21
		$PM_{2.5}$	0.06	0.21
BG02 (A^1)	Lime System Baghouse No. 2	PM	0.10	0.44
		PM_{10}	0.10	0.44
		$PM_{2.5}$	0.10	0.44
LS01	No. 1 Lime Slaker	PM	0.02	0.08
		PM_{10}	0.02	0.08
		$PM_{2.5}$	0.02	0.08
		VOC	0.39	1.41
		NH_3	9.39	33.63
LS02	No. 2 Lime Slaker	PM	0.02	0.10
		PM_{10}	0.02	0.10
		$PM_{2.5}$	0.02	0.10
		VOC	0.68	2.99

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		NH_3	17.10	61.24
BP0351 (A^5)	Methanol Storage Tank	CH_3OH	19.03	0.73
BP0368 (A^5)	Hydrogen Peroxide Tank	H_2O_2	2.21	0.09
NCG01 (A^1, A^3)	NCG Oxidation Unit Scrubber	PM	2.57	9.19
		PM_{10}	2.57	9.19
		$PM_{2.5}$	2.57	9.19
		VOC (note a)	1.10	3.95
		NO_X	5.57	19.96
		SO_2	15.84	69.37
		CO	9.94	35.61
		H_2SO_4	6.01	26.28
		TRS	0.99	4.36
NCG02 (A^5)	Combined Contaminated Condensate Tank	TRS	<0.10	0.40
NCGF1	NCG Fugitives (4)	TRS	0.36	1.56
DIG1	Batch Digester Fugitives (4)	VOC	4.80	19.19
		TRS	0.87	3.46
WWTS1 (A^6, A^7)	Waste Water Treatment Fugitives (4)	VOC	348.16	740.78
		TRS	22.82	81.72
BP14#	B-Line Bleach Plant Scrubber (North)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BP15#	B-Line Bleach Plant Scrubber (South)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37
BP16#	A-Line Bleach Plant Scrubber (5)	Cl_2	0.20	0.86
		ClO_2	11.31	49.51
		CO	39.00	117.37
		VOC	4.17	12.28
		TRS	0.12	0.37
BP01	Bleach Plant Fugitives (4)	Cl_2	0.20	1.00
		ClO_2	0.20	1.00
CLT01 (A^5)	No. 1 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
CLT02 (A^5)	No. 2 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
WLT01 (A^5)	No. 1 Weak Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLT02 (A^5)	No. 2 Weak Liquor Storage Tank (5)	VOC	0.54	2.34
		TRS	0.12	0.51
HLT01 (A^5)	No. 1 Strong/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
HLT02 (A^5)	No. 2 Storage/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SCT01 (A[5])	No. 1 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SCT02 (A[5])	No. 2 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS01 (A[5])	No. 1 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS02 (A[5])	No. 2 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST01 (A[5])	No. 1 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST02 (A[5])	No. 2 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
BLDF01 (A[5])	Black Liquor Digester Fill Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
CT01 (A[5])	Spill Collection Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
ST01 (A[5])	Swing Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST01 (A[5])	No. 1 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST02 (A[5])	No. 2 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST03 (A[5])	No. 3 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BOT01 (A^5)	Evaporator Boil Out Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
DT01 (A^5)	Black Liquor Dump Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLSC01 (A^5)	Weak Liquor Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
FOT (A^5)	Fuel Oil Tank (5)	VOC	1.52	6.64
		TRS	0.19	0.84
CPFUG (note d)	Caustic Plant Fugitives (4)	NH_3	7.31	26.17
		VOC	16.25	68.30
		TRS	3.18	13.91
CP01 (A^5)	No. 1 Causticizer Tanks (5)	NH_3	2.59	9.28
		VOC	0.01	0.03
CP02 (A^5)	No. 2 Causticizer Tank (5)	NH_3	4.72	16.89
		VOC	0.01	0.06
WLOXT1 (A^5)	White Liquor Oxidation Tank (5)	NH_3	0.10	0.44
		VOC	0.26	1.16
		TRS	0.56	2.45
KNCONV	A-and B-Line Knotter Conveyor (4)	VOC	0.01	0.04
AQS	A-Line Quaternary Screen (4)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
BQS	B-Line Quaternary Screen (4)	VOC	0.01	0.03
		TRS	<0.01	<0.01
ASDT (A^5)	A-Line Screen Dilution	VOC	0.01	0.02

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Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
	Tank (5)	TRS	<0.01	<0.01
BSDT (A^5)	B-Line Screen Dilution Tank (5)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
ADHV1/ADSP1	A-Line Decker Hood Vent and A-Line Decker Seal Pit Vent (5)	VOC	9.24	27.20
		TRS	4.06	11.95
BDHV1/BDSP1	B-Line Decker Hood Vent and B-Line Decker Seal Pit Vent (5)	VOC	13.55	54.41
		TRS	5.95	23.89
CPS1 (note e)	Chip/Bark Handling Fugitives (4)	PM	3.35	13.59
		PM_{10}	1.58	6.43
		$PM_{2.5}$	1.58	6.43
REJBIN2	Reject Bin	CH_3OH	0.03	0.10
LOG-1A	Log Processing 1A (4)	PM	0.73	3.20
		PM_{10}	0.22	0.96
		$PM_{2.5}$	0.22	0.96
HDST1 (A^5)	No. 1 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
HDST2 (A^5)	No. 2 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
ALDST (A^5)	A-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
BLDST (A^5)	B-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
AWTST (A^5)	A-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94

Project Number: 262778

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BWTST (A[5])	B-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
(note f)	Extruder No. 5 Vents and Fugitives (4)	PM	3.18	13.91
		PM_{10}	3.18	13.91
		$PM_{2.5}$	3.18	13.91
		VOC	2.07	9.05
		NO_X	0.29	1.29
		CO	0.25	1.08
		SO_2	<0.01	0.01
(note f)	Extruder No. 7 Vents and Fugitives (4)	PM	3.18	13.92
		PM_{10}	3.18	13.92
		$PM_{2.5}$	3.18	13.92
		VOC	2.07	9.05
		NO_X	0.30	1.33
		CO	0.26	1.12
		SO_2	<0.01	0.01
(note g)	Nos. 1 and 3 Paper Machines and Dryer Exhaust (5)	PM	0.19	0.83
		PM_{10}	0.19	0.83
		$PM_{2.5}$	0.19	0.83
		VOC	8.74	38.27
		NO_X	2.50	10.93
		CO	2.10	9.18
		SO_2	0.01	0.07
TNK0115, TNK0116,	Starch Silo Nos. 1 -3	PM	0.02	0.02

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
and TNK0175 (A[1])		PM_{10}	0.02	0.02
		$PM_{2.5}$	0.02	0.02
PAINTYD (A[8])	Sitewide Painting Activities (4)	PM	70.31	32.72
		PM_{10}	70.31	32.72
		$PM_{2.5}$	70.31	32.72
		VOC	96.05	28.94
BSS1 – BSS5 (A[5])	Nos. 1-5 Bleached Stock Storage Tanks (4)	VOC	0.04	0.17
(note h)	Paper Machine Tanks and Chests (4)	VOC	0.16	0.68
HVLC-1	HVLC Vent	VOC	157.78	23.09
		CO	3.19	0.51
		TRS	33.30	4.77
AWSST (A[5])	A-Line Washed Stock Chest (5)	VOC	0.72	3.16
		TRS	0.28	1.21
BWSST (A[5])	B-Line Washed Stock Chest (5)	VOC	0.74	3.26
		TRS	0.28	1.21

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) PM - particulate matter, suspended in the atmosphere, including PM_{10}
PM_{10} - total particulate matter equal to or less than 10 microns in diameter, including $PM_{2.5}$, as represented
$PM_{2.5}$ - particulate matter equal to or less than 2.5 microns in diameter
Emissions of $PM_{2.5}$ is added to the Maximum Allowable Emission Rates Table (MAERT) upon issuance of the permit. These emissions were previously quantified and authorized as PM or PM_{10}, but were not speciated in the MAERT.
VOC - volatile organic compounds as defined in Title 30 Texas Administrative Code §101.1
SO_2 - sulfur dioxide
H_2SO_4 - sulfuric acid
TRS - total reduced sulfur
NO_x - nitrogen oxides
NH_3 - ammonia
Cl_2 - chlorine
ClO_2 - chlorine dioxide (chlorine peroxide)

Emission Sources - Maximum Allowable Emission Rates

CO - carbon monoxide
H_2S - hydrogen sulfide
CH_3OH - methanol
H_2O_2 - hydrogen peroxide
$CHCl_3$ - chloroform
$CHBrCl_2$ - bromodichloromethane

(4) Fugitive emissions are an estimate only and should not be considered as a maximum allowable emission rate.
(5) The VOC and TRS emission rates for this point are considered to be estimates only and are not intended to be enforceable limits.
(6) Planned startup and shutdown emissions are included, as well as planned maintenance activities identified as part of permit alteration issued on April 24, 2013.
A^1 Emissions from planned startup and shutdown activities included.
A^2 Emissions from soot blowing included.
A^3 Emissions from control device for evaporator and concentrators boil outs included.
A^4 Emissions from planned MSS activities included.
A^5 Emissions from draining/degassing included.
A^6 Emissions from dredging and other maintenance (e.g., ponds and collection system) included.
A^7 Emissions from maintenance throughout the mill included.
A^8 Emissions from maintenance painting included.

* Unless otherwise specified, emission rates are based on operating 8,760 hours per year or 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

** Pound per hour rates, TRS emissions based on a 12-hour averaging time, PM/PM_{10} and SO_2 based on a 3-hour averaging time, all other pollutants are based on a 24-hour averaging time.

*** Pound per hour rates, SO_2 and NO_x emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

**** Pounds per hour rates, SO_2 emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

Emissions from the Bleach Plant Scrubbers (EPNs BP14, BP15, and BP16) should be summed up when determining compliance since individual emissions may vary.

Notes:

(a) All VOCs are reported as carbon unless otherwise specified.
(b) All TRS emission rates are reported as H_2S unless otherwise specified.
(c) The SO_2 hourly rates for the Power Boiler No. 2 include combustion of total reduced sulfur compounds during periods when the NCG oxidizer is inoperable.
(d) Green liquor clarifiers (2), green liquor storage tanks (3), weak wash storage tanks (2), white liquor clarifiers (2), white liquor storage tanks (4), white liquor/digestor fill tank, mud washers (2), mud storage tanks (2), mud precoat filters (2), and dregs filter.
(e) These fugitives occur from the chip and RDF handling operations.
(f) Includes the pre-treater stacks (EX5PRE1, EX5PRE2, EX7PRE1, EX7PRE2), the laminator stack (EX5LAM1, EX5LAM2, EX7LAM1, EX7LAM2), the post-treater stack (EX5POSTTR, EX7POSTTR), and fugitives (EXFUG5, EXFUG7) for each extruder.
(g) The Paper Machine Nos.1 and 3 consist of 18 exhaust vents and fugitive emissions.
(h) Includes pine tanks (PINETK3, PINETK1S, PINETK1), hardwood tanks (HDWD1, HDWD3), machine chests (MACHCH1, MACHCH3), and broke storage tanks (BRST1A, BRST1B, BRST3A).

Date: August 10, 2017

Last Page of Report

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source Tested:
No. 2 Smelt Tank Scrubber (SM02)

Test Date:
October 28, 2025

Project No. AST-2025-3989

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citations	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
W Graphic Packaging International Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Timothy Branham
timothy.branham@alliancetg.com
(479) 206-1993

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewers
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

COMPANY:		Graphic Packaging International		SOURCE:		SM02	
REVIEWER:				DATE OF SAMPLING:		October 28, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. D	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. D	Operating parameters of the pollution control equipment					
13.	App. D	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. C	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	N.A.	Chain of custody of samples					
31.	N.A.	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. C	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the sources and operating conditions that were tested during the specific test date and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections of this test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

November 17, 2025

Riley Wilson – Operations Manager
Alliance Technical Group, LLC

Date

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Appendix E SSTP and Associated Documentation
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Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to the provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing was conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Tested Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-2: Project Team

Facility Personnel	John Fussell
Alliance Personnel	Riley Wilson Timothy Branham

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) that was developed by Alliance and approved by GPI. The SSTP is presented in Appendix E.

1.3 Technical Discussion

No operational or sampling pauses were recorded, and no technical difficulties or protocol deviations were encountered during this test program.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on October 28, 2025. Testing consisted of determining the concentration and emission rate of TRS at the exhaust of SM02.

Table 2-1 provides a summary of the emission testing results with comparisons to the applicable NSPS or TCEQ permit limits. Any difference between the summary of results listed in the following table and the detailed results contained in the appendices is due to rounding for presentation.

Table 2-1: Summary of Results

Run Number	Run 1	Run 2	Run 3	Average
Date	**10/28/25**	**10/28/25**	**10/28/25**	**--**
Total Reduced Sulfur (as H_2S) Data				
Emission Rate, lb/hr	0.70	0.91	0.91	0.84
Permit Limit, lb/hr	--	--	--	3.28
Percent of Limit, %	--	--	--	**26**
Emission Factor, lb/ton of black liquor solids	0.0075	0.0097	0.0097	0.0089
NSPS Limit, lb/ton of black liquor solids	--	--	--	0.033
Percent of Limit, %				**27**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods that are listed in Table 3-1. Method descriptions are provided below, and quality assurance/quality control data is provided in Appendix C.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Total Reduced Sulfur	16	Instrumental Analysis
Gas Dilution System Certification	205	---

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1 requirements. The inside diameter of the stack was determined. The upstream and downstream distances between the sampling point and the nearest flow disturbance were measured. The distance between each flow disturbance and the sampling point was expressed in units of stack diameters or stack equivalent diameter. In order to determine the minimum number of traverse points, the upstream and downstream distances were compared to Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas pressure differential (impact pressure vs. static pressure), static pressure and temperature at each measurement point. Pressure differential and static pressure were determined using an S-type pitot tube, an inclined manometer and flexible tubing used to connect both parts of the system. Stack gas temperature was determined using a K-type thermocouple and a pyrometer. The sensor tip of the K-type thermocouple was aligned with the nozzles of the S-type pitot tube in accordance with method requirements.

Stack gas pressure differential, static pressure and temperature measurements were recorded during each test run and were utilized to calculate stack gas velocity in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A –Oxygen and Carbon Dioxide Concentrations – Instrumental

The oxygen (O_2) and carbon dioxide (CO_2) concentrations were determined in accordance with U.S. EPA Reference Test Method 3A. Data was continuously collected and reported as one-minute averages. The sampling system consisted of a stainless-steel probe, unheated Teflon sample line(s), a gas conditioning system and the identified gas analyzer. The gas conditioning system consisted of a filter to remove particulate matter, and a non-contact condenser used to remove moisture from the stack gas. A portable non-contact condenser was placed in the system directly after the probe. A single-point sampling location was used for the determination of the stack gas molecular weight. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 16 – Total Reduced Sulfur

The total reduced sulfur testing was conducted in accordance with U.S. EPA Reference Test Method 16. The total reduced sulfur compounds consisted of hydrogen sulfide (H_2S), methyl mercaptan (MeSH), dimethyl sulfide (DMS), and dimethyl disulfide (DMDS).

The sampling system consisted of a heated Teflon probe, heated Teflon sample line, gas conditioning system, leak-free pump, unheated Teflon sample line, and a gas chromatograph (GC), which was equipped with a flame photometric detector (FPD). The gas conditioning system consisted of three (3) Teflon impingers. The first two (2) impingers each contained 100 mL of citrate buffer (for SO_2 removal), and the third impinger was empty. Each test run consisted of 16 injections, which were performed over a period of at least 3 hours.

The GC/FPD was calibrated for each reduced sulfur compound (H_2S, COS and CS_2) with a certified calibration gas, which was diluted with a dilution system. The dilution system was validated in accordance with EPA Method 205 to produce three (3) or more concentration levels, which spanned the linear range of the FPD. Calibration precision and calibration drift test values were maintained in accordance with EPA Method 16 requirements.

3.4 U.S. EPA Reference Test Method 205 – Gas Dilution System Certification

A calibration gas dilution system field check was conducted in accordance with U.S. EPA Reference Test Method 205. An initial three-point calibration was conducted with individual Protocol 1 gases on the analyzer used to complete the dilution system field check. Multiple dilution rates and total gas flow rates were utilized to force the dilution system to perform two (2) dilutions on each mass flow controller. The diluted calibration gases were sent directly to the analyzer, and the analyzer's response was recorded in an electronic field data sheet. A mid-level supply gas, which was certified to a concentration that was within 10% of one of the gas divider settings described above, was introduced directly to the analyzer, and the analyzer response was recorded in an electronic field data sheet. The analyzer's response was within 2% of the cylinder's concentration. These steps were repeated three (3) times. The average analyzer response was within 2% of the predicted gas concentration. No single injection differed by more than 2% from the average instrument response for its corresponding dilution. The Method 205 data is included in the Quality Assurance/Quality Control Appendix.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Direct Calibration & Calibration Error Test

Direct calibration consisted of introducing Low-Level gas directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration, and once the analyzer reading was stabilized, the analyzer value was recorded. This process was repeated with the High-Level gas. The Calibration Error Test consisted of sequentially introducing Low, Mid, and High-Level calibration gases directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

The system bias and response time were determined by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe, and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it

reached a stable value, and this value was recorded. Next, Low-Level gas was introduced at the probe, and the time that was required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) was recorded. If the Low-Level gas was zero gas, the response was 0.5% or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and the initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

Post test system bias checks were conducted by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe. Once the analyzer reading stabilized, the analyzer value was recorded. Next, Low-Level gas was introduced at the probe, and the analyzer response was recorded once it stabilized. If the System Bias was not within 5.0 percent of the Calibration Span or 0.5% absolute difference, the data was invalidated, and the Calibration Error Test and System Bias were repeated.

Post Test Drift Checks

Drift between pre- and post-run System Bias was within 3 percent of the Calibration Span or 0.5% absolute difference. If the drift exceeded 3 percent or 0.5%, the Calibration Error Test and System Bias were repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check was conducted prior to initiating testing. The pollutant concentrations were measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point was sampled for a minimum of twice the system response time.

The pollutant concentration at each traverse point did not differ more than 5 percent or 0.5 ppmv/0.3% (whichever was less restrictive) of the average pollutant concentration. A single point was sampled during the test runs. Copies of stratification check data can be found in the Quality Assurance/Quality Control Appendix.

Data Collection

A Data Acquisition System equipped with a battery backup was used to record the instrument response as one (1) minute averages. This data was continuously stored as a *.CSV file in Excel format, which was saved to the computer's hard drive. At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

Appendix A - Example Calculations

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	--	= barometric pressure, in. Hg
ΔH	--	= pressure differential of orifice, in H_2O
Pm	--	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	29.63	= barometric pressure, in. Hg
Pg	-0.50	= static pressure, in. H_2O
Ps	29.59	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Vm \times Pm \times Y}{Tm}$$

where,

Y	0.000	= meter correction factor
Vm	--	= meter volume, cf
Pm	--	= absolute meter pressure, in. Hg
Tm	--	= absolute meter temperature, °R
Vmstd	--	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	--	= weight of H_2O collected, g
Vwstd	--	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{\wedge}\left(6.37 - \left(\frac{2{,}827}{Ts + 364.47}\right)\right)}{Ps}$$

where,

Ts	146.6	= stack temperature, °F
Ps	29.6	= absolute stack gas pressure, in. Hg
BWSsat	0.233	= dimensionless

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	--	= standard wet volume, scf
Vmstd	--	= standard meter volume, dscf
BWS	--	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	0.233	= moisture fraction (theoretical at saturated conditions)
BWSmsd	--	= moisture fraction (measured)
BWS	0.233	

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	0.1	= carbon dioxide concentration, %
O_2	20.5	= oxygen concentration, %
Md	28.84	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	28.84	= molecular weight (DRY), lb/lb mol
BWS	0.233	= moisture fraction, dimensionless
Ms	26.32	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.84	= pitot tube coefficient
$\Delta P^{1/2}$	0.619	= average pre/post test velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	606.3	= average pre/post test absolute stack temperature, °R
Ps	29.59	= absolute stack gas pressure, in. Hg
Ms	26.32	= molecular weight of stack gas, lb/lb mol
Vs	39.1	= ft/sec

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	39.1	= stack gas velocity, ft/sec
As	18.99	= cross-sectional area of stack, ft^2
Qa	44,542	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	44,542	= average stack gas flow at stack conditions, acfm
BWS	0.233	= moisture fraction, dimensionless
Ps	29.59	= absolute stack gas pressure, in. Hg
Ts	606.3	= average pre/post test absolute stack temperature, °R
Qs	29,416	= dscfm

Dry Gas Meter Calibration Check (Yqa), percent

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{K \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0	= meter correction factor, dimensionless
Θ	0	= run time, min.
Vm	--	= total meter volume, dcf
K	0.0319	= K-factor, (in. Hg/°R) * cfm^2
Tm	--	= absolute meter temperature, °R
ΔH@	0	= orifice meter calibration coefficient, in. H_2O
Pb	--	= barometric pressure, in. Hg
ΔH avg	--	= average pressure differential of orifice, in H_2O
Md	--	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	#VALUE!	= average square root pressure differential of orifice, $(\text{in. } H_2O)^{1/2}$
Yqa	--	= percent

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	20.1	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.9	= average of pretest & posttest calibration responses, % dry
C_{O_2}	20.5	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	0.2	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.1	= actual concentration of calibration gas, % dry
C_M	9.7	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	0.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 16

TRS - Outlet Concentration (C_{TRS}), ppmvd

$$C_{TRS} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.8	= average analyzer value during test, ppmvd
C_o	NA	= average of pretest & posttest zero responses, ppmvd
C_{MA}	NA	= actual concentration of calibration gas, ppmvd
C_M	NA	= average of pretest & posttest calibration responses, ppmvd
C_{TRS}	4.5	= TRS Concentration, ppmvd

TRS - Outlet Emission Rate (ER_{TRS}), lb/hr

$$ER_{TRS} = \frac{C_{TRS} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 453.592 \frac{g}{lb}}$$

where,

C_{TRSc}	4.5	= TRS - Outlet Concentration, ppmvd
MW	34.081	= TRS molecular weight, g/g-mole
Qs	29,416	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{TRS}	0.70	= lb/hr as H_2S

TRS - Outlet Emission Factor (EF_{TRSPPT}), lb/ton

$$EF_{TRS} = \frac{ER_{TRS} \times 2{,}000 \ \frac{lb}{ton}}{FR}$$

where,

ER_{TRS}	0.70	= TRS - Outlet Emission Rate, lb/hr as H_2S
FR	188,000	= Feed Rate, lb/hr
EF_{TRS}	0.007	= lb/ton

Appendix B - Field Data

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

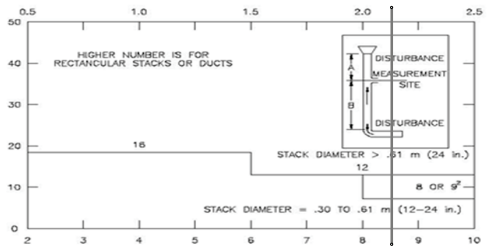
Run Number		Run 1	Run 2	Run 3	Average
Date		10/28/25	10/28/25	10/28/25	--
Start Time		8:15	11:35	14:58	--
Stop Time		11:14	14:34	17:57	--
Source Data					
Feed Rate, ton/hr BLS	FR	94	94	94	94
Input Data - Outlet					
Volumetric Flow Rate (M1-4), dscfm	Qs	29,416	29,913	29,037	29,455
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	20.46	20.48	20.50	20.48
CO_2 Concentration, % dry	C_{CO_2}	0.12	0.09	0.08	0.10
TRS (as SO_2) Concentration, ppmvd	C_{TRS}	4.5	5.7	5.9	5.4
TRS (as H_2S) Emission Rate, lb/hr	ER_{TRSc}	0.70	0.91	0.91	0.84
TRS (as H_2S) Emission Factor, lb/ton BLS	EF_{TRSc}	0.0075	0.0097	0.0097	0.0089

Method 1 Data

Location	Graphic Packaging International Texarkana Mill - Queen City, TX
Source	No. 2 Smelt Tank Scrubber (SM02)
Project No.	AST-2025-4218
Date	10/28/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Measurer (Initial and Date):	TJB 10/28/25	
Reviewer (Initial and Date):	RW 10/28/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall (in)	Distance from outside of port (in)
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

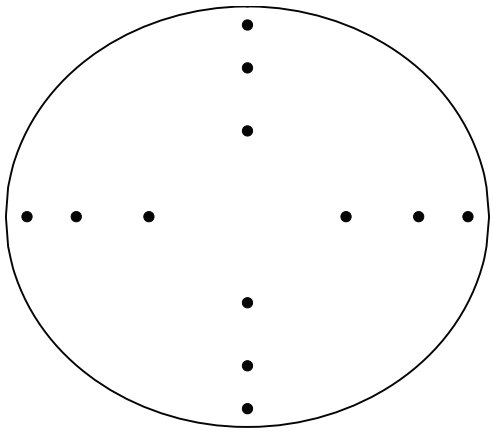
Stack Diagram

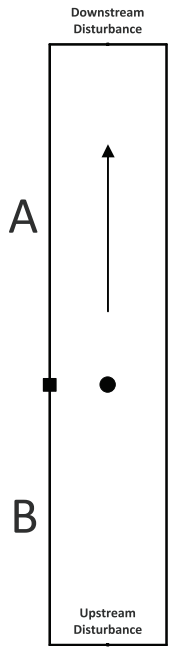
A = 55 ft.

B = 42 ft.

Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Date 10/28/25

Sample Point	Angle (ΔP=0)
1	2
2	5
3	5
4	1
5	6
6	8
7	5
8	2
9	2
10	0
11	8
12	5
Average	4.1

Field Data
Method 2 Data

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Run No.	1		2		3	
Date	10/28/25		10/28/25		10/28/25	
Status	VALID		VALID		VALID	
Start Time	10:45		11:50		16:20	
Stop Time	10:55		12:00		16:32	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.25	146	0.24	145	0.26	145
2	0.29	146	0.33	145	0.28	146
3	0.37	147	0.39	146	0.35	146
4	0.52	147	0.55	147	0.51	147
5	0.48	147	0.47	147	0.45	147
6	0.45	146	0.42	147	0.40	148
B-1	0.36	145	0.38	146	0.35	145
2	0.31	146	0.33	146	0.33	147
3	0.35	147	0.36	147	0.35	148
4	0.39	147	0.42	147	0.38	148
5	0.45	148	0.47	145	0.45	149
6	0.42	147	0.40	145	0.43	148

					Average
Square Root of ΔP, (in. WC)$^{1/2}$	$(\Delta P)^{1/2}$	0.619	0.627	0.612	0.619
Average ΔP, in. WC	(ΔP)	0.39	0.40	0.38	0.39
Pitot Tube Coefficient	(Cp)	0.838	0.838	0.838	0.838
Barometric Pressure, in. Hg	(Pb)	29.63	29.63	29.63	29.63
Static Pressure, in. WC	(Pg)	-0.50	-0.48	-0.45	-0.48
Stack Pressure, in. Hg	(Ps)	29.59	29.59	29.60	29.59
Average Temperature, °F	(Ts)	146.6	146.1	147.0	146.6
Average Temperature, °R	(Ts)	606.3	605.8	606.7	606.2
Moisture Fraction @ Saturation	(BWSsat)	0.233	0.230	0.235	0.233
Moisture Fraction	(BWS)	0.233	0.230	0.235	0.233
O2 Concentration, %	(O_2)	20.46	20.48	20.50	20.5
CO2 Concentration, %	(CO_2)	0.12	0.09	0.08	0.1
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.83	28.83	28.83
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.32	26.35	26.29	26.32
Velocity, ft/sec	(Vs)	39.1	39.6	38.7	39.1
VFR at stack conditions, acfm	(Qa)	44,542	45,085	44,132	44,586
VFR at standard conditions, scfh	(Qsw)	2,300,688	2,330,761	2,278,220	2,303,223
VFR at standard conditions, scfm	(Qsw)	38,345	38,846	37,970	38,387
VFR at standard conditions, dscfm	(Qsd)	29,416	29,913	29,037	29,455

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.10	0.19	3.83
Cal Gas Concentration (C_{MA})	10.02	10.09	NA
Pretest System Zero Response	0.13	0.07	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.14	0.08	NA
Pretest System Cal Response	9.91	9.78	NA
Posttest System Cal Response	9.92	9.69	NA
Average Cal Response (C_M)	9.92	9.74	NA
Corrected Run Average (Corr)	20.46	0.12	4.49
8:15	20.27	0.19	2.90
8:16	20.27	0.18	2.98
8:17	20.25	0.18	3.06
8:18	20.23	0.18	3.01
8:19	20.19	0.19	3.11
8:20	20.18	0.19	3.10
8:21	20.16	0.19	3.19
8:22	20.13	0.19	3.27
8:23	20.09	0.20	3.35
8:24	20.08	0.20	3.46
8:25	20.07	0.20	3.55
8:26	20.05	0.20	3.64
8:27	20.02	0.20	3.59
8:28	19.97	0.20	3.69
8:29	20.00	0.20	3.97
8:30	20.06	0.19	3.98
8:31	20.07	0.19	3.97
8:32	20.09	0.19	3.90
8:33	20.11	0.19	3.80
8:34	20.12	0.18	3.60
8:35	20.14	0.18	3.38
8:36	20.14	0.18	3.33
8:37	20.15	0.18	3.45
8:38	20.14	0.19	3.33
8:39	20.12	0.19	3.26
8:40	20.09	0.19	3.38
8:41	20.09	0.20	3.48
8:42	20.05	0.20	3.35
8:43	20.04	0.21	3.24
8:44	20.07	0.19	3.17
8:45	20.09	0.18	3.15
8:46	20.09	0.18	3.09
8:47	20.10	0.18	3.04
8:48	20.14	0.17	3.12
8:49	20.16	0.17	3.13

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
8:50	20.15	0.17	3.02
8:51	20.17	0.17	2.96
8:52	20.13	0.18	3.02
8:53	20.13	0.18	3.04
8:54	20.13	0.18	3.05
8:55	20.14	0.18	3.06
8:56	20.15	0.18	3.08
8:57	20.13	0.18	3.04
8:58	20.14	0.18	3.02
8:59	20.14	0.18	3.07
9:00	20.13	0.18	3.12
9:01	20.15	0.18	3.24
9:02	20.15	0.18	3.20
9:03	20.17	0.18	3.12
9:04	20.15	0.18	3.20
9:05	20.15	0.18	3.17
9:06	20.12	0.18	3.17
9:07	20.12	0.18	3.19
9:08	20.13	0.18	3.26
9:09	20.13	0.18	3.21
9:10	20.11	0.18	3.26
9:11	20.06	0.19	3.32
9:12	20.03	0.19	3.34
9:13	20.07	0.19	3.44
9:14	20.07	0.19	3.47
9:15	20.03	0.20	3.49
9:16	20.03	0.20	3.42
9:17	20.09	0.19	3.49
9:18	20.10	0.19	3.48
9:19	20.15	0.18	3.49
9:20	20.18	0.18	3.46
9:21	20.15	0.19	3.47
9:22	20.10	0.19	3.49
9:23	20.12	0.19	3.41
9:24	20.15	0.19	3.40
9:25	20.13	0.19	3.52
9:26	20.15	0.19	3.58
9:27	20.08	0.20	3.54
9:28	19.93	0.22	3.61
9:29	19.90	0.22	3.73
9:30	19.93	0.22	3.78
9:31	19.82	0.24	3.90
9:32	19.80	0.24	4.04
9:33	19.81	0.24	4.04
9:34	19.93	0.22	3.97

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
9:35	20.02	0.21	3.86
9:36	20.06	0.20	3.76
9:37	20.10	0.19	3.72
9:38	20.11	0.19	3.65
9:39	20.10	0.19	3.58
9:40	20.09	0.19	3.58
9:41	20.13	0.18	3.60
9:42	20.14	0.18	3.54
9:43	20.15	0.18	3.53
9:44	20.11	0.19	3.51
9:45	20.11	0.19	3.59
9:46	20.12	0.18	3.68
9:47	20.07	0.19	3.66
9:48	20.03	0.20	3.71
9:49	20.09	0.19	3.71
9:50	20.11	0.19	3.76
9:51	20.16	0.18	3.78
9:52	20.15	0.18	3.81
9:53	20.14	0.18	3.78
9:54	20.11	0.19	3.76
9:55	20.14	0.19	3.75
9:56	20.16	0.19	3.68
9:57	20.14	0.20	3.76
9:58	20.11	0.20	3.80
9:59	20.13	0.20	3.76
10:00	20.17	0.19	3.71
10:01	20.16	0.20	3.73
10:02	20.14	0.22	3.75
10:03	20.16	0.20	3.91
10:04	20.08	0.22	4.02
10:05	20.07	0.23	4.08
10:06	20.09	0.23	4.12
10:07	20.13	0.21	4.14
10:08	20.15	0.19	4.23
10:09	20.15	0.20	4.21
10:10	20.12	0.21	4.29
10:11	20.11	0.22	4.29
10:12	20.10	0.22	4.28
10:13	20.11	0.20	4.31
10:14	20.11	0.21	4.28
10:15	20.05	0.23	4.28
10:16	20.05	0.21	4.33
10:17	20.12	0.20	4.25
10:18	20.10	0.22	4.23
10:19	20.10	0.20	4.25

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
10:20	20.09	0.20	4.26
10:21	20.11	0.20	4.36
10:22	20.15	0.18	4.38
10:23	20.11	0.18	4.34
10:24	20.09	0.19	4.30
10:25	20.09	0.19	4.37
10:26	20.12	0.18	4.49
10:27	20.16	0.18	4.39
10:28	20.16	0.18	4.29
10:29	20.10	0.18	4.25
10:30	20.05	0.19	4.32
10:31	20.02	0.19	4.37
10:32	20.02	0.19	4.43
10:33	20.02	0.20	4.46
10:34	20.03	0.20	4.55
10:35	20.06	0.20	4.61
10:36	20.08	0.19	4.65
10:37	20.11	0.18	4.64
10:38	20.07	0.19	4.61
10:39	20.06	0.18	4.58
10:40	20.10	0.18	4.56
10:41	20.11	0.19	4.60
10:42	20.13	0.18	4.55
10:43	20.12	0.18	4.53
10:44	20.10	0.18	4.51
10:45	20.07	0.19	4.49
10:46	20.08	0.18	4.48
10:47	20.10	0.18	4.56
10:48	20.10	0.18	4.50
10:49	20.12	0.18	4.50
10:50	20.15	0.19	4.37
10:51	20.14	0.19	4.29
10:52	20.11	0.19	4.19
10:53	20.10	0.19	4.34
10:54	20.02	0.20	4.34
10:55	20.04	0.21	4.40
10:56	20.07	0.21	4.41
10:57	20.17	0.19	4.47
10:58	20.11	0.19	4.51
10:59	20.11	0.18	4.41
11:00	20.08	0.20	4.43
11:01	20.08	0.21	4.61
11:02	20.03	0.22	4.64
11:03	20.05	0.20	4.62
11:04	20.10	0.19	4.66

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
11:05	20.11	0.18	4.65
11:06	20.14	0.18	4.58
11:07	20.12	0.20	4.58
11:08	20.14	0.19	4.49
11:09	20.20	0.20	4.44
11:10	20.17	0.19	4.51
11:11	20.20	0.17	4.50
11:12	20.24	0.16	4.47
11:13	20.23	0.17	4.43
11:14	20.23	0.17	4.42

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.12	0.17	4.95
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.08	NA
Posttest System Zero Response	0.15	0.09	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.69	NA
Posttest System Cal Response	9.92	9.68	NA
Average Cal Response (C_M)	9.92	9.69	NA
Corrected Run Average (Corr)	20.48	0.09	5.72
11:35	20.16	0.20	4.78
11:36	20.21	0.20	4.72
11:37	20.21	0.18	4.64
11:38	20.19	0.18	4.57
11:39	20.19	0.18	4.55
11:40	20.19	0.18	4.62
11:41	20.24	0.17	4.52
11:42	20.20	0.19	4.52
11:43	20.20	0.18	4.49
11:44	20.21	0.17	4.46
11:45	20.21	0.17	4.49
11:46	20.23	0.16	4.51
11:47	20.22	0.17	4.52
11:48	20.17	0.18	4.43
11:49	20.07	0.20	4.53
11:50	20.13	0.19	4.48
11:51	20.14	0.20	4.52
11:52	20.15	0.20	4.54
11:53	20.20	0.17	4.54
11:54	20.27	0.16	4.53
11:55	20.26	0.16	4.58
11:56	20.22	0.16	4.56
11:57	20.18	0.16	4.57
11:58	20.16	0.17	4.59
11:59	20.19	0.16	4.63
12:00	20.21	0.16	4.64
12:01	20.23	0.17	4.68
12:02	20.21	0.18	4.70
12:03	20.21	0.17	4.74
12:04	20.21	0.17	4.65
12:05	20.21	0.18	4.60
12:06	20.16	0.20	4.58
12:07	19.99	0.23	4.72
12:08	20.01	0.20	4.81
12:09	20.05	0.19	4.87

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:10	20.06	0.19	5.00
12:11	20.10	0.18	5.06
12:12	20.17	0.17	5.01
12:13	20.22	0.17	4.93
12:14	20.20	0.17	4.87
12:15	20.20	0.17	4.95
12:16	20.23	0.16	4.82
12:17	20.24	0.16	4.73
12:18	20.24	0.16	4.66
12:19	20.27	0.16	4.69
12:20	20.25	0.16	4.68
12:21	20.18	0.17	4.74
12:22	20.20	0.16	4.79
12:23	20.14	0.17	4.67
12:24	20.15	0.17	4.75
12:25	20.19	0.16	4.75
12:26	20.19	0.16	4.78
12:27	20.18	0.17	4.91
12:28	20.17	0.17	4.94
12:29	20.17	0.16	4.90
12:30	20.18	0.16	4.87
12:31	20.16	0.17	4.87
12:32	20.19	0.16	4.95
12:33	20.22	0.16	4.93
12:34	20.23	0.16	4.94
12:35	20.23	0.16	4.91
12:36	20.21	0.16	4.87
12:37	20.22	0.15	4.65
12:38	20.25	0.15	4.35
12:39	20.23	0.15	4.31
12:40	20.22	0.15	4.43
12:41	20.16	0.16	4.53
12:42	20.05	0.18	4.59
12:43	19.92	0.19	4.76
12:44	19.90	0.19	4.86
12:45	19.97	0.18	4.97
12:46	20.06	0.17	4.92
12:47	20.11	0.16	4.93
12:48	20.12	0.16	4.97
12:49	20.18	0.15	4.94
12:50	20.22	0.15	4.96
12:51	20.23	0.15	4.89
12:52	20.21	0.15	4.80
12:53	20.18	0.16	4.72
12:54	20.13	0.16	4.72

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:55	20.11	0.17	4.68
12:56	20.07	0.17	4.74
12:57	20.08	0.17	4.76
12:58	20.02	0.17	4.83
12:59	19.94	0.18	4.96
13:00	19.97	0.18	5.01
13:01	19.94	0.18	4.99
13:02	19.97	0.18	5.08
13:03	20.01	0.17	5.21
13:04	20.05	0.17	5.33
13:05	20.09	0.16	5.35
13:06	20.11	0.16	5.40
13:07	20.11	0.16	5.39
13:08	20.11	0.16	5.35
13:09	20.09	0.16	5.30
13:10	20.07	0.17	5.25
13:11	20.08	0.17	5.24
13:12	20.02	0.18	5.32
13:13	19.98	0.18	5.37
13:14	20.01	0.17	5.39
13:15	19.98	0.18	5.51
13:16	19.95	0.18	5.59
13:17	20.00	0.18	5.53
13:18	20.06	0.17	5.50
13:19	20.06	0.17	5.51
13:20	20.03	0.18	5.42
13:21	20.08	0.18	5.37
13:22	20.08	0.17	5.37
13:23	20.05	0.18	5.35
13:24	20.11	0.17	5.16
13:25	20.15	0.17	5.14
13:26	20.17	0.17	5.14
13:27	20.18	0.17	5.10
13:28	20.18	0.17	5.13
13:29	20.20	0.17	5.22
13:30	20.20	0.17	5.14
13:31	20.17	0.17	5.13
13:32	20.14	0.17	5.16
13:33	20.16	0.18	5.17
13:34	20.17	0.17	5.11
13:35	20.14	0.18	5.15
13:36	20.13	0.18	5.06
13:37	20.10	0.19	5.06
13:38	20.15	0.18	5.10
13:39	20.20	0.17	5.10

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
13:40	20.22	0.16	5.02
13:41	20.21	0.17	4.90
13:42	20.18	0.17	4.88
13:43	20.18	0.17	4.86
13:44	20.13	0.17	4.86
13:45	20.11	0.18	4.87
13:46	20.14	0.18	4.93
13:47	20.12	0.18	4.90
13:48	20.15	0.18	4.87
13:49	20.15	0.17	4.92
13:50	20.16	0.17	4.86
13:51	20.16	0.17	4.86
13:52	20.14	0.17	4.95
13:53	20.13	0.17	4.97
13:54	20.08	0.18	5.00
13:55	20.00	0.19	4.97
13:56	19.97	0.19	5.02
13:57	19.96	0.19	5.07
13:58	19.94	0.19	5.01
13:59	19.96	0.19	5.08
14:00	19.99	0.18	5.17
14:01	20.01	0.18	5.26
14:02	20.01	0.18	5.34
14:03	19.96	0.19	5.33
14:04	19.91	0.19	5.45
14:05	19.97	0.18	5.53
14:06	20.00	0.18	5.32
14:07	19.99	0.18	5.28
14:08	20.02	0.18	5.25
14:09	19.98	0.18	5.25
14:10	20.00	0.18	5.31
14:11	20.03	0.18	5.29
14:12	19.98	0.19	5.24
14:13	20.04	0.18	5.23
14:14	19.97	0.19	5.16
14:15	19.97	0.19	5.25
14:16	20.02	0.18	5.28
14:17	20.01	0.18	5.22
14:18	20.05	0.17	5.17
14:19	20.07	0.17	5.14
14:20	20.06	0.17	5.10
14:21	20.07	0.17	5.18
14:22	20.08	0.17	5.25
14:23	20.07	0.17	5.23
14:24	20.03	0.17	5.07

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
14:25	20.03	0.17	4.96
14:26	20.05	0.17	4.98
14:27	20.13	0.16	4.94
14:28	20.15	0.16	4.93
14:29	20.16	0.16	4.95
14:30	20.19	0.16	4.95
14:31	20.21	0.15	4.90
14:32	20.20	0.16	4.87
14:33	20.22	0.15	4.85
14:34	20.22	0.15	4.70

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.16	0.16	5.31
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.09	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.68	NA
Posttest System Cal Response	9.95	9.65	NA
Average Cal Response (C_M)	9.94	9.67	NA
Corrected Run Average (Corr)	20.50	0.08	5.91
14:58	20.01	0.20	4.79
14:59	19.99	0.20	4.82
15:00	20.00	0.20	4.85
15:01	20.01	0.19	4.81
15:02	20.04	0.19	4.80
15:03	20.06	0.18	4.78
15:04	20.06	0.18	4.78
15:05	20.07	0.18	4.84
15:06	20.12	0.17	4.86
15:07	20.14	0.17	4.96
15:08	20.16	0.17	4.99
15:09	20.13	0.17	4.90
15:10	20.12	0.17	4.93
15:11	20.14	0.17	4.91
15:12	20.18	0.16	4.83
15:13	20.23	0.16	4.77
15:14	20.22	0.16	4.73
15:15	20.26	0.15	4.72
15:16	20.25	0.16	4.59
15:17	20.26	0.15	4.48
15:18	20.28	0.15	4.42
15:19	20.24	0.15	4.41
15:20	20.27	0.14	4.35
15:21	20.28	0.15	4.39
15:22	20.23	0.15	4.53
15:23	20.31	0.14	4.50
15:24	20.18	0.16	4.53
15:25	20.09	0.17	4.67
15:26	20.05	0.18	4.71
15:27	19.95	0.19	4.80
15:28	19.96	0.18	4.93
15:29	19.94	0.19	5.02
15:30	19.96	0.18	5.31
15:31	20.00	0.17	5.56
15:32	20.05	0.17	5.58

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
15:33	20.10	0.16	5.51
15:34	20.16	0.16	5.41
15:35	20.19	0.15	5.40
15:36	20.20	0.15	5.37
15:37	20.21	0.15	5.28
15:38	20.24	0.15	5.17
15:39	20.21	0.15	5.15
15:40	20.20	0.15	5.20
15:41	20.17	0.15	5.15
15:42	20.17	0.15	5.16
15:43	20.19	0.15	5.05
15:44	20.20	0.14	4.97
15:45	20.20	0.14	5.00
15:46	20.21	0.14	4.90
15:47	20.19	0.15	4.92
15:48	20.24	0.14	4.68
15:49	20.22	0.15	4.60
15:50	20.20	0.15	4.63
15:51	20.16	0.16	4.63
15:52	20.15	0.16	4.63
15:53	20.17	0.16	4.66
15:54	20.19	0.15	5.06
15:55	20.22	0.15	5.10
15:56	20.22	0.15	5.13
15:57	20.21	0.15	5.09
15:58	20.20	0.15	4.92
15:59	20.18	0.16	4.91
16:00	20.17	0.16	5.00
16:01	20.19	0.15	4.98
16:02	20.18	0.16	4.89
16:03	20.19	0.15	4.87
16:04	20.21	0.15	4.89
16:05	20.23	0.15	4.84
16:06	20.25	0.15	4.81
16:07	20.27	0.14	4.85
16:08	20.29	0.14	4.91
16:09	20.28	0.14	4.83
16:10	20.28	0.14	4.76
16:11	20.30	0.14	4.85
16:12	20.31	0.14	4.89
16:13	20.28	0.14	4.79
16:14	20.27	0.14	4.70
16:15	20.24	0.15	4.69
16:16	20.24	0.15	4.73
16:17	20.24	0.15	4.93

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
16:18	20.16	0.16	5.01
16:19	20.13	0.16	4.93
16:20	20.15	0.16	4.95
16:21	20.11	0.17	4.98
16:22	20.09	0.17	5.06
16:23	20.04	0.17	5.23
16:24	19.93	0.19	5.39
16:25	19.91	0.20	5.53
16:26	19.96	0.19	5.63
16:27	20.00	0.19	5.72
16:28	20.06	0.18	5.89
16:29	20.12	0.17	6.01
16:30	20.10	0.17	5.94
16:31	20.13	0.17	5.88
16:32	20.11	0.18	5.78
16:33	19.99	0.19	5.78
16:34	19.89	0.21	5.95
16:35	19.91	0.21	6.06
16:36	19.96	0.19	6.07
16:37	20.02	0.18	6.04
16:38	20.07	0.18	6.15
16:39	20.09	0.17	6.07
16:40	20.11	0.16	5.95
16:41	20.17	0.16	5.92
16:42	20.19	0.15	5.79
16:43	20.17	0.16	5.66
16:44	20.21	0.15	5.57
16:45	20.23	0.15	5.43
16:46	20.26	0.15	5.31
16:47	20.26	0.15	5.16
16:48	20.27	0.15	5.07
16:49	20.28	0.15	5.03
16:50	20.26	0.15	4.97
16:51	20.26	0.15	5.08
16:52	20.28	0.15	5.16
16:53	20.28	0.15	5.10
16:54	20.29	0.15	5.06
16:55	20.31	0.15	5.10
16:56	20.30	0.16	5.05
16:57	20.24	0.16	4.98
16:58	20.10	0.18	4.92
16:59	19.97	0.20	4.88
17:00	19.91	0.20	5.33
17:01	19.92	0.20	5.99
17:02	19.96	0.19	6.20

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:03	20.01	0.17	6.25
17:04	20.06	0.17	6.23
17:05	20.07	0.16	6.12
17:06	20.05	0.16	6.12
17:07	20.01	0.17	6.20
17:08	20.09	0.16	6.22
17:09	20.13	0.16	6.13
17:10	20.18	0.15	6.07
17:11	20.19	0.15	6.08
17:12	20.18	0.15	5.96
17:13	20.19	0.15	5.93
17:14	20.17	0.16	5.90
17:15	20.15	0.16	5.90
17:16	20.13	0.16	5.87
17:17	20.17	0.16	5.95
17:18	20.13	0.16	5.84
17:19	20.13	0.16	5.85
17:20	20.14	0.17	6.02
17:21	20.13	0.17	6.18
17:22	20.15	0.17	6.14
17:23	20.16	0.16	6.02
17:24	20.16	0.16	6.00
17:25	20.13	0.17	5.95
17:26	20.15	0.16	5.87
17:27	20.15	0.16	5.84
17:28	20.17	0.16	5.89
17:29	20.23	0.15	5.91
17:30	20.23	0.15	5.89
17:31	20.25	0.14	5.91
17:32	20.24	0.15	5.83
17:33	20.20	0.15	5.74
17:34	20.19	0.15	5.65
17:35	20.18	0.15	5.72
17:36	20.20	0.15	5.73
17:37	20.17	0.16	5.69
17:38	20.15	0.16	5.72
17:39	20.22	0.15	5.71
17:40	20.26	0.15	5.67
17:41	20.27	0.15	5.74
17:42	20.26	0.15	5.72
17:43	20.28	0.15	5.62
17:44	20.30	0.15	5.69
17:45	20.29	0.15	5.61
17:46	20.28	0.15	5.49
17:47	20.29	0.15	5.31

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:48	20.28	0.15	5.42
17:49	20.29	0.15	5.47
17:50	20.27	0.15	5.54
17:51	20.28	0.15	5.25
17:52	20.28	0.15	5.11
17:53	20.28	0.15	5.20
17:54	20.28	0.15	5.17
17:55	20.27	0.15	5.20
17:56	20.26	0.15	5.35
17:57	20.26	0.15	5.40

Appendix C - QA/QC

M205 QA Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date

Method Criteria	EPA
Parameter	O_2
Make	Servomex
Model	4900
S/N	900006
Span	19.9
Cylinder Number ID	
Zero	NA
Mid	CC780763
High	EB0074264
Cylinder Certified Values	
Zero	0.00
Mid	10.02
High	19.90
Instrument Response (% or ppm)	
Zero	0.00
Mid	10.04
High	19.91
Calibration Gas Selection (% of Span)	
Mid	50.4
High	100.0
Calibration Error Performance (% of Span)	
Zero	0.0
Mid	0.1
High	0.1
Linearity (% of Range)	
	0.1

Environics ID:	8033
Environics MFC Configuration:	10L, 10L, 1L
Component/Balance Gas:	O_2/N_2
Cylinder Gas ID (Dilution):	EB0074264
Cylinder Gas Concentration (Dilution), %:	19.90
Cylinder Gas ID (Mid-Level):	CC780763
Cylinder Gas Concentration (Mid-Level), %:	10.02

Target Mass Flow Contollers	Target Dilution (%)	Target Flow Rate lpm	Target Concentration (%)	Actual Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)
10L/10L*	90.0	7.0	17.9	17.9	17.95	18.04	18.08	18.02	0.12
10L/10L*	50.0	7.0	10.0	10.0	10.01	10.06	10.04	10.04	0.04
10L/1L	20.0	4.0	4.0	4.0	3.98	3.98	3.95	3.97	-0.03
10L/1L	10.0	4.0	2.0	2.0	1.99	2.05	2.04	2.03	0.03

*Not all AST Environics Units have 2-10L Mass Flow Controllers. For these units the 90% @ 7lpm and 80% @ 7lpm injections will not be conducted.

Average Analyzer Concentration (%)	Injection 1 Error (±2%)	Injection 2 Error (±2%)	Injection 3 Error (±2%)
18.02	-0.4%	0.1%	0.3%
10.04	-0.3%	0.2%	0.0%
3.97	0.3%	0.3%	-0.5%
2.03	-1.8%	1.2%	0.7%

Mid-Level Supply Gas Calibration Direct to Analyzer

Calibration Gas Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)	Average Error (±2%)
10.02	10.05	10.07	10.04	10.05	0.03	0.3%

Location Graphic Packaging International Texarkana Mill - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
10/28/25	PT-201-7	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
10/28/25	PR-208-1	145.0	147.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
10/28/25	Weather Station	NA	NA	NA	Texarkana, TX

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Make	Servomex	Servomex	Ametek
Model	4900	4900	9900
S/N	900006	900006	S13821
Operating Range	0-25	0-25	0-100
Cylinder ID			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	CC780763	CC780763	CC331726
High	EB0074264	EB0074264	CC331726
Cylinder Certified Values			
Zero	0.0	0.0	0.0
Low	NA	NA	NA
Mid	10.02	10.09	125.6
High	19.9	19.83	125.6
Cylinder Expiration Date			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	9/16/33	9/16/33	3/7/27
High	8/12/32	8/12/32	3/7/27
Type of Sample Line	Unheated Sample Line		

Stratification Check

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	8:15	20.27	0.19
2	8:17	20.25	0.18
3	8:19	20.19	0.19
Average		20.2	0.2
Criteria Met		Single Point	Single Point

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Expected Average Concentration	19.00	1.00	7.00
Span Between			
Low	19.00	1.00	7.00
High	95.00	20.00	35.00
Desired Span	19.90	19.83	30.00
Low Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Mid Range Gas			
Low	7.96	7.93	12.00
High	11.94	11.90	18.00
High Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Actual Concentration (% or ppm)			
Zero	0.00	0.00	0.00
Low	NA	NA	NA
Mid	10.02	10.09	15.00
High	19.90	19.83	30.00
Response Time (seconds)	45.00	45.00	45.00
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid
Instrument Response (% or ppm)			
Zero	-0.03	0.01	0.15
Low	NA	NA	NA
Mid	9.96	9.90	15.61
High	19.88	19.74	30.22
Performance (% of Span or Cal. Gas Conc.)			
Zero	0.15	0.05	0.50
Low	NA	NA	NA
Mid	0.30	0.96	2.03
High	0.10	0.45	0.73
Status			
Zero	PASS	PASS	PASS
Low	NA	NA	NA
Mid	PASS	PASS	PASS
High	PASS	PASS	PASS

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 10/28/25		
Span Value	19.90	19.83
Initial Instrument Zero Cal Response	-0.03	0.01
Initial Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.13	0.07
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.91	9.78
Posttest System Upscale Response	9.92	9.69
Bias (%)		
Pretest Zero	0.80	0.30
Posttest Zero	0.90	0.35
Pretest Span	-0.25	-0.61
Posttest Span	-0.20	-1.06
Drift (%)		
Zero	0.10	0.05
Mid	0.05	-0.45
Run 2 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.08
Posttest System Zero Response	0.15	0.09
Pretest System Upscale Response	9.92	9.69
Posttest System Upscale Response	9.92	9.68
Bias (%)		
Pretest Zero	0.90	0.35
Posttest Zero	0.90	0.40
Pretest Span	-0.20	-1.06
Posttest Span	-0.20	-1.11
Drift (%)		
Zero	0.00	0.05
Mid	0.00	-0.05
Run 3 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.09
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.92	9.68
Posttest System Upscale Response	9.95	9.65
Bias (%)		
Pretest Zero	0.90	0.40
Posttest Zero	0.90	0.35
Pretest Span	-0.20	-1.11
Posttest Span	-0.05	-1.26
Drift (%)		
Zero	0.00	-0.05
Mid	0.15	-0.15

Post Test Calibration Drift Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter		TRS (w SO2 gas) - Outlet
Actual Concentration (ppm)		
Mid		15.0
Instrument Response (ppm)		
Mid	**Initial**	15.6
	Post Test	15.7
Performance (% of Calibration Gas)		
Mid		0.3
Status		
Mid		PASS

Note: TRS calibrations were conducted using SO2/N2 calibration gas. Analyzer calibration drift was calculated by evaluating the initial instrument response versus the final instrument response. Performance is acceptable if this value is less than or equal to 3% or 0.5 ppmv.

System Performance Determinations

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	TRS - Outlet
H2S Gas Concentration, ppm	26
Cylinder Certification Number	CC194342
Run 1	
Pretest System Response, ppm	24.67
Posttest System Response, ppm	22.18
Pretest System Performance (%)	94.9
Posttest System Performance (%)	85.3
Run 2	
Posttest System Response, ppm	22.47
Posttest System Performance (%)	86.4
Run 3	
Posttest System Response, ppm	23.36
Posttest System Performance (%)	89.8

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Response Times, seconds			
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**	**TRS - Outlet**
Zero	35	35	45
Low	NA	NA	NA
Mid	35	35	45
Average	35.0	35.0	45.0

Alliance
SOURCE TESTING

Mass Flow Controller Calibration

Dilution System Make:	Environics
Dilution System Model:	4040
Dilution System S/N:	8033
Calibration Equipment Make:	Alicat Scientific
Calibration Equipment Model:	M-10SLPD/5MM-D/5M, M-1SLPM-D/5
Calibration Equipment S/N:	NC00075907 / NC0007908
Flow Cell S/N:	272121
Flow Cell S/N:	272120
Calibration Gas:	Nitrogen
Barometric Pressure, mmHg:	29.94
Ambient Temperature, °F:	68

Mass Flow Controller ID	#1			# 2			# 3		
Size, ccm:	10,000			10,000			1,000		
Make:	Environics			Environics			Environics		
Model:	EFC 202			EFC 202			EFC 202		
S/N:	455242005			455242006			455238003		
	Set Flow cc/min	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**
5%	500	494	1.2%	500	490	2.0%	50	48	4.0%
10%	1,000	1,006	0.6%	1,000	1,004	0.4%	100	97	3.0%
20%	2,000	2,025	1.3%	2,000	2,025	1.3%	200	195	2.5%
30%	3,000	3,046	1.5%	3,000	3,040	1.3%	300	294	2.0%
40%	4,000	4,050	1.3%	4,000	4,050	1.3%	400	391	2.3%
50%	5,000	5,066	1.3%	5,000	5,070	1.4%	500	490	2.0%
60%	6,000	6,086	1.4%	6,000	6,088	1.5%	600	589	1.8%
70%	7,000	7,103	1.5%	7,000	7,111	1.6%	700	691	1.3%
80%	8,000	8,133	1.7%	8,000	8,130	1.6%	800	795	0.6%
90%	9,000	9,167	1.9%	9,000	9,170	1.9%	900	904	0.4%
100%	10,000	10,202	2.0%	10,000	10,193	1.9%	1,000	1,016	1.6%

Note: The mass flow controller's calibration values are used by the dilution system's operating software to improve accuracy. These calibrations are not necessarily indicative of the systems overall performance. Performance is verified by conducting a Method 205 prior to each field use.

Calibration Performed By Timothy Branham

Date 2/21/25

Equipment Detail

Model: Type S
ID: 201-7

Calibration Detail

Time: 9:18
T_s: 69 °F
Pb: 29.47 in. Hg
Std Pitot ID: DAL 1
C_{pstd}: 0.990

Flow	ΔPstd			High Side - "A"			Low Side - 'B"		
	Standard	Start	End	ΔPs		σ	ΔPs		σ
fps	in. WC	in. WC	in. WC	in. WC	Cp(a)	Deviation	in. WC	Cp(b)	Deviation
20	0.09	0.09	0.09	0.13	0.840	0.002	0.13	0.840	0.007
30	0.20	0.20	0.20	0.29	0.829	-0.009	0.29	0.822	-0.011
40	0.36	0.36	0.36	0.51	0.832	-0.006	0.51	0.832	-0.001
50	0.56	0.56	0.56	0.78	0.839	0.001	0.79	0.834	0.001
60	0.81	0.81	0.81	1.15	0.831	-0.007	1.15	0.831	-0.002
70	1.10	1.10	1.10	1.50	0.848	0.010	1.55	0.834	0.001
80	1.44	1.44	1.44	2.00	0.840	0.002	2.00	0.840	0.007
90	1.82	1.82	1.83	2.50	0.846	0.008	2.60	0.829	-0.004
EPA Method 2 Section 10.1.3 QA/QC									
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.826	-0.007
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.829	-0.004
				Average	0.838	0.006		0.833	0.004
				Acceptability Criteria	--	≤ 0.01		--	≤ 0.01
					|Cp(a)-Cp(b)|≤ 0.01			|Cp(a)-Cp(b)|=	0.005

Personnel

Calibrated By: Alaina Drouin
Calibration Date: 12/30/24
Reviewed By: Timothy Branham

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12025

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC780763	**Certification Date:**	09/18/2025
Product ID Number:	124300	**Expiration Date:**	09/16/2033
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC780763.20250911-0	**Lot Number:**	CC780763.20250911
Customer PO. NO.:		**Tracking Number:**	113447110
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.09 %**	±0.08 %	NDIR	09/18/2025
Oxygen	**10.02 %**	±0.03 %	MPA	09/18/2025
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726840	CC726840.20211123	04/18/2031	GMIS	N2	O2	9.35 %	0.163	SRM 2659a
CC770488	CC770488.20240512	02/02/2033	GMIS	N2	O2	24.01 %	0.145	C2459101.03
EB0073532	EB0073532.20230816	09/17/2032	GMIS	N2	CO2	9.47 %	0.176	C2281801.04
EB0078951	EB0078951.20230816	09/17/2032	GMIS	N2	CO2	12.44 %	0.227	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i-HL	1162980025	09/08/2025
CO2	NDIR	Thermo	410i-HL	1162980025	09/10/2025

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0074264	**Certification Date:**	08/14/2024
Product ID Number:	124240	**Expiration Date:**	08/12/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0074264.20240730-0	**Lot Number:**	EB0074264.20240730
Customer PO. NO.:		**Tracking Number:**	084251978
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.83 %**	±0.08 %	FTIR	08/14/2024
Oxygen	**19.90 %**	±0.04 %	MPA	08/08/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
EB0022009	EB0022009.20201022	04/05/2030	GMIS	N2	CO2	24.76 %	0.237	C1847810.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/07/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	08/14/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Airgas Specialty Gases
Airgas USA LLC
9810 BAY AREA BLVD
Pasadena, TX 77507
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	GRAPHIC PACKAGING INTERNATIONAL		
Part Number:	E02NI99E15A0005	Reference Number:	163-401487138-1
Cylinder Number:	CC331726	Cylinder Volume:	144.4 CF
Laboratory:	124 - Pasadena (SG06) - TX	Cylinder Pressure:	2015 PSIG
PGVP Number:	A32019	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	May 07, 2019

Expiration Date: May 07, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	125.0 PPM	125.6 PPM	G1	+/- 0.8% NIST Traceable	04/30/2019, 05/07/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11010402	KAL004739	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Jul 28, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SO2-L-NICOLET iS50 AUP2010248	FTIR	Apr 13, 2019

Triad Data Available Upon Request

Signature on file

Approved for Release

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE
NORTH LITTLE ROCK, AR

Blend Type:	GAS	MOL	
Pressure:	1800	psia	**Sales Order: 1394449**
Volume:	125.0	cf	
Dew Point:	0 C		**RBTGS Part No.:** 130254

Cylinder Size: I-150
Valve Outlet: CGA 330 SS
Cylinder No.: **CC194342**
Bar Code No.: 040319029

Lot No.: RR2503141153
Analysis Date: March 24, 2025
Date Issued: March 24, 2025
Expiration Date: March 24, 2026

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Hydrogen Sulfide	7783-06-4	25.0	ppm	26.0	31.4	26.0	ppm	2%	G
Oxygen	7782-44-7	5.0	%	5.10	5.78	5.10	%	2%	H
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical H2S Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Appendix D - Facility Data

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	10/28/2025 14:58:00 PM	10/28/25 11:35	10/28/25 8:15	
	End Time:	10/28/25 17:58	10/28/25 14:35	10/28/25 11:15	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	657.19	656.52	663.25	659.0
FIC2037E.pv	Pri. Air load -- Total (kpph)	372.32	377.74	372.32	374.1
FIC2038E.pv	Sec. Air load (kpph)	332.76	331.01	331.99	331.9
FIC2039E.pv	Tertiary Air load (kpph)	195.07	195.46	197.83	196.1
AT2197E.pv	Excess O2	2.64	2.47	2.48	2.5
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.20	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	75.33	75.54	74.73	75.2
SIC2085E.pv	"B" I.D. fan speed (rpm)	76.15	76.37	75.54	76.0
FY2103E.pv	Bl. Liq. Burn flow (gpm)	408.46	408.93	413.13	410.2
NM2102E.pv	Bl. Liq. % density (%)	71.92	71.85	71.32	71.7
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	259.22	258.75	259.05	259.0
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	95.05	95.04	95.07	95.1
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	81.72	78.89	73.06	77.9
FT2004E.pv	Weak Wash flow to scrubber (gpm)	94.46	87.14	87.83	89.8
TT2268E.PV	Precip. Ash Tank Temp. (F)	224.93	224.46	224.04	224.5
IT3028e.pv	Scrubber fan amps	45.79	45.62	45.26	45.6

Appendix E - Test Plan

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source to be Tested:
No. 2 Smelt Tank Scrubber (SM02)

Proposed Test Dates:
October 29, 2025

Project No. AST-2025-4218

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citation	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameter*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Test Plan/Report Reviewer
Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing will be conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NSPS.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NSPS, the facility will conduct a performance test program to determine the compliance status of the No. 2 Smelt Tank Scrubber (SM02).

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3A, 4, and 16C. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the TCEQ Air Permit Nos. 2975 and PSDTX778M2 and 40 CFR 60, Subpart BBa.
- Emissions testing will be conducted on the exhaust of the No. 2 Smelt Tank Scrubber (SM02).
- Performance testing will be conducted at the maximum normal operation load.
- Each of the three (3) test runs will be approximately 3 hours in duration.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – October 29, 2025					
Equipment Setup & Pretest QA/QC Checks					12 hr
No. 2 Smelt Tank Scrubber (SM02)	VFR	1-2	3	180 min	
	O_2/CO_2	3A			
	BWS	4			
	TRS	16C			
DAY 2 – October 30, 2025					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
No. 2 Smelt Tank Scrubber (SM02)	TRS – 0.033 lb/ton of black liquor solids (BLS) as hydrogen sulfide (H_2S)	60, Subpart BBa
	TRS – 3.28 lb/hr	TCEQ Permit Nos. 2975 and PSDTX778M2

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Total Reduced Sulfur	16C	Instrumental Analysis

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with a verification measurement provided by the Field Team Leader.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3A. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line is used, then a portable non-contact condenser will be placed in the system directly after the probe. Otherwise, a heated Teflon sample line will be used. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a

known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Method 16C – Total Reduced Sulfur

The total reduced sulfur testing will be conducted in accordance with U.S. EPA Reference Test Method 16C. Data will be collected online and reported in one-minute averages during each test run. The sampling system will consist of a heated Teflon-lined probe, gas conditioning system, Teflon sample line(s), tube furnace and the identified analyzer. The gas conditioning system will consist of three (3) chilled Teflon impingers. The first and second impingers will contain 100 mL of citrate buffer solution while the third impinger will be empty. The citrate buffer solution will be used to remove any sulfur dioxide that will be present in the stack gas. The tube furnace will be operated at 800°C ±100°C. The quality control measures are described in Section 3.6.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Direct Calibration & Calibration Error Test

Low-Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. Next, Low-Level gas will be introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) will be recorded. If the Low-Level gas is zero gas, the acceptable response must be 5.0 percent of the upscale gas concentration or 0.5% (whichever was less restrictive). The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. The measurement system response time and initial system bias will be determined from these data. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe. After the analyzer response is stable, the value will be recorded. Next, Low-Level gas will be introduced at the probe, and the analyzer value will be recorded once it reaches a stable response. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference or the data is invalidated, and the Calibration Error Test and System Bias must be repeated.

Post Test Drift Checks

The Drift between pre- and post-run System Bias must be within 3 percent of the Calibration Span or 0.5% absolute difference or the Calibration Error Test and System Bias must be repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check will be conducted prior to initiating testing. The pollutant concentrations will be measured at twelve traverse points (as described in Method 1) or three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point will be sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point do not differ more than 5% or 0.3% (whichever is less restrictive) of the average pollutant concentration, then single point sampling will be conducted during the test runs. If the pollutant concentration does not meet these specifications but differs less than 10% or 0.5% from the average concentration, then three (3) point sampling will be conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differs by more than 10% or 0.5% from the average concentration, then sampling will be conducted at a minimum of twelve (12) traverse points. Copies of stratification check data will be included in the Quality Assurance/Quality Control Appendix of the report.

Data Collection

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 16C

EPA Protocol 1 Calibration Gases

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Direct Calibration

Low-Level sulfur dioxide (SO_2) gas will be introduced directly to analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading will be stable, the analyzer value will be recorded. This process will be repeated for the Mid-Level gas. Next, High-Level gas will be introduced directly to the analyzer, and the response recorded when it will be stable. All values will be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

System Performance Check

A system performance check will be completed prior to sample collection and after each run. The post-test system performance check will be conducted prior to making any sampling system modifications. The SO_2 scrubber system will be pre-conditioned with stack gas for approximately 10 minutes at 2 liters/min. Prior to starting the test run, Hydrogen Sulfide calibration gas ($\leq$ 100 ppmv) will be introduced at the probe tip and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever will be less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The system performance check will be repeated after the conclusion of each test run. The system performance must be within 80 and 120 percent of the calibration gas concentration. The raw run data will be corrected using the post-test system performance values.

Post-Test Direct Calibration Drift Check

Following the completion testing, a post-test calibration drift check will be performed. Mid-level SO_2 calibration gas will be introduced directly to the analyzer. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The drift value did not differ from the certified calibration gas value by more than 3% or 0.5 ppmv.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.

- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

Appendix F - Field Raw Data

Scaling	0-25	0-25	0-1000
Daisy Lab Channel	0	1	2
DAQ Channel	1	2	3
Time	O2 A	CO2 A	CO A
10/28/25 18:45	20.63	0.14	5.55
10/28/25 18:46	20.63	0.14	5.52
10/28/25 18:47	20.63	0.15	5.63
10/28/25 18:48	20.63	0.15	5.58
10/28/25 18:49	20.63	0.14	5.69
10/28/25 18:50	20.63	0.14	5.69
10/28/25 18:51	20.63	0.14	5.7
10/28/25 18:52	20.63	0.14	5.48
10/28/25 18:53	20.63	0.14	5.52
10/28/25 18:54	20.63	0.14	5.5
10/28/25 18:55	20.63	0.14	5.46
10/28/25 18:56	20.63	0.14	5.47
10/28/25 18:57	20.63	0.14	5.57
10/28/25 18:58	20.63	0.14	5.53
10/28/25 18:59	20.63	0.14	5.51
10/28/25 19:00	20.63	0.14	5.47
10/28/25 19:01	20.63	0.14	5.76
10/28/25 19:02	20.63	0.14	5.8
10/28/25 19:03	20.63	0.14	5.59
10/28/25 19:04	20.63	0.14	5.8
10/28/25 19:05	20.63	0.14	5.72
10/28/25 19:06	20.63	0.14	5.39
10/28/25 19:07	20.63	0.13	5.42
10/28/25 19:08	20.63	0.14	5.63
10/28/25 19:09	20.63	0.13	5.4
10/28/25 19:10	20.63	0.13	5.52
10/28/25 19:11	20.63	0.13	5.49
10/28/25 19:12	20.63	0.13	5.5
10/28/25 19:13	20.62	0.13	5.31
10/28/25 19:14	20.62	0.13	5.3
10/28/25 19:15	20.62	0.13	5.45
10/28/25 19:16	20.62	0.13	5.61
10/28/25 19:17	20.62	0.13	5.44
10/28/25 19:18	20.62	0.13	5.27
10/28/25 19:19	20.62	0.13	5.28
10/28/25 19:20	20.62	0.13	5.26
10/28/25 19:21	20.62	0.13	5.41
10/28/25 19:22	20.62	0.13	5.45
10/28/25 19:23	20.62	0.13	5.46
10/28/25 19:24	20.63	0.13	5.33
10/28/25 19:25	20.62	0.13	5.25
10/28/25 19:26	20.62	0.13	5.18
10/28/25 19:27	20.62	0.13	5.26
10/28/25 19:28	20.62	0.13	5.18
10/28/25 19:29	20.62	0.13	5.18
10/28/25 19:30	20.62	0.13	5.17
10/28/25 19:31	20.62	0.13	5.2
10/28/25 19:32	20.62	0.13	5.25

10/28/25 19:33	20.62	0.13	5.24
10/28/25 19:34	20.62	0.13	5.23
10/28/25 19:35	20.63	0.13	5.19
10/28/25 19:36	20.62	0.13	5.19
10/28/25 19:37	20.62	0.13	5.07
10/28/25 19:38	20.62	0.12	5.1
10/28/25 19:39	20.62	0.13	5.1
10/28/25 19:40	20.62	0.13	5.07
10/28/25 19:41	20.62	0.13	5.06
10/28/25 19:42	20.62	0.13	5.01
10/28/25 19:43	20.62	0.12	5.02
10/28/25 19:44	20.62	0.13	5.14
10/28/25 19:45	20.63	0.12	5.04
10/28/25 19:46	20.63	0.12	5.01
10/28/25 19:47	20.63	0.12	5.03
10/28/25 19:48	20.63	0.12	5.05
10/28/25 19:49	20.63	0.12	5.06
10/28/25 19:50	20.63	0.12	5.01
10/28/25 19:51	20.63	0.12	5.18
10/28/25 19:52	20.63	0.12	5.22
10/28/25 19:53	20.63	0.12	5.35
10/28/25 19:54	20.63	0.12	5.09
10/28/25 19:55	20.64	0.12	5.16
10/28/25 19:56	20.64	0.12	5.09
10/28/25 19:57	20.64	0.12	5.06
10/28/25 19:58	20.64	0.12	5.04
10/28/25 19:59	20.64	0.12	5.31
10/28/25 20:00	20.64	0.12	5.11
10/28/25 20:01	20.64	0.12	5.21
10/28/25 20:02	20.63	0.12	5.12
10/28/25 20:03	20.63	0.12	5.08
10/28/25 20:04	20.64	0.12	5.46
10/28/25 20:05	20.64	0.12	5.02
10/28/25 20:06	20.64	0.12	4.91
10/28/25 20:07	20.64	0.12	5.04
10/28/25 20:08	20.63	0.12	5.32
10/28/25 20:09	20.64	0.12	5
10/28/25 20:10	20.64	0.12	4.93
10/28/25 20:11	20.63	0.12	4.98
10/28/25 20:12	20.63	0.12	5.05
10/28/25 20:13	20.63	0.12	5.09
10/28/25 20:14	20.63	0.12	5
10/28/25 20:15	20.63	0.12	5.18
10/28/25 20:16	20.63	0.12	5.05
10/28/25 20:17	20.63	0.12	4.89
10/28/25 20:18	20.63	0.12	4.92
10/28/25 20:19	20.63	0.12	4.86
10/28/25 20:20	20.63	0.12	5.13
10/28/25 20:21	20.63	0.12	5.12
10/28/25 20:22	20.63	0.12	5.23
10/28/25 20:23	20.63	0.12	5.12
10/28/25 20:24	20.63	0.12	5.22
10/28/25 20:25	20.63	0.12	4.93
10/28/25 20:26	20.64	0.12	4.95
10/28/25 20:27	20.64	0.12	5.25

10/28/25 20:28	20.63	0.12	4.93
10/28/25 20:29	20.64	0.12	4.96
10/28/25 20:30	20.64	0.11	4.88
10/28/25 20:31	20.64	0.12	4.92
10/28/25 20:32	20.64	0.11	4.91
10/28/25 20:33	20.64	0.12	5.02
10/28/25 20:34	20.64	0.12	4.85
10/28/25 20:35	20.64	0.12	4.89
10/28/25 20:36	20.64	0.12	4.94
10/28/25 20:37	20.64	0.11	4.91
10/28/25 20:38	20.64	0.11	5.16
10/28/25 20:39	20.64	0.11	4.94
10/28/25 20:40	20.64	0.11	4.82
10/28/25 20:41	20.64	0.11	4.86
10/28/25 20:42	20.64	0.12	4.88
10/28/25 20:43	20.64	0.11	4.86
10/28/25 20:44	20.64	0.11	4.87
10/28/25 20:45	20.64	0.11	4.83
10/28/25 20:46	20.64	0.11	4.83
10/28/25 20:47	20.64	0.11	4.81
10/28/25 20:48	20.64	0.11	4.86
10/28/25 20:49	20.64	0.11	4.82
10/28/25 20:50	20.64	0.11	4.84
10/28/25 20:51	20.64	0.11	4.83
10/28/25 20:52	20.63	0.11	4.92
10/28/25 20:53	20.63	0.11	4.84
10/28/25 20:54	20.64	0.11	4.83
10/28/25 20:55	20.63	0.11	4.84
10/28/25 20:56	20.63	0.11	4.86
10/28/25 20:57	20.64	0.11	4.86
10/28/25 20:58	20.64	0.11	4.85
10/28/25 20:59	20.64	0.11	4.83
10/28/25 21:00	20.64	0.11	4.86
10/28/25 21:01	20.64	0.11	4.9
10/28/25 21:02	20.64	0.11	4.85
10/28/25 21:03	20.64	0.11	4.87
10/28/25 21:04	20.64	0.11	4.88
10/28/25 21:05	20.64	0.11	4.86
10/28/25 21:06	20.64	0.11	4.9
10/28/25 21:07	20.64	0.11	4.87
10/28/25 21:08	20.64	0.11	4.85
10/28/25 21:09	20.64	0.11	4.88
10/28/25 21:10	20.64	0.11	4.87
10/28/25 21:11	20.64	0.11	4.84
10/28/25 21:12	20.64	0.11	4.88
10/28/25 21:13	20.64	0.11	4.89
10/28/25 21:14	20.63	0.11	4.86
10/28/25 21:15	20.63	0.11	4.88
10/28/25 21:16	20.63	0.11	4.87
10/28/25 21:17	20.64	0.11	4.89
10/28/25 21:18	20.63	0.11	4.9
10/28/25 21:19	20.63	0.11	4.88
10/28/25 21:20	20.63	0.11	4.88
10/28/25 21:21	20.63	0.11	4.89
10/28/25 21:22	20.63	0.11	4.85

10/28/25 21:23	20.63	0.11	4.89
10/28/25 21:24	20.63	0.11	4.93
10/28/25 21:25	20.63	0.11	4.93
10/28/25 21:26	20.63	0.11	4.95
10/28/25 21:27	20.63	0.11	4.89
10/28/25 21:28	20.64	0.11	4.88
10/28/25 21:29	20.64	0.11	4.96
10/28/25 21:30	20.64	0.11	4.94
10/28/25 21:31	20.64	0.11	4.92
10/28/25 21:32	20.64	0.11	4.85
10/28/25 21:33	20.64	0.11	4.89
10/28/25 21:34	20.64	0.11	4.91
10/28/25 21:35	20.64	0.11	4.93
10/28/25 21:36	20.64	0.11	4.9
10/28/25 21:37	20.64	0.11	4.96
10/28/25 21:38	20.64	0.11	4.93
10/28/25 21:39	20.64	0.11	4.9
10/28/25 21:40	20.64	0.11	4.94
10/28/25 21:41	20.64	0.11	5.06
10/28/25 21:42	20.64	0.11	4.98
10/28/25 21:43	20.64	0.11	4.99
10/28/25 21:44	20.64	0.11	5.02
10/28/25 21:45	20.64	0.11	4.99
10/28/25 21:46	20.64	0.11	4.96
10/28/25 21:47	20.64	0.11	4.98
10/28/25 21:48	20.64	0.11	5.03
10/28/25 21:49	20.64	0.11	5
10/28/25 21:50	20.64	0.11	5.03
10/28/25 21:51	20.64	0.11	4.97
10/28/25 21:52	20.64	0.11	5.06
10/28/25 21:53	20.64	0.11	5.01
10/28/25 21:54	20.63	0.11	5.03
10/28/25 21:55	20.63	0.11	5.03
10/28/25 21:56	20.63	0.11	5.04
10/28/25 21:57	20.63	0.11	5.06
10/28/25 21:58	20.63	0.11	5.04
10/28/25 21:59	20.63	0.11	5.04
10/28/25 22:00	20.64	0.11	5.04
10/28/25 22:01	20.64	0.11	5.09
10/28/25 22:02	20.64	0.11	5.06
10/28/25 22:03	20.65	0.11	5.07
10/28/25 22:04	20.64	0.11	5.08
10/28/25 22:05	20.65	0.11	5.06
10/28/25 22:06	20.64	0.11	5.05
10/28/25 22:07	20.64	0.11	5.07
10/28/25 22:08	20.64	0.11	5.06
10/28/25 22:09	20.64	0.11	5.05
10/28/25 22:10	20.64	0.11	5.02
10/28/25 22:11	20.64	0.11	5.07
10/28/25 22:12	20.64	0.11	5.06
10/28/25 22:13	20.64	0.11	5.07
10/28/25 22:14	20.64	0.11	5.09
10/28/25 22:15	20.64	0.11	5.07
10/28/25 22:16	20.64	0.11	5.06
10/28/25 22:17	20.64	0.11	5.09

10/28/25 22:18	20.64	0.11	5.25
10/28/25 22:19	20.64	0.11	5.06
10/28/25 22:20	20.64	0.11	5.07
10/28/25 22:21	20.64	0.11	5.08
10/28/25 22:22	20.64	0.11	5.1
10/28/25 22:23	20.64	0.11	5.12
10/28/25 22:24	20.64	0.11	5.11
10/28/25 22:25	20.64	0.11	5.09
10/28/25 22:26	20.64	0.11	5.05
10/28/25 22:27	20.64	0.11	5.11
10/28/25 22:28	20.65	0.11	5.28
10/28/25 22:29	20.64	0.11	5.17
10/28/25 22:30	20.65	0.11	5.16
10/28/25 22:31	20.64	0.11	5.23
10/28/25 22:32	20.64	0.11	5.16
10/28/25 22:33	20.64	0.11	5.15
10/28/25 22:34	20.64	0.11	5.12
10/28/25 22:35	20.64	0.11	5.16
10/28/25 22:36	20.64	0.11	5.23
10/28/25 22:37	20.64	0.11	5.09
10/28/25 22:38	20.64	0.1	5.29
10/28/25 22:39	20.64	0.1	5.15
10/28/25 22:40	20.64	0.1	5.17
10/28/25 22:41	20.64	0.11	5.25
10/28/25 22:42	20.64	0.11	5.26
10/28/25 22:43	20.64	0.1	5.18
10/28/25 22:44	20.64	0.1	5.1
10/28/25 22:45	20.64	0.1	5.17
10/28/25 22:46	20.64	0.1	5.13
10/28/25 22:47	20.64	0.1	5.28
10/28/25 22:48	20.64	0.1	5.18
10/28/25 22:49	20.64	0.1	5.26
10/28/25 22:50	20.64	0.1	5.21
10/28/25 22:51	20.64	0.1	5.37
10/28/25 22:52	20.64	0.1	5.47
10/28/25 22:53	20.64	0.1	5.36
10/28/25 22:54	20.64	0.1	5.43
10/28/25 22:55	20.64	0.1	5.45
10/28/25 22:56	20.65	0.1	5.35
10/28/25 22:57	20.65	0.1	5.23
10/28/25 22:58	20.65	0.1	5.33
10/28/25 22:59	20.65	0.1	5.23
10/28/25 23:00	20.65	0.1	5.27
10/28/25 23:01	20.65	0.1	5.22
10/28/25 23:02	20.65	0.1	5.13
10/28/25 23:03	20.65	0.1	5.19
10/28/25 23:04	20.65	0.1	5.4
10/28/25 23:05	20.65	0.1	5.47
10/28/25 23:06	20.65	0.1	5.19
10/28/25 23:07	20.64	0.1	5.13
10/28/25 23:08	20.64	0.1	5.2
10/28/25 23:09	20.64	0.1	5.26
10/28/25 23:10	20.64	0.1	5.4
10/28/25 23:11	20.64	0.1	5.66
10/28/25 23:12	20.64	0.1	5.41

10/28/25 23:13	20.64	0.1	5.27
10/28/25 23:14	20.64	0.1	5.26
10/28/25 23:15	20.64	0.1	5.41
10/28/25 23:16	20.64	0.1	5.47
10/28/25 23:17	20.64	0.1	5.36
10/28/25 23:18	20.64	0.1	5.19
10/28/25 23:19	20.64	0.1	5.18
10/28/25 23:20	20.64	0.1	5.27
10/28/25 23:21	20.64	0.09	5.25
10/28/25 23:22	20.64	0.09	5.18
10/28/25 23:23	20.64	0.09	5.24
10/28/25 23:24	20.64	0.09	5.24
10/28/25 23:25	20.64	0.09	5.19
10/28/25 23:26	20.64	0.1	5.22
10/28/25 23:27	20.64	0.09	5.19
10/28/25 23:28	20.64	0.09	5.34
10/28/25 23:29	20.64	0.09	5.22
10/28/25 23:30	20.65	0.09	5.29
10/28/25 23:31	20.65	0.09	5.25
10/28/25 23:32	20.65	0.09	5.25
10/28/25 23:33	20.65	0.1	5.3
10/28/25 23:34	20.65	0.1	5.27
10/28/25 23:35	20.65	0.1	5.29
10/28/25 23:36	20.65	0.1	5.34
10/28/25 23:37	20.65	0.1	5.33
10/28/25 23:38	20.65	0.1	5.43
10/28/25 23:39	20.65	0.1	5.36
10/28/25 23:40	20.65	0.1	5.34
10/28/25 23:41	20.65	0.1	5.33
10/28/25 23:42	20.65	0.1	5.52
10/28/25 23:43	20.65	0.1	5.38
10/28/25 23:44	20.65	0.1	5.45
10/28/25 23:45	20.65	0.1	5.35
10/28/25 23:46	20.64	0.1	5.36
10/28/25 23:47	20.64	0.1	5.41
10/28/25 23:48	20.65	0.1	5.49
10/28/25 23:49	20.64	0.1	5.51
10/28/25 23:50	20.64	0.1	5.65
10/28/25 23:51	20.65	0.1	5.59
10/28/25 23:52	20.65	0.1	5.56
10/28/25 23:53	20.65	0.1	5.52
10/28/25 23:54	20.65	0.1	5.6
10/28/25 23:55	20.65	0.1	5.57
10/28/25 23:56	20.65	0.1	5.55
10/28/25 23:57	20.66	0.09	5.37
10/28/25 23:58	20.66	0.1	5.51
10/28/25 23:59	20.65	0.09	5.47
10/29/25 0:00	20.65	0.09	5.43
10/29/25 0:01	20.65	0.09	5.37
10/29/25 0:02	20.65	0.09	5.63
10/29/25 0:03	20.65	0.09	5.4
10/29/25 0:04	20.65	0.09	5.55
10/29/25 0:05	20.65	0.1	5.76
10/29/25 0:06	20.65	0.1	5.89
10/29/25 0:07	20.65	0.1	5.52

10/29/25 0:08	20.65	0.09	5.71
10/29/25 0:09	20.65	0.1	6
10/29/25 0:10	20.65	0.1	5.65
10/29/25 0:11	20.65	0.09	5.43
10/29/25 0:12	20.65	0.1	5.51
10/29/25 0:13	20.65	0.1	5.7
10/29/25 0:14	20.65	0.1	6.08
10/29/25 0:15	20.65	0.1	5.57
10/29/25 0:16	20.65	0.09	5.58
10/29/25 0:17	20.65	0.09	5.58
10/29/25 0:18	20.65	0.09	5.74
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10/29/25 0:20	20.65	0.09	5.48
10/29/25 0:21	20.65	0.09	5.47
10/29/25 0:22	20.65	0.09	5.47
10/29/25 0:23	20.65	0.09	5.48
10/29/25 0:24	20.65	0.09	5.48
10/29/25 0:25	20.65	0.09	5.47
10/29/25 0:26	20.65	0.09	5.43
10/29/25 0:27	20.65	0.09	5.46
10/29/25 0:28	20.65	0.09	5.49
10/29/25 0:29	20.65	0.09	5.45
10/29/25 0:30	20.65	0.09	5.56
10/29/25 0:31	20.65	0.09	5.51
10/29/25 0:32	20.64	0.09	5.48
10/29/25 0:33	20.65	0.09	5.53
10/29/25 0:34	20.65	0.09	5.52
10/29/25 0:35	20.65	0.09	5.49
10/29/25 0:36	20.65	0.09	5.54
10/29/25 0:37	20.65	0.09	5.56
10/29/25 0:38	20.65	0.09	5.54
10/29/25 0:39	20.65	0.09	5.5
10/29/25 0:40	20.65	0.09	5.54
10/29/25 0:41	20.65	0.09	5.53
10/29/25 0:42	20.65	0.09	5.53
10/29/25 0:43	20.65	0.09	5.53
10/29/25 0:44	20.65	0.09	5.6
10/29/25 0:45	20.65	0.09	5.56
10/29/25 0:46	20.65	0.09	5.58
10/29/25 0:47	20.65	0.09	5.62
10/29/25 0:48	20.65	0.09	5.54
10/29/25 0:49	20.65	0.09	5.54
10/29/25 0:50	20.65	0.09	5.57
10/29/25 0:51	20.65	0.09	5.63
10/29/25 0:52	20.65	0.09	5.56
10/29/25 0:53	20.65	0.09	5.55
10/29/25 0:54	20.65	0.09	5.6
10/29/25 0:55	20.65	0.09	5.6
10/29/25 0:56	20.65	0.09	5.6
10/29/25 0:57	20.65	0.09	5.58
10/29/25 0:58	20.65	0.09	5.62
10/29/25 0:59	20.66	0.09	5.6
10/29/25 1:00	20.66	0.09	5.61
10/29/25 1:01	20.66	0.09	5.59
10/29/25 1:02	20.66	0.09	5.6

10/29/25 1:03	20.66	0.09	5.6
10/29/25 1:04	20.66	0.09	5.57
10/29/25 1:05	20.66	0.09	5.6
10/29/25 1:06	20.66	0.09	5.62
10/29/25 1:07	20.66	0.09	5.65
10/29/25 1:08	20.66	0.09	5.63
10/29/25 1:09	20.66	0.09	5.6
10/29/25 1:10	20.66	0.09	5.63
10/29/25 1:11	20.66	0.09	5.63
10/29/25 1:12	20.66	0.09	5.64
10/29/25 1:13	20.66	0.09	5.66
10/29/25 1:14	20.66	0.09	5.6
10/29/25 1:15	20.66	0.09	5.65
10/29/25 1:16	20.66	0.09	5.65
10/29/25 1:17	20.66	0.09	5.63
10/29/25 1:18	20.66	0.09	5.62
10/29/25 1:19	20.66	0.09	5.68
10/29/25 1:20	20.66	0.09	5.66
10/29/25 1:21	20.66	0.09	5.65
10/29/25 1:22	20.66	0.09	5.65
10/29/25 1:23	20.66	0.09	5.66
10/29/25 1:24	20.65	0.09	5.66
10/29/25 1:25	20.65	0.09	5.7
10/29/25 1:26	20.66	0.09	5.73
10/29/25 1:27	20.66	0.09	5.68
10/29/25 1:28	20.66	0.09	5.7
10/29/25 1:29	20.66	0.09	5.69
10/29/25 1:30	20.67	0.09	5.7
10/29/25 1:31	20.66	0.09	5.76
10/29/25 1:32	20.67	0.09	5.76
10/29/25 1:33	20.66	0.09	5.76
10/29/25 1:34	20.66	0.09	5.77
10/29/25 1:35	20.66	0.09	5.74
10/29/25 1:36	20.66	0.09	5.74
10/29/25 1:37	20.66	0.09	5.77
10/29/25 1:38	20.66	0.09	5.74
10/29/25 1:39	20.66	0.09	5.78
10/29/25 1:40	20.66	0.09	5.79
10/29/25 1:41	20.66	0.09	5.77
10/29/25 1:42	20.66	0.09	5.79
10/29/25 1:43	20.66	0.09	5.77
10/29/25 1:44	20.66	0.09	5.82
10/29/25 1:45	20.66	0.09	5.84
10/29/25 1:46	20.66	0.09	5.79
10/29/25 1:47	20.66	0.09	5.84
10/29/25 1:48	20.66	0.09	5.82
10/29/25 1:49	20.65	0.09	5.89
10/29/25 1:50	20.65	0.09	5.83
10/29/25 1:51	20.65	0.09	5.8
10/29/25 1:52	20.65	0.09	5.84
10/29/25 1:53	20.65	0.09	5.81
10/29/25 1:54	20.65	0.09	5.89
10/29/25 1:55	20.65	0.09	5.84
10/29/25 1:56	20.65	0.09	5.9
10/29/25 1:57	20.65	0.09	5.86

10/29/25 1:58	20.65	0.09	5.85
10/29/25 1:59	20.65	0.09	5.85
10/29/25 2:00	20.65	0.09	5.85
10/29/25 2:01	20.65	0.09	5.83
10/29/25 2:02	20.65	0.09	5.86
10/29/25 2:03	20.65	0.09	5.9
10/29/25 2:04	20.65	0.09	5.89
10/29/25 2:05	20.65	0.09	5.89
10/29/25 2:06	20.65	0.09	5.88
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10/29/25 2:08	20.65	0.09	5.85
10/29/25 2:09	20.66	0.09	5.95
10/29/25 2:10	20.66	0.09	5.91
10/29/25 2:11	20.66	0.09	5.88
10/29/25 2:12	20.65	0.09	5.92
10/29/25 2:13	20.65	0.09	5.92
10/29/25 2:14	20.65	0.09	5.93
10/29/25 2:15	20.66	0.09	5.95
10/29/25 2:16	20.66	0.09	5.92
10/29/25 2:17	20.66	0.09	5.94
10/29/25 2:18	20.67	0.09	5.92
10/29/25 2:19	20.67	0.08	5.91
10/29/25 2:20	20.67	0.09	5.97
10/29/25 2:21	20.66	0.09	5.89
10/29/25 2:22	20.66	0.08	5.97
10/29/25 2:23	20.67	0.09	5.98
10/29/25 2:24	20.67	0.09	5.97
10/29/25 2:25	20.67	0.09	5.95
10/29/25 2:26	20.67	0.09	5.98
10/29/25 2:27	20.66	0.08	5.99
10/29/25 2:28	20.67	0.08	5.99
10/29/25 2:29	20.66	0.08	5.97
10/29/25 2:30	20.66	0.08	5.99
10/29/25 2:31	20.66	0.08	6.02
10/29/25 2:32	20.66	0.08	6.01
10/29/25 2:33	20.66	0.08	5.98
10/29/25 2:34	20.66	0.08	5.94
10/29/25 2:35	20.66	0.08	6.06
10/29/25 2:36	20.66	0.08	5.99
10/29/25 2:37	20.66	0.08	6.03
10/29/25 2:38	20.66	0.08	6.03
10/29/25 2:39	20.66	0.08	6.03
10/29/25 2:40	20.66	0.08	6
10/29/25 2:41	20.67	0.08	6.02
10/29/25 2:42	20.67	0.08	6
10/29/25 2:43	20.67	0.08	6.05
10/29/25 2:44	20.67	0.08	6.04
10/29/25 2:45	20.67	0.08	6.01
10/29/25 2:46	20.67	0.08	5.99
10/29/25 2:47	20.67	0.08	6.04
10/29/25 2:48	20.67	0.08	6.1
10/29/25 2:49	20.67	0.08	6.1
10/29/25 2:50	20.67	0.08	6.11
10/29/25 2:51	20.67	0.08	6.07
10/29/25 2:52	20.67	0.08	6.11

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10/29/25 2:54	20.67	0.08	6.14
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10/29/25 2:56	20.67	0.08	6.04
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10/29/25 2:58	20.66	0.08	6.14
10/29/25 2:59	20.66	0.08	6.12
10/29/25 3:00	20.66	0.08	6.15
10/29/25 3:01	20.66	0.08	6.07
10/29/25 3:02	20.66	0.08	6.11
10/29/25 3:03	20.66	0.08	6.12
10/29/25 3:04	20.66	0.08	6.14
10/29/25 3:05	20.67	0.08	6.16
10/29/25 3:06	20.66	0.08	6.13
10/29/25 3:07	20.66	0.08	6.14
10/29/25 3:08	20.66	0.08	6.19
10/29/25 3:09	20.66	0.08	6.17
10/29/25 3:10	20.66	0.08	6.13
10/29/25 3:11	20.66	0.08	6.18
10/29/25 3:12	20.66	0.08	6.18
10/29/25 3:13	20.66	0.08	6.21
10/29/25 3:14	20.66	0.08	6.19
10/29/25 3:15	20.66	0.08	6.2
10/29/25 3:16	20.66	0.08	6.14
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10/29/25 3:19	20.66	0.08	6.24
10/29/25 3:20	20.66	0.08	6.23
10/29/25 3:21	20.66	0.08	6.16
10/29/25 3:22	20.66	0.08	6.21
10/29/25 3:23	20.66	0.08	6.2
10/29/25 3:24	20.66	0.08	6.26
10/29/25 3:25	20.67	0.08	6.22
10/29/25 3:26	20.67	0.08	6.23
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10/29/25 3:30	20.67	0.08	6.29
10/29/25 3:31	20.67	0.08	6.31
10/29/25 3:32	20.67	0.08	6.27
10/29/25 3:33	20.67	0.08	6.28
10/29/25 3:34	20.67	0.08	6.23
10/29/25 3:35	20.67	0.08	6.25
10/29/25 3:36	20.67	0.08	6.28
10/29/25 3:37	20.67	0.08	6.3
10/29/25 3:38	20.67	0.08	6.27
10/29/25 3:39	20.67	0.08	6.35
10/29/25 3:40	20.67	0.08	6.29
10/29/25 3:41	20.67	0.08	6.26
10/29/25 3:42	20.67	0.08	6.3
10/29/25 3:43	20.67	0.08	6.32
10/29/25 3:44	20.67	0.08	6.3
10/29/25 3:45	20.67	0.08	6.29
10/29/25 3:46	20.67	0.08	6.28
10/29/25 3:47	20.67	0.08	6.34

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10/29/25 3:49	20.67	0.08	6.38
10/29/25 3:50	20.67	0.08	6.32
10/29/25 3:51	20.67	0.08	6.34
10/29/25 3:52	20.68	0.08	6.32
10/29/25 3:53	20.68	0.08	6.39
10/29/25 3:54	20.68	0.08	6.37
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10/29/25 3:58	20.68	0.08	6.38
10/29/25 3:59	20.67	0.08	6.37
10/29/25 4:00	20.67	0.08	6.44
10/29/25 4:01	20.67	0.08	6.4
10/29/25 4:02	20.67	0.08	6.4
10/29/25 4:03	20.67	0.08	6.42
10/29/25 4:04	20.67	0.08	6.38
10/29/25 4:05	20.67	0.08	6.41
10/29/25 4:06	20.67	0.08	6.42
10/29/25 4:07	20.66	0.08	6.44
10/29/25 4:08	20.67	0.08	6.44
10/29/25 4:09	20.67	0.08	6.41
10/29/25 4:10	20.67	0.08	6.42
10/29/25 4:11	20.66	0.08	6.44
10/29/25 4:12	20.66	0.08	6.44
10/29/25 4:13	20.67	0.08	6.46
10/29/25 4:14	20.66	0.08	6.5
10/29/25 4:15	20.66	0.08	6.45
10/29/25 4:16	20.66	0.08	6.43
10/29/25 4:17	20.66	0.08	6.47
10/29/25 4:18	20.66	0.08	6.49
10/29/25 4:19	20.66	0.08	6.46
10/29/25 4:20	20.66	0.08	6.48
10/29/25 4:21	20.66	0.08	6.45
10/29/25 4:22	20.66	0.08	6.49
10/29/25 4:23	20.66	0.08	6.49
10/29/25 4:24	20.67	0.08	6.47
10/29/25 4:25	20.67	0.08	6.53
10/29/25 4:26	20.67	0.08	6.54
10/29/25 4:27	20.67	0.08	6.53
10/29/25 4:28	20.67	0.08	6.52
10/29/25 4:29	20.67	0.08	6.54
10/29/25 4:30	20.67	0.08	6.52
10/29/25 4:31	20.67	0.08	6.55
10/29/25 4:32	20.67	0.08	6.5
10/29/25 4:33	20.67	0.08	6.58
10/29/25 4:34	20.67	0.08	6.57
10/29/25 4:35	20.67	0.08	6.57
10/29/25 4:36	20.67	0.07	6.55
10/29/25 4:37	20.67	0.08	6.56
10/29/25 4:38	20.67	0.08	6.57
10/29/25 4:39	20.67	0.08	6.57
10/29/25 4:40	20.67	0.07	6.56
10/29/25 4:41	20.67	0.07	6.6
10/29/25 4:42	20.67	0.07	6.65

10/29/25 4:43	20.67	0.07	6.63
10/29/25 4:44	20.67	0.08	6.66
10/29/25 4:45	20.67	0.08	6.65
10/29/25 4:46	20.67	0.08	6.6
10/29/25 4:47	20.67	0.08	6.61
10/29/25 4:48	20.67	0.08	6.62
10/29/25 4:49	20.67	0.08	6.64
10/29/25 4:50	20.67	0.08	6.63
10/29/25 4:51	20.67	0.07	6.67
10/29/25 4:52	20.67	0.08	6.69
10/29/25 4:53	20.68	0.08	6.59
10/29/25 4:54	20.67	0.08	6.61
10/29/25 4:55	20.67	0.07	6.64
10/29/25 4:56	20.67	0.08	6.58
10/29/25 4:57	20.67	0.08	6.65
10/29/25 4:58	20.67	0.08	6.66
10/29/25 4:59	20.68	0.08	6.63
10/29/25 5:00	20.67	0.07	6.68
10/29/25 5:01	20.67	0.07	6.68
10/29/25 5:02	20.67	0.07	6.71
10/29/25 5:03	20.67	0.08	6.68
10/29/25 5:04	20.67	0.07	6.7
10/29/25 5:05	20.67	0.07	6.74
10/29/25 5:06	20.67	0.07	6.71
10/29/25 5:07	20.67	0.07	6.73
10/29/25 5:08	20.67	0.08	6.66
10/29/25 5:09	20.67	0.08	6.62
10/29/25 5:10	20.67	0.08	6.68
10/29/25 5:11	20.67	0.07	6.71
10/29/25 5:12	20.67	0.07	6.7
10/29/25 5:13	20.67	0.07	6.7
10/29/25 5:14	20.67	0.07	6.74
10/29/25 5:15	20.67	0.07	6.77
10/29/25 5:16	20.67	0.07	6.75
10/29/25 5:17	20.67	0.07	6.78
10/29/25 5:18	20.68	0.07	6.72
10/29/25 5:19	20.68	0.07	6.74
10/29/25 5:20	20.68	0.07	6.77
10/29/25 5:21	20.68	0.07	6.76
10/29/25 5:22	20.68	0.07	6.77
10/29/25 5:23	20.68	0.07	6.76
10/29/25 5:24	20.67	0.07	6.8
10/29/25 5:25	20.67	0.07	6.78
10/29/25 5:26	20.68	0.07	6.75
10/29/25 5:27	20.67	0.07	6.81
10/29/25 5:28	20.68	0.07	6.81
10/29/25 5:29	20.68	0.07	6.84
10/29/25 5:30	20.68	0.07	6.8
10/29/25 5:31	20.68	0.07	6.86
10/29/25 5:32	20.67	0.07	6.87
10/29/25 5:33	20.67	0.07	6.82
10/29/25 5:34	20.67	0.07	6.84
10/29/25 5:35	20.67	0.07	6.88
10/29/25 5:36	20.67	0.07	6.87
10/29/25 5:37	20.68	0.07	6.85

10/29/25 5:38	20.67	0.07	6.83
10/29/25 5:39	20.67	0.07	6.83
10/29/25 5:40	20.67	0.07	6.82
10/29/25 5:41	20.67	0.07	6.87
10/29/25 5:42	20.67	0.07	6.88
10/29/25 5:43	20.67	0.07	6.9
10/29/25 5:44	20.67	0.07	6.89
10/29/25 5:45	20.67	0.07	6.88
10/29/25 5:46	20.67	0.07	6.89
10/29/25 5:47	20.67	0.07	6.87
10/29/25 5:48	20.67	0.07	6.89
10/29/25 5:49	20.67	0.07	6.87
10/29/25 5:50	20.67	0.07	6.87
10/29/25 5:51	20.67	0.07	6.89
10/29/25 5:52	20.67	0.07	6.93
10/29/25 5:53	20.67	0.07	6.89
10/29/25 5:54	20.67	0.07	6.9
10/29/25 5:55	20.67	0.07	6.93
10/29/25 5:56	20.68	0.07	6.91
10/29/25 5:57	20.68	0.07	6.92
10/29/25 5:58	20.68	0.07	6.96
10/29/25 5:59	20.68	0.07	7.01
10/29/25 6:00	20.68	0.07	6.95
10/29/25 6:01	20.68	0.07	6.93
10/29/25 6:02	20.68	0.07	6.95
10/29/25 6:03	20.68	0.07	6.95
10/29/25 6:04	20.68	0.07	7.01
10/29/25 6:05	20.68	0.07	7.02
10/29/25 6:06	20.68	0.07	6.96
10/29/25 6:07	20.68	0.07	6.98
10/29/25 6:08	20.68	0.07	6.98
10/29/25 6:09	20.68	0.07	7.01
10/29/25 6:10	20.67	0.07	7
10/29/25 6:11	20.68	0.07	7.02
10/29/25 6:12	20.67	0.07	7.03
10/29/25 6:13	20.67	0.07	7.01
10/29/25 6:14	20.67	0.07	7.01
10/29/25 6:15	20.67	0.07	7
10/29/25 6:16	20.67	0.07	7.02
10/29/25 6:17	20.67	0.07	7.06
10/29/25 6:18	20.67	0.07	7.01
10/29/25 6:19	20.67	0.07	7.03
10/29/25 6:20	20.67	0.07	7.02
10/29/25 6:21	20.67	0.07	6.99
10/29/25 6:22	20.67	0.07	7.02
10/29/25 6:23	20.68	0.07	7.12
10/29/25 6:24	20.68	0.07	7.07
10/29/25 6:25	20.68	0.07	7.11
10/29/25 6:26	20.68	0.07	7.07
10/29/25 6:27	20.68	0.07	7.11
10/29/25 6:28	20.68	0.07	7.09
10/29/25 6:29	20.68	0.07	7.07
10/29/25 6:30	20.68	0.07	7.08
10/29/25 6:31	20.68	0.07	7.08
10/29/25 6:32	20.68	0.07	7.06

10/29/25 6:33	20.68	0.07	7.13
10/29/25 6:34	20.68	0.07	7.14
10/29/25 6:35	20.68	0.07	7.13
10/29/25 6:36	20.68	0.07	7.13
10/29/25 6:37	20.68	0.07	7.09
10/29/25 6:38	20.68	0.07	7.06
10/29/25 6:39	20.68	0.07	7.13
10/29/25 6:40	20.68	0.07	7.12
10/29/25 6:41	20.68	0.07	7.11
10/29/25 6:42	20.68	0.07	7.13
10/29/25 6:43	20.68	0.07	7.11
10/29/25 6:44	20.68	0.07	7.17
10/29/25 6:45	20.68	0.07	7.09
10/29/25 6:46	20.68	0.07	7.1
10/29/25 6:47	20.68	0.07	7.17
10/29/25 6:48	20.68	0.07	7.15
10/29/25 6:49	20.68	0.07	7.18
10/29/25 6:50	20.68	0.07	7.12
10/29/25 6:51	20.68	0.07	7.18
10/29/25 6:52	20.67	0.07	7.21
10/29/25 6:53	20.68	0.07	7.19
10/29/25 6:54	20.68	0.07	7.13
10/29/25 6:55	20.68	0.07	7.14
10/29/25 6:56	20.68	0.07	7.16
10/29/25 6:57	20.68	0.07	7.2
10/29/25 6:58	20.67	0.07	7.24
10/29/25 6:59	20.67	0.07	7.2
10/29/25 7:00	20.67	0.07	7.22
10/29/25 7:01	20.67	0.07	7.18
10/29/25 7:02	20.67	0.07	7.17
10/29/25 7:03	20.67	0.07	7.18
10/29/25 7:04	20.67	0.07	7.21
10/29/25 7:05	20.68	0.07	7.16
10/29/25 7:06	20.68	0.07	7.21
10/29/25 7:07	20.68	0.07	7.29
10/29/25 7:08	20.67	0.07	7.23
10/29/25 7:09	20.68	0.07	7.22
10/29/25 7:10	20.68	0.07	7.28
10/29/25 7:11	20.68	0.06	7.26
10/29/25 7:12	20.68	0.06	7.28
10/29/25 7:13	20.68	0.06	7.21
10/29/25 7:14	20.67	0.06	7.24
10/29/25 7:15	20.67	0.07	7.26
10/29/25 7:16	20.67	0.06	7.27
10/29/25 7:17	20.68	0.07	7.3
10/29/25 7:18	20.67	0.07	7.24
10/29/25 7:19	20.68	0.07	7.25
10/29/25 7:20	20.68	0.07	7.22
10/29/25 7:21	20.68	0.07	7.21
10/29/25 7:22	20.68	0.06	7.29
10/29/25 7:23	20.68	0.06	7.26
10/29/25 7:24	20.68	0.06	7.34
10/29/25 7:25	20.68	0.07	7.28
10/29/25 7:26	20.68	0.06	7.28
10/29/25 7:27	20.68	0.07	7.27

10/29/25 7:28	20.68	0.06	7.3
10/29/25 7:29	20.68	0.06	7.33
10/29/25 7:30	20.68	0.06	7.3
10/29/25 7:31	20.68	0.07	7.32
10/29/25 7:32	20.69	0.06	7.33
10/29/25 7:33	20.68	0.06	7.35
10/29/25 7:34	20.68	0.06	7.36
10/29/25 7:35	20.68	0.07	7.33
10/29/25 7:36	20.67	0.06	7.4
10/29/25 7:37	1.55	0	7
10/29/25 7:38	0.01	-0.04	0.57
10/29/25 7:39	0.64	0.62	-0.31
10/29/25 7:40	19.82	20.37	-2.23
10/29/25 7:41	19.93	20.06	-0.95
10/29/25 7:42	19.91	19.84	-1
10/29/25 7:43	19.85	18.85	-0.72
10/29/25 7:44	13.6	9.81	-0.27
10/29/25 7:45	9.96	9.9	-0.93
10/29/25 7:46	13.12	7.43	-0.51
10/29/25 7:47	4.95	0.79	374.64
10/29/25 7:48	0.01	0	508.49
10/29/25 7:49	5.45	0.01	376.72
10/29/25 7:50	0.08	0.01	245
10/29/25 7:51	0	0	250.39
10/29/25 7:52	12.62	0.02	93.49
10/29/25 7:53	4.68	0.1	0.84
10/29/25 7:54	0.14	0.07	0.75
10/29/25 7:55	0.13	0.07	0.79
10/29/25 7:56	7.09	6.93	10.06
10/29/25 7:57	9.9	9.75	0.07
10/29/25 7:58	9.91	9.8	-0.22
10/29/25 7:59	4.02	4.07	134.83
10/29/25 8:00	0.14	0.17	245.75
10/29/25 8:01	0.28	0.38	246.27
10/29/25 8:02	7.18	10.59	118.02
10/29/25 8:03	7.48	11.08	105.74
10/29/25 8:04	7.11	11.45	97.46
10/29/25 8:05	6.94	11.6	101.63
10/29/25 8:06	6.66	11.92	108.9
10/29/25 8:07	6.5	12.08	103.51
10/29/25 8:08	6.46	12.11	99.21
10/29/25 8:09	6.44	12.13	97.83
10/29/25 8:10	6.41	12.17	103.77
10/29/25 8:11	6.52	12.06	102.59
10/29/25 8:12	6.45	12.13	95.36
10/29/25 8:13	6.15	12.43	91.71
10/29/25 8:14	6.07	12.52	100.52
10/29/25 8:15	6.02	12.51	100.74
10/29/25 8:16	6.03	12.58	100.01
10/29/25 8:17	6.07	12.48	96.08
10/29/25 8:18	5.93	12.64	113.7
10/29/25 8:19	5.84	12.67	122.24
10/29/25 8:20	5.82	12.83	143.96
10/29/25 8:21	5.89	12.8	152.03
10/29/25 8:22	6.33	12.6	133.36

10/29/25 8:23	6.99	12.06	111.26
10/29/25 8:24	6.93	12.12	109.96
10/29/25 8:25	7.22	11.83	108.88
10/29/25 8:26	6.76	12.22	104.57
10/29/25 8:27	7.06	12.12	108.43
10/29/25 8:28	7.32	11.73	102.05
10/29/25 8:29	7.16	11.73	106.7
10/29/25 8:30	6.44	12.2	103.21
10/29/25 8:31	6.33	12.31	93.73
10/29/25 8:32	6.61	12.14	97.91
10/29/25 8:33	6.76	11.95	104.8
10/29/25 8:34	6.5	12.18	104.31
10/29/25 8:35	6.84	11.96	112.74
10/29/25 8:36	6.92	11.89	120.98
10/29/25 8:37	6.94	11.93	127.88
10/29/25 8:38	6.96	11.9	123.12
10/29/25 8:39	7.23	11.68	116.59
10/29/25 8:40	7.1	11.78	102.97
10/29/25 8:41	6.94	11.86	98.76
10/29/25 8:42	6.92	11.95	97.81
10/29/25 8:43	7.01	11.88	94.02
10/29/25 8:44	6.37	12.27	85.88
10/29/25 8:45	6.06	12.69	117.2
10/29/25 8:46	6.19	12.57	99.4
10/29/25 8:47	6.26	12.56	97.01
10/29/25 8:48	6.34	12.5	101.28
10/29/25 8:49	6.48	12.38	98.39
10/29/25 8:50	6.6	12.26	106.15
10/29/25 8:51	7.23	11.7	117
10/29/25 8:52	7.27	11.49	110.87
10/29/25 8:53	7.73	11.08	114.55
10/29/25 8:54	7.7	11.01	119.61
10/29/25 8:55	7.54	11.2	115.1
10/29/25 8:56	7.38	11.3	109.92
10/29/25 8:57	7.71	11.16	113.74
10/29/25 8:58	8.22	10.63	112.26
10/29/25 8:59	8.63	10.19	113.78
10/29/25 9:00	8.61	10.2	112.03
10/29/25 9:01	8.58	10.22	117.38
10/29/25 9:02	8.74	10.03	130.19
10/29/25 9:03	8.48	10.28	123.51
10/29/25 9:04	8.27	10.47	125.77
10/29/25 9:05	8.43	10.37	126.13
10/29/25 9:06	8.45	10.34	123.98
10/29/25 9:07	2.66	2.93	80.51
10/29/25 9:08	0.12	0.17	1.25
10/29/25 9:09	0.45	0.45	3.82
10/29/25 9:10	9.64	9.27	6.47
10/29/25 9:11	9.89	9.82	0.26
10/29/25 9:12	5.11	5.07	111.86
10/29/25 9:13	0.13	0.2	246.08
10/29/25 9:14	1.04	1.18	237.16
10/29/25 9:15	8.67	9.75	110.4
10/29/25 9:16	8.56	10.17	104.76
10/29/25 9:17	8.4	10.32	108.36

10/29/25 9:18	8.55	10.18	107.87
10/29/25 9:19	8.07	10.31	87.08
10/29/25 9:20	7.21	10.9	75.09
10/29/25 9:21	6.99	11.15	77.89
10/29/25 9:22	7.01	11.14	87.09
10/29/25 9:23	6.75	11.38	93.57
10/29/25 9:24	6.5	11.58	92.06
10/29/25 9:25	6.08	11.97	105.13
10/29/25 9:26	5.9	12.19	124.1
10/29/25 9:27	5.92	12.16	111.41
10/29/25 9:28	5.81	12.2	123.78
10/29/25 9:29	5.38	12.57	192.52
10/29/25 9:30	5.14	12.84	298.1
10/29/25 9:31	4.87	13.04	451.86
10/29/25 9:32	4.65	13.27	667.98
10/29/25 9:33	4.73	13.24	720.14
10/29/25 9:34	4.82	13.14	659.46
10/29/25 9:35	4.88	13.07	495.39
10/29/25 9:36	4.77	13.11	505.47
10/29/25 9:37	4.89	13.11	502.15
10/29/25 9:38	4.92	13.07	432.78
10/29/25 9:39	4.9	13.08	541.3
10/29/25 9:40	4.79	13.29	268.14
10/29/25 9:41	4.73	13.53	346.34
10/29/25 9:42	5.41	13.16	125.42
10/29/25 9:43	5.54	13.11	137.51
10/29/25 9:44	5.84	12.95	155.19
10/29/25 9:45	6.07	12.63	116.18
10/29/25 9:46	5.72	12.96	155.28
10/29/25 9:47	5.73	12.94	132.63
10/29/25 9:48	5.8	12.8	151.02
10/29/25 9:49	5.63	12.87	176.23
10/29/25 9:50	5.4	12.97	220.92
10/29/25 9:51	5.49	12.9	250.12
10/29/25 9:52	5.34	12.73	488.76
10/29/25 9:53	4.79	13.21	446.14
10/29/25 9:54	4.93	13.11	426.5
10/29/25 9:55	5.01	12.99	463.16
10/29/25 9:56	5.09	12.87	496.5
10/29/25 9:57	5.12	12.92	507.97
10/29/25 9:58	4.99	12.95	458.33
10/29/25 9:59	5.18	12.88	505.37
10/29/25 10:00	5.1	12.98	499.24
10/29/25 10:01	5.07	13.04	477.39
10/29/25 10:02	5.34	12.83	342.41
10/29/25 10:03	5.65	12.57	217.28
10/29/25 10:04	5.45	12.73	303.13
10/29/25 10:05	5.22	13.01	374.23
10/29/25 10:06	5.24	12.96	422.22
10/29/25 10:07	5.02	13.2	472.75
10/29/25 10:08	5.12	13.12	479.64
10/29/25 10:09	5.31	12.95	275.07
10/29/25 10:10	5.75	12.6	140.9
10/29/25 10:11	5.87	12.42	142.68
10/29/25 10:12	6.04	12.29	129.79

10/29/25 10:13	5.86	12.43	160.52
10/29/25 10:14	5.79	12.53	172.32
10/29/25 10:15	5.45	12.79	232.78
10/29/25 10:16	5.36	12.92	209.37
10/29/25 10:17	5.2	13	330.03
10/29/25 10:18	5.25	13.01	262.69
10/29/25 10:19	5.18	13.1	324.51
10/29/25 10:20	5.34	13.03	244.33
10/29/25 10:21	5.24	13.05	285.74
10/29/25 10:22	4.8	13.45	449.33
10/29/25 10:23	5.45	13.16	137.64
10/29/25 10:24	5.78	12.81	90.75
10/29/25 10:25	6.2	12.48	85.14
10/29/25 10:26	6.44	12.4	92.94
10/29/25 10:27	6.62	12.21	97.2
10/29/25 10:28	6.48	12.31	91.74
10/29/25 10:29	6.33	12.45	88.69
10/29/25 10:30	6.4	12.42	94.54
10/29/25 10:31	6.45	12.31	90.21
10/29/25 10:32	6.3	12.44	88.04
10/29/25 10:33	6.51	12.24	92.9
10/29/25 10:34	6.56	12.14	83.19
10/29/25 10:35	6.68	12.02	89.65
10/29/25 10:36	6.73	11.96	83.19
10/29/25 10:37	6.82	11.86	84.09
10/29/25 10:38	6.76	11.92	80.68
10/29/25 10:39	6.95	11.75	86.73
10/29/25 10:40	6.86	11.84	90.97
10/29/25 10:41	7.03	11.72	101.99
10/29/25 10:42	7.3	11.47	107.6
10/29/25 10:43	7.55	11.22	100.07
10/29/25 10:44	7.48	11.28	104.97
10/29/25 10:45	7.49	11.26	112.86
10/29/25 10:46	7.46	11.34	123.89
10/29/25 10:47	7.74	11.08	134.37
10/29/25 10:48	8.1	10.73	152.96
10/29/25 10:49	8.35	10.44	164.43
10/29/25 10:50	8.53	10.28	169.92
10/29/25 10:51	8.61	10.21	168.64
10/29/25 10:52	8.1	10.62	155.16
10/29/25 10:53	0.78	0.94	51.89
10/29/25 10:54	0.11	0.16	1.35
10/29/25 10:55	2.32	2.26	8.17
10/29/25 10:56	9.8	9.49	2.21
10/29/25 10:57	9.88	9.83	0.39
10/29/25 10:58	3	3	164.51
10/29/25 10:59	0.12	0.18	246.57
10/29/25 11:00	2.21	3.82	197.04
10/29/25 11:01	6.73	11.77	75.99
10/29/25 11:02	6.48	12.13	68.31
10/29/25 11:03	6.68	11.93	69.49
10/29/25 11:04	6.41	12.18	68.69
10/29/25 11:05	6.42	12.21	69.49
10/29/25 11:06	6.42	12.2	66.82
10/29/25 11:07	6.57	12.07	68.15

10/29/25 11:08	6.73	11.95	71.54
10/29/25 11:09	7.02	11.63	74.48
10/29/25 11:10	6.87	11.74	70.39
10/29/25 11:11	6.66	11.91	72.12
10/29/25 11:12	6.55	12.06	65.52
10/29/25 11:13	6.61	12.02	65.71
10/29/25 11:14	6.49	12.13	73.96
10/29/25 11:15	6.97	11.78	80.42
10/29/25 11:16	6.97	11.7	82.58
10/29/25 11:17	6.95	11.7	82.88
10/29/25 11:18	6.82	11.81	88.05
10/29/25 11:19	6.58	12.05	74.05
10/29/25 11:20	6.39	12.21	71.2
10/29/25 11:21	6.33	12.32	66.3
10/29/25 11:22	6.36	12.28	69.97
10/29/25 11:23	6.47	12.13	70.42
10/29/25 11:24	6.02	12.48	63.54
10/29/25 11:25	5.9	12.66	69.42
10/29/25 11:26	5.72	12.84	77.51
10/29/25 11:27	5.88	12.73	73.9
10/29/25 11:28	5.79	12.74	71.42
10/29/25 11:29	5.81	12.78	68.31
10/29/25 11:30	5.65	12.85	61.19
10/29/25 11:31	5.69	12.94	69.6
10/29/25 11:32	5.82	12.74	64.59
10/29/25 11:33	6.18	12.48	61.15
10/29/25 11:34	6.09	12.53	61.58
10/29/25 11:35	6.3	12.36	59.63
10/29/25 11:36	6.23	12.36	59.1
10/29/25 11:37	6.25	12.35	60.69
10/29/25 11:38	6.21	12.39	65.46
10/29/25 11:39	6.11	12.48	69.07
10/29/25 11:40	6.1	12.51	68.52
10/29/25 11:41	6.25	12.39	69.68
10/29/25 11:42	6.15	12.42	69.98
10/29/25 11:43	6.15	12.49	71.15
10/29/25 11:44	6.64	12.06	75.24
10/29/25 11:45	6.82	11.78	74.62
10/29/25 11:46	7	11.69	85.95
10/29/25 11:47	7.39	11.29	91.23
10/29/25 11:48	7.24	11.37	89.26
10/29/25 11:49	7.1	11.49	83.81
10/29/25 11:50	7.04	11.62	82.07
10/29/25 11:51	7.38	11.34	88.55
10/29/25 11:52	7.2	11.4	83.02
10/29/25 11:53	7.16	11.5	76.27
10/29/25 11:54	7.26	11.41	82.19
10/29/25 11:55	7.31	11.34	75.45
10/29/25 11:56	7.06	11.55	78.39
10/29/25 11:57	7.12	11.53	80.1
10/29/25 11:58	7.22	11.42	79.95
10/29/25 11:59	6.92	11.68	75.06
10/29/25 12:00	6.67	11.94	77.39
10/29/25 12:01	6.78	11.85	71.09
10/29/25 12:02	6.87	11.77	70.75

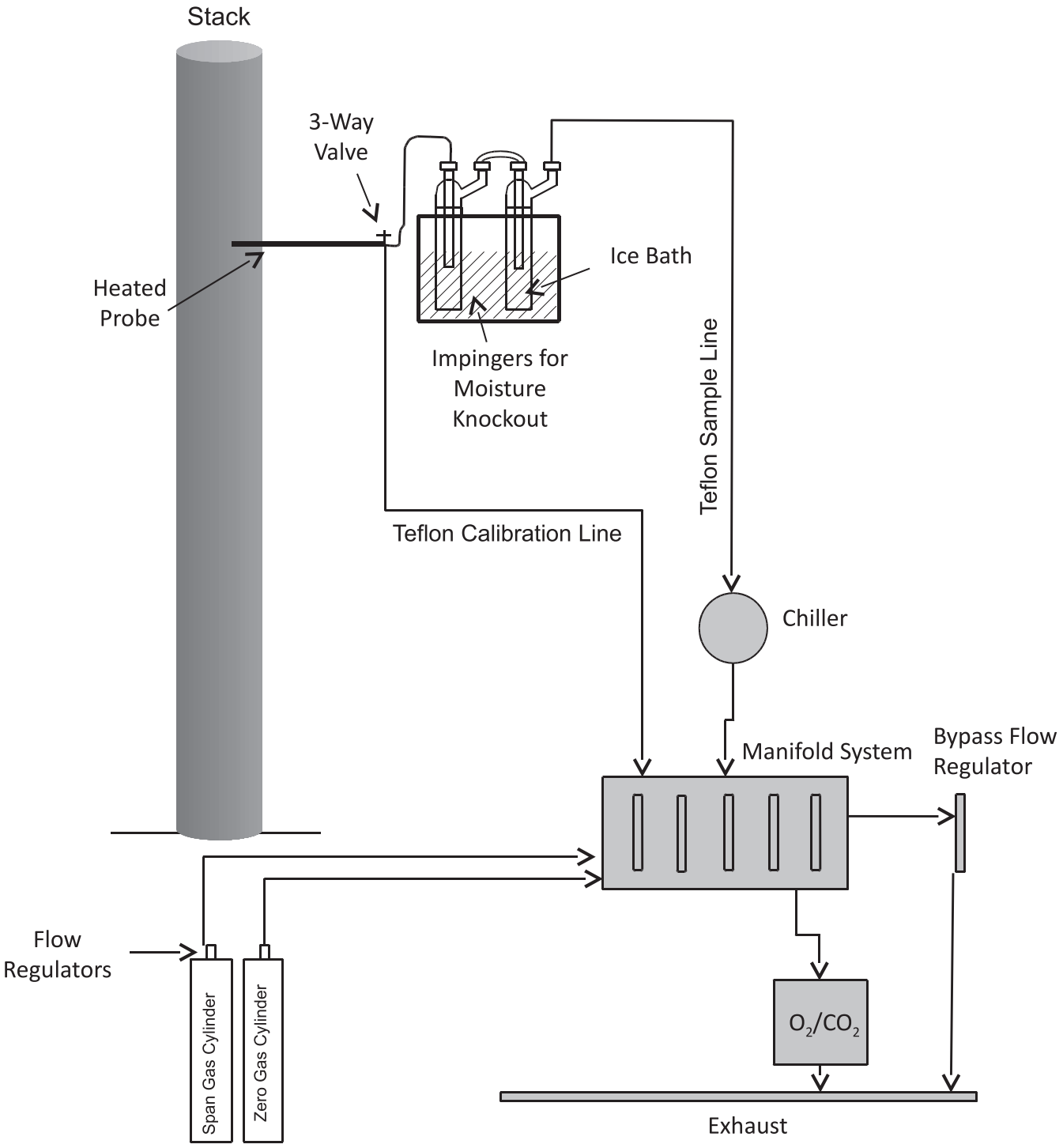
10/29/25 12:03	6.74	11.86	70.52
10/29/25 12:04	6.64	11.98	72.06
10/29/25 12:05	6.54	12.09	75.47
10/29/25 12:06	6.27	12.24	75.6
10/29/25 12:07	6.29	12.33	73.28
10/29/25 12:08	5.93	12.52	62.8
10/29/25 12:09	5.82	12.7	62.04
10/29/25 12:10	5.99	12.56	66.77
10/29/25 12:11	6.32	12.33	73.55
10/29/25 12:12	6.42	12.19	75
10/29/25 12:13	6.69	11.96	81.43
10/29/25 12:14	6.87	11.76	79.58
10/29/25 12:15	6.76	11.83	76.43
10/29/25 12:16	6.59	11.96	73.49
10/29/25 12:17	6.31	12.25	68.89
10/29/25 12:18	6.33	12.24	66.36
10/29/25 12:19	6.08	12.49	66.6
10/29/25 12:20	6.11	12.52	62.54
10/29/25 12:21	6.18	12.53	59.56
10/29/25 12:22	6	12.7	62.08
10/29/25 12:23	6.03	12.87	66.62
10/29/25 12:24	6.15	12.81	73.16
10/29/25 12:25	6.51	12.59	80.26
10/29/25 12:26	6.63	12.42	81.18
10/29/25 12:27	6.59	12.51	82.03
10/29/25 12:28	6.85	12.3	87.4
10/29/25 12:29	6.78	12.32	89.7
10/29/25 12:30	6.92	12.17	92.66
10/29/25 12:31	6.76	12.23	92.53
10/29/25 12:32	6.84	12.1	87.96
10/29/25 12:33	6.59	12.21	70.61
10/29/25 12:34	6.5	12.17	66.5
10/29/25 12:35	1.12	2.01	48.93
10/29/25 12:36	0.11	0.19	1.06
10/29/25 12:37	1.41	1.42	6.94
10/29/25 12:38	9.75	9.39	3.01
10/29/25 12:39	9.87	9.81	0.2
10/29/25 12:40	3.78	3.8	144.62
10/29/25 12:41	0.12	0.2	245.87
10/29/25 12:42	5.17	0.16	193.14
10/29/25 12:43	20.49	0.17	2.71
10/29/25 12:44	20.58	0.17	1.32
10/29/25 12:45	20.6	0.16	1.07
10/29/25 12:46	20.6	0.16	1.06
10/29/25 12:47	14.98	0.16	37.83
10/29/25 12:48	0.06	0.1	3.81
10/29/25 12:49	1.28	1.04	20.66
10/29/25 12:50	-0.02	0.04	0.97
10/29/25 12:51	-0.02	0.01	0.11
10/29/25 12:52	0.69	0.06	25.34
10/29/25 12:53	-0.02	0.01	49.78
10/29/25 12:54	-0.02	0	44.14
10/29/25 12:55	-0.02	0	24.69
10/29/25 12:56	-0.02	0	18.39
10/29/25 12:57	-0.02	0	11.58

10/29/25 12:58	3.1	0.08	7.17
10/29/25 12:59	0.8	0.26	2
10/29/25 13:00	0.08	0.08	0.17
10/29/25 13:01	0.69	0.73	4.9
10/29/25 13:02	9.73	9.52	5.26
10/29/25 13:03	9.87	9.76	0.44
10/29/25 13:04	4.61	4.53	3.62
10/29/25 13:05	0.11	0.17	11.98
10/29/25 13:06	2.12	0.51	12
10/29/25 13:07	14.65	3.36	2.28
10/29/25 13:08	15.1	3.24	1
10/29/25 13:09	15.16	3.23	0.98
10/29/25 13:10	14.7	3.49	0.6
10/29/25 13:11	14.48	3.61	0.48
10/29/25 13:12	14.55	3.57	0.56
10/29/25 13:13	14.74	3.47	0.57
10/29/25 13:14	14.6	3.55	0.48
10/29/25 13:15	14.27	3.73	0.42
10/29/25 13:16	13.83	3.98	0.37
10/29/25 13:17	13.46	4.19	0.32
10/29/25 13:18	13.77	4.01	0.3
10/29/25 13:19	13.71	4.05	0.36
10/29/25 13:20	13.5	4.17	0.29
10/29/25 13:21	13.09	4.4	0.29
10/29/25 13:22	13.06	4.41	0.24
10/29/25 13:23	12.61	4.66	0.27
10/29/25 13:24	12.52	4.71	0.24
10/29/25 13:25	12.57	4.68	0.21
10/29/25 13:26	12.63	4.65	0.26
10/29/25 13:27	12.7	4.61	0.24
10/29/25 13:28	12.72	4.61	0.24
10/29/25 13:29	12.73	4.6	0.24
10/29/25 13:30	12.68	4.63	0.23
10/29/25 13:31	12.71	4.62	0.25
10/29/25 13:32	12.6	4.67	0.23
10/29/25 13:33	12.64	4.65	0.18
10/29/25 13:34	12.68	4.63	0.17
10/29/25 13:35	12.68	4.63	0.21
10/29/25 13:36	12.68	4.62	0.17
10/29/25 13:37	12.65	4.64	0.2
10/29/25 13:38	12.81	4.55	0.18
10/29/25 13:39	12.83	4.54	0.12
10/29/25 13:40	12.69	4.62	0.07
10/29/25 13:41	12.68	4.62	0.1
10/29/25 13:42	12.65	4.64	0.09
10/29/25 13:43	12.87	4.51	0.09
10/29/25 13:44	12.94	4.48	0.05
10/29/25 13:45	12.77	4.57	0.06
10/29/25 13:46	12.7	4.61	0.03
10/29/25 13:47	12.64	4.64	0.02
10/29/25 13:48	12.65	4.63	0.07
10/29/25 13:49	12.7	4.61	0.06
10/29/25 13:50	12.68	4.62	0.07
10/29/25 13:51	12.69	4.62	0.03
10/29/25 13:52	12.86	4.52	0.07

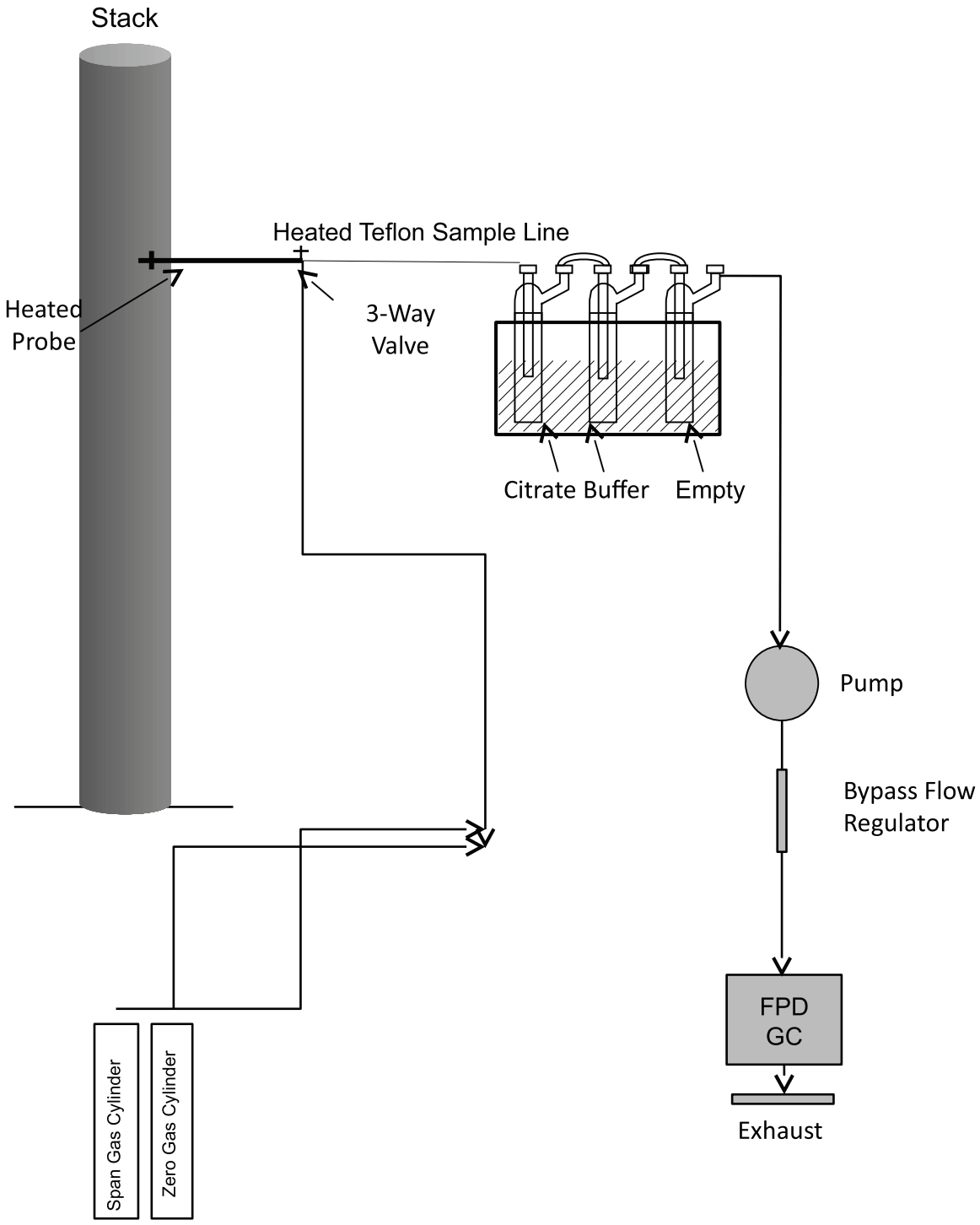
10/29/25 13:53	12.77	4.58	0.04
10/29/25 13:54	12.64	4.66	0.01
10/29/25 13:55	12.6	4.68	0.05
10/29/25 13:56	12.57	4.69	0.01
10/29/25 13:57	12.62	4.66	0.03
10/29/25 13:58	12.63	4.66	0.04
10/29/25 13:59	12.63	4.66	0.04
10/29/25 14:00	12.64	4.65	0.07
10/29/25 14:01	12.6	4.67	0.02
10/29/25 14:02	12.61	4.66	0.05
10/29/25 14:03	12.6	4.68	0.04
10/29/25 14:04	12.57	4.69	0.04
10/29/25 14:05	12.59	4.67	0
10/29/25 14:06	12.6	4.66	0
10/29/25 14:07	12.63	4.65	0
10/29/25 14:08	12.69	4.61	0
10/29/25 14:09	12.67	4.62	0.05
10/29/25 14:10	12.62	4.65	0
10/29/25 14:11	12.62	4.67	0.37
10/29/25 14:12	12.58	4.7	0.44
10/29/25 14:13	12.66	4.57	0.03
10/29/25 14:14	12.73	4.54	0.01
10/29/25 14:15	12.62	4.58	0.04
10/29/25 14:16	12.63	4.58	0
10/29/25 14:17	12.65	4.59	0
10/29/25 14:18	12.59	4.61	0.06
10/29/25 14:19	12.54	4.65	0.07
10/29/25 14:20	12.61	4.61	0.09
10/29/25 14:21	12.71	4.55	0.09
10/29/25 14:22	13.06	4.35	0.04
10/29/25 14:23	13.17	4.3	0.03
10/29/25 14:24	13.19	4.29	0.04
10/29/25 14:25	13.01	4.37	0.08
10/29/25 14:26	1.18	0.53	2.94
10/29/25 14:27	0.08	0.08	0.13
10/29/25 14:28	2.27	2.19	7.35
10/29/25 14:29	9.75	9.42	1.37
10/29/25 14:30	9.84	9.72	-0.5
10/29/25 14:31	2.9	2.88	4.67
10/29/25 14:32	0.08	0.13	11.88
10/29/25 14:33	6.19	0.09	10.72
10/29/25 14:34	20.53	0.11	0.81
10/29/25 14:35	20.6	0.1	0.41
10/29/25 14:36	20.61	0.1	0.45
10/29/25 14:37	20.6	0.1	0.57
10/29/25 14:38	18.89	0.1	0.57

Appendix G - Illustrations

Reference Method Monitors Sampling System
(EPA Method 3A)



Reference Method Monitor Sampling System
(EPA Method 16)



Appendix H - Resume of FTL

CAREER SUMMARY

Mr. Branham is a Project Scientist who has worked in the environmental fieldfor over 7 years. He has been involved with field testing activities on a broad scale and within several different industry types. Over this time, he has developed skills in several areas of emission testing including mobile laboratory operation, meter box operation, and field team supervision.

Education

BS, Parks, Recreation, and Hospitality Administration; Emphasis – Natural Resource Management

Arkansas Tech University

Russellville, AR

Certifications

Visible Emissions Evaluator

Joined Firm

2015

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

Lake City Army Ammunition – Independence, Missouri

Project included sampling for Dioxins and Furans on a hazardous waste combustor via U.S. EPA Reference Test Method 0023a, as well as a RATA to determine relative accuracy of a CO/O2 analyzer they had onsite to monitor emissions from that combustor. Testing was observed by the state regulatory agency. Responsibilities included field organization as well as general field operations.

Martin Marietta Materials – Malvern, Arkansas

Conducted and field managed EPA Method 9 testing at the Jones Mill Quarry location. Responsibilities included project coordination and field operations. Testing parameters included the determination of plume and fugitive emissions opacity.

Clean Harbors – El Dorado, Arkansas

Project included sampling for Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, Total Hydrocarbons, Particulate Matter, Metals, Chlorobenzene, and Hydrogen Cyanide on a hazardous waste incinerator in support of a Comprehensive Performance Test. This project included U.S. EPA Reference Test Methods 6C, 10, 7E, 25A, 5/202, 0030, 29, and OTM-29. Responsibilities included meter box operation, field organization, and general field operations.

Nucor Yamato Steel– Blytheville, Arkansas

Conducted annual compliance and performance specification testing on sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods and instrumental analysis including U.S. EPA Reference Test Methods 5/202 (particulate matter & condensable particulate matter), 12 (lead), 25A (volatile organic compounds), 7E (nitrogen oxides), 6C (sulfur dioxide) and 10 (carbon monoxide). Responsibilities included meter box operation, field organization, and general field operations.

Acme Brick

Conducted and assisted with BMACT testing at multiple locations in Texas and Arkansas. Responsibilities included meter box operation and field organization. Testing parameters included Oxygen, Carbon Dioxide, Nitrogen Oxides, Carbon Monoxide, Non-Methane Volatile Organic Compounds and Total Hydrocarbons, Halide testing with isokinetic train and FTIR, Metals, and Mercury. EPA Methods 3A, 7E, 10, 25A, 26, 29, 30B, and 320. Responsibilities included meter box operation, general field operations, and field organization.

Training

- TVTC Training
- CPR and First Aid
- MSHA Part 46
- Safeland

Last Page of Report

Site Operating Permit Revision Application

Graphic Packaging International, LLC

Texarkana, TX

Submitted by:

Graphic Packaging International

June 2026

Submitted to:

Graphic Packaging International, LLC
9978 FM Road 3129
Queen City, Texas 75572

Texas Commission on Environmental Quality
Air Permits Division
12100 Park 35 Circle, MC-163
Austin, Texas 78753

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Appendix A - PM and TRS Source Testing Results

1. INTRODUCTION

Graphic Packaging International, LLC (GPI) owns and operates a kraft pulp and paper mill near Texarkana, Texas (Texarkana Mill, Mill, or Facility). The Texarkana Mill is located in Cass County, Texas, which is in attainment with the National Ambient Air Quality Standards (NAAQS) for ozone and all criteria pollutants. The Texarkana Mill produces pulp and paper through the following operations: woodyard, power, chemical recovery, caustic plant, non-condensable gas system, pulping, bleaching, papermaking, wastewater treatment, miscellaneous support operations and extruders.

The Facility operates in accordance with Texas Commission on Environmental Quality (TCEQ) Site Operating Permit (SOP) No. O1378 issued December 23, 2025 (Permit). The Facility is classified as a major source with respect to the TCEQ Title V Program, as defined in Title 30 of the Texas Administrative Code (TAC) Chapter 122. The SOP, or Title V Operating Permit (TVOP), expires on December 23, 2030.

GPI conducted particulate matter (PM) testing in February of 2025 and total reduced sulfur (TRS) testing in October of 2025. GPI is requesting to update the Compliance Assurance Monitoring (CAM) deviation limit for the wet scrubbers associated with Nos. 1 and 2 Smelt Dissolving Tanks (Unit IDs SM01 and SM02) to be consistent with the most recent source testing performed. In addition, SM02 was rebuilt in 2019, making SM02 subject to New Source Performance Standards (NSPS) Subpart BBa, Standards of Performance for Kraft Pulp Mill Affected Sources for Which Construction, Reconstruction, or Modification Commenced after May 23, 2013. Permitting was not completed to incorporate the applicable standards. GPI conducted an audit in 2025 under the Texas Audit Privilege Act (TAPA) to voluntarily disclose any violations at the Facility. Findings of the audit, along with the information required under TAPA, have been submitted to the TCEQ on December 10, 2025.

GPI is submitting this minor revision application (Application) to incorporate updates to the CAM and periodic monitoring requirements for the Unit IDs SM01 and SM02 and to add positive applicability for United States Environmental Protection Agency (U.S. EPA) Title 40 Code of Federal Regulations Part 60, Subpart BBa (40 CFR Part 60, Subpart BBa) to unit ID SM02 (Project). The Unit IDs and their associated regulatory updates are summarized in **Table 1-1**.

Table 1-1
Summary of Regulatory Updates by Unit ID

Unit ID	Description	Regulation	Revision
SM01	No. 1 Smelt Dissolving Tank - Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BBa	Add positive applicability of 40 CFR Part 60, Subpart BBa.
SM02	No. 2 Smelt Dissolving Tank	40 CFR Part 60, Subpart BB	Remove applicability of 40 CFR Part 60, Subpart BB.
SM02	No. 2 Smelt Dissolving Tank – Wet Scrubber	40 CFR Part 63, Subpart MM	Update the minimum scrubber flow rate and minimum fan amperage operating limit under CAM deviation limits to be consistent with the most recent performance test results and §63.864(j)(5)(i)(A) and §63.864(j)(5)(i)(B)(1).

This Application contains all required forms and supporting information for the revision of the Permit. The following forms are included in this Application: Form OP-2, Form OP-CRO1, Form OP-UA1, Form OP-REQ3, and Form OP-MON. The certification by a responsible official is included in Form OP-CRO1. Form OP-REQ3 is included to document the detailed citations associated with emissions unit that require a revision at the Facility. Tables 1a and 1b of Form OP-REQ3 show the applicable requirements for emissions units undergoing revisions.

There were no off-permit changes or operational flexibility notifications submitted since the last renewal. Therefore, there are no minor new source review (NSR) authorizations that need to be incorporated with this Application.

2. IDENTIFYING AND ADMINISTRATIVE INFORMATION

This section contains identifying and administrative information for the Mill. The following forms are included in this section:

- OP-2: Application for Permit Revision/Renewal

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1)

Date: **6/5/2026**	
Permit No.: **O1378**	
Regulated Entity No.: **RN100543115**	
Company Name: **Graphic Packaging International, LLC**	
For Submissions to EPA	
Has an electronic copy of this application been submitted (or is being submitted) to EPA?	☒ YES ☐ NO
I. Application Type	
Indicate the type of application:	
☐ Renewal	
☒ Streamlined Revision (Must include provisional terms and conditions as explained in the instructions.)	
☐ Significant Revision	
☐ Revision Requesting Prior Approval	
☐ Administrative Revision	
☐ Response to Reopening	
II. Qualification Statement	
For SOP Revisions Only	☒ YES ☐ NO
For GOP Revisions Only	☐ YES ☐ NO

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2
Texas Commission on Environmental Quality (Table 1 *continued*)

III.	**Major Source Pollutants (Complete this section if the permit revision is due to a change at the site or change in regulations.)**					
Indicate all pollutants for which the site is a major source based on the site's potential to emit: *(Check the appropriate box[es].)*						
☒ VOC	☒ NO_X	☒ SO_2	☒ PM_{10}	☒ CO	☐ Pb	☒ HAP
Other:						
IV.	**Reference Only Requirements** *(For reference only)*					
Has the applicant paid emissions fees for the most recent agency fiscal year (September 1 - August 31)?					☒ YES ☐ NO ☐ N/A	
V.	**Delinquent Fees and Penalties**					
Notice: This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ are paid in accordance with the Delinquent Fee and penalty protocol.						

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 2
Texas Commission on Environmental Quality

Date: **6/5/2026**
Permit No.: **O1378**
Regulated Entity No.: **RN100543115**
Company Name: **Graphic Packaging International, LLC**

Using the table below, provide a description of the revision.

Revision No.	Revision Code	Unit/Group Process			NSR Authorization	Description of Change and Provisional Terms and Conditions
		New Unit	ID No.	Applicable Form		
1	MS-C	NO	SM01	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM01 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
2	MS-C	NO	SM02	OP-UA1	N/A	Update deviation limit for the wet scrubber associated with SM02 to match current monitoring criteria. No additional emissions unit, emission point, or process is being added or deleted. Suggested revision can be found in Form OP-MON.
3	MS-C	NO	SM02	OP-UA1	N/A	GPI is requesting to add positive applicability for 40 CFR Part 60, Subpart BBa to SM02. In addition, GPI is requesting to remove 40 CFR Part 60, Subpart BB applicability for SM02. No additional emissions unit, emission point, or process is being added or deleted. Suggested regulations to be added to the Permit are found in Form OP-REQ3.

Federal Operating Permit Program
Application for Permit Revision/Renewal
Form OP-2-Table 3
Texas Commission on Environmental Quality

Date: **6/5/2026**		
Permit No.: **O1378**		
Regulated Entity No.: **RN100543115**		
Company Name: **Graphic Packaging International, LLC**		
I.	**Significant Revision** *(Complete this section if you are submitting a significant revision application or a renewal application that includes a significant revision.)*	
A.	Is the site subject to bilingual requirements pursuant to 30 TAC § 122.322?	☐ YES ☐ NO
B.	Indicate the alternate language(s) in which public notice is required:	
C.	Will, there be a change in air pollutant emissions as a result of the significant revision?	☐ YES ☐ NO

Using the table below, indicate the air pollutant(s) that will be changing and include a brief description of the change in pollutant emissions for each pollutant:

Pollutant	Description of the Change in Pollutant Emissions

3. RESPONSIBLE OFFICIAL CERTIFICATION

This section contains certification requirements of this Application for the Mill. The following forms are included in this section:

- Form OP-CRO1: Certification by Responsible Official

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program

All initial permit application, revision, renewal, and reopening submittals requiring certification must be addressed using this form. Updates to site operating permit (SOP) and temporary operating permit (TOP) applications, other than public notice verification materials, must be certified prior to authorization of public notice or start of public announcement. Updates to general operating permit (GOP) applications must be certified prior to receiving an authorization to operate under a GOP.

I. Identifying Information	
RN: **RN100543115**	
CN: **CN601710460**	
Account No.: **CG-0010-G**	
Permit No.: **O1378**	
Project No.: **TBA**	
Area Name: **Texarkana Mill**	
Company Name: **Graphic Packaging International, LLC**	
II. Certification Type *(Please mark appropriate box)*	
☒ Responsible Official Representative	☐ Duly Authorized Representative
III. Submittal Type *(Please mark appropriate box) (Only one response can be accepted per form)*	
☐ SOP/TOP Initial Permit Application	☒ Permit Revision, Renewal, or Reopening
☐ GOP Initial Permit Application	☐ Update to Permit Application
☐ Other: _____	

Form OP-CRO1
Certification by Responsible Official
Federal Operating Permit Program
Texas Commission on Environmental Quality

All initial issuance, revision, and renewal permit application submittals requiring certification must be accompanied by this form. Updates to acid rain or CSAPR (other than public notice verification materials) must be certified prior to authorization of public notice for the draft permit.

IV. Certification of Truth
This certification does not extend to information which is designated by TCEQ as information for reference only.
I, **Jeffery Suelzer** certify that I am the **RO** *(Certifier Name printed or typed)* *(RO or DAR)* and that, based on information and belief formed after reasonable inquiry, the statements and information dated during the time period or on the specific date(s) below, are true, accurate, and complete: *Note: Enter Either a Time Period or Specific Date(s) for each certification. This section must be completed. The certification is not valid without documentation date(s).*
Time Period: From _____ to _____ *(Start Date)* *(End Date)*
Specific Dates: **6/5/2026** _____ _____ _____ *(Date 1)* *(Date 2)* *(Date 3)* *(Date 4)*
_____ _____ *(Date 5)* *(Date 6)*
Signature: _____ Signature Date: _____ Title: **Manufacturing Director**

4. PROCESS DESCRIPTION

The Texarkana Mill produces bleached kraft pulp that is used to make paperboard for packaging materials. The operations with air emissions sources at the Texarkana Mill include the following:

- Woodyard
- Power
- Chemical Recovery
- Caustic Plant
- Non-Condensable Gas System
- Pulping
- Bleaching
- Papermaking
- Wastewater Treatment
- Miscellaneous Support Operations
- Extruders

GPI woodyard operations debark logs, process chips, and intake purchased chips as raw materials to the process, which are digested under elevated temperature and pressure in an alkaline solution of sodium sulfide and sodium hydroxide, called “white liquor.” The two pulping lines process hardwood and softwood to produce a pulp slurry which is bleached and sent to the paper machines. The final product is dried and can be laminated through extruders that combine it with polyethylene.

This Application only concerns the smelt dissolving tanks used in the chemical recovery operations. There have been no additional changes to the Mill’s operations since the last renewal of the TVOP application; therefore, only a discussion of the chemical recovery operations is included.

CHEMICAL RECOVERY OPERATIONS

The Texarkana Mill operates two liquor recovery systems that process kraft black liquor from the hardwood and softwood pulping operations. Weak liquor from the pulping process is collected in separate weak black liquor storage tanks, one for the No. 1 System and one for the No. 2 System. The liquor from each system is sent to the multiple effect evaporator set associated with that system. Black liquor from these evaporators is then sent to heavy liquor storage before being further processed in the concentrators. Emissions from the No. 1 and No. 2 Multiple Effect Evaporator Sets and No. 1 and No. 2

Concentrators are collected and controlled by the non-condensable gas (NCG) system. The foul condensates are collected in the evaporator hotwells and routed to the sewer and wastewater treatment system. The combined contaminated condensate is collected and may be used as shower water in the brown stock washers or sewered.

Tall oil soap is produced as a byproduct of the evaporation process. Liquor is extracted from an intermediate stage of each evaporator system and sent to No. 2 Weak Liquor Storage Tank. The soap is then concentrated and kept in the No. 1 and No. 2 Soap Storage Tanks prior to loading into trucks for offsite processing.

The Texarkana Mill recovers cooking chemicals by firing concentrated black liquor into either of the two indirect contact recovery furnaces, No. 1 Recovery Furnace (RB01) and No. 2 Recovery Furnace (RB02). The organics from the liquor are combusted to generate heat for process steam, while the inorganic chemicals collect in the bottom of the furnaces in the form of molten smelt. The recovery furnaces are also permitted to fire natural gas, primarily during start-up operations. Each furnace operates as an independent system that includes: a smelt tank, electrostatic precipitator (ESP) for PM control, and two exhaust stacks. Ash from the ESPs is returned to the system in the Precipitator Ash Tanks (one for each recovery furnace) that are vented to the smelt dissolving tank scrubbers. The molten smelt from each recovery furnace is directed to one of two dedicated smelt tanks, where it is dissolved into weak wash or water to form green liquor, a preliminary step to regenerating white liquor in the causticizing operation. SM01 and SM02 are equipped with scrubbers. The control devices are designed to capture particulates and TRS compounds and return them to the smelt tanks. Weak wash, an aqueous solution of sodium hydroxide, sodium sulfide, and sodium carbonate, is used as the scrubbing medium.

5. PROJECT DESCRIPTION

GPI is requesting to update the CAM deviation limit for the wet scrubbers associated with SM01 and SM02 to be consistent with the most recent source testing performed. Pursuant to 40 CFR §63.864(j)(5)(i)(B)(1), "the minimum fan amperage operating limit must be set as the midpoint between the lowest of the 1-hour average fan amperage values associated with each test run demonstrating compliance with the applicable emission limit in §63.862 and the no-load amperage value." The no-load amperage value is determined using manufacturers specifications, or by performing a no-load test of the fan motor for each smelt dissolving tank scrubber. In 2025, GPI completed PM source testing of SM01 and SM02, on February 11 and 12, respectively. TRS source testing was also performed on SM02 on October 28, 2025. While both pollutants were tested under the applicable NSPS BBa requirements for SM02, the operating parameters (i.e., fan amps and scrubber flow) are established based on the PM performance tests as the operating parameter values were higher than those observed during the TRS test. Therefore, SM01 and SM02 utilize the PM source testing results for the 1-hour average fan amperages of the wet scrubber. The no-load fan amperage value for SM01 and SM02 have been obtained from no-load tests performed in 2015 and 2023, respectively. Therefore, GPI has calculated the lowest 1-hour average fan amperage, as provided in the Source Test Report, and the no-load value, and is requesting the value be used for the CAM deviation limit. Please see Table 5-1 for current Permit values and proposed values. The suggested permit revisions can be found in strikethrough and red text in Form OP-MON.

Table 5-1
Smelt Dissolving Tank Test Results and Proposed Values

Unit Name	No. 1 Smelt Dissolving Tank	No. 2 Smelt Dissolving Tank
Unit ID No.	SM01	SM02
Current Permit Average Fan Amp Value	77	36
No Load Fan Amp Values	50.2	28
Minimum 1-Hour Average Fan Amp	81.8	43.19
Proposed Average Fan Amp Value	66	36
Current Permit Weak Wash Flow to Fan (gpm)	48	75
Proposed Weak Wash Flow to Fan (gpm)	48	77
Current Permit Weak Wash Flow to Scrubber (gpm)	88	95
Proposed Weak Wash Flow to Scrubber (gpm)	87	90

In addition, SM02 was rebuilt in 2019 and is therefore subject to NSPS Subpart BBa. Permitting was not completed to incorporate the applicable Subpart BBa standards associated with SM02. Pursuant to Section 10(G) of the Environmental, Health and Safety Audit Privilege Act, which provides immunity for violations voluntarily disclosed as a result of a compliance audit, the Mill conducted an audit under the TAPA, commencing April 30, 2025, to voluntarily disclose any violations at the Facility. The audit was complete on November 18, 2025 and the audit findings were submitted on December 10, 2025. In addition, a source test for TRS was performed on SM02 on October 28, 2025 to demonstrate compliance with Subpart BBa. Since there were no additions or deletions of an emissions unit, emissions point, or process, Form OP-SUMR is not required per form instructions. However, GPI is requesting to update the Unit Summary of the Permit to include a row for 40 CFR Part 60, Subpart BBa requirements for SM02. An example of the row to include, in red, is found below.

Unit/Group/Process ID No.	Unit Type	Group/Inclusive Units	SOP Index No.	Regulation	Requirement Driver
SM02	KRAFT PULP MILLS	N/A	60BBa-01	40 CFR Part 60, Subpart BBa	No changing attributes.

40 CFR Part 60, Subpart BBa lists additional requirements for sources constructed, reconstructed, or modified after May 23, 2013. SM02 was reconstructed in 2019 and is now regulated by Subpart BBa, rather than Subpart BB. GPI is requesting that the Applicable Requirements Summary also be updated to include the regulations applicable to SM02 in Subpart BBa and to delete regulatory requirements of Subpart BB. The suggested regulations applicable to SM02 to include (in red) and delete (in strikethrough) in the Permit can be found in the example on the following page and in Form OP-REQ3.

Applicable Requirements Summary

Unit Group Process ID No.	Unit Group Process Type	SOP Index No.	Pollutant	State Rule or Federal Regulation Name	Emission Limitation, Standard or Equipment Specification Citation	Textual Description (See Special term and Condition 1.B.)	Monitoring and Testing Requirements	Recordkeeping Requirements (30 TAC §122.144)	Reporting Requirements (30 TAC §122.145)
~~SM02~~	~~EU~~	~~60BB-01~~	~~PM~~	~~40 CFR Part 60, Subpart BB~~	~~§60.282(a)(2)~~	~~On and after the test completion no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases containing PM > 0.1 g/kg black liquor solids (dry weight).~~	~~§ 60.285(a) [G]§ 60.285(c) § 60.285(f)(1) ** See CAM Summary~~	~~None~~	~~None~~

~~SM02~~	~~EU~~	~~60BB-01~~	~~TRS~~	~~40 CFR Part 60, Subpart BB~~	~~§60.283(a)(4)~~	~~On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.~~	~~§ 60.284(b) [G]§ 60.284(b)(2) § 60.284(c)(4) § 60.284(f) § 60.285(a) [G]§ 60.285(e) § 60.285(f)(2)~~	~~§60.284(c)(4)~~	~~None~~
SM02	EU	60BBa-01	PM	40 CFR Part 60, Subpart BBa	§60.282a(a)(3)	On and after the performance test completion no owner/operation shall discharge to the atmosphere from any new smelt dissolving tank that is not associated with a new or reconstructed	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

						recovery furnace subject to the provisions of 60.282a(a)(2) any gases which contain filterable particulate matter in excess of 0.1 gram per kilogram (g/kg) of black liquor solids (dry weight).			
SM02	EU	60BBa-01	TRS	40 CFR Part 60, Subpart BBa	§60.283a(a)(4)	On and after the performance test completion, no owner/operator shall discharge to the atmosphere from smelt dissolving tanks gases with TRS over 0.016 g/kg black liquor solids as H2S.	§60.284a(b)(2)(ii) §60.284a(b)(2)(iii) §60.284a(c)(3)(i) §60.284a(c)(4-7) §60.285a(e) §60.285a(f)(2)	§60.287a(a) §60.287a(b)(4) §60.287a(b)(7) §60.287a(c)	§60.288a(a) §60.288a(b)

6. UNIT ATTRIBUTE INFORMATION

This section contains the applicable unit attribute forms to document regulatory applicability. The following forms are included in this section:

- OP-UA1: Miscellaneous and Generic Unit Attributes

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

General Information

Requested Information	Response
Date:	06/05/2026
Customer Reference No.:	CN601710460
Regulated Entity No.:	RN100543115
Permit No.:	O1378
Permit Area Name:	Texarkana Mill
Permit Type:	SOP
Project Type:	Revision
Submission Type:	Existing Application Update
Project Number (if available):	TBD
Form Information	**TCEQ Entry Only**
Title V Form Release Date:	10/1998
Form Number:	10044
APD ID Number:	35v1.0
Version Revised Date:	07/2025
	This form is for use by facilities subject to air quality permit requirements and may be revised periodically.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table of Contents

Table	Regulation	Page	Data Submitted
N/A	N/A	OP-SUM Table 1	Yes
N/A	N/A	OP-REQ2	Yes
Table 1	N/A	Page 1	Yes

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-SUM - Individual Unit Summary
Table 1

Unit AI	Revision No.	Unit ID No.	Group ID No.	Unit Name/Description	CAM	PCA AI	Preconstruction Authorization (PCA) Category	Authorization/ Registration Number	Permit By Rule (PBR) Number	PBR Effective Date
	1	SM01		NO. 1 SMELT TANK	Y			2975		
	1	SM01		NO. 1 SMELT TANK	Y			PSDTX778M2		
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.261	03/14/1997
	1	SM01		NO. 1 SMELT TANK	Y			179363	106.262	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			2975		
	2	SM02		NO. 2 SMELT TANK	Y			PSDTX778M2		
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.261	03/14/1997
	2	SM02		NO. 2 SMELT TANK	Y			179363	106.262	03/14/1997

Miscellaneous and Generic Unit Attributes
Federal Operating Permit Program
Texas Commission on Environmental Quality

Form OP-REQ2 - Negative Applicable/Superseded Requirement Determinations

Unit AI	Revision No.	Unit ID No.	Potentially Applicable Regulatory Name	Negative Applicability/Superseded Requirement Citation	Negative Applicability/Superseded Requirement Reason
	3	SM02	**40 CFR Part 60, Subpart BBa**	40 CFR Part 60, Subpart BB	SM02 has been rebuilt and is now subject to 40 CFR Part 60, Subpart BBa, which promulgates requirements for sources that have been constructed, reconstructed, or modified after May 23, 2013. 40 CFR Part 60, Subpart BB no longer applies.

Miscellaneous and Generic Unit Attributes
Form OP-UA1
Federal Operating Permit Program
Texas Commission on Environmental Quality

Table 1

Unit ID No.	SOP/GOP Index No.	Unit Type	Date Constructed/Placed in Service	Functionally Identical Replacement	Maximum Rated Capacity	Technical Information and Unit Description
SM02	60BBa-01	EU	**10/03/2019**			No. 2 Smelt Tank was rebuilt in 2019 and is therefore subject to 40 CFR Part 60, Subpart BBa.

Go to the Table of Contents

7. APPLICABLE REQUIREMENT INFORMATION

This section contains forms that document potentially applicable requirements. The following forms are included in this section:

- OP-REQ3: Applicable Requirements Summary

Applicable Requirements Summary
Form OP-REQ3
(Page 1)
Federal Operating Permit Program
Table 1a: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	Unit/Group/Process Applicable Form	SOP/GOP Index No	Pollutant	Applicable Regulatory Requirement Name	Applicable Regulatory Requirement Standard(s)
3	*SM02*	OP-UA1	*60BBa-01*	*PM & TRS*	*40 CFR Part 60, Subpart BBa*	*§ 60.280a* *§ 60.282a(a)(3)* *§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)* *§ 60.287a(a)* *§ 60.287a(b)(4)* *§ 60.287a(b)(7)* *§ 60.287a(c)* *§60.288a*

Applicable Requirements Summary
Form OP-REQ3 (Page 2)
Federal Operating Permit Program
Table 1b: Additions

Date: 06/05/2026	Regulated Entity No.: RN100543115	Permit No.: O1378
Company Name: Graphic Packaging International, LLC	Area Name: Texarkana Mill	

Revision No.	Unit/Group/Process ID No.	SOP/GOP Index No.	Pollutant	Monitoring and Testing Requirements	Recordkeeping Requirements	Reporting Requirements
2	SM02	60BBa-01	PM & TRS	*§ 60.283a(a)(4)* *§ 60.284a(b)(2)* *§ 60.284a(c)(3)* *§ 60.284a(c)(4)* *§ 60.284a(c)(5)* *§ 60.284a(c)(6)* *§ 60.284a(c)(7)* *§ 60.284a(d)(4)* *§ 60.285a(a)* *§ 60.285a(c)* *§ 60.285a(e)* *§ 60.285a(f)(1)* *§ 60.285a(f)(2)*	§ 60.287a(a) § 60.287a(b)(4) § 60.287a(b)(7) § 60.287a(c)	§60.288a

8. COMPLIANCE ASSURANCE MONITORING AND PERIODIC MONITORING

CAM is a Federal program established under 40 CFR Part 64 regulations. The regulatory requirements governing implementation of CAM in Texas are also established in 30 TAC Chapter 122, Subchapter G. CAM applies to an emissions unit located at a major source that meets all of the following:

- The emissions unit is subject to an emissions limitation or standard for an air pollutant in an applicable requirement;
- The emissions unit uses a control device to achieve compliance with the applicable emissions limitation or standard; and
- The emissions unit has the pre-control potential-to-emit greater than or equal to the amount in tons per year required for the site to be classified as a major source.

CAM applicability is determined on a pollutant-by-pollutant basis. Please note that 30 TAC §122.604(c) and (d) include CAM exemptions for certain emissions limitations or standards and certain utility units. For example, CAM does not apply to emissions limitations or standards proposed by U.S. EPA after November 15, 1990 under the Federal Clean Air Act Sections §111 (Standards of Performance for New Stationary Sources) or §112 (Hazardous Air Pollutants). Additionally, CAM does not apply to emissions limitations or standards for which the applicable requirement specifies a continuous compliance determination method.

CAM applicability is determined for the emissions unit, not the control device. Sites are required to address CAM as part of the Title V application process. As such, GPI has reviewed the applicable existing CAM plans for accuracy. Form OP-MON has been included with this Application for the CAM plans that require revisions.

Periodic monitoring is a Federal monitoring program established under 40 CFR Part 70 regulations. The regulatory requirements governing implementation of periodic monitoring in Texas are also established in 30 TAC Chapter 122, Subchapter G. An emissions unit will require periodic monitoring for an emissions limitation or standard when the regulation does not specify sufficient monitoring to determine compliance with the applicable requirement. Form OP-MON has been included to document revisions of the periodic monitoring at the Mill.

Pursuant to 40 CFR §64.2(b)(1), the CAM requirements under 40 CFR Part 64 do not apply to SM02. §64.2(b)(1) exempts units subject to emissions limitations or standards in NSPS promulgated after

November 15, 1990. Subpart BBa lists its own monitoring, performance testing, and compliance provisions for PM and TRS, satisfying the intent of CAM. GPI is requesting to remove CAM requirements that no longer apply to SM02 and has included the suggested strikethrough in Form OP-MON.

Texas Commission on Environmental Quality
Monitoring Requirements
Form OP-MON
(PAGE 3)
Federal Operating Permit Program
Table 1c: CAM/PM Case-By-Case Additions

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**1**		
Unit/EPN/Group/Process ID No.: **SM01**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: **30 TAC Chapter 111, Nonagricultural Processes & 30 TAC Chapter 111, Visible Emissions**		
SOP/GOP Index No.: **R1151-01 & R1111-01**		
Pollutant: **PM & Opacity**		
Main Standard: **§111.151(a) & §111.111(a)(1)(B)**		
Monitoring Type: **CAM & Periodic Monitoring**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 66 ~~77~~ amps; [ii] Minimum liquid flow rate = 87.17 ~~88~~ gpm to scrubber and 47.99 ~~48~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM01**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: **Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**		

Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:
± 2% of span; or
± 5% of design liquid flow rate

Verification Procedures:
N/A

Representative Date: **N/A**

VI. Periodic Monitoring Case-by-case: N/A - No changes to periodic monitoring

Indicator: **[I] Fan motor current; [II] Liquid flow rate**	Minimum Frequency: **Four times per hour**

Averaging Period: **3 hour**

Periodic Monitoring Text:
[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.

I. Identifying Information		
Account No.: **CG-0010-G**	RN No.: **RN100543115**	CN: **CN601710460**
Permit No: **O1378**	Project No.: **TBA**	
Area Name: **Texarkana Mill**		
Company Name: **Graphic Packaging International, LLC**		
II. Unit/Emission Point/Group/Process Information		
Revision No.:**2**		
Unit/EPN/Group/Process ID No.: **SM02**		
Applicable Form: **OP-UA1**		
III. Applicable Regulatory Requirement		
Name: ~~**40 CFR Part 60, Subpart BB &**~~ **30 TAC Chapter 111, Nonagricultural Processes**		
SOP/GOP Index No.: ~~**60BB-01 &**~~ **R1111-01**		
Pollutant: ~~**PM &**~~ **Opacity**		
Main Standard: ~~**§60.282(a)(2) &**~~ **§111.11(a)(1)(B)**		
Monitoring Type: **CAM**		
Unit Size: **SM**		
Deviation Limit: **Minimum current = 35.6 ~~36~~ amps; [ii] Minimum liquid flow rate = 89.62 ~~95~~ gpm to scrubber and 76.54 ~~75~~ gpm to fan**		
IV. Control Device Information		
Control Device ID No.: **SM02**		
Device Type: **Wet Scrubber**		
V. CAM Case-by-case		
Indicator: **Fan Amperage & Liquid Flow Rate**		
Minimum Frequency: **Four times per hour**		
Averaging Period: **3 hour**		
QA/QC Procedures: ~~**Fan Motor Current: The monitoring device, ammeter, will be checked annually for accuracy by subjecting it to a known amperage.**~~ ~~**Liquid Flow Rate: The monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within the following:**~~ ~~**± 2% of span; or**~~ ~~**± 5% of design liquid flow rate**~~		

Verification Procedures: **N/A**	
Representative Date: **N/A**	
VI. Periodic Monitoring Case-by-case	
Indicator: **Fan Amperage & Liquid Flow Rate**	Minimum Frequency: **Four times per hour**
Averaging Period: **3 hour**	
Periodic Monitoring Text: **[I] Measure and record the fan motor current. Establish a minimum current using the most recent performance test data, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.** **[II] Measure and record the liquid flow rate. Establish a minimum liquid flow rate using the most recent performance test, manufacturer's recommendations, engineering calculations, and/or historical data. The monitoring instrumentation shall be maintained, calibrated, and operated in accordance with manufacturer's specifications or other written procedures. Any monitoring data below the minimum limit shall be considered and reported as a deviation.**	

APPENDIX A -
PM AND TRS SOURCE TESTING RESULTS

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Test Dates:
February 11-13, 2025

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subparts MM & S

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Lucas Hotubbee
lucas.hotubbee@alliancetg.com
(479) 206-1157

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewer
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

COMPANY:		Graphic Packaging International		SOURCE:		LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, NCG01	
REVIEWER:				DATE OF SAMPLING:		February 11-13, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. E	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. E	Operating parameters of the pollution control equipment					
13.	App. E	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. D	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	App. C	Chain of custody of samples					
31.	App. C	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. D	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the source) tested and operating conditions for the specific test dates and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections in the test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

March 11, 2025

Riley Wilson, QSTI – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

Appendix A Sample Calculations
Appendix B Field Data
Appendix C Laboratory Data
Appendix D Quality Assurance/Quality Control Data
Appendix E Process Operating/Control System Data
Appendix F CSV Data
Appendix G Illustrations
Appendix H Resume of Field Team Leader
Appendix I Laboratory NELAP Certification
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Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing was conducted to determine the concentrations and emission rates of particulate matter (PM), particulate matter no more than 10 microns in diameter (PM_{10}), particulate matter no more than 2.5 microns in diameter ($PM_{2.5}$), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	$PM/PM_{10}/PM_{2.5}$
No. 2 Lime Kiln	LK02	$PM/PM_{10}/PM_{2.5}$
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	$PM/PM_{10}/PM_{2.5}$
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	$PM/PM_{10}/PM_{2.5}$
No. 1 Smelt Tank Scrubber	SM01	$PM/PM_{10}/PM_{2.5}$
No. 2 Smelt Tank Scrubber	SM02	$PM/PM_{10}/PM_{2.5}$
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John T. Fussell
Alliance Personnel	Riley Wilson Dominic Bradley Ethan Dobbs Lucas Hotubbee Joshua Moore Marcus Nichols Chris Shepard Calvin Standridge

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) developed by Alliance.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on February 11-13, 2025. Testing consisted of determining the concentration and emission rate of CH_3OH at the exhaust of NCG01 and of $PM/PM_{10}/PM_{2.5}$ at the exhausts of LK1, LK2, RB01A/RB01B, RB02A/RB02B, SM01, and SM02.

Tables 2-1 through 2-4 provide a summary of the emission testing results with comparisons to the applicable NESHAP or TCEQ permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Table 2-1: Summary of Results – Nos. 1 and 2 Lime Kilns

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
LK01 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.015	0.015	0.013	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**22**
Total PM[1] Emission Rate, lb/hr	4.7	4.6	4.4	4.5
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	27.60
Percent of Limit, %	--	--	--	**16**
LK02 Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.018	0.006	0.014
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.064
Percent of Limit, %	--	--	--	**21**
Total PM[1] Emission Rate, lb/hr	6.6	6.6	2.8	5.3
Permit $PM/PM_{10}/PM_{2.5}$ Limit, lb/hr	--	--	--	26.30
Percent of Limit, %	--	--	--	**20**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-2: Summary of Results – Nos. 1 and 2 Recovery Furnaces

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
RB01A (North Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0082	0.0051	0.0074	0.0069
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**16**
Total PM[1] Emission Rate, lb/hr	6.5	3.6	5.2	5.1
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**19**
RB01B (South Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.0013	0.0012	0.0010	0.0011
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**3**
Total PM[1] Emission Rate, lb/hr	1.2	1.2	1.1	1.2
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	26.58
Percent of Limit, %	--	--	--	**4**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
RB02A (West Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.017	0.014	0.043	0.025
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**56**
Total PM[1] Emission Rate, lb/hr	21.2	19.9	53.2	31.5
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**74**
RB02B (East Stack) Particulate Matter Data				
Filterable PM Concentration, grain/dscf @ 10% O_2	0.030	0.012	0.014	0.019
NESHAP PM Limit, grain/dscf @ 10% O_2	--	--	--	0.044
Percent of Limit, %	--	--	--	**43**
Total PM[1] Emission Rate, lb/hr	36.2	16.2	18.4	23.6
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	42.59
Percent of Limit, %	--	--	--	**55**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-3: Summary of Results – Nos. 1 and 2 Smelt Tank Scrubbers

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/11/25**	**2/11/25**	**2/11/25**	**--**
SM01 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.15	0.083	0.073	0.10
NESHAP PM Limit, lb/ton	--	--	--	0.40
Percent of Limit, %	--	--	--	
Total PM[1] Emission Rate, lb/hr	7.8	4.4	3.9	5.4
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	10.9
Percent of Limit, %	--	--	--	**49**
Date	**2/12/25**	**2/12/25**	**2/12/25**	**--**
SM02 Particulate Matter Data				
Filterable PM Emission Factor, lb/ton	0.077	0.063	0.060	0.067
NESHAP PM Limit, lb/ton	--	--	--	0.20
Percent of Limit, %	--	--	--	**33**
Total PM[1] Emission Rate, lb/hr	8.0	7.4	6.4	7.3
Permit PM/PM_{10}/$PM_{2.5}$ Limit, lb/hr	--	--	--	19.85
Percent of Limit, %	--	--	--	**37**

[1] Total PM is the sum of filterable and condensable PM fractions and is considered all PM_{10} and $PM_{2.5}$.

Table 2-4: Summary of Results – NCG Oxidation Unit Scrubber

Run Number	Run 1	Run 2	Run 3	Average
Date	**2/13/25**	**2/13/25**	**2/13/25**	**--**
Methanol Data				
Concentration, ppmvd @ 10% O_2	1.1	1.1	0.97	1.1
NESHAP Limit, ppmvd @ 10% O_2	--	--	--	20
Percent of Limit, %	--	--	--	**5**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture	320	FTIR – Continuous Sampling

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated to equivalent diameters and compared to Figure 1-1 in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and an inclined manometer. The stack gas temperature was measured with a K-type thermocouple and a pyrometer.

The O_2 and CO_2 concentrations were assumed to be ambient for the molecular weight and volumetric flow rate calculations at the Nos. 1 and 2 Smelt Tank Scrubbers (SM01 and SM02).

Stack gas velocity pressure and temperature readings were recorded during each test run and were utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing were conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on-site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content (BWS) was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to the testing, each impinger was filled with a known quantity of water or silica gel. Each impinger was analyzed gravimetrically before and after each test run to determine the amount of condensed moisture. All gravimetric analyses were performed on the same balance.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing was conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system consisted of a stainless-steel nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, an un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and five (5) chilled impingers. The first and second impingers were initially empty, the third impinger contained 100 mL of de-ionized water, the fourth impinger was initially empty, and the fifth impinger contained 200-300 grams of silica gel. The un-weighed, 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of 248 ±25°F, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained at a temperature that was greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The nitrogen purge was omitted because the amount of condensate that was collected in the dry impingers was minimal. After the leak check, the impinger contents were measured for moisture gain.

The front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 120-minute purge was conducted at a rate of 14 liters per minute. The nitrogen purge was started within 30 minutes of the conclusion of sampling. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. Condensate was collected in the first dry impinger; therefore, the front-half of the sample train, which consisted of the nozzle, probe, and heated pre-weighed filter, was removed so that the back-half of the sample train, which consisted of the coil condenser, first and second impingers and CPM filter, could be purged. A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, and then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 60-minute purge was conducted at a rate of 14 liters per minute. After the completion of the nitrogen purge, the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder were rinsed six (6) times with acetone to remove any adhering particulate matter, and the resulting rinses were recovered in container 2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water, then with acetone and then with hexane. The resulting water rinse was recovered in container CPM Cont. #1, and the acetone and hexane rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed sequentially

with DIUF water, acetone, and hexane. The resulting water rinse was added to container CPM Cont. #1, and the resulting acetone and hexane rinses were added to container CPM Cont. #2. All containers were sealed, labeled, their liquid levels were marked and they were transported to the identified laboratory for condensable particulate matter analysis. The total moles of sulfate and ammonium were determined in the sample fraction and the maximum mass adjustment factor (MMAF) was calculated to correct for residual ammonia in accordance with OTM-59.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture were determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream was extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 FTIR, which was operated with a portable computer. FTIR spectra for each calibration gas were stored on the computer's hard drive, and these single component calibration spectra were used to analyze the spectra of the measured samples. The gas components to be measured were selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio were measured and recorded to document the analyzer's performance. A leak check was performed on the sample cell. The instrument path length was verified by using ethylene as the Calibration Transfer Standard. Dynamic spiking was performed by using a certified standard of the target compound or appropriate surrogate, which was balanced in nitrogen with sulfur hexafluoride blended as a tracer, to calculate the dilution factor. All test spectra, interferograms, and analytical method information were recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at the Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) was introduced directly to the instrument sample port. The signal amplitude was recorded, a background spectra was taken, a linearity check was performed and recorded, the peak-to-peak noise and the root mean square in the spectral region of interest were measured and a screenshot was recorded, all while the nitrogen was flowing.

Following the zero gas checks, room air was pulled through the sample chamber, the line width and resolution were verified to be at 1879 cm-1, the peak position was entered and a screenshot of the FWHH was recorded. Following these checks, another background spectra was recorded, and the calibration transfer standard (CTS) was introduced directly to the instrument sample port. The CTS instrument recovery was recorded, and the instrument mechanical response time was measured.

Next, stack gas was introduced to the FTIR through the sampling system and several scans were taken until a stable reading was achieved. The native concentration of our target spiking analyte (methanol) was recorded. Spike gas was introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate, and a corresponding dilution ratio and a system response time were calculated. Matrix spike recovery spectra were recorded and were within ± 30% of the calculated value of the spike concentration in accordance with the method's requirements.

The matrix spike recovery was conducted one (1) time at the beginning of the testing, and the CTS recovery procedures were repeated following each test run. The corresponding values were recorded.

Appendix A

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	13.3	= average analyzer value during test, % dry
C_o	0.2	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	10.1	= average of pretest & posttest calibration responses, % dry
C_{O_2}	13.2	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.1	= average analyzer value during test, % dry
C_o	0.0	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.8	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	3.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
ΔH	2.158	= pressure differential of orifice, in H_2O
Pm	30.19	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	30.03	= barometric pressure, in. Hg
Pg	-0.48	= static pressure, in. H_2O
Ps	29.99	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Y \times Vm \times Pm}{Tm}$$

where,

Y	0.999	= meter correction factor
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Tm	523.5	= absolute meter temperature, °R
Vmstd	48.077	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	506	= weight of H_2O collected, g
Vwstd	23.863	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37} - \left(\frac{2,827}{Ts + 365}\right)}{Ps}$$

where,

Ts	363.9	= stack temperature, °F
Ps	29.99	= absolute stack gas pressure, in. Hg
BWSsat	1.000	= dimensionless

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	23.863	= standard wet volume, scf
Vmstd	48.077	= standard meter volume, dscf
BWS	0.332	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	1.000	= moisture fraction (theoretical at saturated conditions)
BWSmsd	0.332	= moisture fraction (measured)
BWS	0.332	

Excess Air (EA), %

$$EA = \frac{(\%O_2 - [0.5 \times \%CO]) \times 100}{(0.264 \times \%N_2) - \%O_2 - (0.5 \times \%CO)}$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
CO	0.0	= carbon monoxide concentration, % (assumed zero)
N_2	79.5	= nitrogen concentration, %
EA	40.97259538	= %

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	14.4	= carbon dioxide concentration, %
O_2	6.1	= oxygen concentration, %
Md	30.55	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	30.55	= molecular weight (DRY), lb/lb mol
BWS	0.332	= moisture fraction, dimensionless
Ms	26.39	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.804	= pitot tube coefficient
$\Delta P^{1/2}$	0.713	= velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Ms	26.39	= molecular weight of stack gas, lb/lb mol
Vs	50.0	= ft/sec

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	50.0	= stack gas velocity, ft/sec
As	46.16	= cross-sectional area of stack, ft^2
Qa	138,543	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	138,543	= average stack gas flow at stack conditions, acfm
BWS	0.332	= moisture fraction, dimensionless
Ps	29.99	= absolute stack gas pressure, in. Hg
Ts	823.5	= absolute stack temperature, °R
Qs	59,472	= dscfm

Dry Gas Meter Calibration Check (Yqa), dimensionless

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{0.0319 \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0.999	= meter correction factor, dimensionless
Θ	60	= run time, min.
Vm	47.32	= total meter volume, dcf
Tm	523.5	= absolute meter temperature, °R
ΔH@	1.832	= orifice meter calibration coefficient, in. H_2O
Pb	30.03	= barometric pressure, in. Hg
ΔH avg	2.158	= average pressure differential of orifice, in H_2O
Md	30.55	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	1.469	= average squareroot pressure differential of orifice, $(in. H2O)^{1/2}$
Yqa	0.2	= percent

Volume of Nozzle (Vn), ft^3

$$Vn = \frac{Ts \times \left(0.002669 \times Vlc + \frac{Vm \times Pm \times Y}{Tm} \right)}{Ps}$$

where,

Ts	823.5	= absolute stack temperature, °R
Ps	29.99	= absolute stack gas pressure, in. Hg
Vlc	506.0	= volume of H_2O collected, ml
Vm	47.320	= meter volume, cf
Pm	30.19	= absolute meter pressure, in. Hg
Y	0.999	= meter correction factor, unitless
Tm	523.5	= absolute meter temperature, °R
Vn	111.928	= volume of nozzle, ft^3

Isokinetic Sampling Rate (I), %

$$I = \left(\frac{Vn}{\theta \times 60 \times An \times Vs} \right) \times 100$$

where,

Vn	111.928	= nozzle volume, ft3
θ	60.0	= run time, minutes
An	0.00059	= area of nozzle, ft^2
Vs	50.0	= average velocity, ft/sec
I	104.7	= %

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Run No.: 1
Parameter: PM/CPM

Filterable PM Concentration (C_s), grain/dscf

$$C_s = \frac{M_n \times 0.0154}{Vmstd}$$

where,

Mn	29.2	= filterable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_s	0.0094	= grain/dscf

Filterable PM Emission Rate (PMR), lb/hr

$$PMR = \frac{C_s \times Qs \times 60}{7.0E+03}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
PMR	4.78	= lb/hr

Condensable PM Concentration (C_{CPM}), grain/dscf

$$C_{CPM} = \frac{M_{CPM} \times 0.0154}{Vmstd}$$

where,

M_{CPM}	10.7	= condensable PM mass, mg
Vmstd	48.077	= standard meter volume, dscf
C_{CPM}	0.0034	= grain/dscf

Condensable PM Emission Rate (ER_{CPM}), lb/hr

$$ER_{CPM} = \frac{C_{CPM} \times Qs \times 60\frac{min}{hr}}{7.0E+03}$$

where,

C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
Qs	59,472	= average stack gas flow at standard conditions, dscfm
ER_{CPM}	1.75	= lb/hr

Total PM Concentration (C_{TPM}), grain/dscf

$$C_{TPM} = C_S + C_{CPM}$$

where,

C_s	0.0094	= filterable PM concentration, grain/dscf
C_{CPM}	0.0034	= condensable PM concentration, grain/dscf
C_{TPM}	0.0128	= grain/dscf

Total PM Emission Rate (ER_{TPM}), lb/hr

$$ER_{TPM} = PMR + ER_{CPM}$$

where,

PMR	4.78	= filterable PM emission rate, lb/hr
ER_{CPM}	1.75	= condensable PM emission rate, lb/hr
ER_{TPM}	6.53	= lb/hr

Location:	Graphic Packaging International - Queen City, TX
Source:	NCG Oxidation Unti Scrubber (NCG01)
Project No.:	AST-2024-4204
Run No. /Method	Run 1 / Method 320
Run No.	1
Target	35

Methanol - Outlet Concentration (C_{CH_3OH}), ppmvd

$$C_{CH_3OH} = \frac{C_{CH_3OHw}}{1 - BWS}$$

where,

C_{CH_3OHw}	0.5	= Methanol - Outlet Concentration, ppmvw
BWS	0.444	= moisture fraction, unitless
C_{CH_3OH}	0.8	= ppmvd

Methanol - Outlet Concentration (C_{CH_3OHw}), ppmvw

$$C_{CH_3OHw} = C_{CH_3OH} \times (1 - BWS)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
BWS	0.444	= moisture fraction, unitless
C_{CH_3OHw}	0.5	= ppmvw

Methanol - Outlet Concentration (C_{CH_3OHc10}), ppmvd @ 10% O_2

$$C_{CH_3OHc10} = C_{CH_3OH} \times \left(\frac{20.9 - 10}{20.9 - O_2}\right)$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
C_{O_2}	13.2	= oxygen concentration, %
C_{CH_3OHc10}	1.1	= ppmvd @10% O_2

Methanol - Outlet Emission Rate (ER_{CH_3OH}), lb/hr

$$ER_{CH_3OH} = \frac{C_{CH_3OH} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 454 \frac{g}{lb}}$$

where,

C_{CH_3OH}	0.8	= Methanol - Outlet Concentration, ppmvd
MW	32.04	= CH_3OH molecular weight, g/g-mole
Qs	6,235	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{CH_3OH}	2.65	= lb/hr

Location Graphic Packaging
Source(s) NCG Incinerator
Project No. AST-2024-4204
Date(s) 2/5/2025

CTS Recovery Value (CTS_R), %

$$\frac{CTS_{avg}}{CTS_{cyl}} \times 100$$

Where,

CTS_{avg}	98.17	= average of all CTS calibration gas readings, ppm
CTS_{cyl}	103	= CTS bottle certified gas value, ppm
CTS_R	95.3%	= CTS recovery value, %

Spike Dilution Factor (DF), %

$$\frac{SF6_{spike} - SF6_{nat}}{SF6_{dir}} \times 100$$

Where,

$SF6_{dir}$	12.03	= average of direct tracer gas value readings
$SF6_{nat}$	0.01	= average of native tracer gas value readings
$SF6_{spike}$	0.759135	= average of dynamic spike tracer gas value readings
DF	6.23%	= spike dilution factor, %

Calculated Spike ($Spike_{calc}$), ppm

$$(DF \times Analyte_{dir}) + (Analyte_{nat} \times (1 - DF))$$

Where,

%DF	6.23%	= spike dilution factor, %
$Analyte_{dir}$	100.07	= average of direct analyte gas values, ppm
Analyte $_{nat}$	0.49	= average of native analyte gas values, ppm
$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm

Spike Recovery Value ($Spike_R$), %

$$\frac{Analyte_{spike}}{Spike_{calc}} \times 100$$

Where,

$Spike_{calc}$	6.69	= calculated spike, ppm value, ppm
$Analyte_{spike}$	5.39	= average of spiked analyte gas values, ppm
$Spike_R$	80.55%	= spike recovery value, %

Appendix B

LK01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

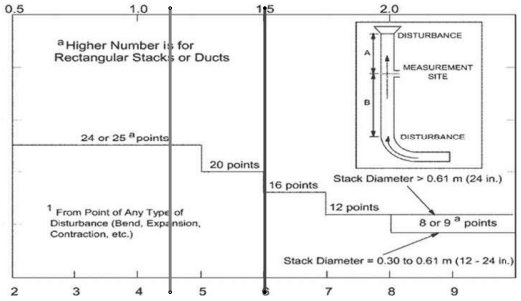
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	160.00	160.10	160.06	160.05
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	42.600	42.370	39.800	41.590
Meter Temperature, °F	(Tm)	47.5	48.5	48.3	48.1
Meter Temperature, °R	(Tm)	507.2	508.2	508.0	507.8
Meter Orifice Pressure, in. WC	(ΔH)	1.633	1.583	1.600	1.606
Volume H_2O Collected, mL	(Vlc)	190.2	195.2	196.8	194.1
Nozzle Diameter, in	(Dn)	0.247	0.247	0.247	0.247
Area of Nozzle, ft^2	(An)	0.0003	0.0003	0.0003	0.0003
Filterable PM Mass, mg	(Mn)	53.7	55.5	44.9	51.4
Condensable PM Mass, mg	(M_{CPM})	4.6	1.8	5.9	4.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.028	44.691	41.999	43.906
Standard Water Volume, ft^3	(Vwstd)	8.970	9.206	9.281	9.152
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
Meter Pressure, in Hg	(Pm)	30.46	30.46	30.46	30.46
Volume at Nozzle, ft^3	(Vn)	59.617	59.606	56.658	58.63
Isokinetic Sampling Rate, (%)	(I)	103.3	103.8	97.1	101.4
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	2.2	3.2	-3.6	0.6
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.019	0.016	0.018
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.015	0.015	0.013	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	4.3	4.5	3.8	4.2
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0016	0.0006	0.0022	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.37	0.14	0.51	0.34
Total PM Concentration, grain/dscf	(C_{TPM})	0.020	0.020	0.019	0.019
Total PM Emission Rate, lb/hr	(ER_{TPM})	4.7	4.6	4.4	4.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Lime Kiln (LK01)
Project No.: AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	56.50	in
Nipple Length:	8.50	in
Depth of Duct:	48.00	in
Cross Sectional Area of Duct:	12.57	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	1.5	(must be ≥ 0.5)
Distance B:	18.0	ft
Distance B Duct Diameters:	4.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/13/25	
Reviewer (Initial and Date):	CAL 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

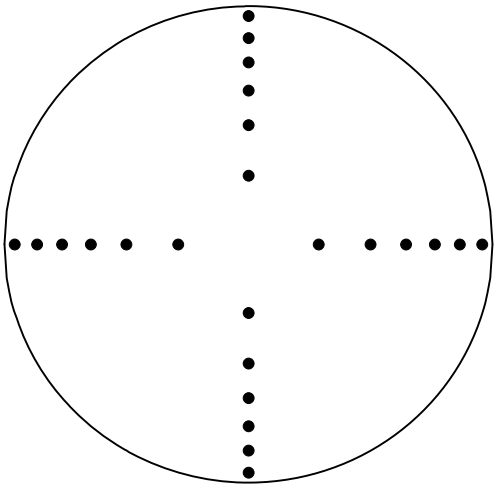
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

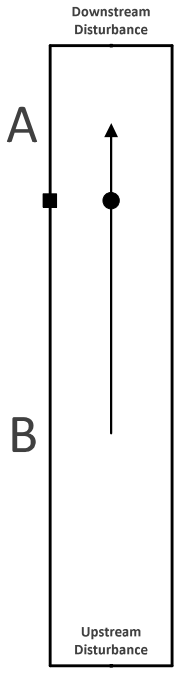
*Percent of stack diameter from inside wall to traverse point.

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.01	9 1/2
2	6.7	3.22	11 11/16
3	11.8	5.66	14 3/16
4	17.7	8.50	17
5	25.0	12.00	20 1/2
6	35.6	17.09	25 9/16
7	64.4	30.91	39 7/16
8	75.0	36.00	44 1/2
9	82.3	39.50	48
10	88.2	42.34	50 13/16
11	93.3	44.78	53 5/16
12	97.9	46.99	55 1/2

Stack Diagram
A = 6 ft.
B = 18 ft.
Depth of Duct = 48 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	6
2	4
3	3
4	5
5	5
6	3
7	2
8	0
9	5
10	2
11	6
12	8
13	2
14	10
15	6
16	5
17	0
18	6
19	6
20	8
21	2
22	3
23	3
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		13:20	15:05	16:25	--
Stop Time		14:26	16:10	17:45	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.44	0.42	0.43	0.43
Point 2		0.69	0.69	0.70	0.69
Point 3		0.76	0.67	0.73	0.72
Point 4		0.68	0.66	0.67	0.67
Point 5		0.70	0.70	0.69	0.70
Point 6		0.73	0.71	0.72	0.72
Point 7		0.74	0.72	0.74	0.73
Point 8		0.74	0.75	0.75	0.75
Point 9		0.66	0.66	0.67	0.66
Point 10		0.64	0.64	0.65	0.64
Point 11		0.58	0.56	0.57	0.57
Point 12		0.55	0.54	0.53	0.54
Point 13		0.45	0.45	0.44	0.45
Point 14		0.71	0.72	0.71	0.71
Point 15		0.75	0.73	0.73	0.74
Point 16		0.69	0.70	0.70	0.70
Point 17		0.70	0.70	0.69	0.70
Point 18		0.73	0.74	0.73	0.73
Point 19		0.72	0.73	0.72	0.72
Point 20		0.74	0.71	0.71	0.72
Point 21		0.65	0.66	0.66	0.66
Point 22		0.65	0.64	0.65	0.65
Point 23		0.59	0.60	0.60	0.60
Point 24		0.55	0.54	0.53	0.54
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.810	0.805	0.807	0.808
Pitot Tube Coefficient	(Cp)	0.832	0.832	0.832	0.832
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.66	-0.66	-0.65	-0.66
Stack Pressure, in. Hg	(Ps)	30.29	30.29	30.29	30.29
Stack Cross-sectional Area, ft^2	(As)	12.57	12.57	12.57	12.57
Stack Temperature, °F	(Ts)	130.3	131.3	130.8	130.8
Stack Temperature, °R	(Ts)	590.0	591.0	590.5	590.5
Moisture Fraction Measured	(BWSmsd)	0.166	0.171	0.181	0.173
Moisture Fraction @ Saturation	(BWSsat)	0.150	0.154	0.152	0.152
Moisture Fraction	(BWS)	0.150	0.154	0.152	0.152
O_2 Concentration, %	(O_2)	7.3	7.1	6.9	7.10
CO_2 Concentration, %	(CO_2)	16.5	16.9	17.2	16.87
N_2 Concentration, %	(N_2)	76.2	76	75.9	76.03
Excess Air, %	(EA)	56.96	54.77	52.52	54.75
Molecular Weight, lb/lb-mole (dry)	(Md)	30.93	30.99	31.03	30.98
Molecular Weight, lb/lb-mole (wet)	(Ms)	29.00	28.99	29.06	29.02
Velocity, ft/sec	(Vs)	47.2	47.0	47.0	47.1
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	35,619	35,424	35,457	35,500
At Standard Conditions, scfm	(Qsw)	32,251	32,021	32,080	32,117
At Standard Conditions, dscfm	(Qs)	27,423	27,097	27,218	27,246

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	14:50	2/13/2025	16:38	2/13/2025	18:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	7.32	16.48	7.07	16.92	6.90	17.15
Analysis #2	7.32	16.49	7.05	16.92	6.90	17.15
Analysis #3	7.32	16.49	7.06	16.92	6.90	17.15
Average	7.3	16.5	7.1	16.9	6.9	17.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.7	815.0	689.0	654.7	1014.9	3533.3
Final Mass, g	498.0	852.6	692.8	656.7	1023.4	3723.5
Gain	138.3	37.6	3.8	2.0	8.5	190.2
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.6	641.4	687.6	557.7	939.6	3320.9
Final Mass, g	633.7	680.7	691.3	558.4	952.0	3516.1
Gain	139.1	39.3	3.7	0.7	12.4	195.2
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.4	662.6	692.8	656.7	1023.4	3533.9
Final Mass, g	631.5	701.3	706.4	657.9	1033.6	3730.7
Gain	133.1	38.7	13.6	1.2	10.2	196.8

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	13:20	**Source:** No.1 Lime Kiln (LK01)
Date:	2/13/25	Run 1 VALID	**End Time:**	14:26	**Project No.:** AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	14.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26962-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	190.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.3 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.237	in.		CO_2:	16.5 %	2.505
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- -- 8			Mid 3 (cf)	--
Ms:	28.94	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. 45	Amb. 45	Ideal	Actual		Amb. 45	Amb. 45	Amb. 45	Amb. 45		
A1	0.00	2.50	168.410	0.44	49	129	1.09	1.10	3	255	257	38	66	93.6	38.66
2	2.50	5.00	169.750	0.69	48	129	1.71	1.70	4	255	254	39	70	92.4	48.42
3	5.00	7.50	171.400	0.76	47	129	1.88	1.90	4	256	256	39	69	103.2	50.81
4	7.50	10.00	173.330	0.68	47	129	1.68	1.70	5	252	253	39	72	104.0	48.06
5	10.00	12.50	175.170	0.70	47	129	1.73	1.70	5	253	255	39	70	102.5	48.77
6	12.50	15.00	177.010	0.73	47	128	1.81	1.80	5	251	255	38	69	103.0	49.76
7	15.00	17.50	178.900	0.74	47	129	1.83	1.80	5	250	254	39	71	101.9	50.14
8	17.50	20.00	180.780	0.74	47	129	1.83	1.80	5	249	256	39	73	101.3	50.14
9	20.00	22.50	182.650	0.66	47	129	1.63	1.60	5	247	255	39	72	102.1	47.35
10	22.50	25.00	184.430	0.64	47	131	1.58	1.60	5	243	253	40	68	103.9	46.71
11	25.00	27.50	186.210	0.58	47	130	1.43	1.40	4	251	255	41	67	103.4	44.43
12	27.50	30.00	187.900	0.55	47	130	1.36	1.40	4	244	254	41	66	104.3	43.26
B1	30.00	32.50	189.560	0.45	48	131	1.11	1.10	4	252	255	41	68	105.4	39.17
2	32.50	35.00	191.080	0.71	47	131	1.75	1.80	5	250	255	41	69	102.5	49.20
3	35.00	37.50	192.930	0.75	47	131	1.85	1.90	5	250	250	42	71	103.0	50.56
4	37.50	40.00	194.840	0.69	48	131	1.70	1.70	5	254	256	42	72	101.5	48.50
5	40.00	42.50	196.650	0.70	48	132	1.72	1.70	5	257	254	42	73	102.0	48.89
6	42.50	45.00	198.480	0.73	48	131	1.80	1.80	6	251	258	43	73	100.4	49.88
7	45.00	47.50	200.320	0.72	48	132	1.77	1.80	6	250	251	42	74	101.7	49.58
8	47.50	50.00	202.170	0.74	48	131	1.82	1.80	6	244	255	43	76	101.3	50.23
9	50.00	52.50	204.040	0.65	48	132	1.60	1.60	5	243	255	43	76	102.4	47.11
10	52.50	55.00	205.810	0.65	48	132	1.60	1.60	5	245	255	43	78	101.8	47.11
11	55.00	57.50	207.570	0.59	48	132	1.45	1.50	5	249	255	43	79	106.2	44.88
12	57.50	60.00	209.320	0.55	48	131	1.36	1.40	5	253	256	44	81	106.1	43.30
	Final DGM:		211.010												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.600	ft^3	0.66	in. WC	47.5	°F	130.3	°F	6	1.633	in. WC	103.3	0.150	2.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	15:05	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	16:10	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26961-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	130	°F		Pg:	-0.66 in. WC	195.2
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.66	in. WC		O_2:	7.1 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	16.9 %	2.42
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.007	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	211.150	0.42	46	130	1.02	1.00	3	261	257	43	67	102.5	37.89
2	2.50	5.00	212.560	0.69	47	131	1.67	1.70	4	248	255	44	69	102.7	48.61
3	5.00	7.50	214.370	0.67	47	131	1.62	1.60	4	248	256	46	69	102.5	47.90
4	7.50	10.00	216.150	0.66	47	131	1.59	1.60	4	244	253	46	70	106.7	47.54
5	10.00	12.50	217.990	0.70	47	130	1.69	1.70	4	244	256	46	70	95.1	48.92
6	12.50	15.00	219.680	0.71	47	130	1.72	1.70	4	248	255	47	71	101.7	49.26
7	15.00	17.50	221.500	0.72	48	131	1.74	1.70	4	250	256	48	71	100.3	49.65
8	17.50	20.00	223.310	0.75	48	130	1.82	1.80	5	248	254	48	71	102.1	50.63
9	20.00	22.50	225.190	0.66	48	131	1.60	1.60	4	241	254	48	71	104.2	47.54
10	22.50	25.00	226.990	0.64	49	131	1.55	1.60	4	249	259	48	70	105.0	46.81
11	25.00	27.50	228.780	0.56	49	131	1.36	1.40	4	253	256	48	71	106.6	43.79
12	27.50	30.00	230.480	0.54	49	133	1.31	1.30	4	245	255	49	72	102.9	43.07
B1	30.00	32.50	232.090	0.45	49	132	1.09	1.10	3	253	257	49	74	99.3	39.29
2	32.50	35.00	233.510	0.72	49	133	1.74	1.70	5	251	255	49	75	102.5	49.74
3	35.00	37.50	235.360	0.73	49	133	1.76	1.80	5	252	255	49	76	104.1	50.08
4	37.50	40.00	237.250	0.70	49	132	1.69	1.70	5	256	254	49	78	103.3	49.00
5	40.00	42.50	239.090	0.70	49	132	1.69	1.70	5	254	255	50	78	102.8	49.00
6	42.50	45.00	240.920	0.74	49	132	1.79	1.80	5	252	252	50	77	101.1	50.38
7	45.00	47.50	242.770	0.73	49	131	1.77	1.80	5	247	252	50	74	103.3	49.99
8	47.50	50.00	244.650	0.71	49	132	1.72	1.70	5	246	256	51	72	102.0	49.35
9	50.00	52.50	246.480	0.66	50	132	1.60	1.60	5	250	256	51	69	104.5	47.58
10	52.50	55.00	248.290	0.64	50	131	1.56	1.60	5	252	256	51	69	109.5	46.81
11	55.00	57.50	250.160	0.60	50	131	1.46	1.50	5	253	255	51	70	99.8	45.33
12	57.50	60.00	251.810	0.54	51	131	1.32	1.30	5	256	255	52	70	108.7	43.00
	Final DGM:		253.520												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	42.370	ft^3	0.65	in. WC	48.5	°F	131.3	°F	5	1.583	in. WC	103.8	0.154	3.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	16:25	**Source:**	No.1 Lime Kiln (LK01)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	17:45	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	15.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	49	°F	26970-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	131	°F		Pg:	-0.65 in. WC	196.8
Static Press:	-0.66	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.65	in. WC		O_2:	6.9 %	K-FACTOR
Stack Press:	30.29	in. Hg	Probe ID:	P-205-3		Est. Dn:	0.240	in.		CO_2:	17.2 %	2.421
CO_2:	14.5	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	10.0	%	Pitot ID:	PT-203-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	75.5	%	Pitot Cp/Type:	0.832	S-type	Leak Rate (cfm):	0.004	-- -- --	0.003		Mid 2 (cf)	--
Md:	30.72	lb/lb-mole	Nozzle ID:	SS-247-1	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	28.81	lb/lb-mole	Nozzle Dn (in.):	0.247		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	253.680	0.43	49	130	1.05	1.10	3	252	244	46	70	105.0	38.34
2	2.50	5.00	255.150	0.70	49	129	1.70	1.70	5	246	252	46	68	95.8	48.87
3	5.00	7.50	256.860	0.73	49	129	1.78	1.80	5	250	257	46	68	94.9	49.91
4	7.50	10.00	258.590	0.67	48	128	1.63	1.60	5	253	255	45	69	97.4	47.77
5	10.00	12.50	260.290	0.69	48	130	1.67	1.70	5	243	248	45	73	98.5	48.56
6	12.50	15.00	262.030	0.72	49	130	1.75	1.80	5	251	251	45	76	97.3	49.61
7	15.00	17.50	263.790	0.74	49	131	1.79	1.80	5	251	247	45	74	92.3	50.34
8	17.50	20.00	265.480	0.75	48	129	1.82	1.80	5	252	245	45	69	100.3	50.59
9	20.00	22.50	267.330	0.67	49	130	1.63	1.60	4	253	251	45	68	98.5	47.86
10	22.50	25.00	269.050	0.65	48	132	1.57	1.60	6	253	258	43	67	94.0	47.22
11	25.00	27.50	270.660	0.57	48	131	1.38	1.40	5	247	260	43	67	93.4	44.18
12	27.50	30.00	272.160	0.53	47	131	1.28	1.30	4	254	263	43	68	95.7	42.60
B1	30.00	32.50	273.640	0.44	47	131	1.06	1.10	3	255	259	43	68	98.6	38.81
2	32.50	35.00	275.030	0.71	47	132	1.71	1.70	5	254	262	43	68	98.5	49.35
3	35.00	37.50	276.790	0.73	48	131	1.77	1.80	6	254	260	43	69	96.4	49.99
4	37.50	40.00	278.540	0.70	48	131	1.69	1.70	5	255	254	44	69	96.7	48.96
5	40.00	42.50	280.260	0.69	48	132	1.67	1.70	5	253	260	44	70	95.8	48.65
6	42.50	45.00	281.950	0.73	48	131	1.77	1.80	6	252	263	45	71	92.0	49.99
7	45.00	47.50	283.620	0.72	48	131	1.74	1.70	5	251	259	46	72	92.6	49.65
8	47.50	50.00	285.290	0.71	49	132	1.72	1.70	5	250	259	47	72	98.7	49.35
9	50.00	52.50	287.060	0.66	49	132	1.60	1.60	5	249	258	48	73	99.5	47.58
10	52.50	55.00	288.780	0.65	49	132	1.57	1.60	5	248	259	48	75	95.6	47.22
11	55.00	57.50	290.420	0.60	49	132	1.45	1.50	4	258	261	49	78	98.8	45.36
12	57.50	60.00	292.050	0.53	49	132	1.28	1.30	4	253	258	50	83	92.2	42.64
	Final DGM:		293.480												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	39.800	ft^3	0.66	in. WC	48.3	°F	130.8	°F	6	1.600	in. WC	97.1	0.152	-3.6

LK02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

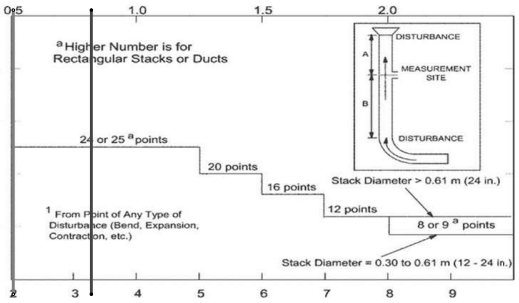
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Lime Production Rate, ton/day	(FR)	309.82	309.98	310.00	309.93
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.375	44.885	45.085	43.782
Meter Temperature, °F	(Tm)	53.6	54.0	57.1	54.9
Meter Temperature, °R	(Tm)	513.3	513.6	516.8	514.6
Meter Orifice Pressure, in. WC	(ΔH)	1.554	1.846	1.838	1.746
Volume H_2O Collected, mL	(Vlc)	336.8	374.0	370.4	360.4
Nozzle Diameter, in	(Dn)	0.416	0.416	0.416	0.416
Area of Nozzle, ft^2	(An)	0.0009	0.0009	0.0009	0.0009
Filterable PM Mass, mg	(Mn)	51.7	64.4	23.3	46.5
Condensable PM Mass, mg	(M_{CPM})	10.4	2.3	5.6	6.1
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	43.210	46.875	46.794	45.626
Standard Water Volume, ft^3	(Vwstd)	15.883	17.638	17.468	16.996
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
Meter Pressure, in Hg	(Pm)	30.45	30.48	30.48	30.47
Volume at Nozzle, ft^3	(Vn)	67.623	73.830	73.701	71.72
Isokinetic Sampling Rate, (%)	(I)	91.2	98.8	99.9	96.6
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.8	0.5	0.9	0.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.018	0.021	0.008	0.016
Filterable PM Concentration (corrected), grain/dscf @ 10% O2	(Csc10)	0.017	0.018	0.006	0.014
Filterable PM Emission Rate, lb/hr	(PMR)	5.5	6.4	2.3	4.7
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.004	0.001	0.002	0.002
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.11	0.23	0.55	0.63
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.022	0.010	0.018
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.6	6.6	2.8	5.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date: 02/13/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	89.50	in
Nipple Length:	2.00	in
Depth of Duct:	87.50	in
Cross Sectional Area of Duct:	41.76	ft^2
No. of Test Ports:	2	
Distance A:	6.0	ft
Distance A Duct Diameters:	0.8	**(must be ≥ 0.5)**
Distance B:	15.0	ft
Distance B Duct Diameters:	2.1	**(must be ≥ 2)**
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/13/25	
Reviewer (Initial and Date):	EDO 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

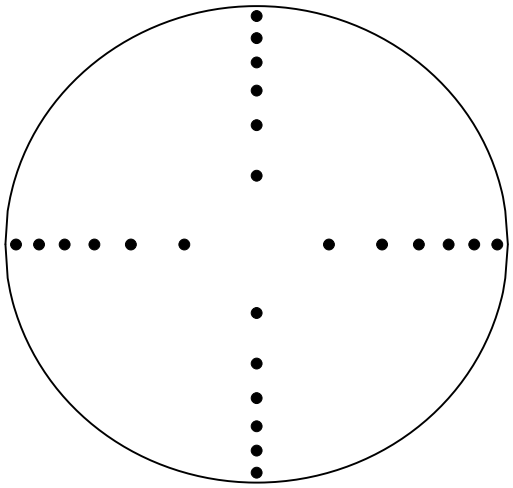
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.84	3 13/16
2	6.7	5.86	7 7/8
3	11.8	10.33	12 5/16
4	17.7	15.49	17 1/2
5	25.0	21.88	23 7/8
6	35.6	31.15	33 1/8
7	64.4	56.35	58 3/8
8	75.0	65.63	67 5/8
9	82.3	72.01	74
10	88.2	77.18	79 3/16
11	93.3	81.64	83 5/8
12	97.9	85.66	87 11/16

Stack Diagram
A = 6 ft.
B = 15 ft.
Depth of Duct = 87.5 in.

Cross Sectional Area



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Date 02/13/25

Sample Point	Angle (ΔP=0)
1	4
2	3
3	8
4	2
5	0
6	1
7	-2
8	-3
9	4
10	3
11	2
12	0
13	3
14	3
15	1
16	-3
17	3
18	4
19	2
20	1
21	0
22	0
23	3
24	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		8:15	9:55	11:15	--
Stop Time		9:20	11:00	12:20	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.13	0.12	0.12	0.12
Point 2		0.12	0.13	0.13	0.13
Point 3		0.14	0.14	0.12	0.13
Point 4		0.13	0.13	0.14	0.13
Point 5		0.15	0.12	0.13	0.13
Point 6		0.14	0.14	0.13	0.14
Point 7		0.13	0.13	0.13	0.13
Point 8		0.12	0.12	0.14	0.13
Point 9		0.15	0.13	0.13	0.14
Point 10		0.13	0.12	0.14	0.13
Point 11		0.11	0.14	0.12	0.12
Point 12		0.12	0.13	0.13	0.13
Point 13		0.14	0.12	0.15	0.14
Point 14		0.13	0.14	0.13	0.13
Point 15		0.12	0.14	0.14	0.13
Point 16		0.14	0.13	0.12	0.13
Point 17		0.13	0.12	0.11	0.12
Point 18		0.15	0.13	0.13	0.14
Point 19		0.14	0.13	0.12	0.13
Point 20		0.11	0.13	0.11	0.12
Point 21		0.12	0.15	0.14	0.14
Point 22		0.14	0.14	0.13	0.14
Point 23		0.12	0.15	0.15	0.14
Point 24		0.13	0.13	0.14	0.13
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.361	0.363	0.361	0.362
Pitot Tube Coefficient	(Cp)	0.819	0.819	0.819	0.819
Barometric Pressure, in. Hg	(Pb)	30.34	30.34	30.34	30.34
Static Pressure, in. WC	(Pg)	-0.08	-0.06	-0.07	-0.07
Stack Pressure, in. Hg	(Ps)	30.33	30.34	30.33	30.33
Stack Cross-sectional Area, ft^2	(As)	41.76	41.76	41.76	41.76
Stack Temperature, °F	(Ts)	152.8	152.9	154.2	153.3
Stack Temperature, °R	(Ts)	612.5	612.6	613.9	613.0
Moisture Fraction Measured	(BWSmsd)	0.269	0.273	0.272	0.271
Moisture Fraction @ Saturation	(BWSsat)	0.265	0.265	0.274	0.268
Moisture Fraction	(BWS)	0.265	0.265	0.272	0.267
O_2 Concentration, %	(O_2)	8.8	7.9	8	8.23
CO_2 Concentration, %	(CO_2)	15.1	16.4	16.2	15.90
N_2 Concentration, %	(N_2)	76.1	75.7	75.8	75.87
Excess Air, %	(EA)	77.94	65.37	66.60	69.97
Molecular Weight, lb/lb-mole (dry)	(Md)	30.77	30.94	30.91	30.87
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.39	27.51	27.41	27.43
Velocity, ft/sec	(Vs)	21.7	21.8	21.7	21.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	54,429	54,507	54,393	54,443
At Standard Conditions, scfm	(Qsw)	47,539	47,604	47,403	47,515
At Standard Conditions, dscfm	(Qs)	34,943	34,965	34,517	34,809

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/13/25**	**9:00**	**Date/Time**	**2/13/25**	**9:00**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.02		0.00	0.00
High Range Gas	CC737073	19.93	19.91	CC737073	19.80	19.77
Mid Range Gas	EB0096121	10.00	10.03	EB0096121	10.00	9.97
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/13/2025	9:40	2/13/2025	11:22	2/13/2025	12:45
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	8.81	15.09	7.88	16.36	7.95	16.18
Analysis #2	8.80	15.10	7.90	16.39	7.96	16.19
Analysis #3	8.80	15.10	7.89	16.39	7.96	16.19
Average	8.8	15.1	7.9	16.4	8.0	16.2

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	359.3	816.2	718.0	651.0	1012.3	3556.8
Final Mass, g	557.1	923.9	733.1	655.4	1024.1	3893.6
Gain	197.8	107.7	15.1	4.4	11.8	336.8
Run 2	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.8	641.0	743.5	560.0	982.0	3421.3
Final Mass, g	685.5	741.6	787.0	578.6	1002.6	3795.3
Gain	190.7	100.6	43.5	18.6	20.6	374.0
Run 3	**Date:**	2/13/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.7	671.0	731.0	617.3	975.2	3504.2
Final Mass, g	699.5	772.5	774.0	634.1	994.5	3874.6
Gain	189.8	101.5	43.0	16.8	19.3	370.4

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	8:15	**Source:**	No.2 Lime Kiln (LK02)	
Date:	2/13/25	Run 1 VALID	**End Time:**	9:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26973-A	Pb:	30.34	in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	148	°F		Pg:	-0.08	in. WC	336.8
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.14	in. WC		O_2:	8.8	%	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.428	in.		CO_2:	15.1	%	11.960
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	26.35	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
					50	50	Ideal	Actual		50	50	50	50		
A1	0.00	2.50	36.145	0.13	50	152	1.53	1.50	4	259	254	44	66	99.7	22.08
2	2.50	5.00	37.830	0.12	50	153	1.41	1.40	4	256	255	43	66	102.0	21.24
3	5.00	7.50	39.485	0.14	51	152	1.65	1.70	4	254	260	40	67	102.2	22.92
4	7.50	10.00	41.280	0.13	51	153	1.53	1.50	4	253	257	41	67	101.6	22.10
5	10.00	12.50	43.000	0.15	51	153	1.76	1.80	4	255	253	41	67	101.8	23.74
6	12.50	15.00	44.850	0.14	51	153	1.65	1.70	4	251	255	41	67	101.4	22.94
7	15.00	17.50	46.630	0.13	51	152	1.53	1.50	4	254	255	41	68	100.7	22.08
8	17.50	20.00	48.335	0.12	52	152	1.42	1.40	4	251	250	41	68	102.1	21.22
9	20.00	22.50	50.000	0.15	52	153	1.77	1.80	4	253	255	42	69	101.1	23.74
0	22.50	25.00	51.840	0.13	53	153	1.54	1.50	4	250	254	42	70	100.6	22.10
11	25.00	27.50	53.550	0.11	53	153	1.30	1.30	4	252	260	43	71	100.4	20.33
12	27.50	30.00	55.120	0.12	53	152	1.42	1.40	4	258	256	44	73	101.6	21.22
B1	30.00	32.50	56.780	0.14	54	153	1.66	1.70	4	251	259	45	73	101.1	22.94
2	32.50	35.00	58.565	0.13	54	154	1.54	1.50	4	255	256	45	73	101.1	22.12
3	35.00	37.50	60.285	0.12	55	153	1.42	1.40	4	255	254	45	74	100.4	21.24
4	37.50	40.00	61.930	0.14	55	153	1.66	1.70	4	254	258	46	74	100.6	22.94
5	40.00	42.50	63.710	0.13	55	152	1.54	1.60	4	251	252	46	75	101.4	22.08
6	42.50	45.00	65.440	0.15	55	153	1.78	1.80	5	253	254	47	76	101.6	23.74
7	45.00	47.50	67.300	0.14	56	153	1.66	1.70	5	255	257	47	78	101.0	22.94
8	47.50	50.00	69.090	0.11	56	154	1.31	1.30	5	255	255	47	78	101.5	20.35
9	50.00	52.50	70.685	0.12	57	153	1.43	1.40	5	250	256	47	78	102.1	21.24
10	52.50	55.00	72.365	0.14	57	154	1.66	1.70	5	256	258	46	80	101.1	22.96
11	55.00	57.50	74.160	0.12	57	153	1.43	1.40	5	258	251	46	80	100.9	21.24
12	57.50	60.00	75.820	0.13	57	152	1.55	1.60	5	256	254	47	82	99.2	22.08
	Final DGM:		77.520												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.375	ft^3	0.13	in. WC	53.6	°F	152.8	°F	5	1.554	in. WC	91.2	0.265	0.8

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	9:55	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 2**	**VALID**	**End Time:**	11:00	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26960-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.06 in. WC	374.0
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	7.9 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.419	in.		CO_2:	16.4 %	14.03
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	77.745	0.12	53	153	1.68	1.70	4	258	255	42	65	101.0	20.88
2	2.50	5.00	79.540	0.13	53	154	1.82	1.80	4	254	256	42	66	100.9	21.75
3	5.00	7.50	81.405	0.14	53	154	1.96	2.00	4	256	254	42	67	100.2	22.57
4	7.50	10.00	83.325	0.13	53	154	1.82	1.80	4	253	258	43	68	100.7	21.75
5	10.00	12.50	85.185	0.12	53	154	1.68	1.70	4	253	259	43	68	99.9	20.90
6	12.50	15.00	86.960	0.14	53	153	1.96	2.00	4	254	256	43	68	100.6	22.56
7	15.00	17.50	88.890	0.13	53	153	1.82	1.80	4	256	253	43	68	100.3	21.74
8	17.50	20.00	90.745	0.12	53	153	1.68	1.70	5	258	250	44	68	99.3	20.88
9	20.00	22.50	92.510	0.13	54	152	1.83	1.80	5	253	255	45	70	98.9	21.72
0	22.50	25.00	94.345	0.12	54	152	1.69	1.70	5	254	259	45	71	99.9	20.87
11	25.00	27.50	96.125	0.14	54	152	1.97	2.00	5	253	260	45	69	100.3	22.54
12	27.50	30.00	98.055	0.13	54	153	1.82	1.80	5	252	254	45	69	99.6	21.74
B1	30.00	32.50	99.900	0.12	54	153	1.68	1.70	5	259	257	48	72	100.0	20.88
2	32.50	35.00	101.680	0.14	54	154	1.96	2.00	5	260	255	47	73	100.0	22.57
3	35.00	37.50	103.600	0.14	54	153	1.96	2.00	5	253	255	48	73	100.4	22.56
4	37.50	40.00	105.530	0.13	54	153	1.82	1.80	5	255	256	48	75	100.9	21.74
5	40.00	42.50	107.400	0.12	54	151	1.69	1.70	5	253	255	49	75	100.9	20.85
6	42.50	45.00	109.200	0.13	55	152	1.83	1.80	5	251	255	50	75	101.4	21.72
7	45.00	47.50	111.085	0.13	55	152	1.83	1.80	5	253	255	51	75	100.9	21.72
8	47.50	50.00	112.960	0.13	55	153	1.83	1.80	5	256	254	52	75	100.7	21.74
9	50.00	52.50	114.830	0.15	55	153	2.11	2.00	5	257	251	53	75	99.8	23.35
10	52.50	55.00	116.820	0.14	55	153	1.97	2.00	5	254	250	53	77	100.7	22.56
11	55.00	57.50	118.760	0.15	55	153	2.11	2.10	5	255	253	55	77	100.9	23.35
12	57.50	60.00	120.770	0.13	55	153	1.83	1.80	5	255	259	55	79	100.2	21.74
	Final DGM:		122.630												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.885	ft^3	0.13	in. WC	54.0	°F	152.9	°F	5	1.846	in. WC	98.8	0.265	0.5

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.2 Lime Kiln (LK02)
Date:	2/13/25	**Run 3**	**VALID**	**End Time:**	12:20	**Project No.:**	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	28.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	54	°F	26972-A	Pb:	30.34 in. Hg	Vlc (ml)
Barometric:	30.34	in. Hg	Y:	0.998		Est. Ts:	153	°F		Pg:	-0.07 in. WC	370.4
Static Press:	-0.06	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.13	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.34	in. Hg	Probe ID:	PR-208-3		Est. Dn:	0.418	in.		CO_2:	16.2 %	14.042
CO_2:	16.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	7.0	%	Pitot ID:	PT-206-1		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	77.0	%	Pitot Cp/Type:	0.819	S-type	Leak Rate (cfm):	0.000	-- -- --	0.000		Mid 2 (cf)	--
Md:	30.84	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	27.24	lb/lb-mole	Nozzle Dn (in.):	0.416		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	122.895	0.12	56	153	1.69	1.70	4	258	258	48	68	101.0	20.88
2	2.50	5.00	124.700	0.13	56	155	1.83	1.80	4	250	259	45	66	99.9	21.77
3	5.00	7.50	126.555	0.12	56	154	1.69	1.70	4	258	252	45	66	100.5	20.90
4	7.50	10.00	128.350	0.14	56	155	1.97	2.00	4	257	252	46	68	101.5	22.59
5	10.00	12.50	130.305	0.13	56	155	1.83	1.80	4	255	253	47	69	101.0	21.77
6	12.50	15.00	132.180	0.13	56	154	1.83	1.80	4	258	256	47	69	100.9	21.75
7	15.00	17.50	134.055	0.13	56	155	1.83	1.80	4	258	255	47	70	100.1	21.77
8	17.50	20.00	135.915	0.14	57	154	1.97	2.00	4	258	256	48	70	100.9	22.57
9	20.00	22.50	137.865	0.13	57	155	1.83	1.80	4	257	250	49	70	101.8	21.77
0	22.50	25.00	139.760	0.14	57	154	1.97	2.00	4	254	258	49	70	101.2	22.57
11	25.00	27.50	141.715	0.12	57	153	1.69	1.70	4	256	257	51	72	101.0	20.88
12	27.50	30.00	143.525	0.13	57	154	1.83	1.80	4	258	259	53	72	101.5	21.75
B1	30.00	32.50	145.415	0.15	57	155	2.11	2.00	4	258	252	54	72	100.4	23.39
2	32.50	35.00	147.420	0.13	57	154	1.83	1.80	4	257	253	55	73	100.9	21.75
3	35.00	37.50	149.300	0.14	57	154	1.97	2.00	4	256	254	55	73	100.2	22.57
4	37.50	40.00	151.235	0.12	57	155	1.69	1.70	4	255	257	58	74	98.7	20.92
5	40.00	42.50	153.000	0.11	57	155	1.55	1.60	5	257	256	57	74	100.4	20.03
6	42.50	45.00	154.720	0.13	58	154	1.84	1.80	5	255	255	58	74	101.0	21.75
7	45.00	47.50	156.605	0.12	58	154	1.70	1.70	5	257	256	59	75	101.8	20.90
8	47.50	50.00	158.430	0.11	58	154	1.55	1.60	5	258	259	59	75	101.3	20.01
9	50.00	52.50	160.170	0.14	58	154	1.98	2.00	5	256	260	59	75	101.3	22.57
10	52.50	55.00	162.130	0.13	59	153	1.84	1.90	5	252	260	59	75	100.5	21.74
11	55.00	57.50	164.010	0.15	59	154	2.12	2.10	5	250	254	60	75	101.7	23.37
12	57.50	60.00	166.050	0.14	59	154	1.98	2.00	5	251	257	60	76	99.5	22.57
	Final DGM:		167.980												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.085	ft^3	0.13	in. WC	57.1	°F	154.2	°F	5	1.838	in. WC	99.9	0.272	0.9

RB01A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

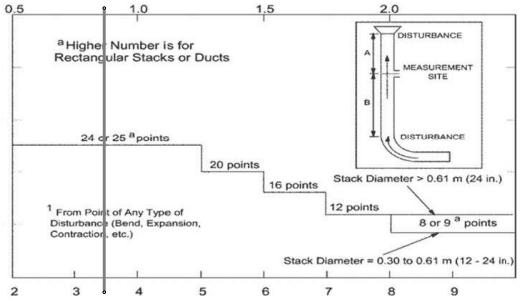
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	47.320	47.695	47.820	47.612
Meter Temperature, °F	(Tm)	63.8	65.7	68.5	66.0
Meter Temperature, °R	(Tm)	523.5	525.4	528.1	525.7
Meter Orifice Pressure, in. WC	(ΔH)	2.158	2.179	2.183	2.174
Volume H_2O Collected, mL	(Vlc)	506.0	450.5	464.3	473.6
Nozzle Diameter, in	(Dn)	0.330	0.330	0.330	0.330
Area of Nozzle, ft^2	(An)	0.0006	0.0006	0.0006	0.0006
Filterable PM Mass, mg	(Mn)	29.2	18.1	26.2	24.5
Condensable PM Mass, mg	(M_{CPM})	10.7	3.3	4.6	6.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.077	48.287	48.162	48.175
Standard Water Volume, ft^3	(Vwstd)	23.863	21.246	21.896	22.335
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
Meter Pressure, in Hg	(Pm)	30.19	30.19	30.19	30.19
Volume at Nozzle, ft^3	(Vn)	111.928	108.082	108.829	109.61
Isokinetic Sampling Rate, (%)	(I)	104.7	101.2	102.2	102.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.2	0.3	0.2	0.2
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0094	0.0058	0.0084	0.0079
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0082	0.0051	0.0074	0.0069
Filterable PM Emission Rate, lb/hr	(PMR)	4.8	3.1	4.4	4.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0034	0.0011	0.0015	0.0020
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.75	0.56	0.77	1.03
Total PM Concentration, grain/dscf	(C_{TPM})	0.013	0.007	0.010	0.010
Total PM Emission Rate, lb/hr	(ER_{TPM})	6.5	3.6	5.2	5.1

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01A) North Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/24	
Reviewer (Initial and Date):	EDO 2/11/24	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

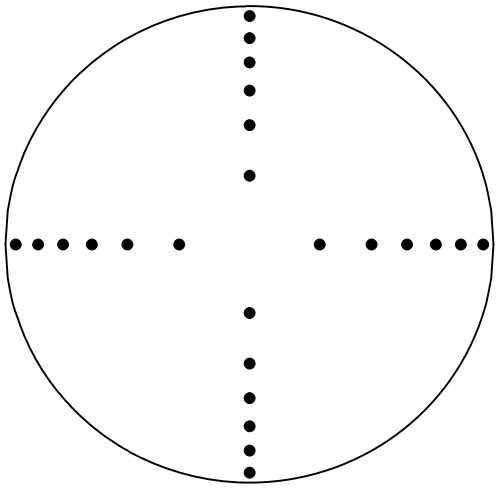
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

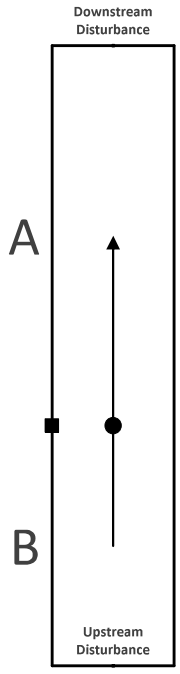
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	5
5	4
6	0
7	3
8	6
9	-2
10	0
11	4
12	1
13	5
14	4
15	2
16	9
17	7
18	4
19	5
20	2
21	3
22	6
23	5
24	4
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.51	0.52	0.50	0.51
Point 2		0.48	0.53	0.53	0.51
Point 3		0.49	0.51	0.51	0.50
Point 4		0.53	0.53	0.49	0.52
Point 5		0.52	0.52	0.52	0.52
Point 6		0.49	0.49	0.51	0.50
Point 7		0.51	0.48	0.49	0.49
Point 8		0.53	0.51	0.50	0.51
Point 9		0.51	0.52	0.48	0.50
Point 10		0.48	0.50	0.51	0.50
Point 11		0.52	0.53	0.52	0.52
Point 12		0.54	0.54	0.54	0.54
Point 13		0.52	0.54	0.50	0.52
Point 14		0.51	0.53	0.51	0.52
Point 15		0.48	0.49	0.53	0.50
Point 16		0.53	0.50	0.52	0.52
Point 17		0.51	0.48	0.48	0.49
Point 18		0.49	0.52	0.50	0.50
Point 19		0.53	0.51	0.53	0.52
Point 20		0.50	0.53	0.54	0.52
Point 21		0.53	0.55	0.55	0.54
Point 22		0.51	0.53	0.52	0.52
Point 23		0.49	0.50	0.49	0.49
Point 24		0.51	0.48	0.48	0.49
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.713	0.717	0.714	0.715
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.48	-0.45	-0.46	-0.46
Stack Pressure, in. Hg	(Ps)	29.99	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	363.9	363.1	362.6	363.2
Stack Temperature, °R	(Ts)	823.5	822.8	822.3	822.9
Moisture Fraction Measured	(BWSmsd)	0.332	0.306	0.313	0.317
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.332	0.306	0.313	0.317
O_2 Concentration, %	(O_2)	6.1	6.2	6.2	6.17
CO_2 Concentration, %	(CO_2)	14.4	14.2	14.3	14.30
N_2 Concentration, %	(N_2)	79.5	79.6	79.5	79.53
Excess Air, %	(EA)	40.97	41.85	41.93	41.58
Molecular Weight, lb/lb-mole (dry)	(Md)	30.55	30.52	30.54	30.53
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.39	26.70	26.62	26.57
Velocity, ft/sec	(Vs)	50.0	49.9	49.8	49.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	138,543	138,342	137,991	138,292
At Standard Conditions, scfm	(Qsw)	88,990	88,949	88,779	88,906
At Standard Conditions, dscfm	(Qs)	59,472	61,771	61,032	60,758

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:25	2/11/2025	12:50	2/11/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.10	14.34	6.20	14.22	6.16	14.25
Analysis #2	6.10	14.36	6.19	14.24	6.16	14.25
Analysis #3	6.11	14.36	6.19	14.24	6.16	14.26
Average	6.1	14.4	6.2	14.2	6.2	14.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.4	640.6	698.9	644.3	934.1	3411.3
Final Mass, g	705.0	761.1	722.3	779.6	949.3	3917.3
Gain	211.6	120.5	23.4	135.3	15.2	506.0
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	498.6	656.8	740.2	636.0	941.0	3472.6
Final Mass, g	686.4	748.9	774.0	762.4	951.4	3923.1
Gain	187.8	92.1	33.8	126.4	10.4	450.5
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.0	639.8	722.0	648.9	942.2	3446.9
Final Mass, g	711.2	731.2	743.7	771.2	953.9	3911.2
Gain	217.2	91.4	21.7	122.3	11.7	464.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	50	°F	26987-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	350	°F		Pg:	-0.48 in. WC	506.0
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.47	in. WC		O_2:	6.1 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.333	in.		CO_2:	14.4 %	4.162
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.001	-- -- --	0.001		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	771.740	0.51	62	359	2.15	2.20	4	257	251	39	73	101.1	49.52
2	2.50	5.00	773.720	0.48	62	361	2.02	2.00	4	258	256	41	73	99.0	48.10
3	5.00	7.50	775.600	0.49	62	363	2.05	2.10	4	254	258	43	74	100.7	48.66
4	7.50	10.00	777.530	0.53	62	366	2.21	2.20	4	254	257	45	75	100.6	50.69
5	10.00	12.50	779.530	0.52	63	365	2.18	2.20	4	255	258	46	75	101.3	50.18
6	12.50	15.00	781.530	0.49	63	365	2.05	2.10	4	258	256	48	75	99.1	48.71
7	15.00	17.50	783.430	0.51	63	364	2.14	2.20	4	256	256	48	75	101.4	49.67
8	17.50	20.00	785.415	0.53	63	366	2.22	2.20	4	258	254	48	76	100.9	50.69
9	20.00	22.50	787.425	0.51	63	365	2.14	2.20	4	254	255	50	76	101.2	49.70
0	22.50	25.00	789.405	0.48	63	364	2.01	2.00	4	256	251	50	76	101.6	48.19
11	25.00	27.50	791.335	0.52	63	363	2.18	2.20	4	253	253	51	76	100.6	50.12
12	27.50	30.00	793.325	0.54	64	360	2.28	2.30	4	255	258	59	78	100.4	50.98
1	30.00	32.50	795.355	0.52	64	362	2.19	2.20	4	257	257	56	78	99.6	50.09
2	32.50	35.00	797.330	0.51	64	364	2.14	2.20	4	257	256	54	79	100.7	49.67
3	35.00	37.50	799.305	0.48	64	365	2.02	2.00	4	257	255	53	80	100.4	48.21
4	37.50	40.00	801.215	0.53	64	368	2.22	2.20	4	253	253	53	80	100.8	50.76
5	40.00	42.50	803.225	0.51	65	366	2.14	2.20	4	252	254	53	80	100.9	49.73
6	42.50	45.00	805.205	0.49	65	365	2.06	2.10	4	251	251	53	79	100.0	48.71
7	45.00	47.50	807.130	0.53	65	365	2.23	2.20	4	250	250	55	76	100.4	50.66
8	47.50	50.00	809.140	0.50	65	363	2.11	2.10	4	258	255	55	74	101.2	49.15
9	50.00	52.50	811.110	0.53	65	365	2.23	2.20	5	257	256	56	74	100.4	50.66
10	52.50	55.00	813.120	0.51	66	365	2.15	2.20	5	259	258	57	72	100.9	49.70
11	55.00	57.50	815.105	0.49	66	362	2.07	2.10	5	258	259	57	72	100.2	48.63
12	57.50	60.00	817.040	0.51	66	362	2.16	2.20	5	253	259	57	72	102.5	49.61
	Final DGM:		819.060												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.320	ft^3	0.51	in. WC	63.8	°F	363.9	°F	5	2.158	in. WC	104.7	0.332	0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		**Start Time:**	11:15	**Source:**	No.1 Recovery Furnace (RB01A) North Stack	
Date:	2/11/25	Run 2 VALID	**End Time:**	12:20	**Project No.:**	AST-2024-4204	**Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	64	°F	26988-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	364	°F		Pg:	-0.45 in. WC	450.5
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2 %	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.323	in.		CO_2:	14.2 %	4.21
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- --	0.002		Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	15	-- -- --	5		Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	2.50	819.395	0.52	64	360	2.20	2.20	4	251	254	40	71	101.3	50.03
2	2.50	5.00	821.405	0.53	64	361	2.24	2.20	4	252	254	41	71	100.6	50.54
3	5.00	7.50	823.420	0.51	64	361	2.15	2.20	4	255	255	41	71	100.8	49.58
4	7.50	10.00	825.400	0.53	64	361	2.23	2.30	4	258	253	41	73	100.7	50.54
5	10.00	12.50	827.415	0.52	64	361	2.19	2.20	4	256	258	41	73	99.1	50.06
6	12.50	15.00	829.380	0.49	65	362	2.07	2.10	4	253	256	45	73	100.6	48.63
7	15.00	17.50	831.320	0.48	65	362	2.03	2.00	4	256	253	45	73	100.8	48.13
8	17.50	20.00	833.245	0.51	65	362	2.15	2.20	4	259	251	46	74	99.9	49.61
9	20.00	22.50	835.210	0.52	65	363	2.19	2.20	4	254	250	46	74	100.5	50.12
0	22.50	25.00	837.205	0.50	65	363	2.11	2.10	4	251	258	50	74	100.7	49.15
11	25.00	27.50	839.165	0.53	66	364	2.24	2.30	4	252	259	51	74	101.5	50.63
12	27.50	30.00	841.200	0.54	66	364	2.28	2.30	4	255	254	51	75	101.3	51.11
1	30.00	32.50	843.250	0.54	66	363	2.28	2.30	4	255	256	52	75	101.4	51.08
2	32.50	35.00	845.305	0.53	66	365	2.23	2.30	5	255	254	52	76	99.5	50.66
3	35.00	37.50	847.300	0.49	66	365	2.07	2.00	5	256	255	53	77	98.5	48.71
4	37.50	40.00	849.200	0.50	66	364	2.11	2.10	5	258	255	51	77	101.6	49.18
5	40.00	42.50	851.180	0.48	67	365	2.03	2.00	5	253	256	50	76	101.4	48.21
6	42.50	45.00	853.120	0.52	67	365	2.20	2.20	5	254	256	49	78	100.5	50.18
7	45.00	47.50	855.120	0.51	67	365	2.15	2.20	5	257	258	49	78	100.5	49.70
8	47.50	50.00	857.100	0.53	67	365	2.24	2.30	5	252	254	49	79	100.3	50.66
9	50.00	52.50	859.115	0.55	67	364	2.32	2.30	5	254	253	53	80	101.4	51.58
10	52.50	55.00	861.190	0.53	67	364	2.24	2.20	5	256	252	52	79	99.7	50.63
11	55.00	57.50	863.195	0.50	67	363	2.12	2.10	5	255	259	53	78	100.6	49.15
12	57.50	60.00	865.160	0.48	67	363	2.03	2.00	5	255	253	53	77	100.8	48.16
	Final DGM:		867.090												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.695	ft^3	0.51	in. WC	65.7	°F	363.1	°F	5	2.179	in. WC	101.2	0.306	0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01A) North Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	66	°F	26696-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.999		Est. Ts:	363	°F		Pg:	-0.46	in. WC	464.3
Static Press:	-0.05	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.51	in. WC		O_2:	6.2	%	K-FACTOR
Stack Press:	30.03	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.322	in.		CO_2:	14.3	%	4.224
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial	Final	Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	--	--	0.001	Mid 1 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS07	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf)			--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.330		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)			--
												Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	867.500	0.50	67	358	2.13	2.10	3	254	255	42	69	102.0	49.00
2	2.50	5.00	869.500	0.53	67	359	2.25	2.30	3	255	256	42	69	101.4	50.48
3	5.00	7.50	871.545	0.51	67	359	2.17	2.20	3	251	258	42	69	100.6	49.52
4	7.50	10.00	873.535	0.49	67	361	2.08	2.10	3	253	257	42	69	101.5	48.60
5	10.00	12.50	875.500	0.52	67	360	2.21	2.20	3	256	256	42	71	100.7	50.03
6	12.50	15.00	877.510	0.51	68	361	2.17	2.20	3	258	259	43	70	100.8	49.58
7	15.00	17.50	879.505	0.49	68	361	2.08	2.10	4	256	258	45	71	100.2	48.60
8	17.50	20.00	881.450	0.50	68	361	2.13	2.10	4	259	258	45	70	99.5	49.09
9	20.00	22.50	883.400	0.48	68	361	2.04	2.10	4	259	253	43	72	98.9	48.10
0	22.50	25.00	885.300	0.51	68	361	2.17	2.20	4	260	250	43	72	101.1	49.58
11	25.00	27.50	887.300	0.52	68	364	2.20	2.20	4	251	260	45	73	101.0	50.15
12	27.50	30.00	889.315	0.54	68	364	2.29	2.30	4	252	251	44	73	99.4	51.11
1	30.00	32.50	891.335	0.50	68	365	2.12	2.10	4	255	254	45	76	99.7	49.21
2	32.50	35.00	893.285	0.51	68	365	2.16	2.20	4	256	258	45	76	100.8	49.70
3	35.00	37.50	895.275	0.53	68	365	2.24	2.30	4	257	259	46	76	101.4	50.66
4	37.50	40.00	897.315	0.52	69	365	2.20	2.20	5	253	253	48	77	99.4	50.18
5	40.00	42.50	899.300	0.48	69	364	2.04	2.10	5	252	255	48	75	100.2	48.19
6	42.50	45.00	901.225	0.50	69	363	2.12	2.10	5	257	258	50	75	100.7	49.15
7	45.00	47.50	903.200	0.53	69	363	2.25	2.30	5	258	254	51	74	100.8	50.60
8	47.50	50.00	905.235	0.54	69	363	2.29	2.30	5	256	257	53	73	101.4	51.08
9	50.00	52.50	907.300	0.55	70	365	2.33	2.30	5	259	256	52	70	101.1	51.61
10	52.50	55.00	909.380	0.52	71	364	2.21	2.20	5	252	258	55	70	100.9	50.15
11	55.00	57.50	911.405	0.49	71	365	2.08	2.10	5	255	259	55	71	99.9	48.71
12	57.50	60.00	913.350	0.48	71	365	2.04	2.10	5	253	255	56	72	102.2	48.21
	Final DGM:		915.320												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	47.820	ft^3	0.51	in. WC	68.5	°F	362.6	°F	5	2.183	in. WC	102.2	0.313	0.2

RB01B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

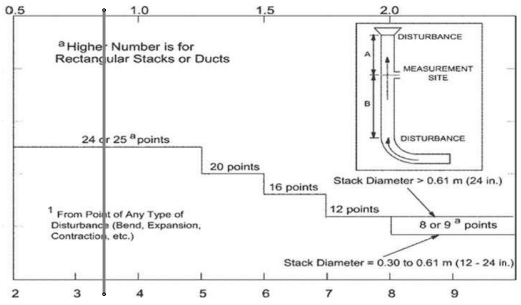
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	40.100	43.045	41.880	41.675
Meter Temperature, °F	(Tm)	62.2	68.3	63.0	64.5
Meter Temperature, °R	(Tm)	521.8	528.0	522.7	524.2
Meter Orifice Pressure, in. WC	(ΔH)	1.621	1.838	1.792	1.750
Volume H_2O Collected, mL	(Vlc)	261.9	266.2	247.8	258.6
Nozzle Diameter, in	(Dn)	0.362	0.362	0.362	0.362
Area of Nozzle, ft^2	(An)	0.0007	0.0007	0.0007	0.0007
Filterable PM Mass, mg	(Mn)	3.4	3.2	2.7	3.1
Condensable PM Mass, mg	(M_{CPM})	4.4	5.1	4.6	4.7
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	40.450	42.936	42.193	41.860
Standard Water Volume, ft^3	(Vwstd)	12.351	12.554	11.686	12.197
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
Meter Pressure, in Hg	(Pm)	30.15	30.17	30.16	30.16
Volume at Nozzle, ft^3	(Vn)	82.136	86.257	83.691	84.03
Isokinetic Sampling Rate, (%)	(I)	93.7	98.3	96.8	96.2
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.3	0.5	-0.4	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.0013	0.0012	0.0010	0.0011
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.0013	0.0012	0.0010	0.0011
Filterable PM Emission Rate, lb/hr	(PMR)	0.52	0.46	0.40	0.46
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0017	0.0018	0.0017	0.0017
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.67	0.74	0.68	0.69
Total PM Concentration, grain/dscf	(C_{TPM})	0.0030	0.0030	0.0027	0.0029
Total PM Emission Rate, lb/hr	(ER_{TPM})	1.2	1.2	1.1	1.2

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Recovery Furnace (RB01B) South Stack
Project No.: AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	100.00	in
Nipple Length:	8.00	in
Depth of Duct:	92.00	in
Cross Sectional Area of Duct:	46.16	ft^2
No. of Test Ports:	2	
Distance A:	42.0	ft
Distance A Duct Diameters:	5.5	(must be ≥ 0.5)
Distance B:	26.5	ft
Distance B Duct Diameters:	3.5	(must be ≥ 2)
Minimum Number of Traverse Points:	24	
Actual Number of Traverse Points:	24	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/11/25	
Reviewer (Initial and Date):	EDO 2/11/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

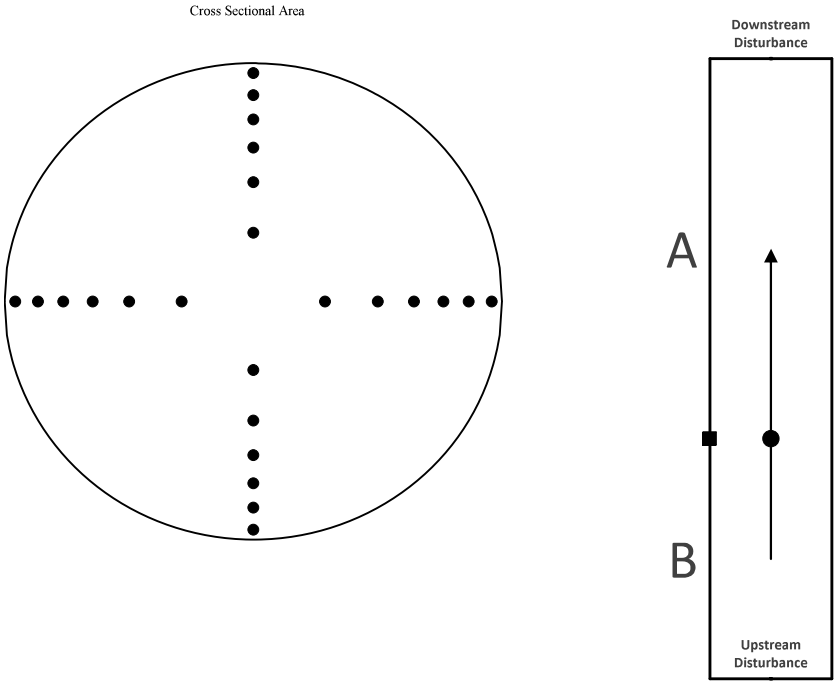
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	2.1	1.93	9 15/16
2	6.7	6.16	14 3/16
3	11.8	10.86	18 7/8
4	17.7	16.28	24 5/16
5	25.0	23.00	31
6	35.6	32.75	40 3/4
7	64.4	59.25	67 1/4
8	75.0	69.00	77
9	82.3	75.72	83 11/16
10	88.2	81.14	89 1/8
11	93.3	85.84	93 13/16
12	97.9	90.07	98 1/16

Stack Diagram
A = 42 ft.
B = 26.5 ft.
Depth of Duct = 92 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	2
2	6
3	8
4	4
5	1
6	0
7	2
8	3
9	0
10	-2
11	1
12	8
13	4
14	2
15	6
16	3
17	2
18	3
19	4
20	7
21	5
22	9
23	5
24	2
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:46	12:20	15:10	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.21	0.21	0.20	0.21
Point 2		0.23	0.24	0.21	0.23
Point 3		0.24	0.23	0.23	0.23
Point 4		0.25	0.24	0.25	0.25
Point 5		0.23	0.22	0.24	0.23
Point 6		0.21	0.20	0.20	0.20
Point 7		0.22	0.24	0.21	0.22
Point 8		0.24	0.22	0.25	0.24
Point 9		0.21	0.25	0.23	0.23
Point 10		0.22	0.23	0.22	0.22
Point 11		0.24	0.21	0.24	0.23
Point 12		0.23	0.24	0.21	0.23
Point 13		0.22	0.23	0.23	0.23
Point 14		0.24	0.21	0.25	0.23
Point 15		0.23	0.24	0.23	0.23
Point 16		0.21	0.22	0.20	0.21
Point 17		0.25	0.24	0.21	0.23
Point 18		0.20	0.23	0.21	0.21
Point 19		0.23	0.25	0.21	0.23
Point 20		0.25	0.24	0.22	0.24
Point 21		0.23	0.24	0.25	0.24
Point 22		0.22	0.25	0.23	0.23
Point 23		0.24	0.22	0.24	0.23
Point 24		0.25	0.23	0.23	0.24
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.478	0.480	0.474	0.477
Pitot Tube Coefficient	(Cp)	0.836	0.836	0.836	0.836
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.12	-0.13	-0.12	-0.12
Stack Pressure, in. Hg	(Ps)	30.02	30.02	30.02	30.02
Stack Cross-sectional Area, ft^2	(As)	46.16	46.16	46.16	46.16
Stack Temperature, °F	(Ts)	364.3	363.7	363.1	363.7
Stack Temperature, °R	(Ts)	824.0	823.3	822.8	823.4
Moisture Fraction Measured	(BWSmsd)	0.234	0.226	0.217	0.226
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.234	0.226	0.217	0.226
O_2 Concentration, %	(O_2)	8	8	8	8.00
CO_2 Concentration, %	(CO_2)	14	14	14	14.00
N_2 Concentration, %	(N_2)	78	78	78	78.00
Excess Air, %	(EA)	63.53	63.53	63.53	63.53
Molecular Weight, lb/lb-mole (dry)	(Md)	30.56	30.56	30.56	30.56
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.63	27.72	27.84	27.73
Velocity, ft/sec	(Vs)	34.1	34.1	33.6	33.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	94,410	94,473	93,103	93,996
At Standard Conditions, scfm	(Qsw)	60,665	60,750	59,913	60,443
At Standard Conditions, dscfm	(Qs)	46,475	47,006	46,918	46,800

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/11/25**	**10:10**	**Date/Time**	**2/11/25**	**10:10**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.93	CC737073	19.80	19.78
Mid Range Gas	EB0096121	10.00	9.99	EB0096121	10.00	9.96
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/11/2025	10:33	2/11/2025	12:58	2/11/2025	16:10
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	6.91	13.52	7.11	13.23	7.18	13.38
Analysis #2	6.92	13.55	7.11	13.25	7.19	13.39
Analysis #3	6.91	13.53	7.11	13.25	7.19	13.38
Average	6.9	13.5	7.1	13.2	7.2	13.4

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.4	670.7	716.5	642.3	942.1	3482.0
Final Mass, g	651.4	760.2	733.5	646.2	952.6	3743.9
Gain	141.0	89.5	17.0	3.9	10.5	261.9
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	507.8	644.0	779.4	644.1	933.3	3508.6
Final Mass, g	639.0	740.2	803.0	648.1	944.5	3774.8
Gain	131.2	96.2	23.6	4.0	11.2	266.2
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	510.5	672.4	733.4	645.7	952.0	3514.0
Final Mass, g	689.0	723.0	740.1	647.8	961.9	3761.8
Gain	178.5	50.6	6.7	2.1	9.9	247.8

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 1	VALID	End Time:	9:46	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26697-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	346	°F		Pg:	-0.12 in. WC	261.9
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.27	in. WC		O_2:	8 %	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.376	in.		CO_2:	14 %	6.965
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	-- -- -- 0.000			Mid 2 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- -- -- 5			Mid 3 (cf)	--
Ms:	26.79	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 50	Stack Amb. 50	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 50	Filter Amb. 50	Imp Exit Amb. 50	CPM Amb. 50	% ISO	Vs (fps)
A1	0.00	2.50	293.420	0.21	61	360	1.47	1.50	3	259	259	40	72	100.6	33.06
2	2.50	5.00	295.015	0.23	61	361	1.61	1.60	3	255	251	41	72	101.9	34.62
3	5.00	7.50	296.705	0.24	61	363	1.67	1.70	3	254	251	42	73	101.4	35.41
4	7.50	10.00	298.420	0.25	61	365	1.74	1.80	3	253	254	42	73	100.9	36.18
5	10.00	12.50	300.160	0.23	61	366	1.60	1.60	3	252	258	43	73	101.3	34.73
6	12.50	15.00	301.835	0.21	61	363	1.47	1.50	3	258	259	43	73	100.1	33.12
7	15.00	17.50	303.420	0.22	61	365	1.53	1.50	3	257	259	45	78	101.3	33.94
8	17.50	20.00	305.060	0.24	61	366	1.67	1.70	3	255	256	48	78	98.9	35.47
9	20.00	22.50	306.730	0.21	61	365	1.46	1.50	3	256	255	48	78	102.5	33.16
10	22.50	25.00	308.351	0.22	61	365	1.53	1.50	3	252	252	48	78	101.9	33.94
11	25.00	27.50	310.000	0.24	62	366	1.67	1.70	3	250	254	48	78	100.5	35.47
12	27.50	30.00	311.700	0.23	62	365	1.60	1.60	4	251	255	50	76	101.1	34.71
B1	30.00	32.50	313.375	0.22	62	366	1.53	1.50	4	255	253	51	75	101.5	33.96
2	32.50	35.00	315.020	0.24	62	364	1.68	1.70	4	256	258	51	74	100.7	35.43
3	35.00	37.50	316.725	0.23	63	363	1.61	1.60	4	253	257	50	74	101.4	34.66
4	37.50	40.00	318.410	0.21	63	365	1.47	1.50	4	255	256	51	72	101.4	33.16
5	40.00	42.50	320.020	0.25	63	366	1.74	1.80	4	258	258	52	73	98.3	36.21
6	42.50	45.00	321.720	0.20	63	365	1.40	1.40	4	252	259	56	74	100.7	32.36
7	45.00	47.50	323.280	0.23	63	364	1.61	1.60	4	259	260	56	76	100.5	34.69
8	47.50	50.00	324.950	0.25	63	363	1.75	1.80	4	256	260	55	76	101.3	36.14
9	50.00	52.50	326.705	0.23	63	365	1.61	1.60	4	252	256	54	77	101.2	34.71
10	52.50	55.00	328.385	0.22	64	364	1.54	1.70	4	254	254	52	78	105.4	33.92
11	55.00	57.50	330.100	0.24	64	364	1.68	1.70	4	255	255	52	79	100.9	35.43
12	57.50	60.00	331.815	0.25	65	364	1.75	1.80	4	255	253	52	79	98.1	36.16
	Final DGM:		333.520												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	40.100 ft^3	0.23 in. WC	62.2 °F	364.3 °F	4	1.621 in. WC	93.7	0.234	0.3

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	11:15	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 2	VALID	End Time:	12:20	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	62	°F	26698-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.13	in. WC	266.2
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.377	in.		CO_2:	14	%	7.82
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf)	--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb.	Amb.	Ideal	Actual		Amb.	Amb.	Amb.	Amb.		
					--	--				--	--	--	--		
A1	0.00	2.50	334.150	0.21	66	362	1.66	1.70	4	255	253	40	68	100.1	32.72
2	2.50	5.00	335.845	0.24	66	363	1.89	1.90	4	254	258	40	68	100.4	35.00
3	5.00	7.50	337.660	0.23	67	363	1.82	1.80	4	255	254	41	68	101.2	34.27
4	7.50	10.00	339.455	0.24	67	363	1.90	1.90	4	254	256	42	70	105.7	35.00
5	10.00	12.50	341.370	0.22	67	363	1.74	1.80	4	258	258	42	70	100.0	33.51
6	12.50	15.00	343.105	0.20	67	363	1.58	1.60	4	260	259	42	71	99.7	31.95
7	15.00	17.50	344.755	0.24	67	363	1.90	1.90	4	256	254	45	71	100.8	35.00
8	17.50	20.00	346.580	0.22	68	364	1.74	1.80	4	253	257	45	70	101.6	33.53
9	20.00	22.50	348.345	0.25	68	365	1.98	2.00	4	258	256	45	71	100.9	35.77
10	22.50	25.00	350.210	0.23	68	365	1.82	1.80	4	254	251	45	72	100.9	34.31
11	25.00	27.50	352.000	0.21	68	365	1.66	1.70	4	255	257	48	71	101.4	32.78
12	27.50	30.00	353.720	0.24	68	364	1.90	1.90	5	255	254	48	73	100.4	35.02
B1	30.00	32.50	355.540	0.23	68	364	1.82	1.80	5	256	258	47	73	101.7	34.29
2	32.50	35.00	357.345	0.21	68	363	1.67	1.70	5	253	256	47	75	99.2	32.74
3	35.00	37.50	359.030	0.24	69	363	1.91	1.90	5	257	258	50	75	100.1	35.00
4	37.50	40.00	360.850	0.22	69	363	1.75	1.80	5	254	259	50	75	100.8	33.51
5	40.00	42.50	362.605	0.24	69	362	1.91	1.90	5	255	254	50	75	100.1	34.98
6	42.50	45.00	364.425	0.23	70	362	1.83	1.80	5	258	251	51	76	100.3	34.24
7	45.00	47.50	366.215	0.25	70	362	1.99	2.00	5	256	255	52	78	100.3	35.70
8	47.50	50.00	368.080	0.24	70	365	1.90	1.90	5	259	258	55	78	100.0	35.04
9	50.00	52.50	369.900	0.24	70	365	1.90	1.90	5	251	259	55	80	101.1	35.04
10	52.50	55.00	371.740	0.25	70	365	1.98	2.00	5	250	256	56	80	101.0	35.77
11	55.00	57.50	373.615	0.22	70	366	1.74	1.80	5	253	257	56	80	102.5	33.57
12	57.50	60.00	375.400	0.23	70	365	1.83	1.80	5	251	254	57	80	100.8	34.31
	Final DGM:		377.195												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.045	ft^3	0.23	in. WC	68.3	°F	363.7	°F	5	1.838	in. WC	98.3	0.226	0.5

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:05	Source:	No.1 Recovery Furnace (RB01B) South Stack
Date:	2/11/25	Run 3	VALID	End Time:	15:10	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	68	°F	26699-A	Pb:	30.03	in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.99		Est. Ts:	364	°F		Pg:	-0.12	in. WC	247.8
Static Press:	-0.12	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.23	in. WC		O_2:	8	%	K-FACTOR
Stack Press:	30.02	in. Hg	Probe ID:	PR-210-0		Est. Dn:	0.374	in.		CO_2:	14	%	7.923
CO_2:	14.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	8.0	%	Pitot ID:	PT-309-1		LEAK CHECK	Pre	Mid 1 / Mid 2 / Mid 3	Post	Mid 1 (cf)			--
N_2/CO:	78.0	%	Pitot Cp/Type:	0.836	S-type	Leak Rate (cfm):	0.002	-- / -- / --	0.000	Mid 2 (cf)			--
Md:	30.56	lb/lb-mole	Nozzle ID:	SS-36	SS	Vacuum (in Hg):	15	-- / -- / --	6	Mid 3 (cf)			--
Ms:	27.42	lb/lb-mole	Nozzle Dn (in.):	0.362		Pitot Tube:	Pass	-- / -- / --	Pass	Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
A1	0.00	2.50	377.420	0.20	60	360	1.57	1.60	4	254	255	41	75	99.7	31.89
2	2.50	5.00	379.050	0.21	60	361	1.64	1.70	4	251	252	42	75	98.5	32.70
3	5.00	7.50	380.700	0.23	60	362	1.80	1.80	4	253	251	42	75	100.5	34.24
4	7.50	10.00	382.460	0.25	61	363	1.95	2.00	4	258	254	42	76	101.3	35.72
5	10.00	12.50	384.310	0.24	61	365	1.87	1.90	4	254	252	42	76	100.7	35.04
6	12.50	15.00	386.110	0.20	61	365	1.56	1.60	4	257	256	43	76	98.6	31.99
7	15.00	17.50	387.720	0.21	61	364	1.64	1.70	4	256	259	44	76	101.2	32.76
8	17.50	20.00	389.415	0.25	61	365	1.95	2.00	4	258	258	45	76	100.6	35.77
9	20.00	22.50	391.250	0.23	61	365	1.79	1.80	4	256	257	45	76	99.9	34.31
10	22.50	25.00	393.000	0.22	61	363	1.72	1.70	4	253	255	45	77	99.1	33.51
11	25.00	27.50	394.700	0.24	62	363	1.88	1.90	4	256	255	46	77	100.9	35.00
12	27.50	30.00	396.510	0.21	62	363	1.65	1.70	4	254	253	47	78	101.3	32.74
B1	30.00	32.50	398.210	0.23	62	364	1.80	1.80	4	254	254	47	78	100.3	34.29
2	32.50	35.00	399.970	0.25	62	365	1.95	2.00	4	255	256	47	78	100.6	35.77
3	35.00	37.50	401.810	0.23	63	365	1.80	1.80	4	256	258	46	79	101.8	34.31
4	37.50	40.00	403.600	0.20	63	362	1.57	1.60	4	258	256	47	75	98.6	31.93
5	40.00	42.50	405.220	0.21	65	361	1.66	1.70	4	256	251	48	75	100.6	32.70
6	42.50	45.00	406.920	0.21	65	360	1.66	1.70	4	258	252	48	71	100.5	32.68
7	45.00	47.50	408.620	0.21	66	361	1.66	1.70	4	254	258	49	71	99.2	32.70
8	47.50	50.00	410.300	0.22	67	362	1.74	1.80	5	251	256	47	71	101.1	33.49
9	50.00	52.50	412.055	0.25	67	362	1.98	2.00	5	250	257	48	72	100.3	35.70
10	52.50	55.00	413.910	0.23	67	363	1.82	1.80	5	252	258	49	73	100.9	34.27
11	55.00	57.50	415.700	0.24	67	365	1.89	1.90	5	256	254	49	73	100.6	35.04
12	57.50	60.00	417.520	0.23	68	365	1.82	1.80	5	253	255	50	75	100.3	34.31
	Final DGM:		419.300												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.880	ft^3	0.23	in. WC	63.0	°F	363.1	°F	5	1.792	in. WC	96.8	0.217	-0.4

RB02A

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

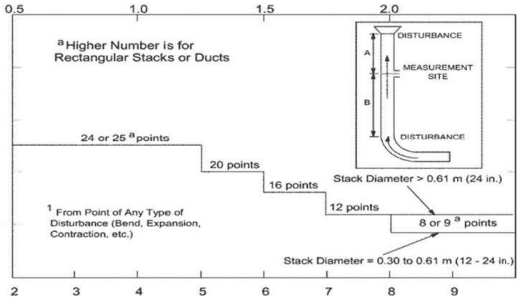
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	41.020	42.440	43.385	42.282
Meter Temperature, °F	(Tm)	48.3	61.7	68.3	59.4
Meter Temperature, °R	(Tm)	507.9	521.3	528.0	519.1
Meter Orifice Pressure, in. WC	(ΔH)	1.533	1.608	1.650	1.597
Volume H_2O Collected, mL	(Vlc)	251.0	250.6	288.0	263.2
Nozzle Diameter, in	(Dn)	0.292	0.292	0.292	0.292
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	57.8	51.0	152.4	87.1
Condensable PM Mass, mg	(M_{CPM})	2.9	5.9	3.7	4.2
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	42.463	42.810	43.215	42.829
Standard Water Volume, ft^3	(Vwstd)	11.837	11.818	13.582	12.413
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
Meter Pressure, in Hg	(Pm)	29.87	29.88	29.88	29.88
Volume at Nozzle, ft^3	(Vn)	88.809	86.910	90.386	88.70
Isokinetic Sampling Rate, (%)	(I)	96.9	96.7	99.4	97.7
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.2	0.1	0.0
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.021	0.018	0.054	0.031
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.017	0.014	0.043	0.025
Filterable PM Emission Rate, lb/hr	(PMR)	20.2	17.9	52.0	30.0
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0011	0.0021	0.0013	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.01	2.07	1.26	1.45
Total PM Concentration, grain/dscf	(C_{TPM})	0.022	0.021	0.056	0.033
Total PM Emission Rate, lb/hr	(ER_{TPM})	21.2	19.9	53.2	31.5

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.2 Recovery Furnace (RB02A) West Stack
Project No.: AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	(must be ≥ 0.5)
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

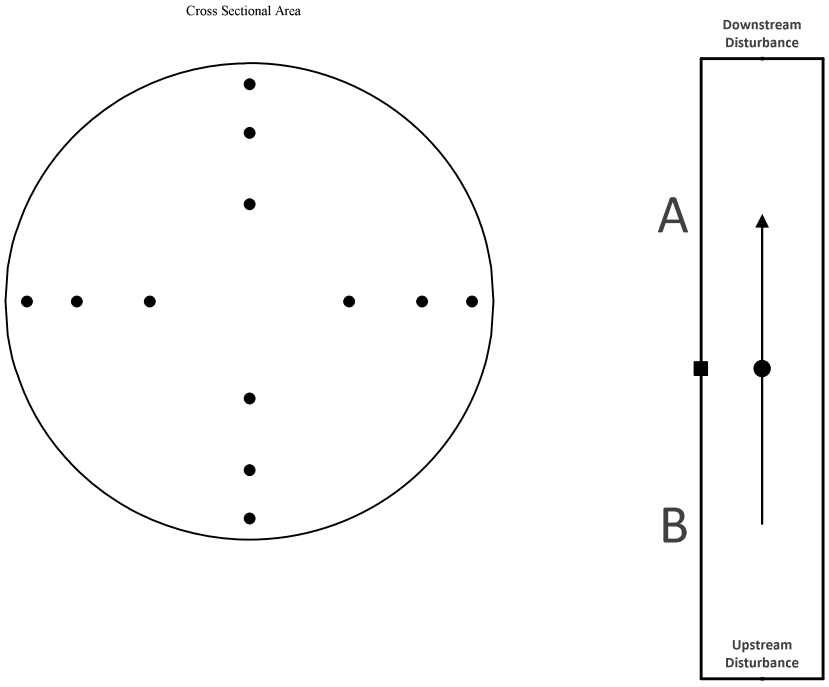
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	4
2	1
3	9
4	8
5	2
6	3
7	6
8	7
9	4
10	0
11	2
12	5
Average	4

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:07	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.57	0.59	0.61	0.59
Point 2		0.59	0.63	0.63	0.62
Point 3		0.60	0.60	0.60	0.60
Point 4		0.63	0.61	0.63	0.62
Point 5		0.62	0.59	0.65	0.62
Point 6		0.64	0.61	0.61	0.62
Point 7		0.61	0.63	0.59	0.61
Point 8		0.63	0.60	0.62	0.62
Point 9		0.64	0.64	0.63	0.64
Point 10		0.60	0.61	0.61	0.61
Point 11		0.65	0.62	0.64	0.64
Point 12		0.60	0.59	0.59	0.59
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.784	0.781	0.786	0.784
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.63	-0.61	-0.62	-0.62
Stack Pressure, in. Hg	(Ps)	29.71	29.72	29.71	29.71
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	397.8	374.4	374.7	382.3
Stack Temperature, °R	(Ts)	857.4	834.1	834.3	841.9
Moisture Fraction Measured	(BWSmsd)	0.218	0.216	0.239	0.224
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.218	0.216	0.239	0.224
O_2 Concentration, %	(O_2)	4.6	4.3	4.5	4.47
CO_2 Concentration, %	(CO_2)	16.2	16.5	16.3	16.33
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	28.21	25.89	27.42	27.17
Molecular Weight, lb/lb-mole (dry)	(Md)	30.78	30.81	30.79	30.79
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.99	28.04	27.73	27.92
Velocity, ft/sec	(Vs)	54.7	53.7	54.3	54.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	234,751	230,403	233,140	232,765
At Standard Conditions, scfm	(Qsw)	143,473	144,762	146,434	144,890
At Standard Conditions, dscfm	(Qs)	112,196	113,444	111,417	112,352

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:42	2/12/2025	14:15	2/12/2025	16:02
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	4.58	16.15	4.25	16.51	4.46	16.22
Analysis #2	4.58	16.16	4.26	16.53	4.46	16.26
Analysis #3	4.59	16.17	4.26	16.52	4.46	16.27
Average	4.6	16.2	4.3	16.5	4.5	16.3

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.2	657.7	740.5	636.8	944.1	3478.3
Final Mass, g	679.7	704.2	750.9	639.5	955.0	3729.3
Gain	180.5	46.5	10.4	2.7	10.9	251.0
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	671.2	509.7	740.2	647.4	1008.0	3576.5
Final Mass, g	691.1	714.7	756.8	651.6	1012.9	3827.1
Gain	19.9	205.0	16.6	4.2	4.9	250.6
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.5	645.8	775.5	650.6	924.3	3505.7
Final Mass, g	734.8	665.7	802.7	653.5	937.0	3793.7
Gain	225.3	19.9	27.2	2.9	12.7	288.0

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX		Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02A) West Stack	
Date:	2/12/25	Run 1 VALID	End Time:	11:07	Project No.:	AST-2024-4204	Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	55	°F	26705-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	399	°F		Pg:	-0.63 in. WC	251.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.6 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.304	in.		CO_2:	16.2 %	2.505
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	--	-- --	0.000	Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	-- --	5	Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 55	Stack Amb. 55	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 55	Filter Amb. 55	Imp Exit Amb. 55	CPM Amb. 55	% ISO	Vs (fps)
A1	0.00	5.00	907.840	0.57	45	394	1.41	1.40	4	256	257	44	69	100.2	53.09
2	5.00	10.00	911.120	0.59	46	395	1.46	1.50	4	254	255	45	70	100.3	54.05
3	10.00	15.00	914.465	0.60	46	395	1.48	1.50	4	256	254	47	71	100.8	54.51
4	15.00	20.00	917.855	0.63	47	396	1.56	1.60	4	258	257	48	71	99.8	55.88
5	20.00	25.00	921.300	0.62	47	399	1.53	1.50	4	259	256	48	73	100.9	55.54
6	25.00	30.00	924.750	0.64	48	401	1.58	1.60	4	260	253	48	73	99.3	56.49
B1	30.00	35.00	928.200	0.61	48	400	1.51	1.50	4	260	252	50	72	100.0	55.12
2	35.00	40.00	931.595	0.63	50	400	1.56	1.60	4	254	258	50	71	99.9	56.02
3	40.00	45.00	935.055	0.64	50	399	1.59	1.60	5	256	259	49	73	100.5	56.43
4	45.00	50.00	938.565	0.60	50	398	1.49	1.50	5	258	260	49	74	100.6	54.60
5	50.00	55.00	941.970	0.65	51	398	1.62	1.60	5	255	256	51	75	100.2	56.83
6	55.00	60.00	945.505	0.60	51	398	1.49	1.50	5	254	254	53	78	98.9	54.60
	Final DGM:		948.860												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	41.020	ft^3	0.62	in. WC	48.3	°F	397.8	°F	5	1.533	in. WC	96.9	0.218	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	48	°F	26706-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	398	°F		Pg:	-0.61	in. WC	250.6
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.62	in. WC		O_2:	4.3	%	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.307	in.		CO_2:	16.5	%	2.48
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				Check Pt.	Initial / Final / Corr.
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1 / Mid 2 / Mid 3 / Post				Mid 1 (cf)	--
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.000	-- / -- / -- / 0.000				Mid 2 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	-- / -- / -- / 5				Mid 3 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	-- / -- / -- / Pass				Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	949.090	0.59	59	374	1.54	1.50	4	253	256	40	76	99.2	53.38
2	5.00	10.00	952.525	0.63	60	375	1.64	1.70	4	253	256	42	73	100.4	55.19
3	10.00	15.00	956.120	0.60	60	374	1.56	1.60	4	253	257	43	75	99.5	53.83
4	15.00	20.00	959.600	0.61	61	375	1.59	1.60	4	257	255	41	68	100.1	54.31
5	20.00	25.00	963.135	0.59	61	375	1.54	1.50	4	255	256	42	69	99.7	53.41
6	25.00	30.00	966.600	0.61	62	376	1.59	1.60	4	254	251	44	71	100.8	54.34
B1	30.00	35.00	970.165	0.63	62	375	1.65	1.70	4	255	254	46	72	100.1	55.19
2	35.00	40.00	973.765	0.60	62	374	1.57	1.60	4	254	256	46	73	100.6	53.83
3	40.00	45.00	977.300	0.64	63	375	1.68	1.70	5	256	258	45	75	100.1	55.63
4	45.00	50.00	980.935	0.61	63	374	1.60	1.60	5	256	257	48	76	100.2	54.28
5	50.00	55.00	984.490	0.62	63	373	1.63	1.60	5	259	254	49	78	99.5	54.69
6	55.00	60.00	988.050	0.59	64	373	1.55	1.60	5	260	255	51	78	99.5	53.35
	Final DGM:		991.530												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	42.440 ft^3	0.61 in. WC	61.7 °F	374.4 °F	5	1.608 in. WC	96.7	0.216	-0.2

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02A) West Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	62	°F	26709-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.998		Est. Ts:	374	°F		Pg:	-0.62 in. WC	288.0
Static Press:	-0.63	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.61	in. WC		O_2:	4.5 %	K-FACTOR
Stack Press:	29.71	in. Hg	Probe ID:	PR-208-2		Est. Dn:	0.301	in.		CO_2:	16.3 %	2.613
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-207-2		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-07	SS	Vacuum (in Hg):	15	--	--	--	5	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.292		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. --	Filter Amb. --	Imp Exit Amb. --	CPM Amb. --	% ISO	Vs (fps)
A1	0.00	5.00	992.320	0.61	67	373	1.61	1.60	3	254	252	48	70	100.3	54.25
2	5.00	10.00	995.910	0.63	67	373	1.67	1.70	3	254	258	48	71	99.7	55.13
3	10.00	15.00	999.535	0.60	67	374	1.58	1.60	3	258	256	48	71	100.5	53.83
4	15.00	20.00	1003.100	0.63	67	374	1.66	1.70	3	253	254	47	71	100.6	55.16
5	20.00	25.00	1006.755	0.65	68	374	1.72	1.70	3	256	257	46	73	99.4	56.03
6	25.00	30.00	1010.430	0.61	68	375	1.61	1.60	3	253	259	46	74	99.7	54.31
B1	30.00	35.00	1014.000	0.59	68	375	1.56	1.60	3	258	260	46	75	100.8	53.41
2	35.00	40.00	1017.550	0.62	69	376	1.64	1.70	3	256	260	49	75	100.9	54.79
3	40.00	45.00	1021.195	0.63	69	375	1.67	1.70	4	255	260	49	76	100.7	55.19
4	45.00	50.00	1024.865	0.61	70	376	1.62	1.60	4	254	258	51	78	100.4	54.34
5	50.00	55.00	1028.470	0.64	70	376	1.70	1.70	4	258	255	52	78	100.2	55.66
6	55.00	60.00	1032.155	0.59	70	375	1.57	1.60	4	256	256	52	78	100.4	53.41
	Final DGM:		1035.705												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	43.385	ft^3	0.62	in. WC	68.3	°F	374.7	°F	4	1.650	in. WC	99.4	0.239	0.1

RB02B

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

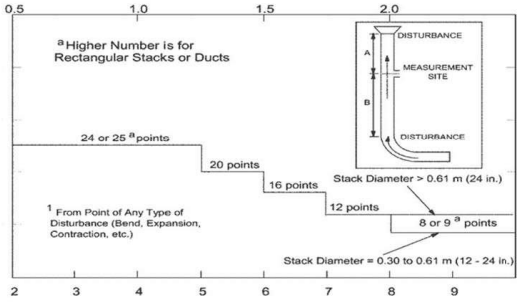
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.999	0.999	0.999	--
Orifice Calibration Value	(ΔH @)	1.832	1.832	1.832	--
Meter Volume, ft^3	(Vm)	44.125	45.125	44.820	44.690
Meter Temperature, °F	(Tm)	53.3	72.4	62.2	62.6
Meter Temperature, °R	(Tm)	512.9	532.1	521.8	522.3
Meter Orifice Pressure, in. WC	(ΔH)	1.908	1.942	1.942	1.931
Volume H_2O Collected, mL	(Vlc)	319.2	291.3	328.1	312.9
Nozzle Diameter, in	(Dn)	0.295	0.295	0.295	0.295
Area of Nozzle, ft^2	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	105.1	43.2	51.4	66.6
Condensable PM Mass, mg	(M_{CPM})	4.0	4.8	4.5	4.4
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	45.319	44.680	45.250	45.083
Standard Water Volume, ft^3	(Vwstd)	15.053	13.738	15.473	14.755
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
Meter Pressure, in Hg	(Pm)	29.90	29.90	29.90	29.90
Volume at Nozzle, ft^3	(Vn)	96.813	95.419	99.108	97.11
Isokinetic Sampling Rate, (%)	(I)	100.1	98.4	100.8	99.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	0.1	-0.3	0.0	-0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.036	0.015	0.018	0.023
Filterable PM Concentration (corrected), grain/dscf @ 8% O2	(Csc8)	0.030	0.012	0.014	0.019
Filterable PM Emission Rate, lb/hr	(PMR)	34.8	14.6	16.9	22.1
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0014	0.0017	0.0015	0.0015
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	1.33	1.62	1.48	1.48
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.017	0.019	0.024
Total PM Emission Rate, lb/hr	(ER_{TPM})	36.2	16.2	18.4	23.6

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date: 02/12/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	120.00	in
Nipple Length:	5.50	in
Depth of Duct:	114.50	in
Cross Sectional Area of Duct:	71.51	ft^2
No. of Test Ports:	2	
Distance A:	100.0	ft
Distance A Duct Diameters:	10.5	**(must be ≥ 0.5)**
Distance B:	100.0	ft
Distance B Duct Diameters:	10.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	CLS 2/12/25	
Reviewer (Initial and Date):	EDO 2/12/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

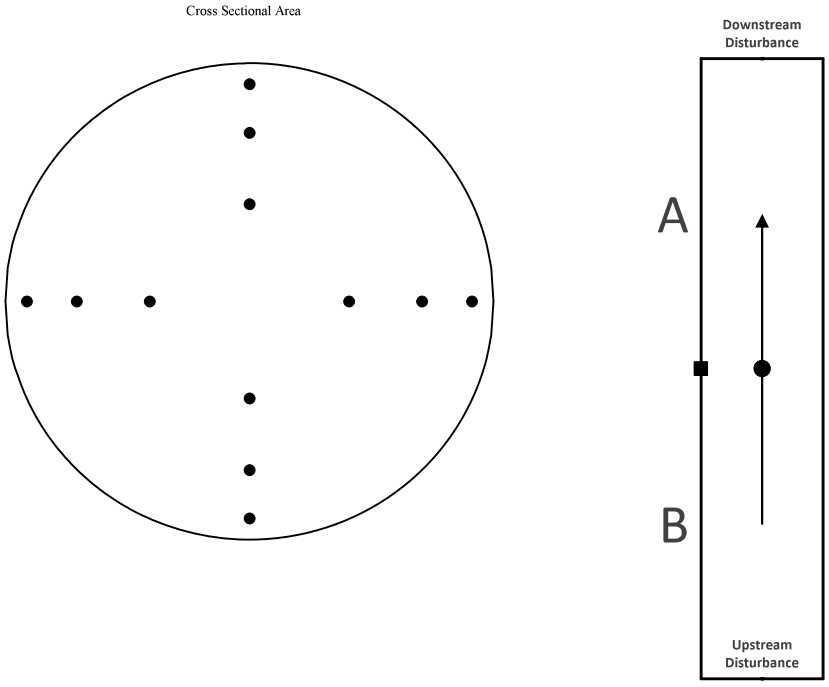
Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	5.04	10 9/16
2	14.6	16.72	22 3/16
3	29.6	33.89	39 3/8
4	70.4	80.61	86 1/8
5	85.4	97.78	103 5/16
6	95.6	109.46	114 15/16
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 100 ft.
B = 100 ft.
Depth of Duct = 114.5 in.



Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	4
3	1
4	3
5	2
6	1
7	0
8	-2
9	-3
10	-1
11	0
12	6
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:17	13:37	15:26	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.62	0.60	0.59	0.60
Point 2		0.63	0.63	0.63	0.63
Point 3		0.65	0.61	0.65	0.64
Point 4		0.61	0.62	0.61	0.61
Point 5		0.59	0.64	0.64	0.62
Point 6		0.63	0.63	0.63	0.63
Point 7		0.61	0.59	0.61	0.60
Point 8		0.59	0.61	0.63	0.61
Point 9		0.61	0.63	0.64	0.63
Point 10		0.64	0.62	0.65	0.64
Point 11		0.65	0.59	0.61	0.62
Point 12		0.59	0.61	0.63	0.61
CALCULATED DATA					
Square Root of ΔP, $(\text{in. WC})^{1/2}$	(ΔP)	0.786	0.784	0.792	0.787
Pitot Tube Coefficient	(Cp)	0.830	0.830	0.830	0.830
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.54	-0.55	-0.53	-0.54
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	71.51	71.51	71.51	71.51
Stack Temperature, °F	(Ts)	381.3	396.8	396.3	391.4
Stack Temperature, °R	(Ts)	840.9	856.5	855.9	851.1
Moisture Fraction Measured	(BWSmsd)	0.249	0.235	0.255	0.246
Moisture Fraction @ Saturation	(BWSsat)	1.000	1.000	1.000	1.000
Moisture Fraction	(BWS)	0.249	0.235	0.255	0.246
O_2 Concentration, %	(O_2)	5.6	5.1	5.3	5.33
CO_2 Concentration, %	(CO_2)	15.2	15.7	15.5	15.47
N_2 Concentration, %	(N_2)	79.2	79.2	79.2	79.20
Excess Air, %	(EA)	36.58	32.26	33.96	34.27
Molecular Weight, lb/lb-mole (dry)	(Md)	30.66	30.72	30.69	30.69
Molecular Weight, lb/lb-mole (wet)	(Ms)	27.50	27.73	27.46	27.56
Velocity, ft/sec	(Vs)	56.6	56.7	57.5	56.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	242,764	243,366	246,763	244,298
At Standard Conditions, scfm	(Qsw)	151,315	148,927	151,116	150,453
At Standard Conditions, dscfm	(Qs)	113,585	113,905	112,609	113,366

Method 3/3A Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204

	O_2 Data			CO_2 Data		
	Date/Time	**2/12/25**	**9:30**	**Date/Time**	**2/12/25**	**9:30**
Make/Model/SN	Servomex	4900	653217	Servomex	4900	653217
Parameter	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**	**Cylinder ID**	**Cylinder Concentration, %**	**Analyzer Concentration, %**
Zero Gas		0.00	0.00		0.00	0.00
High Range Gas	CC737073	19.93	19.95	CC737073	19.80	19.84
Mid Range Gas	EB0096121	10.00	9.98	EB0096121	10.00	10.03
Concentration Span, %	19.9			19.8		
Required Accuracy, %	0.40			0.40		

Run No.	**Run 1**		**Run 2**		**Run 3**	
Analysis Date/Time	2/12/2025	11:35	2/12/2025	14:07	2/12/2025	15:53
Parameter	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**	**O_2 %**	**CO_2 %**
Analysis #1	5.58	15.23	5.08	15.66	5.25	15.51
Analysis #2	5.59	15.23	5.10	15.67	5.25	15.49
Analysis #3	5.58	15.22	5.10	15.67	5.25	15.49
Average	5.6	15.2	5.1	15.7	5.3	15.5

The remaining consistuent is assumed to be nitrogen.

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	509.9	645.2	748.0	647.7	933.7	3484.5
Final Mass, g	687.3	741.5	776.2	651.5	947.2	3803.7
Gain	177.4	96.3	28.2	3.8	13.5	319.2
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	493.7	640.3	746.6	649.0	961.2	3490.8
Final Mass, g	698.7	686.5	771.7	649.5	975.7	3782.1
Gain	205.0	46.2	25.1	0.5	14.5	291.3
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	499.9	658.1	750.2	639.4	952.3	3499.9
Final Mass, g	691.0	735.7	785.2	644.8	971.3	3828.0
Gain	191.1	77.6	35.0	5.4	19.0	328.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 1	VALID	End Time:	11:17	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	55	°F	26704-A	Pb:	29.76	in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	380	°F		Pg:	-0.54	in. WC	319.2
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.6	%	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.2	%	3.091
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm					
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt.	Initial / Final / Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.001	--	--	--	0.000	Mid 1 (cf)	--
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 2 (cf)	--
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf)	--
												Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					55	55				55	55	55	55		
A1	0.00	5.00	915.775	0.62	52	376	1.91	1.90	3	254	251	42	75	100.7	56.56
2	5.00	10.00	919.480	0.63	52	378	1.94	2.00	3	256	252	42	75	100.4	57.08
3	10.00	15.00	923.200	0.65	52	380	2.00	2.00	3	256	256	43	76	100.5	58.05
4	15.00	20.00	926.975	0.61	52	382	1.87	1.90	3	258	260	43	78	99.7	56.30
5	20.00	25.00	930.600	0.59	53	383	1.81	1.80	3	259	258	45	78	100.5	55.40
6	25.00	30.00	934.200	0.63	53	385	1.93	1.90	3	253	257	46	78	100.2	57.32
B1	30.00	35.00	937.905	0.61	53	385	1.87	1.90	3	254	256	48	78	99.7	56.40
2	35.00	40.00	941.530	0.59	54	383	1.81	1.80	4	253	253	49	81	100.4	55.40
3	40.00	45.00	945.135	0.61	54	383	1.88	1.90	4	257	252	50	81	100.5	56.33
4	45.00	50.00	948.800	0.64	54	381	1.97	2.00	4	255	255	52	83	100.1	57.63
5	50.00	55.00	952.545	0.65	55	380	2.01	2.00	4	255	254	52	83	100.3	58.05
6	55.00	60.00	956.335	0.59	55	379	1.83	1.80	4	256	251	53	82	98.9	55.27
	Final DGM:		959.900												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.125	ft^3	0.62	in. WC	53.3	°F	381.3	°F	4	1.908	in. WC	100.1	0.249	0.1

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	53	°F	26707-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	381	°F		Pg:	-0.55 in. WC	291.3
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.1 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.298	in.		CO_2:	15.7 %	3.08
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm				
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Check Pt. Initial Final Corr.
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.000	--	--	--	0.002	Mid 1 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	7	Mid 2 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid 3 (cf) --
												Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. --	Stack Amb. --	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
A1	0.00	5.00	959.925	0.60	70	396	1.87	1.90	4	251	252	45	76	99.3	56.30
2	5.00	10.00	963.600	0.63	70	396	1.97	2.00	4	260	251	43	75	99.7	57.69
3	10.00	15.00	967.380	0.61	70	397	1.90	1.90	4	256	254	45	76	100.1	56.80
4	15.00	20.00	971.115	0.62	71	396	1.94	2.00	5	253	250	51	75	100.8	57.23
5	20.00	25.00	974.915	0.64	71	396	2.00	2.00	5	255	258	51	71	100.4	58.15
6	25.00	30.00	978.760	0.63	72	395	1.98	2.00	5	254	253	52	73	100.3	57.66
B1	30.00	35.00	982.580	0.59	73	397	1.85	1.90	5	255	258	53	75	99.6	55.86
2	35.00	40.00	986.255	0.61	74	397	1.92	1.90	5	252	253	53	76	99.6	56.80
3	40.00	45.00	990.000	0.63	74	398	1.98	1.90	5	252	255	54	78	100.8	57.76
4	45.00	50.00	993.850	0.62	74	398	1.95	2.00	5	254	254	55	80	100.7	57.30
5	50.00	55.00	997.665	0.59	75	399	1.85	1.90	5	256	257	56	80	100.5	55.93
6	55.00	60.00	1001.385	0.61	75	397	1.92	1.90	5	258	255	56	81	97.3	56.80
	Final DGM:		1005.050												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	45.125	ft^3	0.62	in. WC	72.4	°F	396.8	°F	5	1.942	in. WC	98.4	0.235	-0.3

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Recovery Furnace (RB02B) East Stack
Date:	2/12/25	Run 3	VALID	End Time:	15:26	Project No.:	AST-2024-4204	Parameter:	PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	25.0	% est.	Meter Box ID:	MB-214-2990		Est. Tm:	72	°F	26708-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.999		Est. Ts:	397	°F		Pg:	-0.53 in. WC	328.1
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.832		Est. ΔP:	0.62	in. WC		O_2:	5.3 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-210-2		Est. Dn:	0.295	in.		CO_2:	15.5 %	3.133
CO_2:	15.0	%	Liner Material:	glass		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.	
O_2:	4.8	%	Pitot ID:	PT-202-4		LEAK CHECKS	Pre	Mid 1	Mid 2	Mid 3	Post	Mid 1 (cf) --
N_2/CO:	80.2	%	Pitot Cp/Type:	0.830	S-type	Leak Rate (cfm):	0.002	--	--	--	0.001	Mid 2 (cf) --
Md:	30.59	lb/lb-mole	Nozzle ID:	SS-7	SS	Vacuum (in Hg):	14	--	--	--	5	Mid 3 (cf) --
Ms:	27.44	lb/lb-mole	Nozzle Dn (in.):	0.295		Pitot Tube:	Pass	--	--	--	Pass	Mid-Point Leak Check Vol (cf): --

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	6.280	0.59	61	393	1.82	1.80	4	254	251	43	70	100.2	55.73
2	5.00	10.00	9.905	0.63	61	395	1.94	1.90	4	256	252	43	71	101.0	57.66
3	10.00	15.00	13.675	0.65	61	396	1.99	2.00	4	258	250	43	72	99.7	58.60
4	15.00	20.00	17.450	0.61	61	396	1.87	1.90	4	254	256	45	72	100.4	56.77
5	20.00	25.00	21.135	0.64	61	396	1.96	2.00	4	258	258	45	73	100.6	58.15
6	25.00	30.00	24.915	0.63	62	397	1.93	1.90	4	257	259	45	73	100.1	57.72
B1	30.00	35.00	28.655	0.61	62	397	1.87	1.90	4	256	260	46	74	100.7	56.80
2	35.00	40.00	32.355	0.63	63	397	1.94	2.00	4	258	254	48	75	100.5	57.72
3	40.00	45.00	36.115	0.64	63	397	1.97	2.00	4	259	257	49	78	99.7	58.18
4	45.00	50.00	39.875	0.65	63	398	2.00	2.00	5	257	255	50	79	99.8	58.67
5	50.00	55.00	43.665	0.61	64	397	1.88	1.90	5	256	255	51	79	100.2	56.80
6	55.00	60.00	47.360	0.63	64	396	1.94	2.00	5	255	256	51	82	99.7	57.69
	Final DGM:		51.100												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	44.820	ft^3	0.63	in. WC	62.2	°F	396.3	°F	5	1.942	in. WC	100.8	0.255	0.0

SM01

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

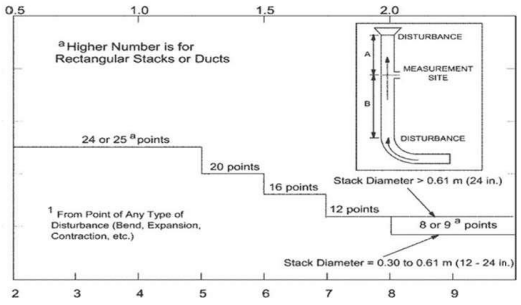
Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	49.70	49.70	49.69	49.70
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Meter Correction Factor	(Y)	0.998	0.998	0.998	--
Orifice Calibration Value	(ΔH @)	1.685	1.685	1.685	--
Meter Volume, ft^3	(Vm)	48.040	48.100	53.630	49.923
Meter Temperature, °F	(Tm)	51.4	49.9	53.6	51.6
Meter Temperature, °R	(Tm)	511.1	509.6	513.3	511.3
Meter Orifice Pressure, in. WC	(ΔH)	1.950	1.958	2.417	2.108
Volume H_2O Collected, mL	(Vlc)	806.2	438.4	456.0	566.9
Nozzle Diameter, in	(Dn)	0.382	0.382	0.382	0.382
Area of Nozzle, ft^2	(An)	0.0008	0.0008	0.0008	0.0008
Filterable PM Mass, mg	(Mn)	245.4	122.5	118.9	162.3
Condensable PM Mass, mg	(M_{CPM})	13.8	7.9	9.3	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	49.919	50.129	55.555	51.868
Standard Water Volume, ft^3	(Vwstd)	38.020	20.675	21.505	26.733
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
Meter Pressure, in Hg	(Pm)	30.17	30.17	30.21	30.19
Volume at Nozzle, ft^3	(Vn)	103.488	81.841	88.953	91.43
Isokinetic Sampling Rate, (%)	(I)	101.3	91.2	100.1	97.5
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	1.7	1.7	1.7	1.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.076	0.038	0.033	0.049
Filterable PM Emission Rate, lb/hr	(PMR)	7.4	4.1	3.6	5.1
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.15	0.083	0.073	0.10
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0043	0.0024	0.0026	0.0031
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.42	0.26	0.28	0.32
Total PM Concentration, grain/dscf	(C_{TPM})	0.080	0.040	0.036	0.052
Total PM Emission Rate, lb/hr	(ER_{TPM})	7.8	4.4	3.9	5.4

Method 1 Data

Location: Graphic Packaging International - Queen City, TX
Source: No.1 Smelt Tank Scrubber (SM01)
Project No.: AST-2024-4204
Date: 02/10/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	54.00	in
Nipple Length:	9.00	in
Depth of Duct:	45.00	in
Cross Sectional Area of Duct:	11.04	ft^2
No. of Test Ports:	1	
Distance A:	112.0	ft
Distance A Duct Diameters:	29.9	(must be ≥ 0.5)
Distance B:	60.0	ft
Distance B Duct Diameters:	16.0	(must be ≥ 2)
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN 2/10/25	
Reviewer (Initial and Date):	CAL 2/10/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

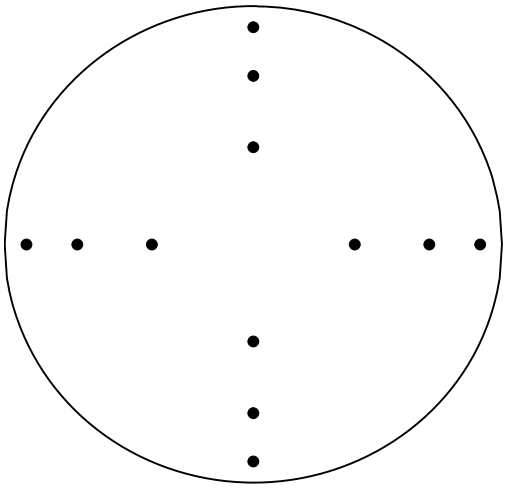
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

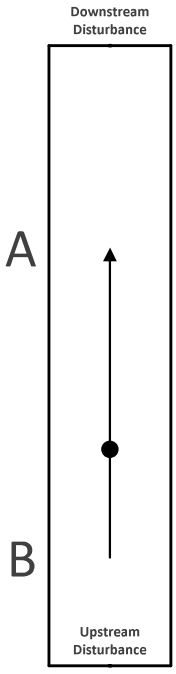
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	1.98	11
2	14.6	6.57	15 9/16
3	29.6	13.32	22 5/16
4	70.4	31.68	40 11/16
5	85.4	38.43	47 7/16
6	95.6	43.02	52
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 112 ft.
B = 60 ft.
Depth of Duct = 45 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Date 02/11/25

Sample Point	Angle (ΔP=0)
1	-4
2	-2
3	-1
4	1
5	0
6	2
7	3
8	5
9	4
10	3
11	-1
12	2
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/11/25	2/11/25	2/11/25	--
Start Time		8:40	11:15	14:05	--
Stop Time		9:40	12:15	15:05	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.16	0.16	0.17	0.16
Point 2		0.17	0.18	0.18	0.18
Point 3		0.23	0.22	0.23	0.23
Point 4		0.32	0.31	0.30	0.31
Point 5		0.29	0.28	0.27	0.28
Point 6		0.27	0.28	0.27	0.27
Point 7		0.40	0.35	0.36	0.37
Point 8		0.29	0.34	0.33	0.32
Point 9		0.28	0.29	0.28	0.28
Point 10		0.24	0.23	0.25	0.24
Point 11		0.19	0.18	0.19	0.19
Point 12		0.16	0.17	0.17	0.17
CALCULATED DATA					
Square Root of ΔP, (in. WC)$^{1/2}$	(ΔP)	0.495	0.495	0.496	0.495
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	30.03	30.03	30.03	30.03
Static Pressure, in. WC	(Pg)	-0.39	-0.39	-0.39	-0.39
Stack Pressure, in. Hg	(Ps)	30.00	30.00	30.00	30.00
Stack Cross-sectional Area, ft^2	(As)	11.04	11.04	11.04	11.04
Stack Temperature, °F	(Ts)	163.5	152.3	151.4	155.7
Stack Temperature, °R	(Ts)	623.2	611.9	611.1	615.4
Moisture Fraction Measured	(BWSmsd)	0.432	0.292	0.279	0.334
Moisture Fraction @ Saturation	(BWSsat)	0.345	0.264	0.259	0.289
Moisture Fraction	(BWS)	0.345	0.264	0.259	0.289
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	25.10	25.98	26.04	25.70
Velocity, ft/sec	(Vs)	31.0	30.1	30.2	30.4
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	20,517	19,971	19,993	20,160
At Standard Conditions, scfm	(Qsw)	17,420	17,268	17,310	17,333
At Standard Conditions, dscfm	(Qs)	11,402	12,707	12,830	12,313

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.2	648.2	744.6	544.8	948.7	3244.5
Final Mass, g	873.1	888.1	769.2	557.9	962.4	4050.7
Gain	514.9	239.9	24.6	13.1	13.7	806.2
Run 2	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.0	799.4	763.4	637.7	942.4	3637.9
Final Mass, g	819.0	864.0	792.7	644.0	956.6	4076.3
Gain	324.0	64.6	29.3	6.3	14.2	438.4
Run 3	**Date:**	2/11/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.9	828.8	768.8	556.4	956.3	3469.2
Final Mass, g	735.9	871.4	789.3	560.3	968.3	3925.2
Gain	377.0	42.6	20.5	3.9	12.0	456.0

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Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:40	Source:	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	Run 1	VALID	End Time:	9:40	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	160	°F	26974-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	163	°F		Pg:	-0.39 in. WC	806.2
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.313	in.		CO_2:	0 %	9.461
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECK:	Pre	Mid 1 Mid 2 Mid 3 Post			Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.002	-- -- -- 0.003			Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- -- 12			Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- -- Pass			Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					45	45				45	45	45	45		
1	0.00	5.00	756.890	0.16	48	167	1.23	1.20	3	254	255	43	68	100.6	25.11
2	5.00	10.00	760.060	0.17	49	163	1.32	1.30	3	256	254	35	73	101.1	25.80
3	10.00	15.00	763.360	0.23	49	167	1.77	1.80	4	254	254	35	69	99.5	30.10
4	15.00	20.00	767.120	0.32	50	168	2.46	2.50	7	256	256	36	67	99.4	35.54
5	20.00	25.00	771.550	0.29	50	168	2.24	2.20	6	255	253	38	80	101.8	33.83
6	25.00	30.00	775.870	0.27	51	164	2.10	2.10	6	255	257	40	83	102.5	32.54
7	30.00	35.00	780.090	0.40	52	162	3.12	3.10	9	255	257	41	78	99.0	39.54
8	35.00	40.00	785.060	0.29	53	163	2.27	2.30	8	256	254	41	73	103.8	33.70
9	40.00	45.00	789.510	0.28	53	162	2.19	2.20	7	255	256	41	68	100.3	33.08
10	45.00	50.00	793.740	0.24	54	160	1.89	1.90	7	256	249	40	72	103.8	30.58
11	50.00	55.00	797.810	0.19	54	159	1.50	1.50	7	255	256	39	74	105.0	27.19
12	55.00	60.00	801.480	0.16	54	159	1.26	1.30	6	253	250	40	71	107.5	24.95
	Final DGM:		804.930												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.040 ft^3	0.25 in. WC	51.4 °F	163.5 °F	9	1.950 in. WC	101.3	0.345	1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	11:15	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 2**	**VALID**	**End Time:**	12:15	**Project No.:**	AST-2024-4204 **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	35.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	51	°F	26989-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	164	°F		Pg:	-0.39 in. WC	438.4
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.345	in.		CO_2:	0 %	7.80
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.005	-- -- --	0.002		Mid 2 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	-- -- --	10		Mid 3 (cf)	--
Ms:	25.04	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	CPM		
	Begin	End			Amb. --	Amb. --	Ideal	Actual		Amb. --	Amb. --	Amb. --	Amb. --		
1	0.00	5.00	805.210	0.16	49	146	1.28	1.30	3	254	249	46	66	102.8	24.68
2	5.00	10.00	808.510	0.18	50	153	1.42	1.40	4	255	256	37	68	99.4	26.33
3	10.00	15.00	811.880	0.22	49	152	1.74	1.70	5	254	256	39	82	100.5	29.09
4	15.00	20.00	815.640	0.31	49	153	2.44	2.40	7	253	259	40	84	101.8	34.56
5	20.00	25.00	820.150	0.28	48	151	2.21	2.20	6	256	255	40	75	102.8	32.79
6	25.00	30.00	824.480	0.28	49	148	2.23	2.20	6	255	255	42	67	100.9	32.71
7	30.00	35.00	828.750	0.35	49	147	2.78	2.80	8	255	256	43	66	101.1	36.54
8	35.00	40.00	833.530	0.34	50	147	2.71	2.70	8	256	256	46	75	100.9	36.01
9	40.00	45.00	838.240	0.29	51	149	2.31	2.30	7	255	254	49	82	101.9	33.32
10	45.00	50.00	842.640	0.23	51	158	1.81	1.80	7	256	255	49	73	103.3	29.89
11	50.00	55.00	846.590	0.18	52	160	1.41	1.40	6	255	255	48	69	101.3	26.48
12	55.00	60.00	850.020	0.17	52	163	1.33	1.30	6	256	255	46	72	100.2	25.80
	Final DGM:		853.310												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	48.100 ft^3	0.25 in. WC	49.9 °F	152.3 °F	8	1.958 in. WC	91.2	0.264	1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			**Start Time:**	14:05	**Source:**	No.1 Smelt Tank Scrubber (SM01)
Date:	2/11/25	**Run 3**	**VALID**	**End Time:**	15:05	**Project No.:**	AST-2024-4204 — **Parameter:** PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	27.0	% est.	Meter Box ID:	MB-210-2447		Est. Tm:	50	°F	26700-A	Pb:	30.03 in. Hg	Vlc (ml)
Barometric:	30.03	in. Hg	Y:	0.998		Est. Ts:	152	°F		Pg:	-0.39 in. WC	456.0
Static Press:	-0.39	in. WC	ΔH @ (in.WC):	1.685		Est. ΔP:	0.25	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	30.00	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.328	in.		CO_2:	0 %	9.650
CO_2:	0.0	%	Liner Material:	glass		Target Rate:	0.65	scfm				
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 / Mid 3	Post	Check Pt. / Initial / Final / Corr.	
N_2/CO:	79.1	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- / --	0.002	Mid 1 (cf)	--
Md:	28.84	lb/lb-mole	Nozzle ID:	SS-382-2	SS	Vacuum (in Hg):	15	--	-- / --	9	Mid 2 (cf)	--
Ms:	25.91	lb/lb-mole	Nozzle Dn (in.):	0.382		Pitot Tube:	Pass	--	-- / --	Pass	Mid 3 (cf)	--
											Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
1	0.00	5.00	853.490	0.17	52	154	1.64	1.60	4	254	254	51	67	100.8	25.18
2	5.00	10.00	857.170	0.18	50	150	1.74	1.70	4	254	254	43	69	102.9	25.83
3	10.00	15.00	861.030	0.23	51	148	2.24	2.20	5	256	256	42	68	99.5	29.14
4	15.00	20.00	865.260	0.30	52	148	2.92	2.90	6	255	255	44	70	100.7	33.29
5	20.00	25.00	870.150	0.27	53	147	2.64	2.60	5	255	256	44	66	101.9	31.55
6	25.00	30.00	874.860	0.27	54	146	2.65	2.70	6	256	255	47	65	102.1	31.53
7	30.00	35.00	879.590	0.36	55	146	3.53	3.50	8	256	255	48	72	99.4	36.40
8	35.00	40.00	884.910	0.33	55	154	3.20	3.20	8	255	256	48	69	100.5	35.08
9	40.00	45.00	890.030	0.28	55	155	2.71	2.70	8	256	256	46	73	101.2	32.34
10	45.00	50.00	894.780	0.25	55	156	2.42	2.40	7	256	254	45	68	101.9	30.59
11	50.00	55.00	899.300	0.19	55	158	1.83	1.80	7	255	254	44	76	103.2	26.71
12	55.00	60.00	903.290	0.17	56	155	1.65	1.70	6	254	256	45	78	104.3	25.20
	Final DGM:		907.120												

RESULTS

Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
60.0 min	53.630 ft^3	0.25 in. WC	53.6 °F	151.4 °F	8	2.417 in. WC	100.1	0.259	1.7

SM02

Emission Calculations

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

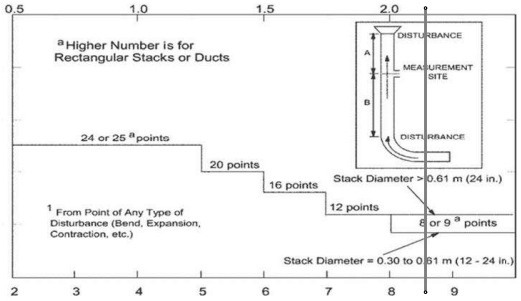
Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Feed Rate, ton/hr	(FR)	97.01	96.99	96.99	97.00
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Meter Correction Factor	(Y)	0.99	0.99	0.99	--
Orifice Calibration Value	(ΔH @)	1.949	1.949	1.949	--
Meter Volume, ft^3	(Vm)	48.530	39.450	39.950	42.643
Meter Temperature, °F	(Tm)	61.0	63.1	64.0	62.7
Meter Temperature, °R	(Tm)	520.7	522.8	523.7	522.4
Meter Orifice Pressure, in. WC	(ΔH)	2.317	1.467	1.458	1.747
Volume H_2O Collected, mL	(Vlc)	467.7	380.9	370.7	406.4
Nozzle Diameter, in	(Dn)	0.344	0.305	0.305	0.318
Area of Nozzle, ft^2	(An)	0.0006	0.0005	0.0005	0.0006
Filterable PM Mass, mg	(Mn)	108.2	73.4	71.1	84.2
Condensable PM Mass, mg	(M_{CPM})	8.0	16.2	6.8	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft^3	(Vmstd)	48.707	39.354	39.782	42.615
Standard Water Volume, ft^3	(Vwstd)	22.057	17.963	17.482	19.167
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
Meter Pressure, in Hg	(Pm)	29.93	29.87	29.87	29.89
Volume at Nozzle, ft^3	(Vn)	82.478	67.206	67.182	72.29
Isokinetic Sampling Rate, (%)	(I)	93.9	99.1	100.3	97.8
DGM Calibration Check Value, (+/- 5%)	(Y_{qa})	-1.7	0.2	1.6	0.1
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C_s)	0.034	0.029	0.028	0.030
Filterable PM Emission Rate, lb/hr	(PMR)	7.5	6.1	5.8	6.5
Filterable PM Emission Factor, lb/ton	(EF_{PM})	0.077	0.063	0.060	0.067
Condensable PM Concentration, grain/dscf	(C_{CPM})	0.0025	0.0064	0.0026	0.0038
Condensable PM Emission Rate, lb/hr	(ER_{CPM})	0.55	1.35	0.56	0.82
Total PM Concentration, grain/dscf	(C_{TPM})	0.037	0.035	0.030	0.034
Total PM Emission Rate, lb/hr	(ER_{TPM})	8.0	7.4	6.4	7.3

Method 1 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date: 02/11/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Number of Readings per Point:	1	
Measurer (Initial and Date):	MCN	
Reviewer (Initial and Date):	CAL	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

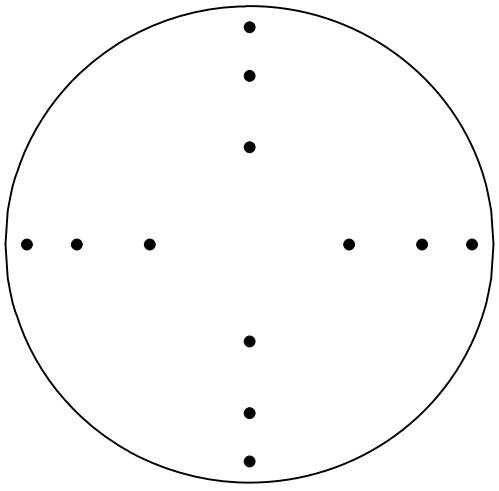
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

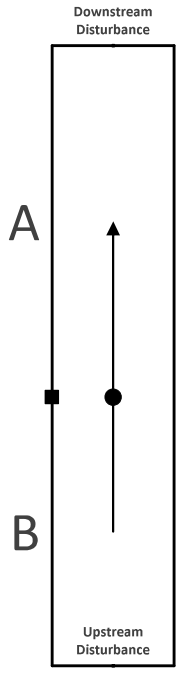
**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 55 ft.
B = 42 ft.
Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Date 02/12/25

Sample Point	Angle (ΔP=0)
1	5
2	2
3	1
4	0
5	1
6	2
7	-3
8	-2
9	0
10	1
11	-1
12	3
Average	2

Flow Information

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		2/12/25	2/12/25	2/12/25	--
Start Time		8:00	12:30	14:20	--
Stop Time		11:18	13:37	15:28	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.36	0.35	0.34	0.35
Point 2		0.34	0.34	0.34	0.34
Point 3		0.31	0.30	0.32	0.31
Point 4		0.32	0.30	0.31	0.31
Point 5		0.34	0.33	0.35	0.34
Point 6		0.35	0.36	0.36	0.36
Point 7		0.35	0.36	0.35	0.35
Point 8		0.33	0.34	0.34	0.34
Point 9		0.32	0.33	0.31	0.32
Point 10		0.30	0.32	0.32	0.31
Point 11		0.33	0.33	0.34	0.33
Point 12		0.35	0.36	0.35	0.35
CALCULATED DATA					
Square Root of ΔP, $(in. WC)^{1/2}$	(ΔP)	0.577	0.579	0.579	0.578
Pitot Tube Coefficient	(Cp)	0.804	0.804	0.804	0.804
Barometric Pressure, in. Hg	(Pb)	29.76	29.76	29.76	29.76
Static Pressure, in. WC	(Pg)	-0.61	-0.61	-0.61	-0.61
Stack Pressure, in. Hg	(Ps)	29.72	29.72	29.72	29.72
Stack Cross-sectional Area, ft^2	(As)	18.99	18.99	18.99	18.99
Stack Temperature, °F	(Ts)	151.5	155.2	155.5	154.1
Stack Temperature, °R	(Ts)	611.2	614.8	615.2	613.7
Moisture Fraction Measured	(BWSmsd)	0.312	0.313	0.305	0.310
Moisture Fraction @ Saturation	(BWSsat)	0.262	0.286	0.289	0.279
Moisture Fraction	(BWS)	0.262	0.286	0.289	0.279
O_2 Concentration, %	(O_2)	20.9	20.9	20.9	20.90
CO_2 Concentration, %	(CO_2)	0	0	0	0.00
N_2 Concentration, %	(N_2)	79.1	79.1	79.1	79.10
Excess Air, %	(EA)	-118750.00	-118750.00	-118750.00	-118750.00
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.84	28.84	28.84
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.00	25.74	25.71	25.82
Velocity, ft/sec	(Vs)	35.3	35.7	35.7	35.6
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	40,191	40,629	40,702	40,507
At Standard Conditions, scfm	(Qsw)	34,462	34,630	34,673	34,589
At Standard Conditions, dscfm	(Qs)	25,439	24,719	24,670	24,942

Method 4 Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM
Analysis Gravimetric

Run 1	Date:	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	494.9	799.9	724.0	643.3	951.8	3613.9
Final Mass, g	847.9	880.1	741.1	647.1	965.4	4081.6
Gain	353.0	80.2	17.1	3.8	13.6	467.7
Run 2	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	358.7	829.0	790.1	560.5	971.9	3510.2
Final Mass, g	696.1	854.5	797.1	561.2	982.2	3891.1
Gain	337.4	25.5	7.0	0.7	10.3	380.9
Run 3	**Date:**	2/12/25				
Impinger No.	**1**	**2**	**3**	**4**	**5**	**Total**
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Mass, g	495.2	799.1	740.3	641.5	938.2	3614.3
Final Mass, g	806.2	832.5	753.1	643.9	949.3	3985.0
Gain	311.0	33.4	12.8	2.4	11.1	370.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	8:00	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 1	VALID	End Time:	11:18	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	50	°F	26702-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	154	°F		Pg:	-0.61 in. WC	467.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.308	in.		CO_2:	0 %	6.815
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.003	--	-- --	0.002	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-344-3	SS	Vacuum (in Hg):	15	--	-- --	10	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.344		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb. 45	Stack Amb. 45	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb. 45	Filter Amb. 45	Imp Exit Amb. 45	CPM Amb. 45	% ISO	Vs (fps)
A1	0.00	5.00	420.260	0.36	55	154	2.47	2.50	6	248	246	41	68	96.9	37.04
2	5.00	10.00	424.350	0.34	54	151	2.34	2.30	6	247	257	40	72	99.8	35.91
3	10.00	15.00	428.450	0.31	54	149	2.14	2.10	5	246	256	46	70	95.2	34.23
4	15.00	20.00	432.190	0.32	60	149	2.24	2.20	6	254	257	47	68	98.1	34.78
5	20.00	25.00	436.150	0.34	63	149	2.39	2.40	6	250	252	47	67	97.8	35.85
6	25.00	30.00	440.240	0.35	64	148	2.47	2.50	7	251	248	46	69	99.6	36.35
B1	30.00	35.00	444.480	0.35	63	150	2.46	2.50	7	254	253	45	70	100.7	36.41
2	35.00	40.00	448.750	0.33	63	151	2.31	2.30	6	255	248	42	76	99.6	35.38
3	40.00	45.00	452.850	0.32	63	152	2.24	2.20	6	255	251	38	81	98.0	34.87
4	45.00	50.00	456.820	0.30	64	153	2.10	2.10	5	253	255	40	67	100.3	33.79
5	50.00	55.00	460.760	0.33	64	154	2.31	2.30	6	255	254	40	68	98.4	35.47
6	55.00	60.00	464.810	0.35	65	158	2.43	2.40	7	256	254	41	74	94.1	36.64
	Final DGM:		468.790												

RESULTS

Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
60.0	min	48.530	ft^3	0.33	in. WC	61.0	°F	151.5	°F	7	2.317	in. WC	93.9	0.262	-1.7

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	12:30	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 2	VALID	End Time:	13:37	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	61	°F	26703-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	152	°F		Pg:	-0.61 in. WC	380.9
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.33	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.307	in.		CO_2:	0 %	4.34
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1	Mid 2 Mid 3	Post	Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.006	--	-- --	0.003	Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	--	-- --	6	Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	--	-- --	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	468.950	0.35	62	158	1.51	1.50	3	254	255	42	67	97.0	36.64
2	5.00	10.00	472.170	0.34	60	155	1.46	1.50	4	260	263	43	83	103.7	36.03
3	10.00	15.00	475.560	0.30	61	156	1.29	1.30	4	261	254	43	76	102.8	33.87
4	15.00	20.00	478.720	0.30	61	158	1.29	1.30	4	260	251	45	66	101.0	33.93
5	20.00	25.00	481.820	0.33	61	160	1.41	1.40	4	260	249	45	74	98.3	35.64
6	25.00	30.00	484.980	0.36	62	154	1.56	1.60	5	260	252	47	81	102.4	37.04
B1	30.00	35.00	488.440	0.36	63	151	1.57	1.60	4	246	244	47	73	98.7	36.95
2	35.00	40.00	491.790	0.34	64	153	1.48	1.50	4	257	252	51	68	101.5	35.97
3	40.00	45.00	495.140	0.33	64	152	1.45	1.50	4	259	250	49	72	101.3	35.57
4	45.00	50.00	498.450	0.32	66	154	1.40	1.40	4	260	241	49	72	102.1	34.92
5	50.00	55.00	501.730	0.33	66	156	1.44	1.40	4	258	246	50	69	99.8	35.52
6	55.00	60.00	504.980	0.36	67	155	1.57	1.60	5	261	254	51	67	100.4	37.07
	Final DGM:		508.400												

RESULTS	Run Time	Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y_{qa}
	60.0 min	39.450 ft^3	0.34 in. WC	63.1 °F	155.2 °F	5	1.467 in. WC	99.1	0.286	0.2

Alliance TECHNICAL GROUP

Isokinetic Field Data

Location:	Graphic Packaging International - Queen City, TX			Start Time:	14:20	Source:	No.2 Smelt Tank Scrubber (SM02)
Date:	2/12/25	Run 3	VALID	End Time:	15:28	Project No.:	AST-2024-4204

Parameter: PM/CPM

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA
Moisture:	30.0	% est.	Meter Box ID:	MB-211-2613		Est. Tm:	63	°F	26971-A	Pb:	29.76 in. Hg	Vlc (ml)
Barometric:	29.76	in. Hg	Y:	0.99		Est. Ts:	155	°F		Pg:	-0.61 in. WC	370.7
Static Press:	-0.61	in. WC	ΔH @ (in.WC):	1.949		Est. ΔP:	0.34	in. WC		O_2:	20.9 %	K-FACTOR
Stack Press:	29.72	in. Hg	Probe ID:	PR-205-2		Est. Dn:	0.306	in.		CO_2:	0 %	4.327
CO_2:	0.1	%	Liner Material:	glass		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.	
O_2:	20.9	%	Pitot ID:	PT-204-4		LEAK CHECKS	Pre	Mid 1 Mid 2 Mid 3	Post		Mid 1 (cf)	--
N_2/CO:	79.0	%	Pitot Cp/Type:	0.804	S-type	Leak Rate (cfm):	0.007	-- -- --	0.009		Mid 2 (cf)	--
Md:	28.85	lb/lb-mole	Nozzle ID:	SS-305-2	SS	Vacuum (in Hg):	15	-- -- --	6		Mid 3 (cf)	--
Ms:	25.60	lb/lb-mole	Nozzle Dn (in.):	0.305		Pitot Tube:	Pass	-- -- --	Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F) DGM Average Amb.	Stack Amb.	Orifice Press. ΔH (in. WC) Ideal	Actual	Pump Vac (in. Hg)	Gas Temperatures (°F) Probe Amb.	Filter Amb.	Imp Exit Amb.	CPM Amb.	% ISO	Vs (fps)
					--	--				--	--	--	--		
A1	0.00	5.00	511.870	0.34	64	154	1.48	1.50	3	258	253	46	73	99.5	36.00
2	5.00	10.00	515.150	0.34	65	151	1.49	1.50	5	260	253	46	74	100.9	35.91
3	10.00	15.00	518.490	0.32	65	153	1.40	1.40	5	260	245	46	84	103.5	34.90
4	15.00	20.00	521.810	0.31	64	156	1.34	1.30	4	260	247	47	82	101.8	34.43
5	20.00	25.00	525.010	0.35	64	155	1.52	1.50	5	259	250	47	79	102.9	36.56
6	25.00	30.00	528.450	0.36	64	158	1.55	1.60	5	259	252	49	66	102.7	37.16
B1	30.00	35.00	531.920	0.35	64	158	1.51	1.50	5	259	249	47	67	102.0	36.64
2	35.00	40.00	535.320	0.34	64	158	1.47	1.50	4	261	251	47	70	103.8	36.12
3	40.00	45.00	538.730	0.31	63	156	1.34	1.30	4	260	246	48	69	100.7	34.43
4	45.00	50.00	541.890	0.32	63	155	1.39	1.40	4	263	248	47	68	101.3	34.95
5	50.00	55.00	545.120	0.34	64	156	1.47	1.50	4	257	255	47	67	99.4	36.06
6	55.00	60.00	548.390	0.35	64	156	1.52	1.50	4	261	251	46	66	102.7	36.58
	Final DGM:		551.820												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y_{qa}
	60.0	min	39.950	ft^3	0.34	in. WC	64.0	°F	155.5	°F	5	1.458	in. WC	100.3	0.289	1.6

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

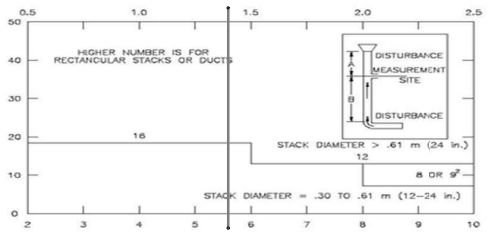
Run Number		Run 1	Run 2	Run 3	Average
Date		2/13/25	2/13/25	2/13/25	--
Start Time		9:10	10:42	11:57	--
Stop Time		10:09	11:41	12:56	--
Input Data - Outlet					
Moisture Fraction, dimensionless	BWS	0.444	0.442	0.442	0.443
Volumetric Flow Rate (M1-4), dscfm	Qs	6,235	6,311	6,345	6,297
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	13.20	13.24	13.06	13.17
CO_2 Concentration, % dry	C_{CO_2}	3.13	3.20	3.19	3.17
Methanol - Outlet Concentration, ppmvd	C_{CH_3OH}	0.81	0.77	0.70	0.76
Methanol - Outlet Concentration, ppmvw	C_{CH_3OHw}	0.45	0.43	0.39	0.42
Methanol - Outlet Concentration, ppmvd @ 10 % O_2	C_{CH_3OHc15}	1.1	1.1	0.97	1.1
Methanol - Outlet Emission Rate, lb/hr	ER_{CH_3OH}	0.03	0.02	0.02	0.02

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unit Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	in
Nipple Length:	7.00	in
Depth of Duct:	29.00	in
Cross Sectional Area of Duct:	4.59	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	ft
Distance A Duct Diameters:	23.4	**(must be > 0.5)**
Distance B:	13.5	ft
Distance B Duct Diameters:	5.6	**(must be > 2)**
Actual Number of Traverse Points:	16	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	3.2	1.00	8
2	10.5	3.05	10 1/16
3	19.4	5.63	12 5/8
4	32.3	9.37	16 3/8
5	67.7	19.63	26 5/8
6	80.6	23.37	30 3/8
7	89.5	25.96	32 15/16
8	96.8	28.00	35
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

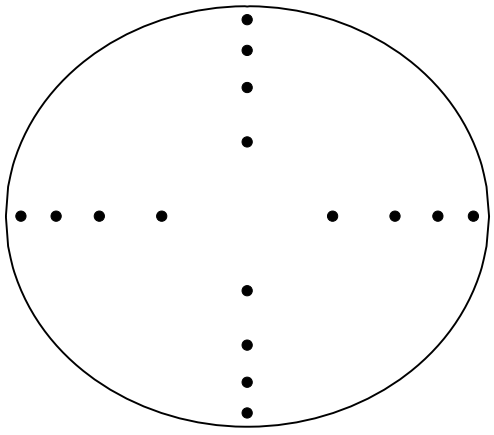
Stack Diagram

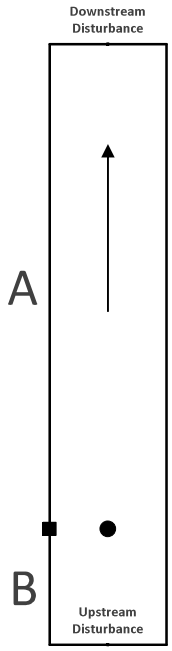
A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International - Queen City, TX

Source NCG Oxidation Unit Scrubber (NCG01)

Project No. AST-2024-4204

Date 2/13/25

Sample Point	Angle (ΔP=0)
1	3
2	5
3	2
4	6
5	5
6	2
7	8
8	5
9	10
10	5
11	12
12	8
13	8
14	2
15	2
16	5
Average	5.5

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204

Run No.	1		2		3	
Date	2/13/25		2/13/25		2/13/25	
Status	VALID		VALID		VALID	
Start Time	9:20		10:55		12:40	
Stop Time	9:30		11:05		12:50	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.54	174	0.58	176	0.55	177
2	0.53	175	0.55	176	0.54	177
3	0.51	175	0.54	176	0.55	178
4	0.46	175	0.51	177	0.56	178
5	0.46	176	0.49	177	0.52	177
6	0.45	176	0.46	178	0.51	177
7	0.46	176	0.49	178	0.48	178
8	0.43	177	0.52	178	0.45	178
B-1	0.54	176	0.55	176	0.49	176
2	0.55	177	0.58	177	0.56	177
3	0.56	177	0.56	177	0.59	178
4	0.59	178	0.54	178	0.60	178
5	0.55	178	0.54	178	0.61	177
6	0.57	177	0.57	178	0.56	178
7	0.58	178	0.54	177	0.52	177
8	0.60	178	0.51	177	0.54	177

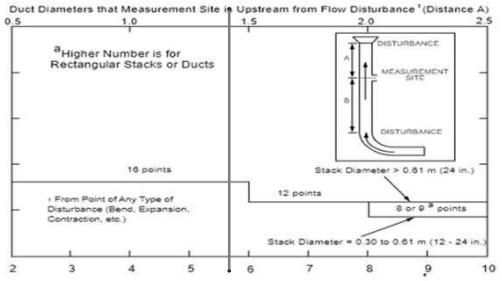
					Average
Square Root of ΔP, (in. WC)$^{1/2}$	**$(\Delta P)^{1/2}$**	0.723	0.730	0.734	0.729
Average ΔP, in. WC	**(ΔP)**	0.52	0.53	0.54	0.53
Pitot Tube Coefficient	**(Cp)**	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	**(Pb)**	30.46	30.46	30.46	30.46
Static Pressure, in. WC	**(Pg)**	-0.48	-0.45	-0.49	-0.47
Stack Pressure, in. Hg	**(Ps)**	30.42	30.43	30.42	30.43
Average Temperature, °F	**(Ts)**	176.4	177.1	177.4	177.0
Average Temperature, °R	**(Ts)**	636.1	636.8	637.0	636.6
Measured Moisture Fraction	**(BWSmsd)**	0.444	0.442	0.442	0.443
Moisture Fraction @ Saturation	**(BWSsat)**	0.457	0.464	0.467	0.463
Moisture Fraction	**(BWS)**	0.444	0.442	0.442	0.443
O2 Concentration, %	**(O2)**	13.20	13.24	13.06	13.17
CO2 Concentration, %	**(CO2)**	3.13	3.20	3.19	3.17
Molecular Weight, lb/lb-mole (dry)	**(Md)**	29.03	29.04	29.03	29.03
Molecular Weight, lb/lb-mole (wet)	**(Ms)**	24.14	24.17	24.16	24.16
Velocity, ft/sec	**(Vs)**	48.3	48.8	49.1	48.7
VFR at stack conditions, acfm	**(Qa)**	13,294	13,422	13,501	13,406
VFR at standard conditions, scfh	**(Qsw)**	672,819	678,628	682,305	677,917
VFR at standard conditions, scfm	**(Qsw)**	11,214	11,310	11,372	11,299
VFR at standard conditions, dscfm	**(Qsd)**	6,235	6,311	6,345	6,297

Method 1 Data

Location	**Graphic Packaging International - Queen City, TX**
Source	**NCG Oxidation Unti Scrubber (NCG01)**
Project No.	**AST-2024-4204**
Date:	**02/13/25**

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	36.00	**in**
Nipple Length:	7.00	**in**
Depth of Duct:	29.00	**in**
Cross Sectional Area of Duct:	4.59	**ft²**
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	56.5	**ft**
Distance A Duct Diameters:	23.4	**(must be ≥ 0.5)**
Distance B:	13.5	**ft**
Distance B Duct Diameters:	5.6	**(must be ≥ 2)**
Minimum Number of Traverse Points:	16	
Actual Number of Traverse Points:	3	
Measurer (Initial and Date):	CAL 2/13/25	
Reviewer (Initial and Date):	CLS 2/13/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

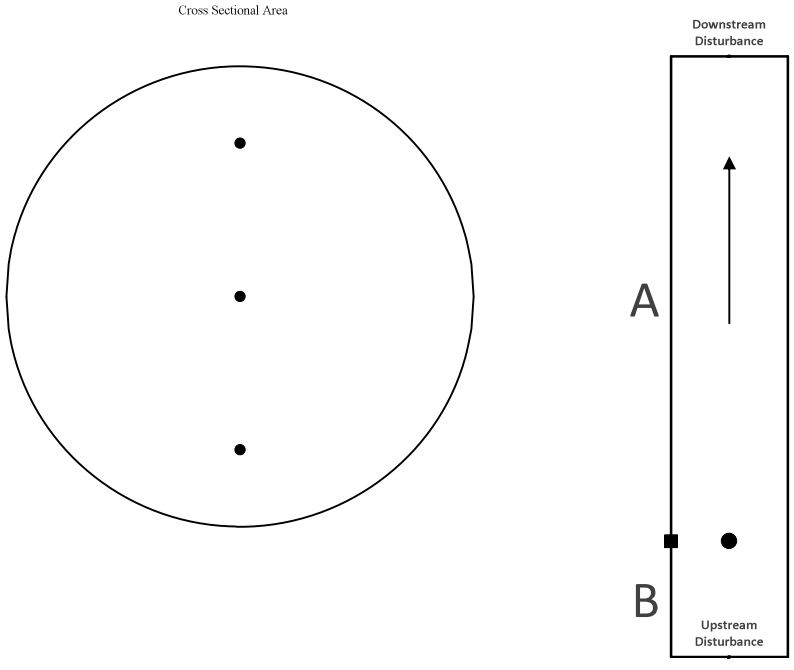
Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	4.84	11.84
2	50.0	14.50	21.50
3	83.3	24.16	31.16
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram

A = 56.5 ft.

B = 13.5 ft.

Depth of Duct = 29 in.



Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.26	3.08
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Average Zero Response (Co)	0.24	0.02
Pretest System Cal Response	10.10	9.81
Posttest System Cal Response	10.10	9.84
Average Cal Response (C_M)	10.10	9.83
Corrected Run Average (Corr)	13.20	3.13
9:10	13.46	2.95
9:11	13.66	2.75
9:12	13.34	2.77
9:13	13.13	2.98
9:14	13.70	2.72
9:15	13.11	2.92
9:16	13.41	3.01
9:17	13.39	2.88
9:18	13.33	2.91
9:19	12.86	3.11
9:20	13.58	2.83
9:21	13.71	2.67
9:22	12.94	3.14
9:23	13.04	3.23
9:24	13.54	2.92
9:25	13.17	2.91
9:26	13.11	3.07
9:27	13.40	2.93
9:28	13.23	2.87
9:29	13.28	2.97
9:30	12.74	3.15
9:31	13.00	3.24
9:32	13.55	2.90
9:33	13.89	2.64
9:34	13.33	2.94
9:35	13.43	3.07
9:36	13.43	3.05
9:37	13.65	3.07
9:38	13.28	3.13
9:39	12.98	3.54
9:40	13.29	3.31
9:41	13.01	3.64
9:42	13.10	3.53
9:43	12.76	3.54
9:44	13.11	3.51
9:45	12.67	3.43
9:46	12.19	3.68
9:47	12.61	3.60
9:48	13.24	3.12
9:49	13.73	2.71
9:50	13.53	2.80
9:51	12.98	3.19
9:52	12.80	3.23
9:53	13.65	2.74
9:54	13.86	2.61
9:55	13.79	2.60
9:56	13.81	2.67
9:57	13.77	2.73
9:58	13.85	2.86
9:59	13.48	3.05
10:00	12.71	3.50
10:01	13.43	3.36
10:02	13.28	3.26
10:03	12.38	3.78
10:04	12.85	3.65
10:05	13.83	2.98
10:06	13.98	2.74
10:07	13.30	2.97
10:08	12.74	3.27
10:09	12.11	3.76

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.32	3.17
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Average Zero Response (Co)	0.21	0.03
Pretest System Cal Response	10.10	9.84
Posttest System Cal Response	10.13	9.84
Average Cal Response (C_M)	10.12	9.84
Corrected Run Average (Corr)	13.24	3.20
10:42	12.69	3.47
10:43	13.78	2.68
10:44	13.66	2.62
10:45	13.75	2.57
10:46	13.10	3.07
10:47	13.52	2.74
10:48	13.38	2.78
10:49	13.02	3.03
10:50	12.91	3.28
10:51	13.26	3.25
10:52	13.68	3.02
10:53	13.83	2.85
10:54	13.60	2.88
10:55	13.23	3.33
10:56	13.45	3.19
10:57	13.25	3.16
10:58	13.22	3.28
10:59	13.88	3.08
11:00	13.21	3.20
11:01	13.20	3.44
11:02	13.43	3.29
11:03	12.83	3.41
11:04	12.73	3.61
11:05	12.85	3.60
11:06	13.26	3.37
11:07	13.69	3.11
11:08	13.44	3.10
11:09	13.39	3.21
11:10	13.04	3.26
11:11	12.95	3.49
11:12	12.91	3.34
11:13	13.32	3.25
11:14	12.83	3.26
11:15	13.00	3.40
11:16	13.42	3.21
11:17	13.64	3.06
11:18	13.64	2.93
11:19	13.56	2.96
11:20	13.54	3.01
11:21	13.22	3.11
11:22	13.45	3.23
11:23	13.22	3.17
11:24	13.30	3.28
11:25	12.88	3.27
11:26	13.28	3.31
11:27	13.22	3.15
11:28	14.05	2.80
11:29	13.66	2.79
11:30	13.79	3.02
11:31	13.38	3.04
11:32	13.49	3.30
11:33	13.57	3.06
11:34	13.08	3.44
11:35	13.44	3.27
11:36	13.02	3.37
11:37	13.56	3.30
11:38	13.06	3.29
11:39	12.69	3.60
11:40	13.41	3.23
11:41	13.54	3.11

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid
Uncorrected Run Average (C_{obs})	13.16	3.15
Cal Gas Concentration (C_{MA})	10.00	10.00
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Average Zero Response (Co)	0.22	0.03
Pretest System Cal Response	10.13	9.84
Posttest System Cal Response	10.12	9.81
Average Cal Response (C_M)	10.13	9.83
Corrected Run Average (Corr)	13.06	3.19
11:57	13.24	2.94
11:58	12.96	3.17
11:59	13.51	2.85
12:00	13.07	3.00
12:01	13.43	3.13
12:02	13.15	3.06
12:03	13.55	3.05
12:04	13.64	2.82
12:05	13.53	3.01
12:06	12.69	3.36
12:07	12.85	3.57
12:08	13.00	3.45
12:09	12.44	3.56
12:10	12.67	3.72
12:11	12.83	3.56
12:12	13.24	3.26
12:13	13.12	3.08
12:14	13.17	3.10
12:15	13.37	2.92
12:16	13.30	2.90
12:17	13.01	3.07
12:18	12.88	3.21
12:19	13.43	3.04
12:20	13.60	2.73
12:21	13.35	3.03
12:22	13.23	3.04
12:23	13.02	3.33
12:24	13.43	3.03
12:25	12.54	3.45
12:26	12.79	3.63
12:27	12.54	3.44
12:28	12.82	3.53
12:29	13.21	3.10
12:30	12.76	3.50
12:31	13.11	3.21
12:32	13.04	3.18
12:33	13.14	3.10
12:34	12.97	3.04
12:35	13.14	3.05
12:36	13.33	2.95
12:37	13.49	2.83
12:38	13.59	2.79
12:39	13.45	2.80
12:40	13.72	2.88
12:41	13.64	2.86
12:42	13.58	2.98
12:43	13.07	3.26
12:44	13.05	3.59
12:45	12.84	3.48
12:46	12.54	3.60
12:47	13.55	3.18
12:48	12.87	3.29
12:49	13.38	3.18
12:50	13.09	3.09
12:51	13.50	2.99
12:52	13.36	2.87
12:53	12.84	3.09
12:54	13.22	3.10
12:55	13.38	2.89
12:56	13.18	2.95

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
9:10	191.0	1.037	0.4	45.0
9:11	191.0	1.036	0.5	45.8
9:12	191.0	1.036	0.5	44.7
9:13	191.0	1.036	0.6	45.2
9:14	191.0	1.035	0.5	46.0
9:15	191.0	1.036	0.5	45.8
9:16	191.0	1.036	0.4	45.1
9:17	191.0	1.036	0.5	45.7
9:18	191.0	1.036	0.5	45.8
9:20	190.9	1.037	0.4	44.5
9:21	191.1	1.036	0.5	45.3
9:22	191.1	1.037	0.5	44.5
9:23	191.0	1.036	0.5	44.0
9:24	191.0	1.036	0.5	44.0
9:25	191.0	1.036	0.4	44.1
9:26	191.0	1.037	0.4	45.4
9:27	191.0	1.036	0.4	45.4
9:28	191.1	1.036	0.4	44.6
9:29	191.0	1.036	0.4	45.2
9:30	190.9	1.036	0.4	44.9
9:31	190.9	1.036	0.4	45.5
9:32	191.0	1.036	0.4	46.4
9:33	190.9	1.037	0.4	44.6
9:34	190.9	1.038	0.5	43.1
9:35	191.0	1.036	0.5	43.6
9:36	191.2	1.037	0.5	44.0
9:37	191.1	1.037	0.5	43.8
9:38	191.0	1.037	0.4	43.4
9:39	191.0	1.037	0.4	42.9
9:40	191.0	1.037	0.4	43.0
9:41	191.0	1.037	0.3	42.9
9:43	191.0	1.037	0.3	43.7
9:44	191.0	1.037	0.3	43.0
9:45	191.0	1.037	0.4	45.2
9:46	191.0	1.037	0.3	43.4
9:47	191.0	1.037	0.3	44.3
9:48	191.0	1.037	0.4	45.1
9:49	190.9	1.037	0.4	44.7
9:50	191.0	1.037	0.5	44.1
9:51	191.0	1.037	0.5	43.8
9:52	191.0	1.036	0.5	44.3
9:53	191.0	1.037	0.4	45.6
9:54	191.0	1.037	0.4	45.5
9:55	191.0	1.037	0.5	45.2
9:56	191.0	1.038	0.6	44.4
9:57	191.0	1.037	0.8	43.6
9:58	191.0	1.038	0.7	42.7
9:59	191.0	1.038	0.6	42.6
10:00	191.0	1.038	0.5	43.1
10:01	191.0	1.037	0.5	43.4
10:02	191.0	1.037	0.4	43.4
10:03	191.0	1.037	0.4	42.6
10:05	191.0	1.037	0.3	44.1
10:06	191.0	1.037	0.4	45.6
10:07	191.0	1.037	0.5	43.4
10:08	191.0	1.038	0.6	43.4
10:09	190.9	1.037	0.5	43.9

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.037	0.5	44.4

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
10:42	191.0	1.040	0.5	43.3
10:43	191.0	1.040	0.4	44.8
10:44	191.0	1.039	0.5	45.1
10:45	191.0	1.040	0.6	44.5
10:46	191.0	1.040	0.7	43.6
10:47	191.0	1.040	0.7	43.8
10:48	191.0	1.040	0.6	44.6
10:49	191.0	1.040	0.6	43.9
10:50	191.0	1.040	0.5	44.1
10:51	191.0	1.039	0.4	45.4
10:52	191.0	1.039	0.4	44.9
10:53	191.0	1.040	0.5	43.9
10:54	191.0	1.040	0.5	43.9
10:55	191.0	1.039	0.5	43.4
10:56	191.0	1.039	0.5	44.4
10:57	191.0	1.040	0.3	42.9
10:58	191.0	1.040	0.4	44.0
10:59	191.0	1.040	0.5	43.1
11:00	191.0	1.040	0.4	43.1
11:01	191.0	1.040	0.4	44.1
11:03	190.9	1.040	0.4	44.0
11:04	190.9	1.040	0.5	44.7
11:05	191.0	1.040	0.3	43.5
11:06	191.0	1.040	0.3	43.8
11:07	191.0	1.039	0.3	44.9
11:08	191.0	1.040	0.3	43.8
11:09	191.0	1.040	0.4	43.5
11:10	191.0	1.039	0.4	45.0
11:11	191.0	1.039	0.4	44.6
11:12	191.0	1.039	0.4	45.4
11:13	191.0	1.040	0.4	45.7
11:14	191.0	1.040	0.3	44.5
11:15	191.0	1.039	0.3	45.7
11:16	191.0	1.039	0.3	45.6
11:17	191.0	1.039	0.3	44.4
11:18	190.9	1.040	0.4	43.2
11:19	190.9	1.039	0.4	44.4
11:20	190.9	1.040	0.5	43.0
11:21	190.9	1.040	0.4	43.1
11:22	190.9	1.039	0.5	43.1
11:23	191.0	1.040	0.4	43.3
11:25	191.1	1.039	0.4	43.1
11:26	191.1	1.039	0.4	45.0
11:27	191.0	1.039	0.3	45.4
11:28	191.0	1.039	0.4	45.2
11:29	191.0	1.039	0.4	44.6
11:30	191.0	1.039	0.5	44.8
11:31	191.0	1.040	0.7	43.0
11:32	191.0	1.039	0.5	43.5
11:33	190.9	1.039	0.5	43.9
11:34	190.9	1.039	0.4	43.8
11:35	190.9	1.039	0.4	44.5
11:36	190.9	1.039	0.4	44.7
11:37	190.9	1.038	0.4	44.8
11:38	190.9	1.040	0.3	44.5
11:39	191.0	1.039	0.4	44.5
11:40	191.0	1.039	0.4	45.6
11:41	191.0	1.039	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Time	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Unit	° C	atm	ppmvw	% (wet)
MDL	--	--	0.24	--
Status	Valid	Valid	Valid	Valid
11:57	190.9	1.039	0.3	43.3
11:58	190.9	1.039	0.3	43.6
11:59	190.9	1.039	0.4	43.8
12:00	190.9	1.040	0.4	43.5
12:01	190.9	1.039	0.4	43.4
12:02	191.0	1.039	0.4	42.8
12:03	191.0	1.040	0.5	42.8
12:04	191.0	1.040	0.5	43.1
12:05	191.1	1.039	0.5	44.3
12:06	191.1	1.040	0.4	42.2
12:07	191.1	1.040	0.3	41.7
12:09	191.0	1.040	0.3	43.0
12:10	190.9	1.039	0.4	44.6
12:11	190.9	1.039	0.4	44.5
12:12	191.0	1.039	0.3	44.6
12:13	191.1	1.039	0.3	43.5
12:14	191.1	1.040	0.4	43.4
12:15	191.1	1.039	0.3	43.5
12:16	191.0	1.040	0.3	44.2
12:17	191.0	1.039	0.4	43.4
12:18	191.0	1.040	0.3	43.3
12:19	191.0	1.039	0.3	45.1
12:20	190.9	1.039	0.4	44.5
12:21	190.9	1.039	0.4	44.0
12:22	190.8	1.039	0.5	44.1
12:23	190.9	1.039	0.4	43.0
12:24	191.0	1.040	0.4	42.5
12:25	191.1	1.039	0.4	43.6
12:26	191.1	1.039	0.3	45.6
12:27	191.1	1.039	0.4	44.8
12:28	191.0	1.039	0.3	44.6
12:29	191.0	1.039	0.3	44.0
12:31	191.0	1.039	0.3	45.0
12:32	191.0	1.038	0.3	44.7
12:33	191.0	1.038	0.3	46.1
12:34	191.0	1.038	0.4	45.3
12:35	191.0	1.039	0.3	44.7
12:36	191.0	1.038	0.4	45.8
12:37	191.0	1.038	0.4	45.3
12:38	191.0	1.039	0.6	44.8
12:39	190.9	1.038	0.5	44.0
12:40	190.9	1.039	0.5	44.1
12:41	190.9	1.039	0.5	43.1
12:42	190.9	1.039	0.5	44.7
12:43	191.0	1.039	0.5	43.6
12:44	191.1	1.039	0.5	44.3
12:45	191.0	1.038	0.4	45.1
12:46	191.0	1.038	0.3	45.1
12:47	191.0	1.038	0.4	45.9
12:48	191.0	1.039	0.3	44.5
12:49	191.1	1.038	0.4	44.9
12:50	191.0	1.039	0.4	44.5
12:51	191.0	1.038	0.4	46.0
12:53	191.0	1.038	0.3	45.4
12:54	191.0	1.038	0.4	44.7
12:55	191.0	1.038	0.4	45.8
12:56	190.9	1.038	0.4	45.0

Parameter	Temperature	Pressure	Methanol - Outlet	BWS - Outlet
Run Average	191.0	1.039	0.4	44.2

Appendix C

Alliance Technical Group, LLC
Analytical Services
214 Central Circle
Decatur, AL 35603
(256) 274-4488
www.alliancetg.com

Analytical Laboratory Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, Texas 75572

Project No. AST-2024-4204LS

Version No. LT 2022-00_24.4

Certification Statement

Alliance Technical Group, LLC (ATG) has completed the analysis as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and ATG is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Any deviations or problems are detailed in the relevant sections on the test report.

This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Validation Signature

The analytical data and all QC contained within this report was reviewed and validated by the following individual.

Rebecca Pope

Digitally signed by Rebecca Pope
Reason: I have reviewed this document
Location:
Date: 2025.03.06 12:42:30-06'00'
Foxit PDF Editor Version: 12.1.4

Rebecca Pope
Laboratory Quality Analyst

Date

Project Narrative

Analytical Method(s):	*Method 5 - Determination of Particulate Matter Emissions From Stationary Sources* *Method 202 - Dry Impinger Method for Determining Condensable Particulate Matter Emissions From Stationary Sources*
Filterable	The filter(s) were oven dried and desiccated per the method until a final weight was obtained. The liquid fractions were extracted if required, evaporated and cooled until a final weight was obtained. These fractions were summed together to provide the total Filterable Particulate Matter collected.
Condensable	The filter(s) were cut up and extracted per the method. The organic extract was added to the organic rinse, and the inorganic extract was added to the inorganic rinse. The inorganic fraction was extracted with solvent per the method. Extracts were combined with the organic rinse. The organic and inorganic fractions were evaporated and desiccated until a final weight was obtained.
MDL	The Minimum Detection Level (MDL) is 0.5 mg per fraction. If the measured result for a fraction is less than the MDL, the MDL was used in ensuing calculations.
Blank Correction	If blank correction is performed, only blank values returned higher than the MDL are used. If a blank returns a value less than the MDL, no correction is included. Method 202 Recovery Blank corrections are applied by fraction (inorganic subtracted from inorganic; organic subtracted from organic).
Custody:	The samples were received by Madilyn Golembeck on 02/24/25 in Decatur, AL. The samples were received in good condition with proper Chain-of-Custody documentation. No apparent container problems were noted upon receipt. Prior to analysis, the samples were kept secure with access limited to authorized personnel of ATG.
Number of Samples:	129
Labeling:	Acceptable
Analyst:	Evan Marth-Laboratory Analyst
Equipment:	Ohaus Balance PX224, S/N B919636400. This scale was used for analytical determinations. A&D Weighing AND EJ-1500, S/N 5A2845843. This scale was only used to measure the total mass of rinse collected. Analysis was performed on the same balance as the associated tare. Quincy Lab Inc oven, 40CG, SN G4-007640. Desiccator Number: 2 contained M5 rinse petri dishes.. Desiccator Number: 3 contained M5 filters. Desiccator Number: 4 contained organic rinse tins & inorganic rinse petri dishes. Desiccator Number: 5 contained M5 rinse petri dishes & organic rinse tins.
Lab Reagents:	Acetone Lot Number: 240513 Hexane Lot Number: 240648
QC Notes:	The samples met the minimum criteria established by the relevant method.
Reporting Notes:	The M5 samples were collected in the field using DI water in place of acetone for the rinse. The M202 DI water, hexane, and acetone reagent blanks were HELD. No. 1 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 2 Lime Kiln M5 filter run 3 contains visibly less PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-E M5 rinse run 3 contains visibly more and darker PM than runs 1 and 2. No. 1 Smelt Tank Scrubber M5 rinse run 1 contains visibly more and darker PM than runs 2 and 3. No. 2 Recovery Furnace-W M5 rinse run 1 contains visibly more PM than runs 2 and 3. No. 2 Smelt Tank Scrubber M5 rinse run 1 contains visbly more PM than runs 2 and 3.
Certifications:	Primary Accreditation: Louisiana Environmental Laboratory Accreditation Program (LELAP) Agency Interest (AI) No. 194891 Certificate: 05054, Expiration Date: 6/30/25 Secondary Accreditation: Texas Commission on Environmental Quality Certificate: T104704540-TX-C25-00047, Expiration Date: 2/28/26 Virginia Environmental Laboratory Accreditation Program (VELAP) VA Laboratory ID: 460299, Certificate: 13081 Expiration Date: 9/14/2025
State Registrations:	PADEP # 68-04598 NYDOH # 12146

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2294		2295		2296	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Filter ID	26987-A		26988-A		26696-A	
Filter Tare Weight, g	0.4609		0.4591		0.4504	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:00		8:01		8:02	
Filter Weight, g	0.4817		0.4711		0.4723	
Filter PM Mass, mg*	**20.8**		**12.0**		**21.9**	
Front Half Rinse						
Lab ID	2318		2319		2320	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5853		G5854		G5855	
Beaker tare, g	44.4445		46.9315		47.1823	
Field Vessel with DI Water, g	197.0		233.2		170.1	
Empty Field Vessel,g	28.6		28.2		27.4	
DI Water Mass, g	168.4		205.0		142.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:01	8:00	15:02	8:01	15:03	8:02
Weight, g	44.4531	44.4526	46.9378	46.9374	47.1868	47.1864
Rinse PM Mass, mg*	**8.4**		**6.1**		**4.3**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**29.2**		**18.1**		**26.2**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2297		2298		2299	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Filter ID	26697-A		26698-A		26699-A	
Filter Tare Weight, g	0.4586		0.4665		0.4639	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:03		8:04		8:05	
Filter Weight, g	0.4596		0.4688		0.4647	
Filter PM Mass, mg*	**1.0**		**2.3**		**0.8**	
Front Half Rinse						
Lab ID	2321		2322		2323	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5856		G5857		G5858	
Beaker tare, g	40.4982		42.8656		46.6289	
Field Vessel with DI Water, g	192.0		211.2		204.2	
Empty Field Vessel,g	28.1		28.1		28.5	
DI Water Mass, g	163.9		183.1		175.7	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:04	8:03	15:05	8:04	15:06	8:05
Weight, g	40.5008	40.5003	42.8667	42.8663	46.6309	46.6307
Rinse PM Mass, mg*	**2.4**		**0.9**		**1.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**3.4**		**3.2**		**2.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2300		2301		2302	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Filter ID	26974-A		26989-A		26700-A	
Filter Tare Weight, g	0.4583		0.4533		0.4701	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:06		8:07		8:08	
Filter Weight, g	0.6305		0.5645		0.5783	
Filter PM Mass, mg*	**172.2**		**111.2**		**108.2**	
Front Half Rinse						
Lab ID	2324		2325		2326	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5859		G5860		G5861	
Beaker tare, g	42.6719		40.4452		41.3230	
Field Vessel with DI Water, g	158.0		204.4		141.5	
Empty Field Vessel,g	29.1		28.5		29.0	
DI Water Mass, g	128.9		175.9		112.5	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:07	8:06	15:08	8:07	15:09	8:08
Weight, g	42.7452	42.7450	40.4567	40.4563	41.3338	41.3337
Rinse PM Mass, mg*	**73.2**		**11.3**		**10.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**245.4**		**122.5**		**118.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2303		2304		2305	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Filter ID	26704-A		26707-A		26708-A	
Filter Tare Weight, g	0.4591		0.4513		0.4611	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:09		8:10		8:11	
Filter Weight, g	0.4943		0.4947		0.5073	
Filter PM Mass, mg*	**35.2**		**43.4**		**46.2**	
Front Half Rinse						
Lab ID	2327		2328		2329	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5862		G5863		G5864	
Beaker tare, g	46.6607		33.1419		43.5493	
Field Vessel with DI Water, g	152.5		109.7		148.9	
Empty Field Vessel,g	27.3		27.8		27.0	
DI Water Mass, g	125.2		81.9		121.9	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:10	8:09	15:11	8:10	15:12	8:11
Weight, g	46.6834	46.6832	33.1496	33.1493	43.6557	43.6553
Rinse PM Mass, mg*	**22.6**		**7.6**		**106.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**57.8**		**51.0**		**152.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2306		2307		2308	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Filter ID	26705-A		26706-A		26709-A	
Filter Tare Weight, g	0.4641		0.4546		0.4555	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:12		8:13		8:14	
Filter Weight, g	0.5186		0.4899		0.4912	
Filter PM Mass, mg*	**54.5**		**35.3**		**35.7**	
Front Half Rinse						
Lab ID	2330		2331		2332	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5865		G5866		G5867	
Beaker tare, g	41.4498		46.8473		41.7306	
Field Vessel with DI Water, g	161.9		174.0		175.3	
Empty Field Vessel,g	26.9		28.3		27.2	
DI Water Mass, g	135.0		145.7		148.1	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:13	8:12	15:14	8:13	15:15	8:14
Weight, g	41.5004	41.5005	46.8552	46.8551	41.7462	41.7463
Rinse PM Mass, mg*	**50.6**		**7.9**		**15.7**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**105.1**		**43.2**		**51.4**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2309		2310		2311	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Filter ID	26702-A		26703-A		26971-A	
Filter Tare Weight, g	0.4583		0.4611		0.4626	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:15		8:16		8:17	
Filter Weight, g	0.5226		0.5186		0.5168	
Filter PM Mass, mg*	**64.3**		**57.5**		**54.2**	
Front Half Rinse						
Lab ID	2333		2334		2335	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5868		G5869		G5870	
Beaker tare, g	46.0004		38.3894		47.8755	
Field Vessel with DI Water, g	122.8		104.6		118.2	
Empty Field Vessel,g	29.4		27.7		27.9	
DI Water Mass, g	93.4		76.9		90.3	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:16	8:15	15:17	8:16	15:18	8:17
Weight, g	46.0441	46.0444	38.4051	38.4055	47.8925	47.8923
Rinse PM Mass, mg*	**43.9**		**15.9**		**16.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**108.2**		**73.4**		**71.1**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2312		2313		2314	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Filter ID	26962-A		26961-A		26970-A	
Filter Tare Weight, g	0.4713		0.4648		0.4520	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:18		8:19		8:20	
Filter Weight, g	0.5219		0.5158		0.4907	
Filter PM Mass, mg*	**50.6**		**51.0**		**38.7**	
Front Half Rinse						
Lab ID	2336		2337		2338	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5871		G5872		G5873	
Beaker tare, g	43.1226		42.5851		44.9883	
Field Vessel with DI Water, g	108.9		92.3		98.7	
Empty Field Vessel,g	28.2		27.2		28.1	
DI Water Mass, g	80.7		65.1		70.6	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:19	8:18	15:20	8:19	15:21	8:20
Weight, g	43.1258	43.1255	42.5898	42.5894	44.9947	44.9943
Rinse PM Mass, mg*	**3.1**		**4.5**		**6.2**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**53.7**		**55.5**		**44.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Front Half Filter						
Lab ID	2315		2316		2317	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Filter ID	26973-A		26960-A		26972-A	
Filter Tare Weight, g	0.4544		0.4476		0.4644	
Date - Oven	2/24/25		2/24/25		2/24/25	
Time - Oven	14:00		14:00		14:00	
Date of Weighing	2/25/25		2/25/25		2/25/25	
Time of Weighing	8:21		8:22		8:23	
Filter Weight, g	0.4880		0.4856		0.4698	
Filter PM Mass, mg*	**33.6**		**38.0**		**5.4**	
Front Half Rinse						
Lab ID	2339		2340		2341	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5874		G5875		G5876	
Beaker tare, g	45.9829		40.9130		47.1276	
Field Vessel with DI Water, g	123.5		102.2		179.3	
Empty Field Vessel,g	29.2		28.2		27.9	
DI Water Mass, g	94.3		74.0		151.4	
Date - Desiccator	2/25/25		2/25/25		2/25/25	
Time - Desiccator	15:00		15:00		15:00	
Date of Weighing	2/26/25	2/27/25	2/26/25	2/27/25	2/26/25	2/27/25
Time of Weighing	15:22	8:21	15:23	8:22	15:24	8:23
Weight, g	46.0011	46.0008	40.9396	40.9391	47.1458	47.1453
Rinse PM Mass, mg*	**18.1**		**26.4**		**17.9**	
Blank Corrected	No					
Total Filterable PM Mass, mg	**51.7**		**64.4**		**23.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	EPA Method 5

Blank Rinse		
Lab ID	2342	
Field ID	DI Water Blank	
Beaker ID	G5877	
Beaker tare, g	45.4094	
Field Vessel with DI Water, g	386.7	
Empty Field Vessel, g	178.6	
DI Water Mass, g	208.1	
Date - Desiccator	2/25/25	
Time - Desiccator	15:00	
Date of Weighing	2/26/25	2/27/25
Time of Weighing	15:25	8:24
Weight, g	45.4097	45.4097
Measured Blank Mass, mg	**0.3**	
Blank Mass, mg*	**0.3**	
Blank Mass, mg/g	**0.0014**	

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2343		2344		2345	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Organic Fraction						
Lab ID	2367		2368		2369	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	2367		2368		2369	
Beaker tare, g	4.1481		4.1697		4.1752	
Field Vessel w/ Solvent, g	301.0		277.6		261.7	
Empty Field Vessel, g	176.9		176.8		176.8	
Solvent Mass, g	124.1		100.8		84.9	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	4.1533	4.1537	4.1728	4.1731	4.1780	4.1784
Organic Condensable Mass, mg*	**5.4**		**3.3**		**3.0**	
Inorganic Fraction						
Lab ID	2391		2392		2393	
Field ID	RB01A-N-Run 1		RB01A-N-Run 2		RB01A-N-Run 3	
Beaker ID	G5878		G5879		G5880	
Beaker tare, g	42.8783		39.7638		46.7558	
Field Vessel w/ Water, g	677.1		575.1		654.6	
Empty Field Vessel, g	286.2		286.6		285.8	
Water Mass, g	390.9		288.5		368.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:01	8:00	14:02	8:01	14:03	8:02
Weight, g	42.8857	42.8855	39.7660	39.7657	46.7596	46.7592
Inorganic Condensable Mass, mg*	**7.3**		**2.0**		**3.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.7**		**3.3**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2346		2347		2348	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Organic Fraction						
Lab ID	2370		2371		2372	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	2370		2371		2372	
Beaker tare, g	4.1708		4.1859		4.1780	
Field Vessel w/ Solvent, g	292.3		272.5		278.4	
Empty Field Vessel, g	177.5		176.3		176.9	
Solvent Mass, g	114.8		96.2		101.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	4.1753	4.1755	4.1892	4.1891	4.1811	4.1810
Organic Condensable Mass, mg*	**4.6**		**3.2**		**3.1**	
Inorganic Fraction						
Lab ID	2394		2395		2396	
Field ID	RB01B-S-Run 1		RB01B-S-Run 2		RB01B-S-Run 3	
Beaker ID	G5881		G5882		G5883	
Beaker tare, g	41.1547		42.8616		31.5071	
Field Vessel w/ Water, g	640.1		606.9		636.0	
Empty Field Vessel, g	286.2		286.4		286.1	
Water Mass, g	353.9		320.5		349.9	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:04	8:03	14:05	8:04	14:06	8:05
Weight, g	41.1568	41.1563	42.8653	42.8657	31.5107	31.5106
Inorganic Condensable Mass, mg*	**1.8**		**3.9**		**3.5**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.4**		**5.1**		**4.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2349		2350		2351	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Organic Fraction						
Lab ID	2373		2374		2375	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	2373		2374		2375	
Beaker tare, g	4.2438		4.2125		4.2150	
Field Vessel w/ Solvent, g	298.4		291.4		220.1	
Empty Field Vessel, g	176.7		176.5		177.7	
Solvent Mass, g	121.7		114.9		42.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	4.2482	4.2485	4.2162	4.2165	4.2184	4.2187
Organic Condensable Mass, mg*	**4.6**		**3.8**		**3.6**	
Inorganic Fraction						
Lab ID	2397		2398		2399	
Field ID	SM01-Run 1		SM01-Run 2		SM01-Run 3	
Beaker ID	G5884		G5885		G5886	
Beaker tare, g	50.4549		33.9860		42.7755	
Field Vessel w/ Water, g	1135.0		994.8		957.7	
Empty Field Vessel, g	441.2		441.6		439.7	
Water Mass, g	693.8		553.2		518.0	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:07	8:06	14:08	8:07	14:09	8:08
Weight, g	50.4661	50.4662	33.9919	33.9922	42.7833	42.7833
Inorganic Condensable Mass, mg*	**11.2**		**6.1**		**7.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**13.8**		**7.9**		**9.3**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2352		2353		2354	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Organic Fraction						
Lab ID	2376		2377		2378	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	2376		2377		2378	
Beaker tare, g	4.2256		4.2210		4.2251	
Field Vessel w/ Solvent, g	268.5		269.3		261.8	
Empty Field Vessel, g	178.0		178.3		177.5	
Solvent Mass, g	90.5		91.0		84.3	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	4.2289	4.2289	4.2243	4.2245	4.2278	4.2281
Organic Condensable Mass, mg*	**3.3**		**3.4**		**2.8**	
Inorganic Fraction						
Lab ID	2400		2401		2402	
Field ID	RB02A-E-Run 1		RB02A-E-Run 2		RB02A-E-Run 3	
Beaker ID	G5887		G5888		G5889	
Beaker tare, g	39.6069		45.8132		42.3755	
Field Vessel w/ Water, g	555.9		607.3		602.0	
Empty Field Vessel, g	286.0		286.2		286.3	
Water Mass, g	269.9		321.1		315.7	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:10	8:09	14:11	8:10	14:12	8:11
Weight, g	39.6085	39.6086	45.8175	45.8179	42.3783	42.3785
Inorganic Condensable Mass, mg*	**1.6**		**4.5**		**2.9**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**2.9**		**5.9**		**3.7**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2355		2356		2357	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Organic Fraction						
Lab ID	2379		2380		2381	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	2379		2380		2381	
Beaker tare, g	4.2316		4.2100		4.2438	
Field Vessel w/ Solvent, g	257.7		272.3		295.6	
Empty Field Vessel, g	177.0		177.7		177.2	
Solvent Mass, g	80.7		94.6		118.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	4.2352	4.2352	4.2142	4.2140	4.2464	4.2465
Organic Condensable Mass, mg*	**3.6**		**4.1**		**2.7**	
Inorganic Fraction						
Lab ID	2403		2404		2405	
Field ID	RB02B-W-Run 1		RB02B-W-Run 2		RB02B-W-Run 3	
Beaker ID	G5890		G5891		G5892	
Beaker tare, g	46.8411		33.4643		41.8922	
Field Vessel w/ Water, g	582.1		593.0		634.4	
Empty Field Vessel, g	286.0		285.9		285.9	
Water Mass, g	296.1		307.1		348.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:13	8:12	14:14	8:13	14:15	8:14
Weight, g	46.8433	46.8437	33.4670	33.4670	41.8960	41.8961
Inorganic Condensable Mass, mg*	**2.4**		**2.7**		**3.8**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.0**		**4.8**		**4.5**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2358		2359		2360	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Organic Fraction						
Lab ID	2382		2383		2384	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	2382		2383		2384	
Beaker tare, g	4.2097		4.2193		4.2603	
Field Vessel w/ Solvent, g	256.4		268.9		265.7	
Empty Field Vessel, g	178.7		177.1		177.3	
Solvent Mass, g	77.7		91.8		88.4	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	4.2135	4.2132	4.2261	4.2260	4.2634	4.2634
Organic Condensable Mass, mg*	**3.7**		**6.8**		**3.1**	
Inorganic Fraction						
Lab ID	2406		2407		2408	
Field ID	SM02-Run 1		SM02-Run 2		SM02-Run 3	
Beaker ID	G5893		G5894		G5895	
Beaker tare, g	38.9202		45.5879		41.7805	
Field Vessel w/ Water, g	945.0		956.2		863.2	
Empty Field Vessel, g	440.0		441.8		441.4	
Water Mass, g	505.0		514.4		421.8	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:16	8:15	14:17	8:16	14:18	8:17
Weight, g	38.9267	38.9264	45.5993	45.5994	41.7863	41.7861
Inorganic Condensable Mass, mg*	**6.3**		**11.5**		**5.7**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**8.0**		**16.2**		**6.8**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2361		2362		2363	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Organic Fraction						
Lab ID	2385		2386		2387	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	2385		2386		2387	
Beaker tare, g	4.1945		4.2061		4.2093	
Field Vessel w/ Solvent, g	433.2		399.7		423.8	
Empty Field Vessel, g	285.6		285.0		285.6	
Solvent Mass, g	147.6		114.7		138.2	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	4.1982	4.1982	4.2092	4.2092	4.2125	4.2127
Organic Condensable Mass, mg*	**3.7**		**3.1**		**3.3**	
Inorganic Fraction						
Lab ID	2409		2410		2411	
Field ID	No. 1 LK (LK01)-Run 1		No. 1 LK (LK01)-Run 2		No. 1 LK (LK01)-Run 3	
Beaker ID	G5896		G5897		G5898	
Beaker tare, g	39.9904		38.9263		47.8517	
Field Vessel w/ Water, g	569.3		575.6		607.9	
Empty Field Vessel, g	285.7		286.1		285.3	
Water Mass, g	283.6		289.5		322.6	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:19	8:18	14:20	8:19	14:21	8:20
Weight, g	39.9933	39.9933	38.9268	38.9272	47.8564	47.8563
Inorganic Condensable Mass, mg*	**2.9**		**0.7**		**4.6**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**4.6**		**1.8**		**5.9**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter						
Lab ID	2364		2365		2366	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Organic Fraction						
Lab ID	2388		2389		2390	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	2388		2389		2390	
Beaker tare, g	4.2001		4.2214		4.1849	
Field Vessel w/ Solvent, g	434.2		412.2		432.4	
Empty Field Vessel, g	285.1		284.9		284.9	
Solvent Mass, g	149.1		127.3		147.5	
Date - Desiccator	2/26/25		2/26/25		2/26/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	4.2073	4.2077	4.2241	4.2241	4.1891	4.1891
Organic Condensable Mass, mg*	**7.4**		**2.7**		**4.2**	
Inorganic Fraction						
Lab ID	2412		2413		2414	
Field ID	No. 2 LK (LK02)-Run 1		No. 2 LK (LK02)-Run 2		No. 2 LK (LK02)-Run 3	
Beaker ID	G5899		G5900		G5901	
Beaker tare, g	37.9457		41.3364		44.6145	
Field Vessel w/ Water, g	678.5		673.6		638.3	
Empty Field Vessel, g	285.8		285.7		285.8	
Water Mass, g	392.7		387.9		352.5	
Date - Desiccator	3/3/25		3/3/25		3/3/25	
Time - Desiccator	14:00		14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:22	8:21	14:23	8:22	14:24	8:23
Weight, g	37.9508	37.9505	41.3381	41.3380	44.6181	44.6177
Inorganic Condensable Mass, mg*	**4.9**		**1.6**		**3.4**	
Blank Corrected	Yes					
Total Condensable PM Mass, mg	**10.4**		**2.3**		**5.6**	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

Client	Graphic Packaging International
City, State	Queen City, TX
Project No.	AST-2024-4204
Method	US EPA Method 202

Teflon Filter Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2415		N/A	
Field ID	Field Train Blank		N/A	
Organic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2416		2418	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	2416		2418	
Beaker tare, g	4.2179		4.2326	
Field Vessel w/ Solvent, g	351.6		350.2	
Empty Field Vessel, g	177.2		176.5	
Solvent Mass, g	174.4		173.7	
Date - Desiccator	2/26/25		2/26/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	2/27/25	2/28/25	2/27/25	2/28/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	4.2204	4.2207	4.2328	4.2331
Measured Organic Mass, mg	**2.6**		**0.4**	
Organic Mass, mg*	**2.0**		**0.5**	
Inorganic Fraction Blanks				
	Field Train Blank		**Proof Blank**	
Lab ID	2417		2419	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	G5902		G5903	
Beaker tare, g	48.0627		39.1195	
Field Vessel w/ Water, g	321.9		329.5	
Empty Field Vessel, g	177.1		177.2	
Water Mass, g	144.8		152.3	
Date - Desiccator	3/3/25		3/3/25	
Time - Desiccator	14:00		14:00	
Date of Weighing	3/4/25	3/5/25	3/4/25	3/5/25
Time of Weighing	14:25	8:24	14:26	8:25
Weight, g	48.0640	48.0641	39.1200	39.1195
Measured Inorganic Mass, mg	**1.4**		**0.2**	
Inorganic Mass, mg*	**1.4**		**0.5**	

The total results have been calculated based on MDL values for any sample fractions which were below the MDL.

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL
City, State: QUEEN CITY, TX
Source: RB01A-N, RB01B-S, SM01
Project No: AST-2024-4204

Turn Around Time: [✓] Standard [ ] Expedited ____ days
Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079
Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5 — Filter Number - 83mm Quartz	Method 5 — Filter Number - 83mm Teflon	Method 5 — Probe Nozzle Rinse - DIUF	Method 5 — Probe Nozzle Rinse - 1-bromopropane	Method 17 — Filter Number - 47mm Quartz	Method 17 — Nozzle Rinse - Acetone	Method 201A — PM 2.5 Filter Number- 47mm Quartz	Method 201A — PM 2.5 Rinse - Acetone	Method 201A — PM 10 Filter Number- 47mm Quartz	Method 201A — PM 10 Rinse - Acetone	Method 202 — CPM Filter - 83mm Tefon	Method 202 — Condensate Catch - DIUF	Method 202 — Solvent Rinse - DIUF/Hexane
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 1	5	2/11/25	11:30	RW		26987-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 2	5	2/11/25	13:55	RW		26988-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01A-N.) - RUN 3	5	2/11/25	17:30	RW		26696-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 1	5	2/11/25	11:40	RW		26697-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 2	5	2/11/25	13:40	RW		26698-A		✓								✓	✓	✓
M5/202 - NO.1 RECOVERY FURNACE (RB01B-S.) - RUN 3	5	2/11/25	17:10	RW		26699-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 1	5	2/11/25	11:20	RW		26974-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 2	5	2/11/25	13:45	RW		26989-A		✓								✓	✓	✓
M5/202 - No.1 Smelt Tank Scrubber (SM01) - RUN 3	5	2/11/25	17:00	RW		26700-A		✓								✓	✓	✓
M5 ~~ACETONE~~ BLANK DIUF	1	2/11/25	11:00	RW				✓										
M202 FT PROOF BLANK	2	2/11/25	11:15	RW													✓	✓
M202 FT RECOVERY BLANK	3	2/11/25	14:30	RW												✓	✓	✓
M202 ACETONE BLANK	1	2/11/25	11:00	RW														
M202 WATER BLANK	1	2/11/25	11:00	RW														
M202 HEXANE BLANK	1	2/11/25	11:00	RW														

Relinquished By _____ Date 2-14-25 Received By Madilyn Galenbeck Date 2/28/25

Relinquished By _____ Date _____ Received By _____ Date _____

Relinquished By _____ Date _____ Received By _____ Date _____

Sample Container Recieved Temperature (°F) 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Alliance TECHNICAL GROUP

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Technical Group, LLC - Lab Services
214 Central Circle, Decatur, AL 35603
Phone (256) 351-0121

Client Name: GRAPHIC PACKAGING INTERNATIONAL

City, State: QUEEN CITY, TX

Source: RB02A-E, RB02B-W, SM02), LK01, LK02

Project No.: AST-2024-4204

Turn Around Time: [✔] Standard [ ] Expedited ____ days

Blank Manuf./Lot #: Acetone - 240399, Hexane - 236079

Blank Manuf./Lot #: DIUF - 243949

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media: Method 5: Filter Number - 83mm Quartz	Method 5: Filter Number - 83mm Teflon	Method 5: Probe Nozzle Rinse - DIUF	Method 5: Probe Nozzle Rinse - 1-bromopropane	Method 17: Filter Number - 47mm Quartz	Method 17: Nozzle Rinse - Acetone	Method 201A: PM 2.5 Filter Number - 47mm Quartz	Method 201A: PM 2.5 Rinse - Acetone	Method 201A: PM 10 Filter Number - 47mm Quartz	Method 201A: PM 10 Rinse - Acetone	Method 202: CPM Filter - 83mm Teflon	Method 202: Condensate Catch - DIUF	Method 202: Solvent Rinse - DIUF/Hexane
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 1	5	2/12/25	12:45	RW		26704-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 2	5	2/12/25	15:00	RW		26707-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02A-E.) - RUN 3	5	2/12/25	17:00	RW		26708-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 1	5	2/12/25	12:45	RW		26705-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 2	5	2/12/25	15:00	RW		26706-A		✔								✔	✔	✔
M5/202 - NO.2 RECOVERY FURN. (RB02B-W.) - RUN 3	5	2/12/25	17:00	RW		26709-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 1	5	2/12/25	12:45	RW		26702-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 2	5	2/12/25	15:00	RW		26703-A		✔								✔	✔	✔
M5/202 - No.2 Smelt Tank Scrubber (SM02) - RUN 3	5	2/12/25	17:00	RW		26971-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 1	5	2/13/25	15:50	RW		26962-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 2	5	2/13/25	17:30	RW		26961-A		✔								✔	✔	✔
M5/202 - NO. 1 LIME KILN (LK01) - RUN 3	5	2/13/25	19:00	RW		26970-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 1	5	2/13/25	10:35	RW		26973-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 2	5	2/13/25	12:15	RW		26960-A		✔								✔	✔	✔
M5/202 - NO. 2 LIME KILN (LK02) - RUN 3	5	2/13/25	13:45	RW		26972-A		✔								✔	✔	✔

Relinquished By: [signature] Date: 2-14-25 Received By: madelyn Galenkeed Date: 2/24/25

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Relinquished By: _____ Date: _____ Received By: _____ Date: _____

Sample Container Recieved Temperature (°F): 68.7

Notes

AST Office: LRA LRAreports@alliancetg.com

Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-001

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	Ohaus	PA214	B919636400	Balance Room	210 g	0.0001g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000
5	0.0001	5.0000	0.0000	5	0.0001	5.0000	0.0000
0	0.0000	0.0000	0.0000	0	0.0000	0.0000	0.0000

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0.2	0.0001	0.2000	0.0000	0.2	0.0001	0.2000	0.0000
1	0.0001	1.0000	0.0000	1	0.0001	1.0000	0.0000
5	0.0001	4.9999	-0.0001	5	0.0001	5.0000	0.0000
50	0.0003	49.9998	-0.0002	50	0.0003	49.9998	-0.0002
150	0.0003	149.9998	-0.0002	150	0.0003	149.9998	-0.0002

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	YES	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED		*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.00011g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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Weigh-Tec
4615 Marsha Ave
Decatur, Al. 35603

Weigh-Tec
Scale Test / Calibration Report
ISO/IEC 17025:2017 Accredited

Rev: 8/1/19 Cal. Rep. 4
Accreditation# 74114

Report Number: AST-0624-003

Customer	Location	Cal. Date	Expiration Date
Alliance Source Testing	**214 Central Circle SW Decatur, AL 35603**	**6/28/2024**	**6/25**

ID	Manufactuer	Model	Serial	Description	Capacity	Min. Grad.
	A&D	EJ-1500	5A2845843	LAB	1500 g	0.1g

REPEATABILITY TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
0	0.0	0.0	0.0	0	0.0	0.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
0	0.0	0.0	0.0	0	0.0	0.0	0.0

SHIFT TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0
20	0.1	20.0	0.0	20	0.1	20.0	0.0

STRAIN TEST

As Found				As Left			
Test Wt.	Tolerance	Indication	Error	Test Wt.	Tolerance	Indication	Error
20	0.1	20.0	0.0	20	0.1	20.0	0.0
100	0.1	100.0	0.0	100	0.1	100.0	0.0
200	0.1	200.0	0.0	200	0.1	200.0	0.0
500	0.1	500.0	0.0	500	0.1	500.0	0.0
1000	0.1	1000.0	0.0	1000	0.1	1000.0	0.0

DECREASING LOAD TEST | **COUNTING TEST**

TOLERANCE

Tolerance: NIST HB-44		Class: I	
AS FOUND		**AS LEFT**	
In Tolerance	Out of Tolerance	In Tolerance	Out of Tolerance
YES		YES	

ENVIROMENT		
Enviromental Conditions Have Been Met?	**YES**	Exceptions and Conditions Needing Attention:

CALIBRATION STANDARDS USED			*Expanded uncertainty (U) expressed at approximatley 95% with K=2 factor
Unit # (s)	Kits: 202002 LB / 2284 KG	N.I.S.T. Traceability (Exp 2/2025)	Measurement Uncertainty
50's (2-1 Thru 2-10), 1k's and 2k's Cast		232402, 11032303, LA23-846, 05112304, 02232401, WV23-00	0.11g

INVOLVED PARTIES

Technician(s)	License Number(s)	Customer Representative
David Allen	503647	**John Lawrence**
Test Method: Customer Stated Weight Increments	*Authorized by: Dawn Freeman QA Manager on 7-5-24*	

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Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26680-A	0.4978	11/14/24	MEG	S/N G4-007640	105° C	379990
26681-A	0.4918	11/14/24	MEG	S/N G4-007640	105° C	379990
26682-A	0.4955	11/14/24	MEG	S/N G4-007640	105° C	379990
26683-A	0.4954	11/14/24	MEG	S/N G4-007640	105° C	379990
26684-A	0.4894	11/14/24	MEG	S/N G4-007640	105° C	379990
26685-A	0.4901	11/14/24	MEG	S/N G4-007640	105° C	379990
26686-A	0.4930	11/14/24	MEG	S/N G4-007640	105° C	379990
26687-A	0.4940	11/14/24	MEG	S/N G4-007640	105° C	379990
26688-A	0.4948	11/14/24	MEG	S/N G4-007640	105° C	379990
26689-A	0.4879	11/14/24	MEG	S/N G4-007640	105° C	379990
26690-A	0.4676	11/27/24	MEG	S/N G4-007640	105° C	379990
26691-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26692-A	0.4628	11/27/24	MEG	S/N G4-007640	105° C	379990
26693-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26694-A	0.4669	11/27/24	MEG	S/N G4-007640	105° C	379990
26695-A	0.4593	11/27/24	MEG	S/N G4-007640	105° C	379990
26696-A	0.4504	11/27/24	MEG	S/N G4-007640	105° C	379990
26697-A	0.4586	11/27/24	MEG	S/N G4-007640	105° C	379990
26698-A	0.4665	11/27/24	MEG	S/N G4-007640	105° C	379990
26699-A	0.4639	11/27/24	MEG	S/N G4-007640	105° C	379990
26700-A	0.4701	11/27/24	MEG	S/N G4-007640	105° C	379990
26701-A	0.4645	11/27/24	MEG	S/N G4-007640	105° C	379990
26702-A	0.4583	11/27/24	MEG	S/N G4-007640	105° C	379990
26703-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26704-A	0.4591	11/27/24	MEG	S/N G4-007640	105° C	379990
26705-A	0.4641	11/27/24	MEG	S/N G4-007640	105° C	379990
26706-A	0.4546	11/27/24	MEG	S/N G4-007640	105° C	379990
26707-A	0.4513	11/27/24	MEG	S/N G4-007640	105° C	379990
26708-A	0.4611	11/27/24	MEG	S/N G4-007640	105° C	379990
26709-A	0.4555	11/27/24	MEG	S/N G4-007640	105° C	379990
26710-A	0.4571	11/27/24	MEG	S/N G4-007640	105° C	379990
26711-A	0.4452	11/27/24	MEG	S/N G4-007640	105° C	379990
26712-A	0.4487	11/27/24	MEG	S/N G4-007640	105° C	379990
26713-A	0.4460	11/27/24	MEG	S/N G4-007640	105° C	379990
26714-A	0.4481	11/27/24	MEG	S/N G4-007640	105° C	379990
26715-A	0.4502	11/27/24	MEG	S/N G4-007640	105° C	379990
26716-A	0.4512	11/27/24	MEG	S/N G4-007640	105° C	379990
26717-A	0.4510	11/27/24	MEG	S/N G4-007640	105° C	379990
26718-A	0.4406	11/27/24	MEG	S/N G4-007640	105° C	379990
26719-A	0.4459	11/27/24	MEG	S/N G4-007640	105° C	379990

Filter ID	Weight 1 (g)	Date	Initials	Oven ID	Oven Temp	Thermometer
26960-A	0.4476	12/09/24	MEG	S/N G4-007640	105° C	379990
26961-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26962-A	0.4713	12/09/24	MEG	S/N G4-007640	105° C	379990
26963-A	0.4658	12/09/24	MEG	S/N G4-007640	105° C	379990
26964-A	0.4577	12/09/24	MEG	S/N G4-007640	105° C	379990
26965-A	0.4503	12/09/24	MEG	S/N G4-007640	105° C	379990
26966-A	0.4683	12/09/24	MEG	S/N G4-007640	105° C	379990
26967-A	0.4473	12/09/24	MEG	S/N G4-007640	105° C	379990
26968-A	0.4648	12/09/24	MEG	S/N G4-007640	105° C	379990
26969-A	0.4585	12/09/24	MEG	S/N G4-007640	105° C	379990
26970-A	0.4520	12/10/24	MEG	S/N G4-007640	105° C	379990
26971-A	0.4626	12/10/24	MEG	S/N G4-007640	105° C	379990
26972-A	0.4644	12/10/24	MEG	S/N G4-007640	105° C	379990
26973-A	0.4544	12/10/24	MEG	S/N G4-007640	105° C	379990
26974-A	0.4583	12/10/24	MEG	S/N G4-007640	105° C	379990
26975-A	0.4575	12/10/24	MEG	S/N G4-007640	105° C	379990
26976-A	0.4632	12/10/24	MEG	S/N G4-007640	105° C	379990
26977-A	0.4587	12/10/24	MEG	S/N G4-007640	105° C	379990
26978-A	0.4639	12/10/24	MEG	S/N G4-007640	105° C	379990
26979-A	0.4622	12/10/24	MEG	S/N G4-007640	105° C	379990
26980-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26981-A	0.4647	12/10/24	MEG	S/N G4-007640	105° C	379990
26982-A	0.4671	12/10/24	MEG	S/N G4-007640	105° C	379990
26983-A	0.4535	12/10/24	MEG	S/N G4-007640	105° C	379990
26984-A	0.4513	12/10/24	MEG	S/N G4-007640	105° C	379990
26985-A	0.4568	12/10/24	MEG	S/N G4-007640	105° C	379990
26986-A	0.4582	12/10/24	MEG	S/N G4-007640	105° C	379990
26987-A	0.4609	12/10/24	MEG	S/N G4-007640	105° C	379990
26988-A	0.4591	12/10/24	MEG	S/N G4-007640	105° C	379990
26989-A	0.4533	12/10/24	MEG	S/N G4-007640	105° C	379990
26990-A	0.4506	12/10/24	MEG	S/N G4-007640	105° C	379990
26991-A	0.4612	12/10/24	MEG	S/N G4-007640	105° C	379990
26992-A	0.4482	12/10/24	MEG	S/N G4-007640	105° C	379990
26993-A	0.4480	12/10/24	MEG	S/N G4-007640	105° C	379990
26994-A	0.4560	12/10/24	MEG	S/N G4-007640	105° C	379990
26995-A	0.4564	12/10/24	MEG	S/N G4-007640	105° C	379990
26996-A	0.4534	12/10/24	MEG	S/N G4-007640	105° C	379990
26997-A	0.4525	12/10/24	MEG	S/N G4-007640	105° C	379990
26998-A	0.4501	12/10/24	MEG	S/N G4-007640	105° C	379990
26999-A	0.4491	12/10/24	MEG	S/N G4-007640	105° C	379990

This is the last page of the report.

Appendix D

LK01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Lime Kiln (LK01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-247-1	0.247	0.248	0.247	0.247	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-203-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	P-205-3	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
14:45	70.0	16:30	68.0	18:00	73.0
15:00	70.0	16:45	68.0	18:15	73.0
15:15	70.0	17:00	69.0	18:30	74.0
15:30	70.0	17:15	69.0	18:45	74.0
15:45	71.0	17:30	69.0	19:00	75.0

LK02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Lime Kiln (LK02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/13/25	SS-7	0.416	0.416	0.416	0.416	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/13/25	PT-206-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/13/25	PR-208-3	150.0	150.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/13/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/13/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/13/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
9:40	70.0	11:20	73.0	12:40	73.0
9:55	70.0	11:35	73.0	12:55	73.0
10:10	70.0	11:50	73.0	13:10	74.0
10:25	70.0	12:05	74.0	13:25	74.0
10:40	70.0	12:20	73.0	13:40	74.0

RB01A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01A) North Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS07	0.330	0.330	0.330	0.330	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-2	365.0	365.0	0.0%	± 1.5 % (absolute)	8 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	68.0
10:30	73.0	12:55	70.0	16:00	68.0
10:45	73.0	13:10	70.0	16:15	67.0
11:00	74.0	13:25	69.0	16:30	67.0
11:15	74.0	13:40	69.0	16:45	66.0

RB01B

Location Graphic Packaging International - Queen City, TX
Source No.1 Recovery Furnace (RB01B) South Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-36	0.362	0.362	0.362	0.362	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-309-1	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-210-0	355.0	355.0	0.0%	± 1.5 % (absolute)	10'

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	66.0	12:40	72.0	15:45	75.0
10:30	66.0	12:55	72.0	16:00	74.0
10:45	67.0	13:10	72.0	16:15	74.0
11:00	67.0	13:25	72.0	16:30	75.0
11:15	68.0	13:40	71.0	16:45	75.0

RB02A

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02A) West Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-07	0.292	0.292	0.292	0.292	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-207-2	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-209-2	385.0	384.0	0.1%	± 1.5 % (absolute)	9'

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

RB02B

Location Graphic Packaging International - Queen City, TX
Source No.2 Recovery Furnace (RB02B) East Stack
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-7	0.295	0.295	0.295	0.295	0.000	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-202-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-210-2	395.0	395.0	0.0%	± 1.5 % (absolute)	10 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-214-2990	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

SM01

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.1 Smelt Tank Scrubber (SM01)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/11/25	SS-382-2	0.382	0.381	0.382	0.382	0.001	≤ 0.004 in.	SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/11/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/11/25	PR-205-2	160.0	161.0	0.2%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/11/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**999.9**					
Weight Difference (g):	**0.1**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/11/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/11/25	MB-210-2447	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
10:15	73.0	12:40	69.0	15:45	71.0
10:30	73.0	12:55	69.0	16:00	72.0
10:45	73.0	13:10	68.0	16:15	72.0
11:00	74.0	13:25	68.0	16:30	72.0
11:15	74.0	13:40	69.0	16:45	73.0

SM02

QA/QC Data

Location Graphic Packaging International - Queen City, TX
Source No.2 Smelt Tank Scrubber (SM02)
Project No. AST-2024-4204
Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.) #1	#2	#3	Dn (Average)	Difference	Criteria	Material
2/12/25	SS-344-3	0.344	0.344	0.345	0.344	0.001	≤ 0.004 in.	SS
2/12/25	SS-305-2	0.305	0.306	0.305	0.305	0.001		SS

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?
2/12/25	PT-204-4	no	no	no

Date	Probe or Thermocouple ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length
2/12/25	PR-205-2	150.0	150.0	0.0%	± 1.5 % (absolute)	5 '

Field Balance Check

Date	**02/12/25**					
Balance ID:	**2100005838**					
Certified Weight ID:	**LRA-1KG-7**					
Certified Weight Expiration:	**12/7/25**					
Certified Weight (g):	**1000.0**					
Measured Weight (g):	**1000.0**					
Weight Difference (g):	**0.0**	--	--	--	--	--

Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location
2/12/25	Weather Station	NA	NA	NA	Queen City, TX

Date	Meter Box ID	Positive Pressure Leak Check
2/12/25	MB-211-2613	Pass

Reagent Name	Lot/ID Number	Field Prep performed?	If Field Prep Performed: Field Lot Number	Date Prepared	Prepared By
Acetone	240399	No			
Hexane	236079	No			
DIUF	243949	No			

Posttest Purge

Run 1		Run 2		Run 3	
Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**	Flow Rate (lpm):	**14**
Clock Time	Temperature	Clock Time	Temperature	Clock Time	Temperature
11:30	69.0	14:00	74.0	15:50	71.0
11:45	69.0	14:15	74.0	16:05	71.0
12:00	70.0	14:30	74.0	16:20	71.0
12:15	70.0	14:45	75.0	16:35	71.0
12:30	71.0	15:00	75.0	16:50	70.0

NCG01

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unit Scrubber (NCG01)
Project No. AST-2024-4204
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
2/13/25	P-203-1	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
2/13/25	P-203-1	176.0	178.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
2/13/25	Weather Station	NA	NA	NA	

Location Graphic Packaging International - Queen City, TX
Source NCG Oxidation Unti Scrubber (NCG01)
Project No. AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Make	Servomex	Servomex
Model	4900	4900
S/N	653218	653218
Operating Range	25	25
Cylinder ID		
Zero	NA	NA
Low	NA	NA
Mid	EB0096121	EB0096121
High	CC737073	CC737073
Cylinder Certified Values		
Zero	NA	NA
Mid	10	10
High	19.93	19.8
Cylinder Expiration Date		
Zero	NA	NA
Mid	8/18/32	8/18/32
High	9/15/32	9/15/32
Type of Sample Line	Heated Sample Line	

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	9:05	12.85	3.41
2	9:07	13.33	3.29
3	9:09	13.22	3.16
Average		13.1	3.3
Criteria Met		Single Point	Single Point

Alliance TECHNICAL GROUP

Calibration Data

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204
Date: 2/13/25

Parameter	O_2 - Outlet	CO_2 - Outlet
Expected Average Concentration	10.00	10.00
Span Between		
Low	10.00	10.00
High	50.00	50.00
Desired Span	19.93	19.80
Low Range Gas		
Low	NA	NA
High	NA	NA
Mid Range Gas		
Low	7.97	7.92
High	11.96	11.88
High Range Gas		
Low	NA	NA
High	NA	NA
Actual Concentration (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.00	10.00
High	19.93	19.80
Response Time (seconds)	35.00	35.00
Upscale Calibration Gas (C_{MA})	Mid	Mid
Instrument Response (% or ppm)		
Zero	0.00	0.00
Low	NA	NA
Mid	10.10	10.04
High	19.92	19.84
Performance (% of Span or Cal. Gas Conc.)		
Zero	0.00	0.00
Low	NA	NA
Mid	0.50	0.20
High	0.05	0.20
Status		
Zero	PASS	PASS
Low	NA	NA
Mid	PASS	PASS
High	PASS	PASS

Bias/Drift Determinations

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1		
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Run 2		
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Run 3		
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 2/13/25		
Span Value	19.93	19.80
Initial Instrument Zero Cal Response	0.00	0.00
Initial Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.26	0.00
Posttest System Zero Response	0.21	0.04
Pretest System Upscale Response	10.10	9.81
Posttest System Upscale Response	10.10	9.84
Bias (%)		
Pretest Zero	1.30	0.00
Posttest Zero	1.05	0.20
Pretest Span	0.00	-1.16
Posttest Span	0.00	-1.01
Drift (%)		
Zero	-0.25	0.20
Mid	0.00	0.15
Run 2 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.04
Posttest System Zero Response	0.21	0.02
Pretest System Upscale Response	10.10	9.84
Posttest System Upscale Response	10.13	9.84
Bias (%)		
Pretest Zero	1.05	0.20
Posttest Zero	1.05	0.10
Pretest Span	0.00	-1.01
Posttest Span	0.15	-1.01
Drift (%)		
Zero	0.00	-0.10
Mid	0.15	0.00
Run 3 Date 2/13/25		
Span Value	19.93	19.80
Instrument Zero Cal Response	0.00	0.00
Instrument Upscale Cal Response	10.10	10.04
Pretest System Zero Response	0.21	0.02
Posttest System Zero Response	0.23	0.03
Pretest System Upscale Response	10.13	9.84
Posttest System Upscale Response	10.12	9.81
Bias (%)		
Pretest Zero	1.05	0.10
Posttest Zero	1.15	0.15
Pretest Span	0.15	-1.01
Posttest Span	0.10	-1.16
Drift (%)		
Zero	0.10	0.05
Mid	-0.05	-0.15

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: NCG Oxidation Unti Scrubber (NCG01)
Project No.: AST-2024-4204

Response Times, seconds		
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**
Zero	35	35
Low	NA	NA
Mid	35	35

Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Date(s)	2/5/2025
Ethylene Cylinder ID	CC768666
Concentration (ppmv)	103.0
Instrument Outlet	MKS 20 (Serial #111455302)

CTS 1	98.03
CTS 2	98.31
CTS 3	98.14
CTS 4	98.19
CTS 5	--
CTS 6	--

CTS 7	--
CTS 8	--
CTS 9	--
CTS 10	--
CTS 11	--
CTS 12	--

AVERAGE	98.17
MAX	98.31
deviation	0.14
MIN	98.03
deviation	0.14

Greatest Deviation from average
0.14%

Agreement with Assumed Pathlength
95.31%
within 5% no correction required

CTS 1

Date	Time	File	Temperature (C	Pressure	Ethylene
2/12/25	17:51:48	24-4204_000007.LAB	191.0	1.002	98.15
2/12/25	17:52:51	24-4204_000008.LAB	191.0	1.002	97.88
2/12/25	17:53:54	24-4204_000009.LAB	191.0	1.002	98.07

CTS 2

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	7:41:32	24-4204_000785.LAB	190.9	1.020	98.26
2/13/25	7:42:35	24-4204_000786.LAB	191.0	1.020	98.36
2/13/25	7:43:38	24-4204_000787.LAB	191.0	1.020	98.31

CTS 3

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	10:32:36	24-4204_000947.LAB	191.0	1.025	97.92
2/13/25	10:33:38	24-4204_000948.LAB	191.0	1.025	98.10
2/13/25	10:34:41	24-4204_000949.LAB	191.0	1.025	98.40

CTS 4

Date	Time	File	Temperature (C	Pressure	Ethylene
2/13/25	13:25:54	24-4204_001111.LAB	191.0	1.026	98.21
2/13/25	13:26:57	24-4204_001112.LAB	191.0	1.026	98.22
2/13/25	13:28:00	24-4204_001113.LAB	191.1	1.025	98.14

CTS 5

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 6

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 7

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 8

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 9

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 10

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 11

Date	Time	File	Temperature (C	Pressure	Ethylene

CTS 12

Date	Time	File	Temperature (C	Pressure	Ethylene

Location	Graphic Packaging
Source	NCG Incinerator
Project No.	AST-2024-4204
Date	2/5/2025

Spike Cylinder ID	CC774584	Component
Spike Gas concentration	96.8	Methanol
Tracer Cylinder ID	CC774584	Component
Tracer Gas concentration	10.1	SF6
Instrument ID Outlet	MKS 20 (Serial #111455302)	

Direct Spike Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/12/25	18:06:28	24-4204_000021.LAB	191.0	1.030	98.62	12.006
02/12/25	18:07:30	24-4204_000022.LAB	190.9	1.030	99.29	12.015
02/12/25	18:08:33	24-4204_000023.LAB	190.9	1.030	99.83	12.021
02/12/25	18:09:36	24-4204_000024.LAB	190.9	1.030	100.33	12.027
02/12/25	18:10:39	24-4204_000025.LAB	191.0	1.031	100.46	12.029
02/12/25	18:11:42	24-4204_000026.LAB	190.9	1.031	100.82	12.037
02/12/25	18:12:45	24-4204_000027.LAB	191.0	1.031	101.13	12.049
				Average	**100.07**	**12.026**

Native Values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	9:10:34	24-4204_000870.LAB	191.0	1.037	0.44	0.010
02/13/25	9:11:37	24-4204_000871.LAB	191.0	1.036	0.48	0.010
02/13/25	9:12:40	24-4204_000872.LAB	191.0	1.036	0.46	0.010
02/13/25	9:13:42	24-4204_000873.LAB	191.0	1.036	0.56	0.010
02/13/25	9:14:45	24-4204_000874.LAB	191.0	1.035	0.53	0.010
02/13/25	9:15:48	24-4204_000875.LAB	191.0	1.036	0.52	0.010
02/13/25	9:16:51	24-4204_000876.LAB	191.0	1.036	0.43	0.010
				Average	**0.49**	**0.010**

Spiked values

Date	Time	File	Temperature (C)	Pressure	Spike (ppm)	Tracer (ppm)
02/13/25	8:42:17	24-4204_000843.LAB	191.0	1.036	5.14	0.757
02/13/25	8:43:20	24-4204_000844.LAB	191.1	1.035	5.25	0.766
02/13/25	8:44:23	24-4204_000845.LAB	191.1	1.036	5.17	0.757
02/13/25	8:45:26	24-4204_000846.LAB	191.0	1.035	5.38	0.764
02/13/25	8:46:28	24-4204_000847.LAB	191.0	1.034	5.72	0.758
02/13/25	8:47:31	24-4204_000848.LAB	191.0	1.036	5.58	0.763
02/13/25	8:48:34	24-4204_000849.LAB	191.0	1.035	5.50	0.751
				Average	**5.39**	**0.759**

Dilution Factor

6.2%

Calculated Spike

6.69

Spike Recovery

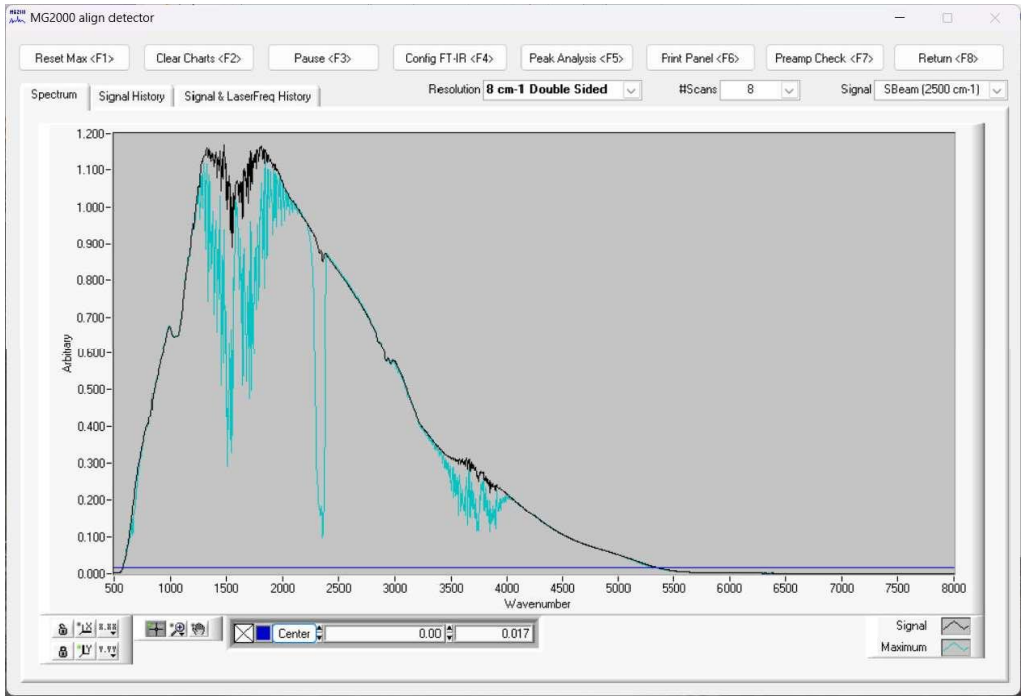
80.55%

Location	Graphic Packaging
Project No.	AST-2024-4204
Instrument	MKS 20 (Serial #111455302)

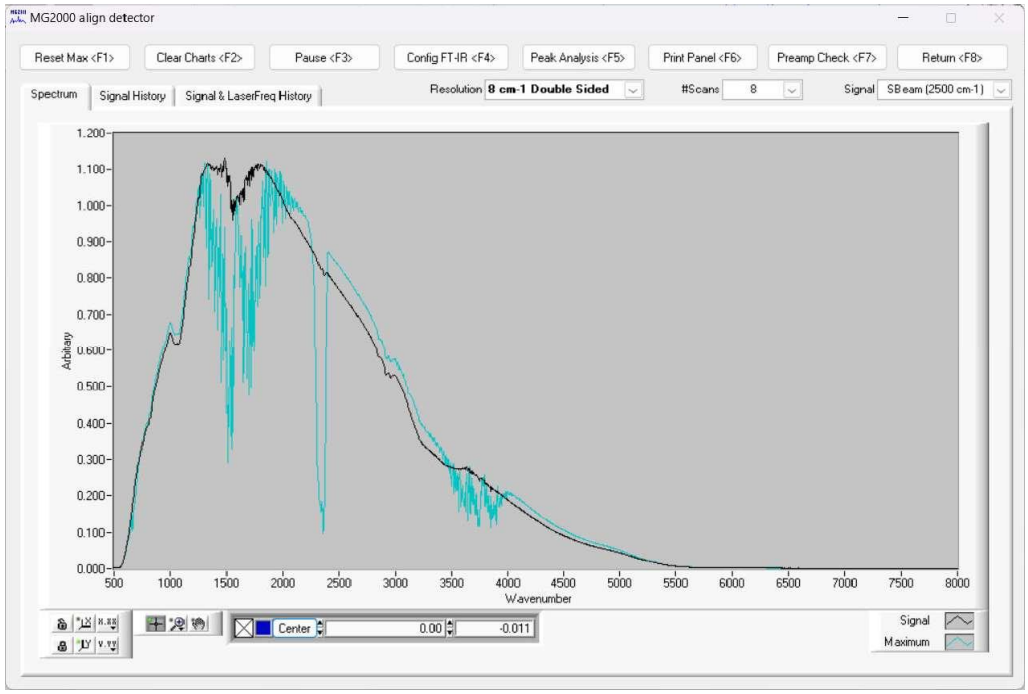
Summary of Spikes

Source	NCG Incinerator
Date	2/5/25
Time	8:42
Analyte	Methanol
Direct	100.07
Native	0.49
Spiked	5.39
Dilution	6.2%
Recovery	81%
Result	PASS

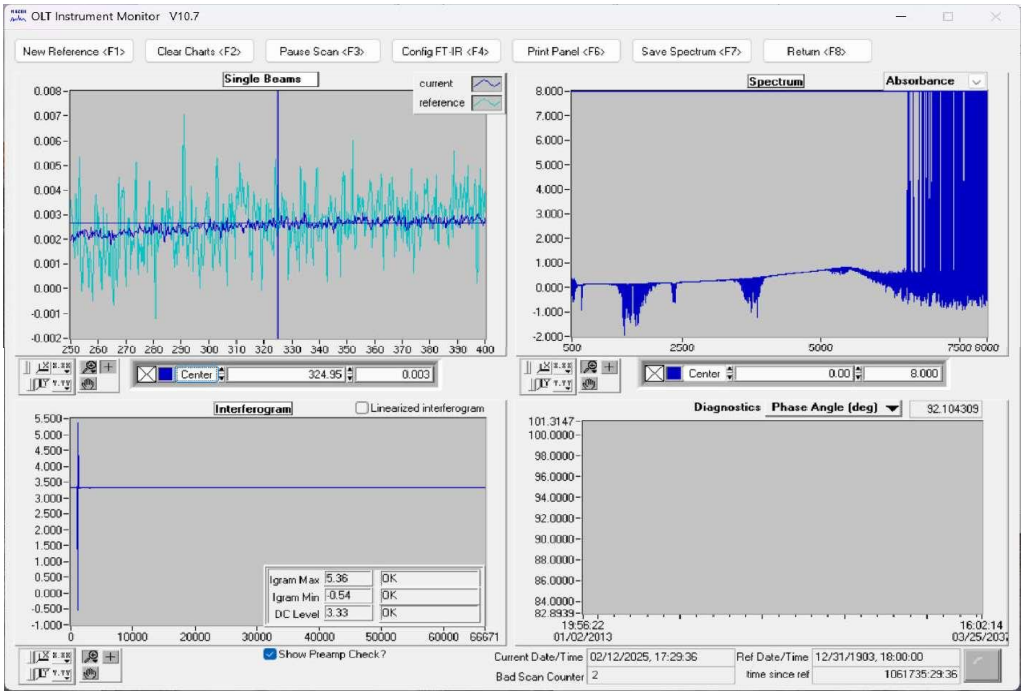
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Pre-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



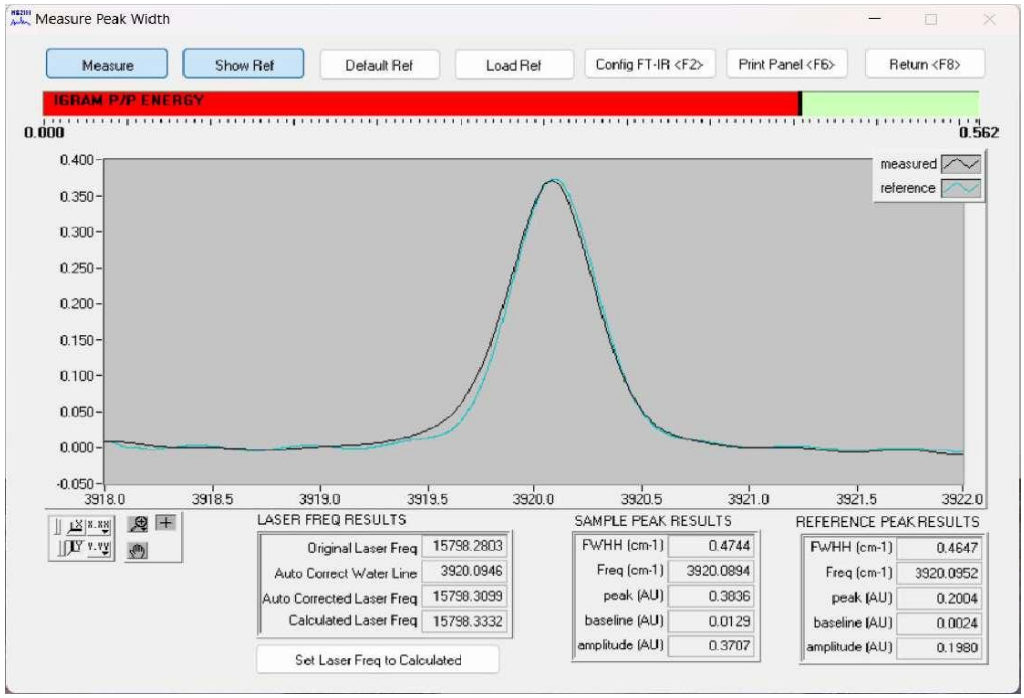
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Single Beam (Post-Test)
Instrument ID	MKS 20 (Serial #111455302)
Date	2/13/2025



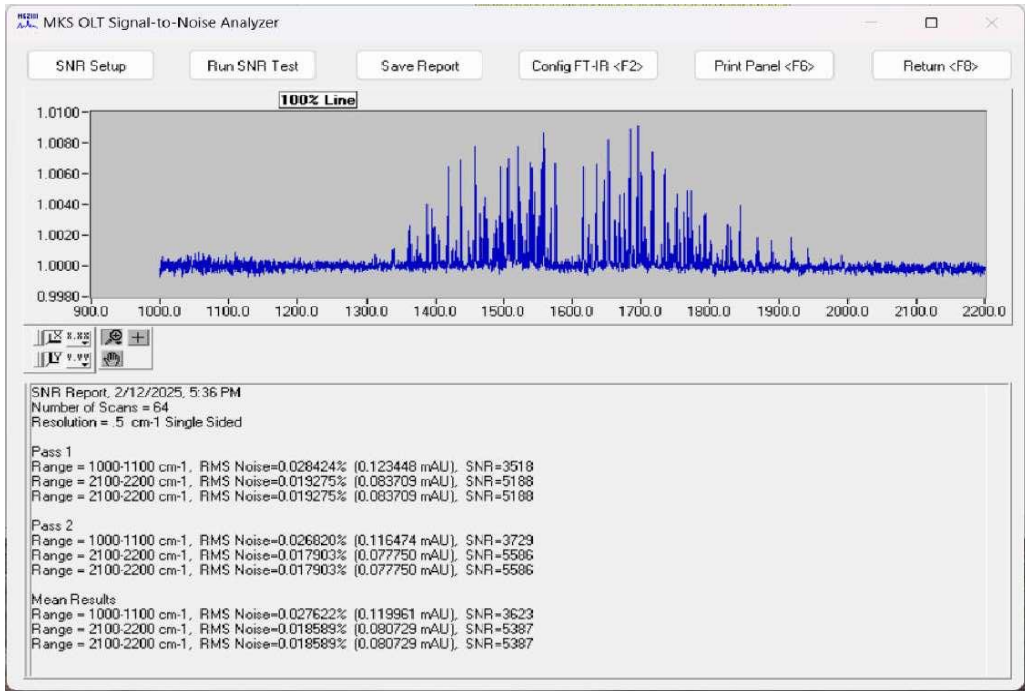
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Detector Linearity
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Peak Analysis
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Signal to Noise Ratio
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Health Check Parameter	Analysis Validation Utility
Instrument ID	MKS 20 (Serial #111455302)
Date	2/12/2025

Analysis Validation Report

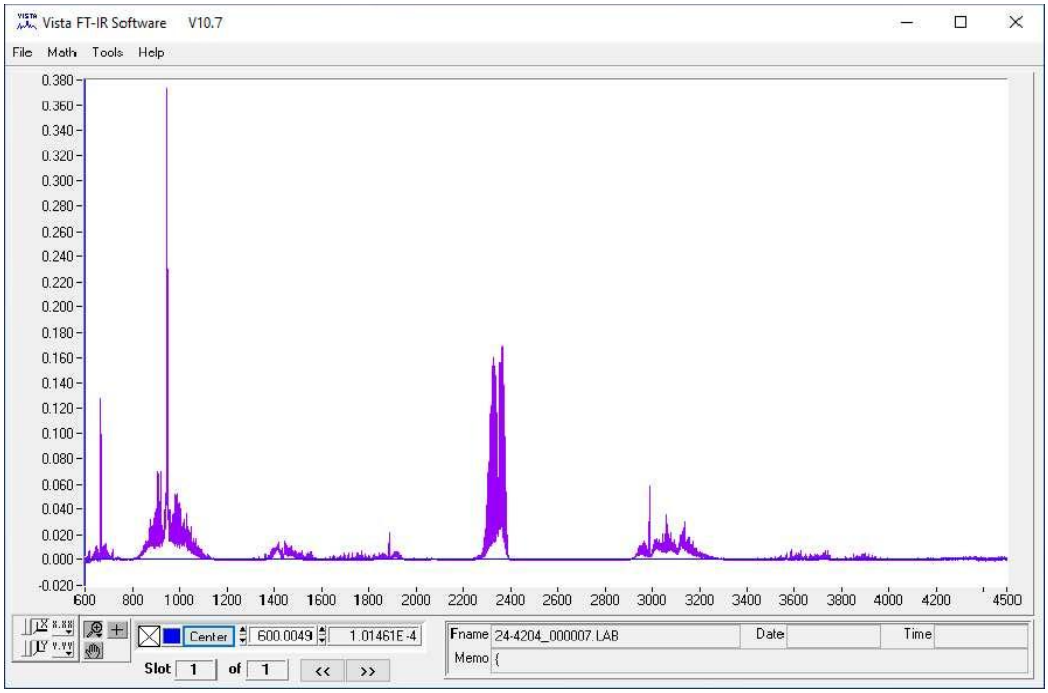
Sample Filename: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_001011.LAB

Filename for noise: D:\Documents\2025\24-4204 Graphic Packaging\24-4204_000945.LAB
Interferences Filenames: C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2C
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #
C:\OLT\Analysis Validation Utility\Support spectra\1min 191C LN2\Interferents H2O 20pct CO2 20pct 1min #

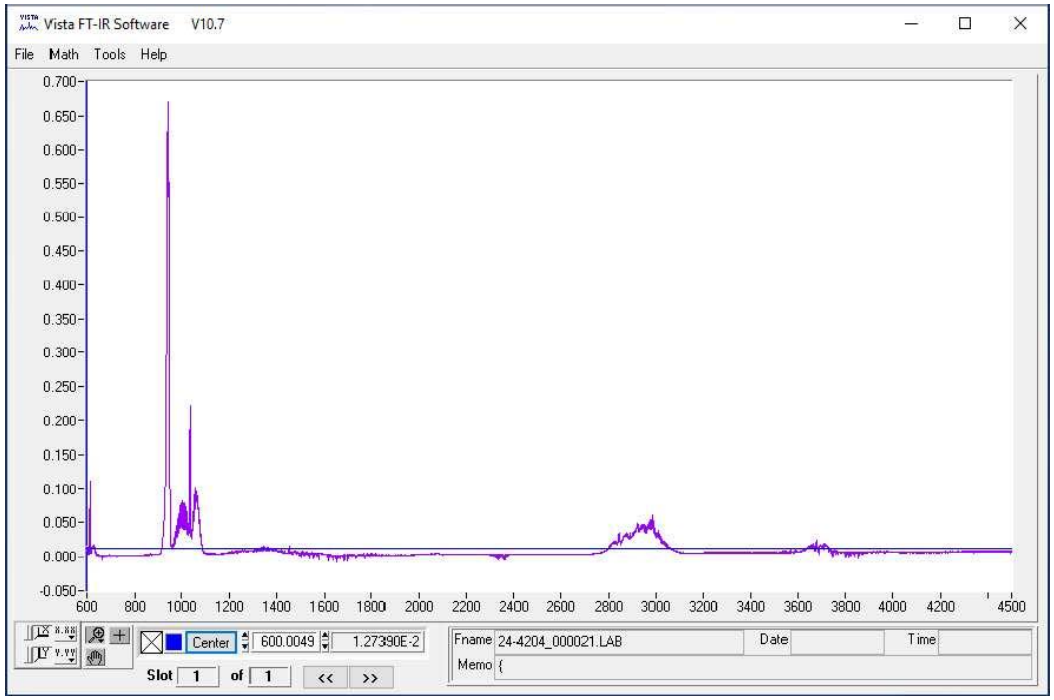
Recipe path: C:\OLT\RECIPES\Coal EGU Testing R3 - Copy DO NOT USE.MGRCP

Gas calibration Name	Conc	MDC3	**MDC2**	MDC1	MAU	FMU*R	OCU
NO (350,3000) 191C	19.47	5.27	**0.17**	0.26	0.36	7.19	7.19
NO2 (150) 191C (1OF2)	1.58	1.46	**0.16**	0.05	0.05	1.52	1.52
NO2 (2000) 191C (2OF2)	1.64	10.16	**0.5**	1.15	1.46	12.94	12.94
N2O (100,200,300) 191C	0.44	0.45	**0.05**	0.05	0.06	0.52	0.52
NH3 (300) 191C (1OF2)	0.07	1.38	**0.04**	0.15	0.25	2.34	2.34
NH3 (3000) 191C (2OF2)	6.47	33.8	**0.58**	1.37	2.59	63.76	63.76
CO (500) 191C (1OF2)	149.62	8.29	**0.1**	0.14	0.31	16.87	16.87
CO% (1) 191C (2OF2)	0.01	0	**0**	0	0	0.01	0.01
H2O% (40) 191C	44.5	0.44	-	0.01	0.02	0.75	0.75
CO2% (40) 191C	1.94	0.16	-	0.01	0.02	0.23	0.23
CH4 (250) 191C (1OF2)	-0.49	2.67	**0.05**	0.49	1.29	7.05	7.05
CH4 (3000) 191C (2OF2)	0.55	18.41	**0.6**	1.36	2.24	30.32	30.32
FORMALDEHYDE (70) 191C	-0.1	0.29	**0.09**	0.24	0.29	0.35	0.35
PROPYLENE (200,1000) 191(	-0.95	4.24	**0.25**	0.55	0.64	4.97	4.97
ETHYLENE (100,3000) 191C	-0.47	1.76	**0.11**	0.21	0.36	3.07	3.07
ACETYLENE (1000) 191C	0.43	4.8	**0.26**	0.83	1	5.78	5.78
PROPANE (100) 191C	0.15	1.01	**0.09**	0.16	0.19	1.2	1.2
ETHANE (500) 191C	-0.27	2.08	**0.16**	0.27	0.3	2.32	2.32
ACETALDEHYDE (1000) 191(	-0.85	1.18	**0.12**	0.42	0.46	1.28	1.28
HCL PPM (100) 191C	0.05	0.32	**0.08**	0.16	0.29	0.59	0.59
HF PPM (10) 191C	0.32	0.95	**0.04**	0.09	0.17	1.7	1.7
HCN (100) 191C	0.28	7.31	**0.13**	0.87	1.49	12.51	12.51
HBR (100) 180C	0.08	1.33	**0.27**	0.73	1.48	2.71	2.71
SO2 (1000) 191C	-1.9	3.46	**0.24**	0.2	0.38	6.66	6.66
SO3 (150) 191C	-749.83	0	-	0.07	0.07	0	0.07
COS (100) 150C	0.42	0.19	**0.01**	0.02	0.02	0.25	0.25
H2SO4 (50) 150C	-0.13	0.2	**0.05**	0.06	0.07	0.22	0.22
SF6 (10) 191C	-0.01	0.02	**0.01**	0.01	0.01	0.02	0.02
MEOH (10) 191C	0.37	0.56	**0.24**	0.15	0.17	0.65	0.65

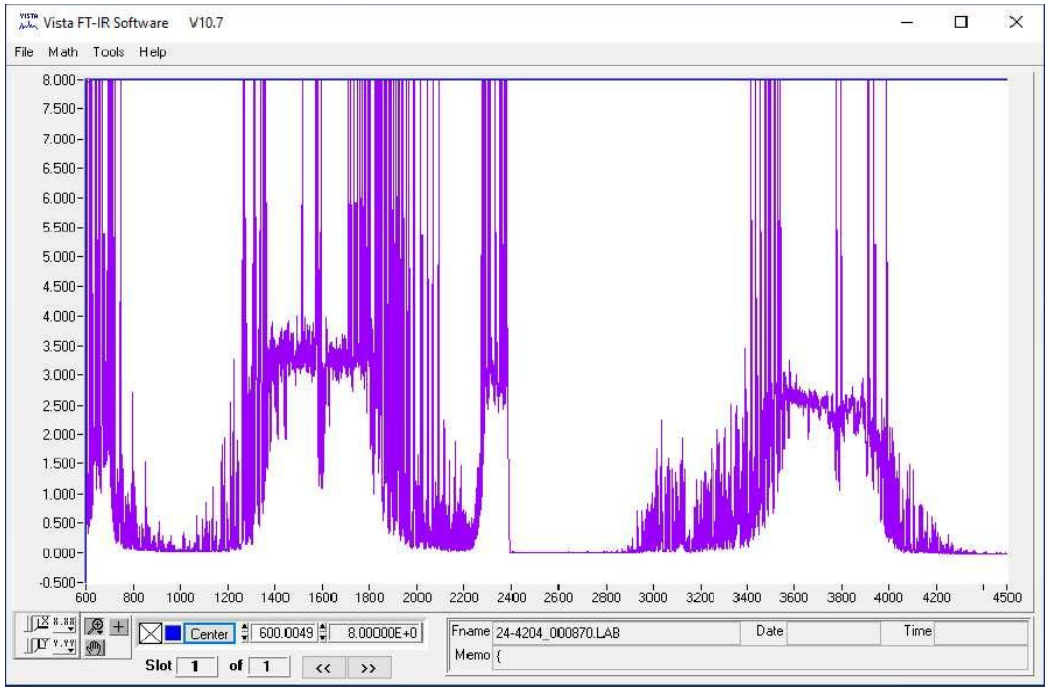
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (CTS)	24-4204_000007.LAB
Date	2/12/2025
Time	5:51:48 PM



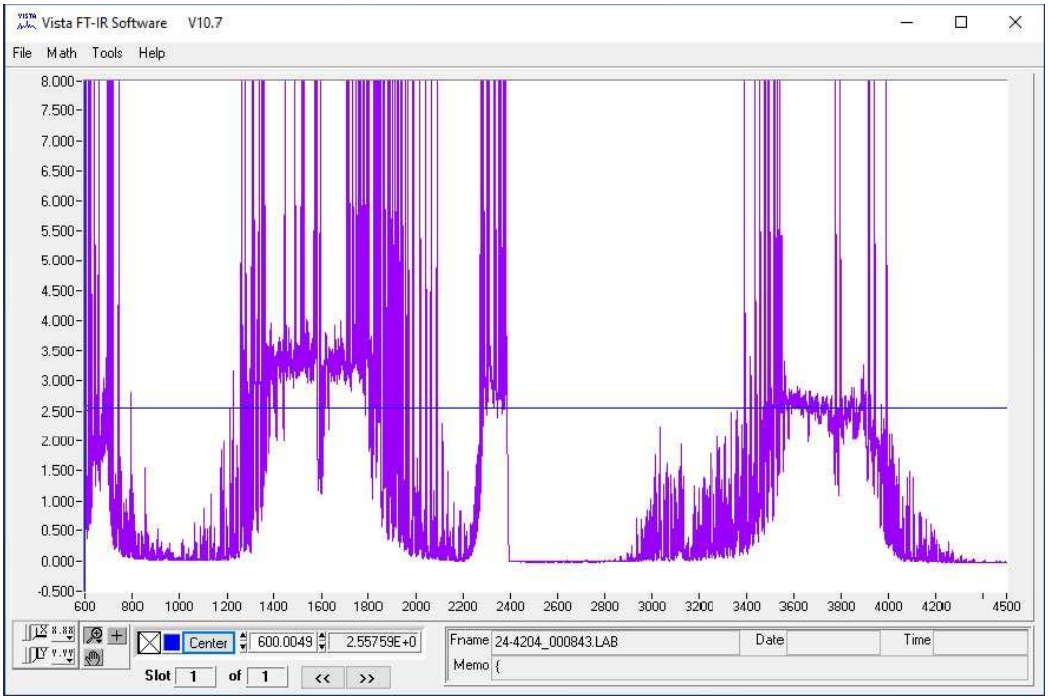
Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Analyte Direct)	24-4204_000021.LAB
Date	2/12/2025
Time	6:06:28 PM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Native)	24-4204_000870.LAB
Date	2/13/2025
Time	9:10:34 AM



Location	Graphic Packaging
Source(s)	NCG Incinerator
Project No.	AST-2024-4204
Spectra (Spike)	24-4204_000843.LAB
Date	2/13/2025
Time	8:42:17 AM



Certifications & Calibrations

Equipment Detail - Dry Gas Meter

Console ID: MB-210-2447
Meter S/N: 20035533
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	30.17					
Final Barometric Pressure, in. Hg	(Pb_F)	30.20					
Average Barometric Pressure, in. Hg	(Pb)	30.19					
Critifcal Orifice ID	(Y)	29	29	19	19	6	6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	21.0	21.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	738.100	713.100	730.000	705.500	749.350	724.000
Final DGM Volume, ft^3	(Vm_F)	748.955	723.620	736.700	712.200	754.500	729.210
Total DGM Volume, ft^3	(Vm)	10.855	10.520	6.700	6.700	5.150	5.210
Ambient Temperature, °F	(Ta)	64	64	64	64	64	64
Initial DGM Temperature, °F	(Tm_I)	62	62	63	61	62	62
Final DGM Temperature, °F	(Tm_F)	63	63	64	63	63	62
Average DGM Temperature, °F	(Tm)	63	63	64	62	63	62
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.50	3.40	1.40	1.40	0.13	0.13
Standard Meter volume, ft^3	(Vmstd)	11.1629	10.8158	6.8420	6.8617	5.2530	5.3193
Standard Critical Orifice Volume, ft^3	(Vcr)	11.0047	11.0047	6.8537	6.8537	5.2497	5.2497
Meter Correction Factor	(Y)	0.986	1.017	1.002	0.999	0.999	0.987
Tolerance	--	0.013	0.019	0.003	0.000	0.001	0.011
Orifice Calibration Value	(ΔH @)	1.672	1.624	1.712	1.717	1.691	1.693
Tolerance	--	0.013	0.061	0.027	0.032	0.007	0.008
Orifice Cal Check	--	0.85		0.72		0.85	
Meter Correction Factor	**(Y)**	**0.998**					
Orifice Calibration Value	**(ΔH @)**	**1.685**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	99	559	0.2	1
223	683	224	684	-0.1	1
248	708	249	709	-0.1	1
273	733	274	734	-0.1	1
300	760	300	760	0.0	0
400	860	399	859	0.1	1
500	960	498	958	0.2	2
600	1,060	600	1,060	0.0	0
700	1,160	703	1,163	-0.3	3
800	1,260	802	1,262	-0.2	2
900	1,360	903	1,363	-0.2	3
1,000	1,460	1,003	1,463	-0.2	3
1,100	1,560	1,103	1,563	-0.2	3
1,200	1,660	1,203	1,663	-0.2	3

Personnel

Calibration By: EDO
Calibration Date: 2/4/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-211-2613
Meter S/N: MB-211-2613
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.89					
Final Barometric Pressure, in. Hg	(Pb_F)	29.89					
Average Barometric Pressure, in. Hg	(Pb)	29.89					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647s-6	1647s-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	18.0	18.0	22.0	22.0	25.0	25.0
Initial DGM Volume, ft^3	(Vm_I)	59.700	71.250	83.820	91.100	98.000	103.400
Final DGM Volume, ft^3	(Vm_F)	70.545	82.082	90.650	97.904	103.241	108.615
Total DGM Volume, ft^3	(Vm)	10.845	10.832	6.830	6.804	5.241	5.215
Ambient Temperature, °F	(Ta)	55	55	55	55	55	55
Initial DGM Temperature, °F	(Tm_I)	56	56	60	60	67	67
Final DGM Temperature, °F	(Tm_F)	56	56	60	60	67	67
Average DGM Temperature, °F	(Tm)	56	56	60	60	67	67
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	4.10	4.10	1.60	1.60	0.15	0.15
Standard Meter volume, ft^3	(Vmstd)	11.2001	11.1867	6.9568	6.9303	5.2486	5.2226
Standard Critical Orifice Volume, ft^3	(Vcr)	10.9920	10.9920	6.8458	6.8458	5.2437	5.2437
Meter Correction Factor	(Y)	0.981	0.983	0.984	0.988	0.999	1.004
Tolerance	--	0.008	0.007	0.006	0.002	0.009	0.014
Orifice Calibration Value	(ΔH @)	1.971	1.971	1.956	1.956	1.921	1.921
Tolerance	--	0.022	0.022	0.007	0.007	0.029	0.029
Orifice Cal Check	--	1.95		1.56		1.99	
Meter Correction Factor	**(Y)**	**0.990**					
Orifice Calibration Value	**(ΔH @)**	**1.949**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIE
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	66	526	0.4	2
100	560	98	558	0.4	2
223	683	221	681	0.3	2
248	708	246	706	0.3	2
273	733	271	731	0.3	2
300	760	298	758	0.3	2
400	860	395	855	0.6	5
500	960	494	954	0.6	6
600	1,060	595	1,055	0.5	5
700	1,160	696	1,156	0.3	4
800	1,260	795	1,255	0.4	5
900	1,360	895	1,355	0.4	5
1,000	1,460	994	1,454	0.4	6
1,100	1,560	1,094	1,554	0.4	6
1,200	1,660	1,193	1,653	0.4	7

Personnel

Calibration By: David Larru
Calibration Date: 1/3/2025
Reviewed By: Timothy Branham

Equipment Detail - Dry Gas Meter

Console ID: MB-214-2990
Meter S/N: 18392990
Critical Orifice S/N: 1647s

Calibration Detail

Initial Barometric Pressure, in. Hg	(Pb_I)	29.66					
Final Barometric Pressure, in. Hg	(Pb_F)	29.66					
Average Barometric Pressure, in. Hg	(Pb)	29.66					
Critifcal Orifice ID	(Y)	1647s-29	1647s-29	1647s-19	1647s-19	1647-6	1647-6
K' Factor, $ft^3 \cdot R^{1/2}$ / in. WC·min	(K')	0.8343	0.8343	0.5196	0.520	0.1592	0.159
Vacuum Pressure, in. Hg	(V_P)	16.0	16.0	20.0	20.0	24.0	23.0
Initial DGM Volume, ft^3	(Vm_I)	733.400	721.100	745.400	752.400	759.200	764.600
Final DGM Volume, ft^3	(Vm_F)	744.442	732.054	752.170	759.180	764.418	769.813
Total DGM Volume, ft^3	(Vm)	11.042	10.954	6.770	6.780	5.218	5.213
Ambient Temperature, °F	(Ta)	67	67	67	67	67	67
Initial DGM Temperature, °F	(Tm_I)	73	73	73	73	73	73
Final DGM Temperature, °F	(Tm_F)	73	73	73	73	73	73
Average DGM Temperature, °F	(Tm)	73	73	73	73	73	73
Elapsed Time	(Θ)	10.00	10.00	10.00	10.00	25.00	25.00
Meter Orifice Pressure, in. WC	(ΔH)	3.80	3.80	1.50	1.50	0.14	0.14
Standard Meter volume, ft^3	(Vmstd)	10.9475	10.8603	6.6741	6.6840	5.1268	5.1219
Standard Critical Orifice Volume, ft^3	(Vcr)	10.7824	10.7824	6.7153	6.7153	5.1437	5.1437
Meter Correction Factor	(Y)	0.985	0.993	1.006	1.005	1.003	1.004
Tolerance	--	0.014	0.007	0.007	0.005	0.004	0.005
Orifice Calibration Value	(ΔH @)	1.823	1.823	1.845	1.845	1.828	1.828
Tolerance	--	0.009	0.009	0.013	0.013	0.004	0.004
Orifice Cal Check	--	1.65		1.67		1.51	
Meter Correction Factor	**(Y)**	**0.999**					
Orifice Calibration Value	**(ΔH @)**	**1.832**					
Positive Pressure Leak Check		**Yes**					

Equipment Detail - Thermocouple Sensor

Reference Calibrator Make: PIECAL
Reference Calibrator Model: 520B
Reference Calibrator S/N: 109894

Calibration Detail

Reference Temp.		Display Temp.		Accuracy	Absolute Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	67	527	0.2	1
100	560	100	560	0.0	0
223	683	228	688	-0.7	5
248	708	253	713	-0.7	5
273	733	278	738	-0.7	5
300	760	306	766	-0.8	6
400	860	407	867	-0.8	7
500	960	508	968	-0.8	8
600	1,060	612	1,072	-1.1	12
700	1,160	716	1,176	-1.4	16
800	1,260	817	1,277	-1.3	17
900	1,360	920	1,380	-1.5	20
1,000	1,460	1,021	1,481	-1.4	21
1,100	1,560	1,122	1,582	-1.4	22
1,200	1,660	1,224	1,684	-1.4	24

Personnel

Calibration By: David Larru
Calibration Date: 2/7/2025
Reviewed By: Timothy Branham

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE

Blend Type:	GAS	MOL	
Pressure:	2000	psia	**Sales Order: 1354918**
Volume:	138.9	cf	
Dew Point:	0 C		**RBTGS Part No.:** 304930

Cylinder Size: I-150
Valve Outlet: CGA 350
Cylinder No.: **CC774584**
Bar Code No.: 107623038

Lot No.: NV2411081526
Analysis Date: November 13, 2024
Date Issued: November 15, 2024
Expiration Date: November 15, 2028

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Sulfur Hexafluoride	2551-62-4	10.0	ppm	10.1	59.2	10.1	ppm	5%	M
Methanol	67-56-1	100.0	ppm	96.8	110.7	96.8	ppm	2%	B
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical Oxygen Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0096121	**Certification Date:**	08/20/2024
Product ID Number:	124300	**Expiration Date:**	08/18/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0096121.20240814-0	**Lot Number:**	EB0096121.20240814
Customer PO. NO.:		**Tracking Number:**	095703714
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.00 %**	±0.08 %	NDIR	08/20/2024
Oxygen	**10.00 %**	±0.03 %	MPA	08/19/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726207	CC726207.20230109	07/09/2031	GMIS	N2	O2	12.01 %	0.122	SRM 2659a
CC749195	CC749195.20230228	07/09/2031	GMIS	N2	O2	20.01 %	0.112	SRM 2659a
EB0006119	EB0006119.20210412	01/03/2032	GMIS	N2	CO2	19.58 %	0.375	C2190301.03
EB0016852	EB0016852.20210412	01/03/2032	GMIS	N2	CO2	11.92 %	0.235	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	07/29/2024
CO2	NDIR	Thermo	410i	1162980025	08/13/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC737073	**Certification Date:**	09/17/2024
Product ID Number:	124240	**Expiration Date:**	09/15/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC737073.20240903-0	**Lot Number:**	CC737073.20240903
Customer PO. NO.:		**Tracking Number:**	103890438
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.8 %**	±0.13 %	FTIR	09/17/2024
Oxygen	**19.93 %**	±0.03 %	MPA	09/10/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
CC769424	CC769424.20240512	08/05/2032	GMIS	N2	O2	19.98 %	0.155	SRM 2659a
EB0010822	EB0010822.20230816	07/09/2032	GMIS	N2	CO2	24.84 %	0.292	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/21/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	09/17/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

CERTIFIED GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC768666	**Certification Date:**	06/19/2024
Product ID Number:	124838	**Expiration Date:**	06/17/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC768666.20240618-0	**Lot Number:**	CC768666.20240618
Customer PO. NO.:		**Tracking Number:**	108819146
Customer:		**Previous Certification Dates:**	

This mixture is for laboratory use only, not for drug, household or other use.
This mixture is certified in Mole % to be within ±2% of the actual number reported with a confidence of 95%.
This mixture was manufactured by scale; weights traceable to N.I.S.T. Certificate #822/266926-02.
Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Ethylene	**103 PPM**	± 2% NIST	FTIR
Nitrogen	Balance		

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC734580	CC734580	07/26/2024	PS	N2	C2H4	1005 PPM	2	4034426

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
C2H4	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-G, Revised on 2017-07-02

Appendix E

LK01

#1 Lime Kiln Process Data

	Start Time:		2/13/25 16:25	2/13/25 15:05	2/13/25 13:20	
	End Time:		2/13/25 17:46	2/13/25 16:10	2/13/25 14:26	
Run #			3	2	1	Avgs
Tag						
FIC0262G.pv	Mud Flow	gpm	161.25	160.4	160.0	160.5
FYC0262G.pv	Lime Production	tons/day	160.06	160.1	160.0	160.0
FIC0275G.pv	Natural Gas Flow	cfm	832.71	835.0	822.8	830.2
AT0267G.pv	Kiln O2	%	1.96	2.0	2.0	2.0
AM0273BG.pv	Hot End Temp (oil)	°F	1313.76	1326.4	1247.3	1295.8
TT0273G.pv	Hot End Temp (gas)	°F	NA	NA	NA	
TT0269G.pv	Wet End Temp	°F	439.63	438.1	452.9	443.5
FT0296G.pv	Scrubber Recirc Flow	gpm	404.15	403.7	403.6	403.8
DPT0297G.pv	Scrubber delta P	in. H2O	17.16	17.2	17.3	17.2
DIC0260G.pv	Precoat Filter Solids	%	31.86	32.0	32.0	31.9
	Scrubber solids	%	NA	NA	NA	
CAUS-#1kiln.CARE	Carbonate Test	% CaCO3	4.40	4.4	13.0	7.3
H_LK01_TRS.avg	TRS/O2	ppm	8.27	8.2	5.9	7.5
I_LK01_o2.avg.filt	Excess stack O2	%	6.72	6.8	6.8	6.7

LK02

#2 Lime Kiln Process Data

		Start Time:	2/13/2025 11:15	2/13/2025 9:55	2/13/2025 8:15	
		End Time:	2/13/2025 12:20	2/13/2025 11:00	2/13/2025 9:20	
Run #		Units	3	2	1	AVG
Tag						
FIC0035G.pv	Mud Flow	gpm	287.16	287.09	287.02	287.2
FYC0035G.pv	Lime Production	tons/day	310.00	309.98	309.82	310.0
FIC0057G.pv	Natural Gas Flow	cfm	1241.62	1265.10	1175.79	1241.6
FIC3102G.pv	Fuel Oil Flow	gpm	0.00	0.00	0.00	0.0
AT0045G.pv	Excess O2	%	4.00	3.91	5.00	4.0
AM0047BG.pv	Hot End Temp (oil)	°F	1357.95	1226.80	1279.54	1357.9
TT0047G.pv	Hot End Temp (gas)	°F	1357.49	1228.54	1280.14	1357.5
TT0044G.pv	Wet End Temperature	°F	620.79	614.41	599.04	620.8
FT0066G.pv	Scrubber Recirc Flow	gpm	742.60	744.03	743.38	742.6
DPT0065G.pv	Scrubber delta P	in. H2O	32.29	32.57	32.73	32.3
DIC0036G.pv	Precoat Filter Solids	%	34.01	34.01	34.00	34.0
CAUS-#2kiln.CARB	Carbonate Test	% CaCO3	2.20	13.00	12.31	2.2
h_lk02_trs.avg	TRS/O2	ppm	0.30	0.40	0.40	0.3
i_lk02_o2.avg.filt	O2	%	8.12	8.13	9.13	8.1

RB01

#1 Recovery Boiler Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40 AM	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46 AM	
	Run	3	2	1	
Tag					Averages
FT0170E.pv	Steam load (kpph)	354.13	354.04	356.26	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.68	212.46	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.93	201.70	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.77	119.98	120.7
AIC0066E.pv	Excess O2	2.99	3.03	2.92	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.19	0.20	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.78	79.71	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.08	83.90	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.78	211.15	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	
TIC786E.PV	Bl. Liq. Nozzle temp. (F)	[-11059] No Good Data For Calculation	] No Good Data For Cal	] No Good Data For Cal	#DIV/0!
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.69	49.70	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
H_RB1N_TRS.AVG	TRS/O2 -- North (ppm)	1.18	1.46	1.44	1.4
H_RB1S_TRS.AVG	TRS/O2 -- South (ppm)	0.62	0.63	0.07	0.4
H_RB1N_SO2.AVG	SO2/O2 -- North (ppm)	0.05	19.56	3.11	7.6
H_RB1S_SO2.AVG	SO2/O2 -- South (ppm)	-0.17	24.73	4.34	9.6
I_RB1N_O2.FILT	O2 -- North %	5.88	5.92	5.76	5.9
I_RB1S_O2.FILT	O2 -- South %	7.20	7.27	6.75	7.1
AT0421BE.PV	Opacity -- North %	4.85	5.31	4.52	4.9
AT0421CE.PV	Opacity -- South %	4.01	4.21	4.10	4.1

RB02

#2 Recovery Boiler West Stack -- Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.9	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.1	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.7	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.1	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.2	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.2	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.6	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.5	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.2	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.4	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.2	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.0	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.0	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.5	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.1	90.3
H_RB2E_TRS.AVG	TRS/O2 -- East (ppm)	0.66	0.76	0.6	0.7
H_RB2W_TRS.AVG	TRS/O2 -- West (ppm)	0.32	0.26	#VALUE!	#VALUE!
H_RB2E_SO2.AVG	SO2/O2 -- East (ppm)	0.00	0.10	0.2	0.1
H_RB2W_SO2.AVG	SO2/O2 -- West (ppm)	0.00	0.00	0.1	0.0
I_RB2E_O2.FILT	O2 -- East %	4.25	3.90	4.4	4.2
I_RB2W_O2.FILT	O2 -- West %	4.98	4.79	5.3	5.0
AT2083E.PV	Opacity -- East %	9.71	9.61	10.0	9.8
AT2082E.PV	Opacity -- West %	10.90	10.75	11.6	11.1

SM01

#1 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/11/2025 14:05:00 PM	2/11/2025 11:15	2/11/25 8:40	
	End Time:	2/11/2025 15:10:00 PM	2/11/2025 12:20	2/11/25 9:46	
	Run #	3	2	1	**Averages**
Tag					
FT0170E.pv	Steam load (kpph)	354.13	354.0	356.3	354.8
FIC0074E.pv	Pri. Air load (kpph)	213.28	213.7	212.5	213.1
FIC0075E.pv	Sec. Air load (kpph)	201.94	202.9	201.7	202.2
FIC0076E.pv	Tertiary Air load (kpph)	120.32	121.8	120.0	120.7
AIC0066E.pv	Excess O2	2.99	3.0	2.9	3.0
PIC419E.pv	Furnace Press. (in. w.c.)	0.22	0.2	0.2	0.2
FIC419AE.pv	"A" I.D. fan (% output)	80.45	83.8	79.7	81.3
FIC419BE.pv	"B" I.D. fan (% output)	84.65	88.1	83.9	85.5
FY069E.pv	Bl. Liq. Burn flow (gpm)	209.68	209.8	211.2	210.2
DI068E.pv	Bl. Liq. % density (%)	Tag not found	Tag not found	Tag not found	Tag not found
FIC0069E.pv	Bl. Liq. Flow (ton/hr)	49.69	49.7	49.7	49.7
FI480E.pv	Nat. Gas Flow (kcfh)	0.00	0.0	0.0	0.0
Ft1024e.pv	Weak Wash flow to fan (gpm)	47.99	48.14	48.32	48.1
FT1030E.pv	Weak Wash flow to scrubber (gpm)	87.37	87.17	87.88	87.5
TIC786E.PV	Precip. Ash Tank Temp. (F)	59] No Good Data For Calcu	o Good Data For C	No Good Data For C	#DIV/0!
IT3025e.pv	Scrubber Fan Amps	83.46	83.5	81.8	82.9

SM02

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	2/12/25 14:20	2/12/25 12:30	2/12/25 8:00	
	End Time:	2/12/25 15:28	2/12/25 13:37	2/12/25 11:18	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	608.27	611.56	601.91	607.3
FIC2037E.pv	Pri. Air load -- Total (kpph)	350.37	350.13	349.12	349.9
FIC2038E.pv	Sec. Air load (kpph)	350.33	349.81	349.72	350.0
FIC2039E.pv	Tertiary Air load (kpph)	171.25	176.93	180.08	176.1
AT2197E.pv	Excess O2	2.95	2.64	3.21	2.9
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.19	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	73.88	72.65	74.60	73.7
SIC2085E.pv	"B" I.D. fan speed (rpm)	74.75	73.51	75.49	74.6
FY2103E.pv	Bl. Liq. Burn flow (gpm)	409.46	407.97	406.22	407.9
NM2102E.pv	Bl. Liq. % density (%)	72.93	73.12	73.35	73.1
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	260.10	260.03	259.20	259.8
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	96.99	96.99	97.01	97.0
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	77.16	79.61	76.54	77.8
FT2004E.pv	Weak Wash flow to scrubber (gpm)	89.62	90.04	91.09	90.3
TT2268E.PV	Precip. Ash Tank Temp. (F)	228.03	228.01	227.36	227.8
IT3028e.pv	Scrubber fan amps	43.19	43.19548758	43.70370315	43.4

NCG01

GRAPHIC PACKAGING INTERNATIONAL - TEXARKANA MILL
INCINERATOR EXHAUST STACK (NCG01)
PROCESS DATA

	Start Time:	2/13/25 11:57	2/13/25 10:42	2/13/25 9:10	
	End Time:	2/13/25 12:57	2/13/25 11:42	2/13/25 10:10	
					Avg
PI Tag No.	**Parameter Description**	**Run 3**	**Run 2**	**Run 1**	
TIC3076H.PV	Incinerator chamber temperature, F	1448.68	1449.0	1446.9	1448.20
AIC3112H.PV	Incinerator SO2 scrubber pH	9.82	9.8	9.6	9.74
FT3104H.PV	Incinerator SO2 scrubber recirc flow, gpm	405.99	405.9	412.0	407.97
	Hardwood blow rate	48	48	48	48.00
	Pine blow rate	67	67	67	67.00
FIC3387C.pv	A-line brown stock flow, gpm	2898.79	2900.7	2697.0	2832.17
FQC3377C.pv	B-line brown stock flow, gpm	4101.42	4036.0	4014.9	4050.79

Notes:
This testing for methanol at the incinerator stack was conducted due to the 40 CFR 63 requirement to retest certain MACT I sources.
The port tested was on west side of stack, approximately 20 feet above the 10th floor of #2 Power Boiler.
Pine and hardwood digesters were blown during the testing.
Several periods of digester double blows occurred during the testing.

Appendix F

Data Log

DAQ #	1.00	2.00
DasyLab #	0.00	1.00
Time	O2	CO2
2/13/2025 7:30	0.03	0.00
2/13/2025 7:31	0.00	0.00
2/13/2025 7:32	0.00	0.00
2/13/2025 7:33	0.00	0.00
2/13/2025 7:34	0.00	0.00
2/13/2025 7:35	7.79	7.03
2/13/2025 7:36	19.92	19.84
2/13/2025 7:37	16.14	16.33
2/13/2025 7:38	10.10	10.04
2/13/2025 7:39	6.34	6.47
2/13/2025 7:40	0.00	0.02
2/13/2025 7:41	0.00	0.01
2/13/2025 7:42	0.00	0.01
2/13/2025 7:43	0.00	0.00
2/13/2025 7:44	0.00	0.00
2/13/2025 7:45	0.00	0.01
2/13/2025 7:46	0.00	0.02
2/13/2025 7:47	2.36	0.04
2/13/2025 7:48	20.59	0.06
2/13/2025 7:49	20.77	0.06
2/13/2025 7:50	6.39	0.06
2/13/2025 7:51	0.36	0.01
2/13/2025 7:52	0.26	0.00
2/13/2025 7:53	5.48	4.91
2/13/2025 7:54	10.10	9.76
2/13/2025 7:55	10.10	9.79
2/13/2025 7:56	10.10	9.81
2/13/2025 7:57	12.21	7.97
2/13/2025 7:58	20.78	0.17
2/13/2025 7:59	20.85	0.08
2/13/2025 8:00	20.86	0.07
2/13/2025 8:01	20.87	0.06
2/13/2025 8:02	20.87	0.06
2/13/2025 8:03	20.87	0.05
2/13/2025 8:04	20.88	0.05
2/13/2025 8:05	20.88	0.05
2/13/2025 8:06	20.88	0.05
2/13/2025 8:07	20.09	0.44
2/13/2025 8:08	12.18	4.21
2/13/2025 8:09	12.22	4.17
2/13/2025 8:10	11.85	4.24
2/13/2025 8:11	11.14	4.55
2/13/2025 8:12	12.16	4.06
2/13/2025 8:13	12.03	3.97
2/13/2025 8:14	12.56	3.94
2/13/2025 8:15	12.66	3.69
2/13/2025 8:16	12.26	3.79
2/13/2025 8:17	11.42	4.21

Data Log

Time	O2	CO2
2/13/2025 8:18	10.55	4.51
2/13/2025 8:19	10.93	4.39
2/13/2025 8:20	12.03	3.71
2/13/2025 8:21	11.74	3.76
2/13/2025 8:22	12.08	3.69
2/13/2025 8:23	12.74	3.29
2/13/2025 8:24	12.54	3.32
2/13/2025 8:25	12.26	3.46
2/13/2025 8:26	11.69	3.75
2/13/2025 8:27	11.75	3.80
2/13/2025 8:28	10.96	4.10
2/13/2025 8:29	11.05	4.13
2/13/2025 8:30	11.35	4.42
2/13/2025 8:31	11.26	3.12
2/13/2025 8:32	10.39	3.27
2/13/2025 8:33	9.55	3.76
2/13/2025 8:34	10.03	3.58
2/13/2025 8:35	10.35	3.35
2/13/2025 8:36	10.20	3.38
2/13/2025 8:37	9.75	3.69
2/13/2025 8:38	9.98	3.69
2/13/2025 8:39	9.60	3.63
2/13/2025 8:40	9.61	3.74
2/13/2025 8:41	9.76	3.66
2/13/2025 8:42	10.02	3.56
2/13/2025 8:43	10.22	3.43
2/13/2025 8:44	10.06	3.31
2/13/2025 8:45	10.29	3.33
2/13/2025 8:46	10.14	3.24
2/13/2025 8:47	9.99	3.31
2/13/2025 8:48	9.83	3.38
2/13/2025 8:49	10.33	3.61
2/13/2025 8:50	11.03	3.86
2/13/2025 8:51	11.51	3.86
2/13/2025 8:52	11.72	3.74
2/13/2025 8:53	11.51	3.87
2/13/2025 8:54	11.71	3.81
2/13/2025 8:55	11.61	3.85
2/13/2025 8:56	11.79	3.89
2/13/2025 8:57	11.57	3.90
2/13/2025 8:58	11.66	3.99
2/13/2025 8:59	12.02	4.04
2/13/2025 9:00	12.52	3.89
2/13/2025 9:01	12.95	3.61
2/13/2025 9:02	12.98	3.57
2/13/2025 9:03	13.49	3.13
2/13/2025 9:04	13.06	3.16
2/13/2025 9:05	12.85	3.41
2/13/2025 9:06	12.94	3.42
2/13/2025 9:07	13.33	3.29
2/13/2025 9:08	13.16	3.17

Data Log

Time	O2	CO2
2/13/2025 9:09	13.22	3.16
2/13/2025 9:10	13.46	2.95
2/13/2025 9:11	13.66	2.75
2/13/2025 9:12	13.34	2.77
2/13/2025 9:13	13.13	2.98
2/13/2025 9:14	13.70	2.72
2/13/2025 9:15	13.11	2.92
2/13/2025 9:16	13.41	3.01
2/13/2025 9:17	13.39	2.88
2/13/2025 9:18	13.33	2.91
2/13/2025 9:19	12.86	3.11
2/13/2025 9:20	13.58	2.83
2/13/2025 9:21	13.71	2.67
2/13/2025 9:22	12.94	3.14
2/13/2025 9:23	13.04	3.23
2/13/2025 9:24	13.54	2.92
2/13/2025 9:25	13.17	2.91
2/13/2025 9:26	13.11	3.07
2/13/2025 9:27	13.40	2.93
2/13/2025 9:28	13.23	2.87
2/13/2025 9:29	13.28	2.97
2/13/2025 9:30	12.74	3.15
2/13/2025 9:31	13.00	3.24
2/13/2025 9:32	13.55	2.90
2/13/2025 9:33	13.89	2.64
2/13/2025 9:34	13.33	2.94
2/13/2025 9:35	13.43	3.07
2/13/2025 9:36	13.43	3.05
2/13/2025 9:37	13.65	3.07
2/13/2025 9:38	13.28	3.13
2/13/2025 9:39	12.98	3.54
2/13/2025 9:40	13.29	3.31
2/13/2025 9:41	13.01	3.64
2/13/2025 9:42	13.10	3.53
2/13/2025 9:43	12.76	3.54
2/13/2025 9:44	13.11	3.51
2/13/2025 9:45	12.67	3.43
2/13/2025 9:46	12.19	3.68
2/13/2025 9:47	12.61	3.60
2/13/2025 9:48	13.24	3.12
2/13/2025 9:49	13.73	2.71
2/13/2025 9:50	13.53	2.80
2/13/2025 9:51	12.98	3.19
2/13/2025 9:52	12.80	3.23
2/13/2025 9:53	13.65	2.74
2/13/2025 9:54	13.86	2.61
2/13/2025 9:55	13.79	2.60
2/13/2025 9:56	13.81	2.67
2/13/2025 9:57	13.77	2.73
2/13/2025 9:58	13.85	2.86
2/13/2025 9:59	13.48	3.05

Data Log

Time	O2	CO2
2/13/2025 10:00	12.71	3.50
2/13/2025 10:01	13.43	3.36
2/13/2025 10:02	13.28	3.26
2/13/2025 10:03	12.38	3.78
2/13/2025 10:04	12.85	3.65
2/13/2025 10:05	13.83	2.98
2/13/2025 10:06	13.98	2.74
2/13/2025 10:07	13.30	2.97
2/13/2025 10:08	12.74	3.27
2/13/2025 10:09	12.11	3.76
2/13/2025 10:10	12.28	3.74
2/13/2025 10:11	13.04	3.36
2/13/2025 10:12	13.47	3.04
2/13/2025 10:13	13.10	3.09
2/13/2025 10:14	13.29	3.22
2/13/2025 10:15	4.55	1.05
2/13/2025 10:16	0.21	0.04
2/13/2025 10:17	0.31	0.14
2/13/2025 10:18	9.35	8.93
2/13/2025 10:19	10.09	9.84
2/13/2025 10:20	10.10	9.84
2/13/2025 10:21	7.54	2.79
2/13/2025 10:22	0.02	0.02
2/13/2025 10:23	0.00	0.02
2/13/2025 10:24	0.00	0.02
2/13/2025 10:25	0.00	0.02
2/13/2025 10:26	0.00	0.02
2/13/2025 10:27	0.00	0.02
2/13/2025 10:28	0.00	0.02
2/13/2025 10:29	0.00	0.02
2/13/2025 10:30	0.05	0.28
2/13/2025 10:31	0.01	0.16
2/13/2025 10:32	0.00	0.03
2/13/2025 10:33	0.00	0.02
2/13/2025 10:34	0.00	0.02
2/13/2025 10:35	0.00	0.02
2/13/2025 10:36	3.68	0.84
2/13/2025 10:37	13.44	3.26
2/13/2025 10:38	13.62	2.92
2/13/2025 10:39	12.79	3.36
2/13/2025 10:40	13.76	2.89
2/13/2025 10:41	13.23	2.98
2/13/2025 10:42	12.69	3.47
2/13/2025 10:43	13.78	2.68
2/13/2025 10:44	13.66	2.62
2/13/2025 10:45	13.75	2.57
2/13/2025 10:46	13.10	3.07
2/13/2025 10:47	13.52	2.74
2/13/2025 10:48	13.38	2.78
2/13/2025 10:49	13.02	3.03
2/13/2025 10:50	12.91	3.28

Data Log

Time	O2	CO2
2/13/2025 10:51	13.26	3.25
2/13/2025 10:52	13.68	3.02
2/13/2025 10:53	13.83	2.85
2/13/2025 10:54	13.60	2.88
2/13/2025 10:55	13.23	3.33
2/13/2025 10:56	13.45	3.19
2/13/2025 10:57	13.25	3.16
2/13/2025 10:58	13.22	3.28
2/13/2025 10:59	13.88	3.08
2/13/2025 11:00	13.21	3.20
2/13/2025 11:01	13.20	3.44
2/13/2025 11:02	13.43	3.29
2/13/2025 11:03	12.83	3.41
2/13/2025 11:04	12.73	3.61
2/13/2025 11:05	12.85	3.60
2/13/2025 11:06	13.26	3.37
2/13/2025 11:07	13.69	3.11
2/13/2025 11:08	13.44	3.10
2/13/2025 11:09	13.39	3.21
2/13/2025 11:10	13.04	3.26
2/13/2025 11:11	12.95	3.49
2/13/2025 11:12	12.91	3.34
2/13/2025 11:13	13.32	3.25
2/13/2025 11:14	12.83	3.26
2/13/2025 11:15	13.00	3.40
2/13/2025 11:16	13.42	3.21
2/13/2025 11:17	13.64	3.06
2/13/2025 11:18	13.64	2.93
2/13/2025 11:19	13.56	2.96
2/13/2025 11:20	13.54	3.01
2/13/2025 11:21	13.22	3.11
2/13/2025 11:22	13.45	3.23
2/13/2025 11:23	13.22	3.17
2/13/2025 11:24	13.30	3.28
2/13/2025 11:25	12.88	3.27
2/13/2025 11:26	13.28	3.31
2/13/2025 11:27	13.22	3.15
2/13/2025 11:28	14.05	2.80
2/13/2025 11:29	13.66	2.79
2/13/2025 11:30	13.79	3.02
2/13/2025 11:31	13.38	3.04
2/13/2025 11:32	13.49	3.30
2/13/2025 11:33	13.57	3.06
2/13/2025 11:34	13.08	3.44
2/13/2025 11:35	13.44	3.27
2/13/2025 11:36	13.02	3.37
2/13/2025 11:37	13.56	3.30
2/13/2025 11:38	13.06	3.29
2/13/2025 11:39	12.69	3.60
2/13/2025 11:40	13.41	3.23
2/13/2025 11:41	13.54	3.11

Data Log

Time	O2	CO2
2/13/2025 11:42	13.67	3.01
2/13/2025 11:43	13.60	2.99
2/13/2025 11:44	3.47	1.05
2/13/2025 11:45	0.21	0.02
2/13/2025 11:46	1.56	1.13
2/13/2025 11:47	10.12	9.83
2/13/2025 11:48	10.13	9.84
2/13/2025 11:49	12.20	5.78
2/13/2025 11:50	13.28	2.93
2/13/2025 11:51	13.24	2.92
2/13/2025 11:52	13.22	2.83
2/13/2025 11:53	13.14	2.85
2/13/2025 11:54	13.31	2.91
2/13/2025 11:55	13.04	2.98
2/13/2025 11:56	13.15	3.19
2/13/2025 11:57	13.24	2.94
2/13/2025 11:58	12.96	3.17
2/13/2025 11:59	13.51	2.85
2/13/2025 12:00	13.07	3.00
2/13/2025 12:01	13.43	3.13
2/13/2025 12:02	13.15	3.06
2/13/2025 12:03	13.55	3.05
2/13/2025 12:04	13.64	2.82
2/13/2025 12:05	13.53	3.01
2/13/2025 12:06	12.69	3.36
2/13/2025 12:07	12.85	3.57
2/13/2025 12:08	13.00	3.45
2/13/2025 12:09	12.44	3.56
2/13/2025 12:10	12.67	3.72
2/13/2025 12:11	12.83	3.56
2/13/2025 12:12	13.24	3.26
2/13/2025 12:13	13.12	3.08
2/13/2025 12:14	13.17	3.10
2/13/2025 12:15	13.37	2.92
2/13/2025 12:16	13.30	2.90
2/13/2025 12:17	13.01	3.07
2/13/2025 12:18	12.88	3.21
2/13/2025 12:19	13.43	3.04
2/13/2025 12:20	13.60	2.73
2/13/2025 12:21	13.35	3.03
2/13/2025 12:22	13.23	3.04
2/13/2025 12:23	13.02	3.33
2/13/2025 12:24	13.43	3.03
2/13/2025 12:25	12.54	3.45
2/13/2025 12:26	12.79	3.63
2/13/2025 12:27	12.54	3.44
2/13/2025 12:28	12.82	3.53
2/13/2025 12:29	13.21	3.10
2/13/2025 12:30	12.76	3.50
2/13/2025 12:31	13.11	3.21
2/13/2025 12:32	13.04	3.18

Data Log

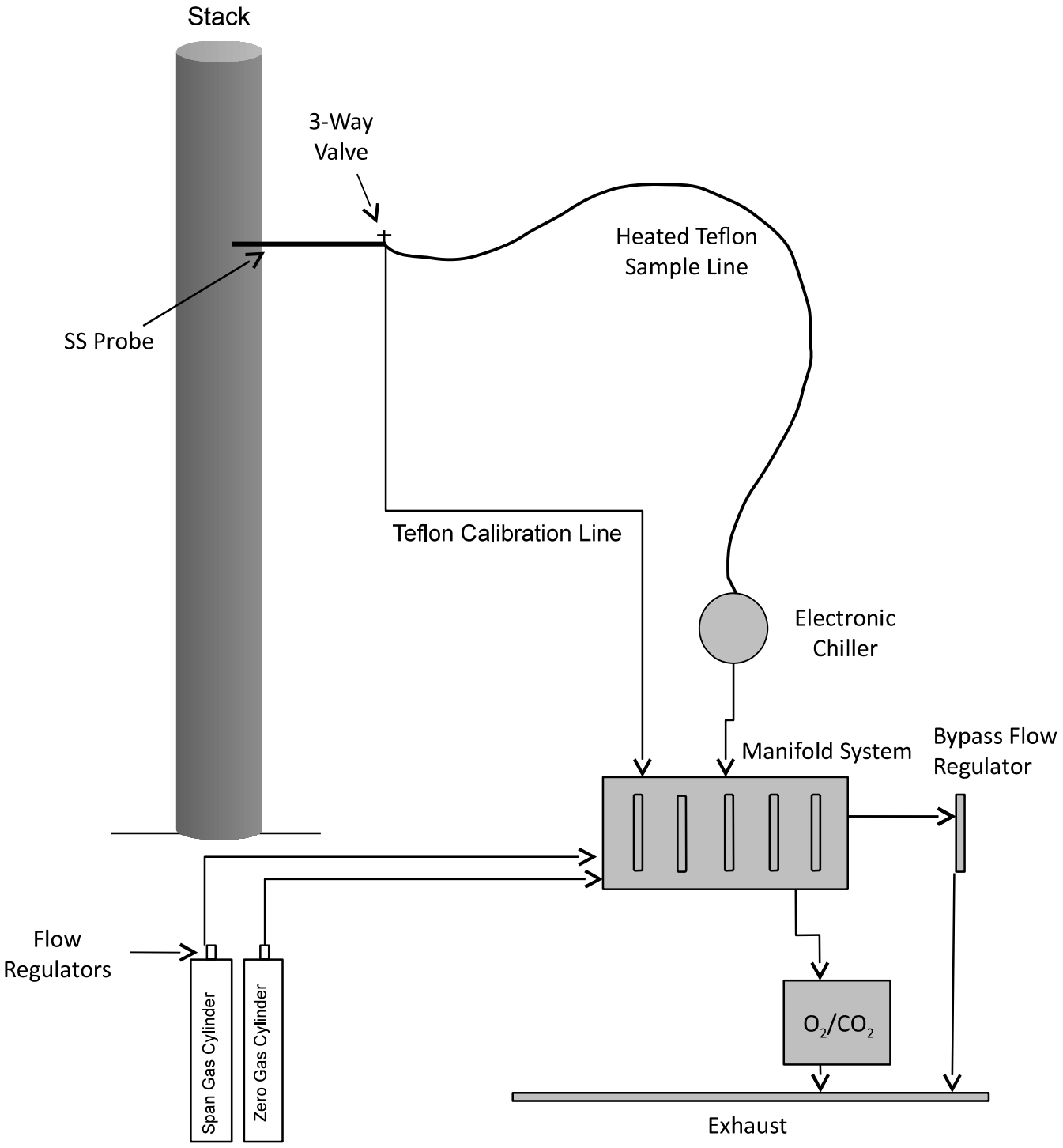
Time	O2	CO2
2/13/2025 12:33	13.14	3.10
2/13/2025 12:34	12.97	3.04
2/13/2025 12:35	13.14	3.05
2/13/2025 12:36	13.33	2.95
2/13/2025 12:37	13.49	2.83
2/13/2025 12:38	13.59	2.79
2/13/2025 12:39	13.45	2.80
2/13/2025 12:40	13.72	2.88
2/13/2025 12:41	13.64	2.86
2/13/2025 12:42	13.58	2.98
2/13/2025 12:43	13.07	3.26
2/13/2025 12:44	13.05	3.59
2/13/2025 12:45	12.84	3.48
2/13/2025 12:46	12.54	3.60
2/13/2025 12:47	13.55	3.18
2/13/2025 12:48	12.87	3.29
2/13/2025 12:49	13.38	3.18
2/13/2025 12:50	13.09	3.09
2/13/2025 12:51	13.50	2.99
2/13/2025 12:52	13.36	2.87
2/13/2025 12:53	12.84	3.09
2/13/2025 12:54	13.22	3.10
2/13/2025 12:55	13.38	2.89
2/13/2025 12:56	13.18	2.95
2/13/2025 12:57	13.44	3.04
2/13/2025 12:58	13.53	3.03
2/13/2025 12:59	13.52	3.05
2/13/2025 13:00	4.47	1.66
2/13/2025 13:01	0.23	0.03
2/13/2025 13:02	1.76	1.36
2/13/2025 13:03	10.12	9.80
2/13/2025 13:04	10.12	9.81
2/13/2025 13:05	11.99	5.97
2/13/2025 13:06	10.57	4.46
2/13/2025 13:07	10.41	4.66
2/13/2025 13:08	10.80	4.42
2/13/2025 13:09	11.56	4.06
2/13/2025 13:10	11.63	3.84
2/13/2025 13:11	9.24	3.35
2/13/2025 13:12	0.05	0.02
2/13/2025 13:13	0.02	0.00
2/13/2025 13:14	0.02	0.00
2/13/2025 13:15	0.01	0.00
2/13/2025 13:16	0.01	0.00
2/13/2025 13:17	0.00	0.00
2/13/2025 13:18	0.00	0.00
2/13/2025 13:19	0.00	0.00
2/13/2025 13:20	0.00	0.00
2/13/2025 13:21	0.00	0.00
2/13/2025 13:22	0.00	0.00
2/13/2025 13:23	0.02	0.28

Data Log

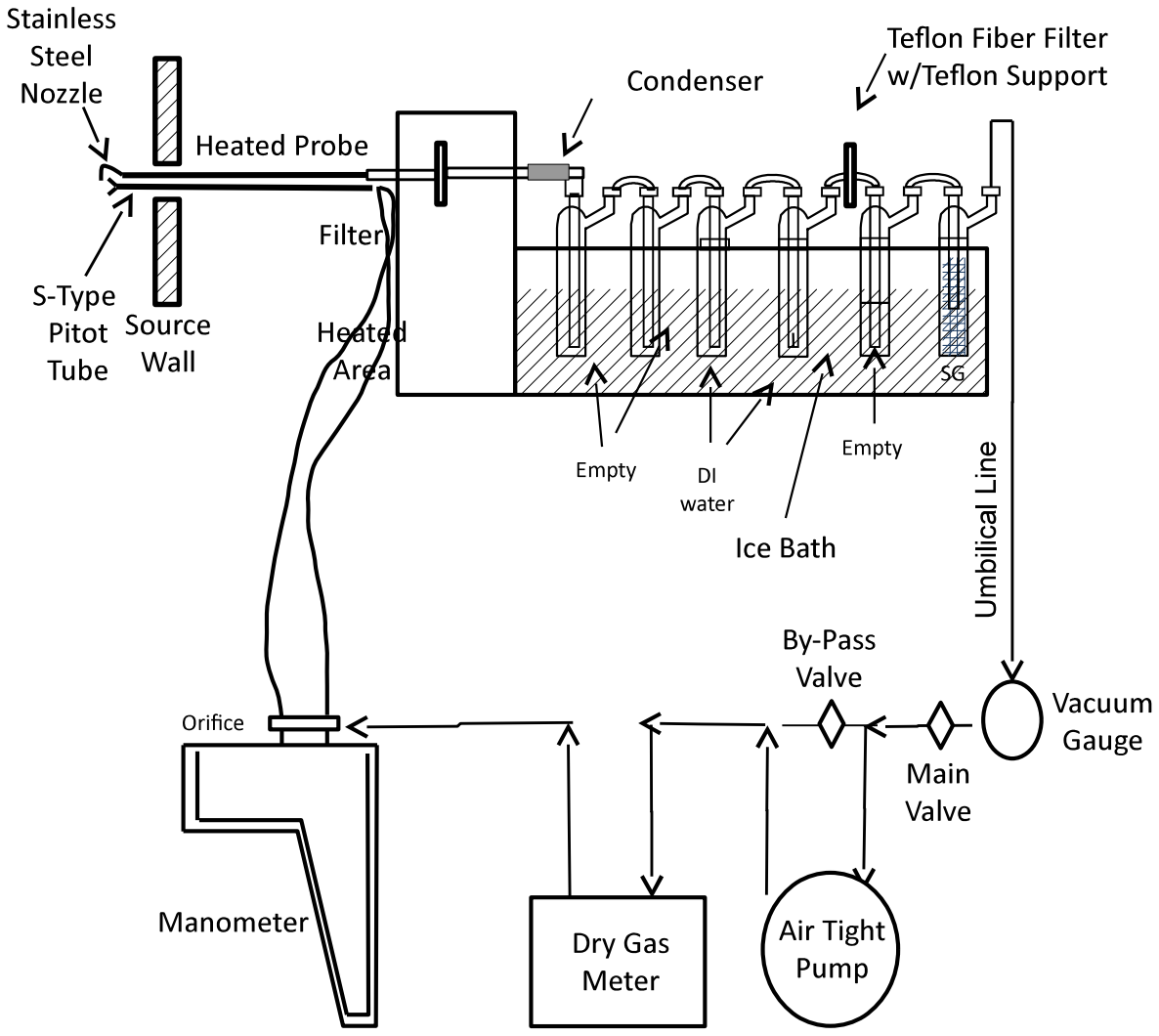
Time	O2	CO2
2/13/2025 13:24	0.02	0.11
2/13/2025 13:25	0.00	0.01
2/13/2025 13:26	0.00	0.00
2/13/2025 13:27	0.00	0.00
2/13/2025 13:28	0.00	0.00
2/13/2025 13:29	0.00	0.00
2/13/2025 13:30	0.00	0.00
2/13/2025 13:31	0.00	0.00
2/13/2025 13:32	0.00	0.00
2/13/2025 13:33	0.00	0.00
2/13/2025 13:34	0.00	0.00
2/13/2025 13:35	0.00	0.00
2/13/2025 13:36	0.00	0.00
2/13/2025 13:37	0.00	0.00
2/13/2025 13:38	0.00	0.00
2/13/2025 13:39	0.00	0.00
2/13/2025 13:40	0.00	0.00
2/13/2025 13:41	0.00	0.00
2/13/2025 13:42	0.00	0.00
2/13/2025 13:43	0.00	0.00
2/13/2025 13:44	0.00	0.00
2/13/2025 13:45	0.00	0.00
2/13/2025 13:46	0.00	0.00
2/13/2025 13:47	0.00	0.00

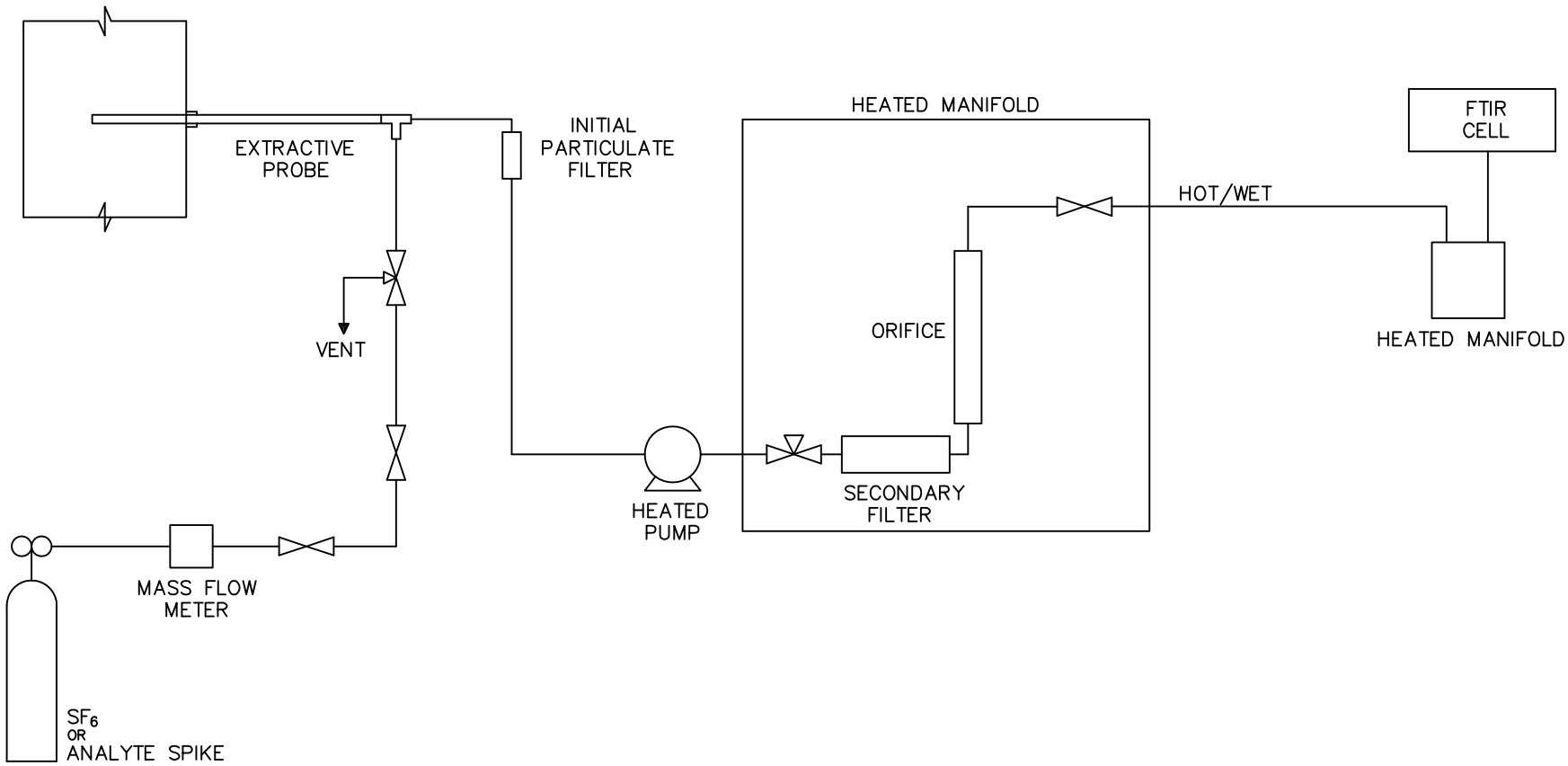
Appendix G

Reference Method Monitors Sampling System
(EPA Method 3A)



Schematic Diagram of the EPA Combined Methods 5/202 Sampling Train for Particulate Matter





EPA METHOD 320 FTIR SAMPLING/SPIKING SYSTEM

DRAWN BY:	KWB	JOB NO.:	2007-0308	REVISION:	1	SCALE:	NTS

E. ROBERTS Alley & Associates INCORPORATED
Environmental Engineering & Consulting
1931 Central Parkway SW Suite S
Decatur, AL 35601
Phone: (615) 351-0121
Fax: (615) 351-0151
www.eralley.com

Appendix H

CAREER SUMMARY

Mr. Wilson is a Project Scientist who has worked in the environmental field approximately four years. He has been involved with field testing activities on a broad scale and within several different industry types. Over the past four years, he has developed skills in several areas of emission testing including mobile laboratory operation and field team supervision.

Education
BS, Emergency Management
Arkansas Tech University
Russellville, AR

Joined Firm
2013

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

DeSoto Gathering Company – Arkansas

Conducted and field managed multiple NSPS, Subpart JJJJ and state permit compliance tests on natural gas-fired compressor engines at multiple stations throughout Arkansas. Responsibilities included project coordination and mobile laboratory and meter box console operation. Testing parameters included nitrogen oxides, carbon monoxide and non-methane volatile organic compounds. EPA Methods 3A, 7E, 10, 19 and 25A.

Saint Gobain – Bryant, Arkansas

Conducted and field managed compliance testing to determine the emission rates of multiple pollutants to demonstrate compliance with federal and state regulations. Testing involved wet chemistry (filterable and condensable particulate matter) and other isokinetic applications. Testing also involved instrumental analysis of sulfur dioxide, carbon monoxide, nitrogen oxides and volatile organic compounds. Mr. Wilson was responsible for operating the dry gas meter consoles and the mobile laboratory equipment as well as coordinating activities with the facility on site contact.

El Dorado Chemical – El Dorado, Arkansas

Conducted compliance testing on multiple sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods, instrumental, and FTIR analysis including U.S. EPA Reference Test Methods 5, 201A/202 (particulate matter & condensable particulate matter), 3A (oxygen and carbon dioxide), 6C (sulfur dioxide) 25A (volatile organic compounds), 7E (nitrogen oxides), 10 (carbon monoxide), and 320 (FTIR). Mr. Wilson was a member of the AST field team for this testing project.

Training

- TVTC Training
- CPR and First Aid
- Safeland
- MSHA Part 46 & Part 48

Appendix I

Brooke T. Paup, *Chairwoman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 13, 2025

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW,
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2025
Expiration Date: 02/28/2026
Certificate ID: TX-C25-00047

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation (FoA) specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Note: For the attached FoA table, matrices may include DW (drinking water), NPW (non-potable water), S (solid and chemical materials), A (air), and/ or BT (biological tissue).

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2025

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix J

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Sources to be Tested:
No. 1 Lime Kiln (LK01),
No. 2 Lime Kiln (LK02),
No. 1 Recovery Furnace (RB01A/RB01B),
No. 2 Recovery Furnace (RB02A/RB02B),
No. 1 Smelt Tank Scrubber (SM01),
No. 2 Smelt Tank Scrubber (SM02),
NCG Oxidation Unit Scrubber (NCG01)

Proposed Test Dates:
December 3-5, 2024

Project No. AST-2024-4204

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
Permit Nos.	Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2
Regulatory Citations	40 CFR 63, Subpart MM and 40 CFR 63, Subpart S

Source Information

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A/RB01B	PM, CPM
No. 2 Recovery Furnace	RB02A/RB02B	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 799-1197

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146
(subject to change)

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ State Lab ID T104704540
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Queen City, Texas Texarkana Mill facility. Portions of the facility are subject to provisions of 40 CFR 63, Subpart MM – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills and 40 CFR 63, Subpart S – NESHAP from the Pulp and Paper Industry, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Permit Nos. 2975 and PSDTX778M2. Testing will be conducted to determine the emission rates of particulate matter (PM), condensable particulate matter (CPM), and methanol (CH_3OH) from the sources identified below:

Source Name	*Emission Point No.*	*Target Parameters*
No. 1 Lime Kiln	LK01	PM, CPM
No. 2 Lime Kiln	LK02	PM, CPM
No. 1 Recovery Furnace	RB01A (North Stack)/RB01B (South Stack)	PM, CPM
No. 2 Recovery Furnace	RB02A (West Stack)/RB02B (East Stack)	PM, CPM
No. 1 Smelt Tank Scrubber	SM01	PM, CPM
No. 2 Smelt Tank Scrubber	SM02	PM, CPM
NCG Oxidation Unit Scrubber	NCG01	CH_3OH

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NESHAP.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NESHAP, the facility will conduct a performance test program to determine the compliance status of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01.

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3/3A, 4, 5/202, and 320. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the facility TCEQ Permits, 40 CFR 63, Subpart MM, and 40 CFR 63, Subpart S.
- Emissions testing will be conducted on the exhaust of LK01, LK02, RB01A/RB01B, RB02A/RB02B, SM01, SM02, and NCG01. The No. 1 and No. 2 Recovery Furnaces each exhaust to two (2) stacks: The No. 1 Recovery Furnace to the North (RB01A) and South (RB01B) Stacks, and the No. 2 Recovery Furnace to the West (RB02A) and East (RB02B) Stacks.
- Performance testing will be conducted at the maximum normal operation load for each source.
- Each of the three (3) test runs per source will be approximately 1 hour in duration.
- A minimum of 0.90 dscm (31.8 dscf) will be collected during each PM test run.
- Per Subpart MM, DI water will be used as the sample recovery solvent during PM testing.
- PM sample analysis will be conducted at Alliance's Decatur, AL laboratory.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

LK01 and LK02:

- Lime Production Rate, tons/day
- Scrubber Recirculation Flow, gph
- Scrubber Delta P, WC

RB01A/RB01B and RB02A/RB02B:

- Steam Load, kPPH
- Fuel Data

SM01 and SM02:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

NCG01:

- Chamber Temperature, °F
- Scrubber pH
- Scrubber Recirculation Flow, gph

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – December 2, 2024					
Equipment Setup & Pretest QA/QC Checks					6 hr
DAY 2 – December 3, 2024					
RB01A/RB01B & SM01	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 3 – December 4, 2024					
RB02A/RB02B & SM02	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
	BWS	4			
	PM/CPM	5/202			
DAY 4 – December 5, 2024					
All Sources	VFR	1-2	3	1 hr	12 hr
	O_2/CO_2	3/3A			
LK01 & LK02	BWS	4			
	PM/CPM	5/202			
NCG01	BWS/CH_3OH	320			
DAY 5 – December 6, 2024					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
LK01	PM, CPM – 27.60 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
LK02	PM, CPM – 26.30 lb/hr	Permit
	PM – 0.064 gr/dscf @ 10% O_2	63, Subpart MM
RB01A/RB01B	PM, CPM – 26.58 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
RB02A/RB02B	PM, CPM – 42.59 lb/hr	Permit
	PM – 0.044 gr/dscf @ 8% O_2	63, Subpart MM
SM01	PM, CPM – 10.90 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
SM02	PM, CPM – 19.85 lb/hr	Permit
	PM – 0.20 lb/ton	63, Subpart MM
NCG01	CH_3OH – 20 ppmvd @ 10% O_2	63, Subpart S

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Laboratory Data* – Copies of laboratory report(s) and chain of custody(s).
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.
- *Photos* – Include stacks being tested and must include all ports and the nearest upstream and downstream disturbances, as well as all equipment being used to conduct the testing (e.g., glassware, meter box, gas cylinders, probe assembly, etc.).

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Particulate Matter	5 & 202	Isokinetic Sampling
Methanol, Moisture Content	320	FTIR – Continuous Sampling

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with an EPA Method 1 verification measurement provided by the Field Team Leader. These measurements will be included in the test report.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) and/or Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample will be collected during each test run. The bags will be collected from the positive pressure side of the sample pump and conditioner. They will be collected through a manifold with a restriction (either rotameter or critical orifice) to ensure even filling throughout the course of the run. Samples will be concurrent with the test runs. The bag samples will be analyzed on site with a gas analyzer. The remaining stack gas constituent will be assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.6.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing will be conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system will consist of a glass nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train will consist of a coiled condenser and four (4) chilled impingers. The first and second impingers will be initially empty, the third will contain 100 mL of de-ionized water and the last impinger will contain 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter will be placed between the second and third impingers. The probe liner heating system will be maintained at a temperature of 248 ±25°F, and the impinger temperature will be maintained at 68°F or less throughout testing. The temperature of the Teflon filter will be maintained greater than 65°F but less than or equal to 85°F.

Following the completion of each test run, the sampling train will be leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. If condensate is collected in the first dry impinger, then the front-half of the sample train (the nozzle, probe, and heated pre-weighed filter) will be removed in order to purge the back-half of the sample train (coil condenser, first and second impingers and CPM filter). A glass bubbler will be inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water will be added to the first impinger to raise the water level above the bubbler, then the coil condenser will be replaced. Zero nitrogen will be connected to the condenser, and a 60-minute purge at 14 liters per minute will be conducted. After the completion of the nitrogen purge the impinger contents will be measured for moisture gain. The nitrogen purge will be omitted if minimal condensate is collected in the dry impingers.

The pre-weighed quartz filter will be carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder will be rinsed three (3) times with DI water to remove any adhering particulate matter and these rinses will be recovered in container 2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 will be recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, the coil condenser, impingers 1 and 2 and all connecting glassware will be rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses will be added to container CPM Cont. #1 while the solvent rinses will be recovered in container CPM Cont. #2. The Teflon filter will be removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder will be rinsed with DIUF water and then with acetone, followed by hexane. The water rinse will be added to container CPM Cont. #1 while the solvent rinses will be added to container CPM Cont. #2. All containers will be sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.5 U.S. EPA Reference Test Method 320 – Methanol and Moisture Content

The concentrations of methanol (CH_3OH) and moisture will be determined in accordance with U.S. EPA Reference Test Method 320. Each source gas stream will be extracted at a constant rate through a heated probe, heated filter and heated sample line and analyzed with a MKS MultiGas 2030 or CAI 600 FTIR operated by a portable computer. The computer has FTIR spectra of calibration gases stored on the hard drive. These single component calibration spectra are used to analyze the measured sample spectra. The gas components to be measured will be selected from the spectra library and incorporated into the analytical method. The signal amplitude, linearity, and signal to noise ratio will be measured and recorded to document analyzer performance. A leak check will be performed on the sample cell. The instrument path length will be verified using ethylene as the Calibration Transfer Standard. Dynamic spiking will be performed using a certified standard of the target compound or appropriate surrogate in nitrogen with sulfur hexafluoride blended as a tracer to calculate the dilution factor. All test spectra, interferograms, and analytical method information are recorded and stored with the calculated analytical results. The quality control measures are described in Section 3.7.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Low Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.7 Quality Assurance/Quality Control – U.S. EPA Reference Method 320

EPA Protocol 1 Calibration Gases – Cylinder calibration gases used will meet EPA Protocol 1 (+/- 2%) standards or will be certified standards.

After providing ample time for the FTIR to reach the desired temperature and to stabilize, zero gas (nitrogen) will be introduced directly to the instrument sample port. While flowing nitrogen the signal amplitude will be recorded, a background spectra will be taken, a linearity check will be performed and recorded, the peak to peak noise and the root mean square in the spectral region of interest will be measured and a screenshot will be recorded.

Following the zero gas checks, room air will be pulled through the sample chamber and the line width and resolution will be verified to be at 1879 cm-1, the peak position will be entered and the FWHH will be recorded (screenshot). Following these checks, another background spectra will be recorded and the calibration transfer standard (CTS) will be introduced directly to the instrument sample port. The CTS instrument recovery will be recorded and the instrument mechanical response time will be measured.

Next, stack gas will be introduced to the FTIR through the sampling system and several scans will be taken until a stable reading will be achieved. The native concentration of our surrogate or target spiking analyte will be recorded. Spike gas will be introduced to the sampling system at a constant flow rate ≤ 10% of the total sample flow rate and a corresponding dilution ratio will be calculated along with a system response time. Matrix spike recovery spectra will be recorded and will be within the ± 30% of the calculated value of the spike concentration that the method requires.

The matrix spike recovery will be conducted once at the beginning of the testing and the CTS recovery procedures will be repeated following each test run. The corresponding values will be recorded.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Nozzles. Nozzles are measured three (3) times prior to initiating sampling with a caliper. The maximum difference between any two (2) dimensions is 0.004 in.
- Digital Calipers. Calipers are calibrated annually by Alliance by using gage blocks that are calibrated annually by an outside laboratory.

- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.
- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. A mass flow controller calibration is conducted on each Environics system annually following the procedures in the Manufacturer's Operation manual. A methane/ethane penetration factor check is conducted on the total hydrocarbon analyzers equipped with non-methane cutters every six (6) months following the procedures in 40 CFR 60, Subpart JJJJ. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- An isokinetic sampling rate of 90-110% will be maintained, as applicable.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

4.3 Analytical Laboratory

Analytical laboratory selection for sample analyses is based on the capabilities, certifications and accreditations that the laboratory possesses. An approved analytical laboratory subcontractor list is maintained with a copy of the certificate and analyte list as evidence of compliance. Alliance assumes responsibility to the client for the subcontractor's work. Alliance maintains a verifiable copy of the results with chain of custody documentation.

Jon Niermann, *Chairman*
Bobby Janecka, *Commissioner*
Catarina R. Gonzales, *Commissioner*
Kelly Keel, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 14, 2024

Ms. Heather Morgan
Alliance Technical Group - Decatur, Alabama
214 Central Circle SW
Decatur, AL 35603-1667

Subject: Texas NELAP accreditation renewal

Dear Ms. Morgan:

I am writing to congratulate you and the staff of *Alliance Technical Group - Decatur, Alabama*. Based on your application and primary NELAP accreditation from the state of Louisiana, pursuant to authorization from the Executive Director of the Texas Commission on Environmental Quality, the Program Manager of the Quality Assurance Section has issued your laboratory secondary NELAP accreditation according to the attached Fields of Accreditation.

I am enclosing the accreditation certificate and Fields of Accreditation listing. Please review the enclosures for accuracy and completeness. Your laboratory's accreditation is valid until the expiration date on the certificate and scope, contingent on continued compliance with the requirements of the state of Texas as well as those of your primary accreditation body.

Please contact me at frank.jamison@tceq.texas.gov if I can provide any additional information or assistance.

Sincerely,

Frank Jamison
Data and Records Specialist

Enclosures

Texas Commission on Environmental Quality

Certificate of Accreditation

Accreditation is hereby granted to

Alliance Technical Group - Decatur, Alabama

214 Central Circle SW
Decatur, AL 35603-1667

State Lab ID: T104704540
Effective Date: 03/01/2024
Expiration Date: 02/28/2025
Document ID: TX-C24-00053

Conditions of Accreditation

This laboratory has been found to conform with TCEQ rules and applicable standards for laboratory accreditation. The scope of accreditation is limited to the Fields of Accreditation specifically listed on the subsequent page(s) of this certificate. Accreditation is for all version of a method approved per 40 CFR 136, 40 CFR 141, and/ or 40 CFR 143. Continued accreditation requires ongoing compliance with all applicable standards and requirements.

Issued By: Kelly Keel, Executive Director Texas Commission on Environmental Quality
Date Issued: 03/01/2024

Laboratory Fields of Accreditation

Matrix	Method	Method Code	Analyte	Analyte Code	AB
A	EPA Method 17	10402707	Particulate Matter	3915	LA-DEQ
A	EPA Method 202	10403006	Condensible Particulate Matter	4467	LA-DEQ
A	EPA Method 5	10404305	Particulate Matter	3915	LA-DEQ
A	EPA Method 5A	10404407	Particulate Matter	3915	LA-DEQ
A	EPA Method 5B	10404509	Particulate Matter	3915	LA-DEQ
A	EPA Method 5D	10404601	Particulate Matter	3915	LA-DEQ
A	EPA Method 5I	10405104	Particulate Matter	3915	LA-DEQ
A	TCEQ-23	60049743	Particulate Matter	3915	LA-DEQ

Appendix K

Special Conditions

Permit Numbers 2975 and PSDTX778M2

Emission Standards

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates," and those sources are limited to the emission limits and other conditions specified in the attached table including emissions from maintenance, startup, and shutdown (MSS) activities represented on pages B-1 and B-2 of the February 11, 2005, amendment application for Recovery Furnace Nos. 1 and 2.

   In addition, this permit authorizes all emissions from planned startup and shutdown activities associated with facilities or groups of facilities that are authorized by this permit.

Fuel Specifications

2. Fuel for mill combustion sources shall be limited as follows:

   A. Fuel for No. 2 Power Boiler (Emission Point Number [PN PB02]) shall be limited to bark and wood materials (defined as any uncontaminated wood materials including but not limited to sawdust, pallets, size-reduced limbs, and any other wood material from a tree such as nut shells); pipeline-quality, sweet natural gas as defined in the General Rules; Nos. 2, 4, and 6 fuel oil containing less than 3 percent sulfur by weight; primary clarifier underflow fiber cake (sludge from the wastewater treatment plant) as defined in the file by correspondence dated October 21, 1994, or used railroad crossties (26.2 tons per hour [tph] based on a 30-day average). All railroad crossties used as fuel in the No. 2 Power Boiler shall meet the specifications of Title 40 Code of Federal Regulations (40 CFR) Part 241, Subpart B, § 241.4(a). **(11/22)**

   The burning rate for bark is limited to 75 tph. Compliance with this rate shall be determined by a 30-day average. Records shall be maintained on-site for a rolling 24-month period and made available to personnel from the TCEQ upon request.

   B. Fuel for the No. 1 Power Boiler (EPN PB01) shall be limited to natural gas. Nos. 2, 4, and 6 fuel oils containing no more than 3 percent sulfur by weight. If the sulfur content of the fuel oil will exceed 3 weight percent, the permit holder must notify the TCEQ Regional Office and propose a fuel mixing plan that will not cause an exceedance of the maximum allowable emission rates; otherwise, the permit holder must obtain approval from the Executive Director.

   Annual fuel firing rates (MMBtu/yr, HHV) are limited as follows: Natural Gas - 5,725,625; No. 6 Fuel Oil - 681,120; Total Fuel Oils (Nos. 2, 4, and 6 Fuel Oils) - 3,300,910; Total - All Fuels (Natural Gas and Fuel Oils) - 5,725,625.

   While firing only No. 6 fuel oil, the total hours of operation for the No. 1 Power Boiler over any consecutive 12-month period shall not exceed a maximum of 720 hours.

   C. The Nos. 1 and 2 Lime Kilns (EPNs LK01 and LK02) shall burn only pipeline-quality, sweet natural gas as defined in the General Rule and Nos. 2, 4, and 6 fuel oils containing less than 3 percent sulfur by weight.

   D. Auxiliary fuel for the Recovery Furnace Nos. 1 and 2 shall be only pipeline-quality, sweet natural gas as defined in the General Rules.

   E. Auxiliary fuel for the NCG Oxidation Unit shall be sweet natural gas. This fuel shall be used, as necessary, to maintain the required minimum temperature in the NCG Oxidation Unit.

Use of any other fuel shall require prior approval from the Executive Director of the Texas Commission on Environmental Quality (TCEQ).

Federal Applicability

3. These facilities shall comply with all applicable requirements of the U.S. Environmental Protection Agency (EPA) regulations on Standards of Performance for New Stationary Sources in 40 CFR Part 60, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart BB - Kraft Paper Mills (The Smelt Dissolving Tank No. 2, the non-condensable gas (NCG) oxidation unit, the Recovery Furnace Nos. 1 and 2, and all affected facilities);

   C. Subpart D - Commercial Steam Generating Units (Power Boiler No. 2 [EPN PB02]); and

   D. Subparts A and BB, § 60.283 (a)(1)(iii) only - Kraft Pulp Mills (Power Boiler No. 2 [EPN PB02]).

4. These facilities shall comply with all applicable requirements of the EPA regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 63, specifically the following:

   A. Subpart A - General Provisions;

   B. Subpart S – Pulp and Paper Industry;

   C. Subpart MM - Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (Lime Kiln Nos. 1 and 2 (Emission Point Nos. [EPN] LK01 and LK02), Recovery Furnace Nos. 1 and 2 (EPNs RB01 and RB02), and Smelt Dissolving Tank Nos. 1 and 2 (EPNs SM01 and SM02); and

   D. Subpart DDDDD - Industrial, Commercial, and Institutional Boilers (Power Boiler No. 1 [EPN PB01] and Power Boiler No. 2 [EPN PB02], and all affected facilities).

5. These facilities shall comply with all applicable requirements of the EPA Regulations on National Emission Standards for Hazardous Air Pollutants for Source Categories in 40 CFR Part 61, specifically the following:

   A. Subpart A - General Provisions; and

   B. Subpart E – Mercury (Power Boiler No. 2 [EPN PB02]).

Opacity/Visible Emission Limitations

6. Opacity of emissions from Power Boiler No. 1, the Smelt Tank Scrubber Nos. 1 and 2, the Lime Kiln Stack Nos. 1 and 2, the NCG oxidation unit scrubber, and the Recovery Furnace Stack Nos. 1 and 2 shall not exceed 20 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in Title 30 Texas Administrative Code (30 TAC) §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

7. Opacity of emissions from any uncontrolled stationary vent shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS. If this condition is violated, further controls may be required to be installed and/or implemented to limit visible emissions.

8. Opacity of emissions from the A-Line and B-Line Bleach Plant Scrubbers shall not exceed 5 percent averaged over a six-minute period when adjusted for uncombined water vapor, except for those periods described in 30 TAC §§ 101.201 and 101.211. Opacity shall not exceed the limits set forth in 30 TAC Chapter 111, Control of Air Pollution from Visible Emissions and Particulate Matter, during planned MSS.

Operational Limitations, Work Practice, and Plant Design

9. Power Boiler No. 1 (EPN PB01) emission concentrations are limited as follows during production operations:

   A. Nitrogen oxides (NO_x): 0.6 lb/ million British Thermal Unit (MMBtu) (24-hour average).

   B. Carbon monoxide (CO): 400 parts per million dry volume (ppmv), corrected to 3 percent dry oxygen. (24-hour average).

   C. Sulfur dioxide (SO_2): 440 ppmv (3-hour average) for fuel oil firing.

10. In-stack concentration of sulfur dioxide (SO_2) from Recovery Furnace Nos. 1 and 2 shall not exceed 300 parts per million by volume (ppmv) and 100 ppmv during production operations, averaged over a three-hour and a yearly period, respectively, and corrected to a dry 8 percent oxygen (O_2) basis. Compliance with the SO_2 concentrations provided in this condition may be determined by the use of continuous monitoring data.

11. The No. 1 Lime Kiln shall comply with the following limitations during production operations:

   A. The maximum total reduced sulfur (TRS) shall be 20 parts per million by volume (ppmv) corrected to 10 percent oxygen (O_2) (measured as hydrogen sulfide, 12-hour average).

   B. The maximum total carbon monoxide shall be 0.064lb/MMBtu (short term)(24-hr average) and 0.051 lb/MMBtu (annual).

   C. The maximum nitrogen oxides shall be 0.17 lb/MMBtu (fuel oil) (24-hour average) and 0.18 lb/MMBtu (natural gas) (24-hour average).

12. PB01 shall be equipped with multi-cyclones to control emissions of PM, and shall be equipped with at least a 218.9-foot tall stack, as measured from the ground level, to provide adequate dispersion of the boiler exhaust and shall have no raincaps or other similar devices that will prevent adequate dispersion of the boiler exhaust. The permit holder shall install stack testing port in the boiler stack.

13. The EPN PB02 shall be equipped with multi-cyclones and a scrubber with the following control efficiencies: 95 percent removal efficiency for hydrogen chloride, 98.5 percent for total particulate matter (PM) and 90 percent for SO_2.

14. Maximum hourly emission rates (ER) for EPN PB02 shall be based on 24-hour averages (except for SO_2 when firing fuel oil, which shall be based on a three-hour averaging time according to 30 TAC §112.9 and NO_x, which shall also be based on a three-hour averaging time according to 40 CFR Part 60, Subpart D).

    The mill is authorized to operate:

    24 hours/day, 7 days/week, 52 weeks/year, and 8,760 hours /year and 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

15. Emissions of chlorine (Cl_2) and chlorine dioxide (ClO2) from the bleaching plant shall be minimized by the use of weak wash (sodium sulfide solution) scrubbers equipped with a pH monitor and control system. The solution of the scrubbers shall be maintained at a minimum pH of eight in order to insure that the emission control efficiencies are maintained at the following values:

Scrubber and Emission Point No.	Emission Control Efficiencies
B-line (BP14)	95 percent (Cl_2/ClO2)
B-line (BP15)	95 percent (Cl_2/ClO2)
A-line (BP16)	95 percent (Cl_2/ClO2)

    The bleach plant lines are also authorized to operate as follows:

    A. When both the A- and B-lines are operating, the B-line bleach plant vents can be routed to the A-line bleach plant scrubber (EPN BP16).

    B. When the B-line is not operating, the A-line bleach plant vents can be routed to the B-line bleach plant scrubbers (EPNs BP14 and BP15).

        This is in line with MAERT statement that emissions from all three scrubbers shall be summed for compliance.

16. In order to maintain the maximum combustion efficiency for TRS compounds and NCGs, the NCG oxidation unit shall be operated as shown in Special Condition No. 21 with a residence time of 0.11 seconds (minimum) and a TRS removal efficiency of 99.9 percent. Immediate corrective action shall be taken when the O_2 deviates below 4 percent per (3-hour rolling average).

17. The SO_2 packed tower scrubber on the NCG oxidation unit shall use a recirculating sodium hydroxide solution. The solution shall be maintained at the minimum pH to ensure good SO_2 removal.

18. Recovery Furnace No. 1 (EPNs RB01A and RB01B) shall be limited to 54.5 tph of black liquor solids and a natural gas firing rate of 375 MMBtu/per hour (hr). Recovery Furnace No. 2 (EPNs RB02A and RB02B) is limited to 99.25 tph of black liquor solids and a natural gas firing rate of 750 MMBtu/hr. The maximum hourly ER for most pollutants from Recovery Furnace Nos.1 and 2 are based on a 24-hour averaging time except for TRS (as hydrogen sulfide [H_2S]) which is based on a 12-hour averaging time while PM and SO_2 are based on a 3-hour averaging time.

    The maximum ER for the Recovery Furnace Nos. 1 and 2 shall be split between the two stacks in the MAERT for accounting purposes only. To determine compliance with the MAERT, the

emission rates listed for each stack shall be summed since each furnace is a single facility and the individual stack emissions may vary.

In order to comply with the PM/PM_{10} MSS emission limits represented in the MAERT for the four Recovery Furnace Stacks (EPNs RB01A, RB01B, RB02A, and RB02B) during planned MSS activities, the planned MSS activities shall be limited to 25 hours per year for each of the four Recovery Furnace Stacks.

19. Lime Kiln No. 1 (LK01) is limited to 228 tons per day and 68,620 tons per year. The maximum firing rate for LK01 using either Nos. 2, 4, or 6 fuel oils shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 420,480 MMBtu/yr. The maximum firing rate for LK01 using natural gas shall not exceed 2,520 MMBtu/day (105 MMBtu/hr) and 550,000 MMBtu/yr.

20. Lime Kiln No. 2 (LK02) shall be limited to 400 tons per day of lime with a burner rating of 132.3 MMBtu/hr for short-term oil firing or 113.3 MMBtu/hr for sustained oil firing, and 113.3 MMBtu/hr for both short-term and sustained firing for natural gas. The maximum hourly ER for most pollutants from EPN LK02 shall be based on a 24-hour averaging time except for TRS (as H_2S) which is based on a 12-hour averaging time while PM and SO_2 shall be based on a three-hour averaging time.

Demonstration of Continuous Compliance

21. The following parameters shall be monitored and recorded:

Table 1: Monitoring Parameters and Limits

Unit	Parameter	Limit
Smelt Tank Scrubber No. 1	PM - Fan motor current	Title V Compliance Assurance
	PM - Liquid flow rate to scrubber	Monitoring (CAM)*
	PM - Liquid flow rate to fan	Title V CAM*
	PM (Opacity) - Fan motor current	Title V CAM*
	PM (Opacity) - Liquid flow rate to scrubber	Title V Periodic Monitoring*
	PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring*
		Title V Periodic Monitoring*

Unit	Parameter	Limit
Smelt Tank Scrubber No. 2[H]	PM - Fan motor current PM - Liquid flow rate to scrubber PM - Liquid flow rate to fan PM (Opacity) - Fan motor current	Title V CAM * Title V CAM* Title V CAM* TitleV Periodic Monitoring*
Smelt Tank Scrubber No. 2[H]	PM (Opacity) - Liquid flow rate to scrubber PM (Opacity) - Liquid flow rate to fan	Title V Periodic Monitoring* Title V Periodic Monitoring*
Precipitator Ash Tank No. 2	Temperature	235^{O}F maximum, daily average
No. 2 Recovery Boiler Ash Tank	Temperature	235^{O}F maximum, daily average
Power Boiler No. 1	Opacity SO_2 - Fuel sulfur content	20 percent Title V Periodic Monitoring*
Power Boiler No. 2[I]	PM - Liquid flow rate PM - Pressure drop PM (Opacity) - Liquid flow rate PM (Opacity) - Pressure drop SO_2 NO_x O_2	Title V CAM* Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring* MAERT MAERT
Lime Kiln No. 1 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop	Title V CAM * Title V CAM* Title V Periodic Monitoring*

Unit	Parameter	Limit
	PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring*
Lime Kiln No. 2 Scrubber	PM - Gas stream pressure drop PM - Liquid flow rate PM (Opacity) - Pressure drop PM (Opacity) - Liquid flow rate	Title V CAM * Title V CAM* Title V Periodic Monitoring* Title V Periodic Monitoring*
A-Line Bleach Plant Scrubber	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber North	PM (Opacity) - pH of scrubbing liquid PM (Opacity) - Fan motor current PM (Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*
B-Line Bleach Plant Scrubber South	PM (opacity) -pH of scrubbing liquid PM (opacity) - Fan motor current PM(Opacity) - Liquid flow rate	Title V Periodic Monitoring * Title V Periodic Monitoring* Title V Periodic Monitoring*

Unit	Parameter	Limit
Recovery Furnace No. 1 Stack[H]	PM - Opacity TRS SO_2 Black liquor solids Opacity	Title V CAM* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 54.5 ton/hr (24-hr average) 20% maximum
Recovery Furnace No. 2 Stack[H]	PM - Opacity PM (Opacity) - Opacity TRS SO_2 Black liquor solids	Title V CAM* Title V Periodic Monitoring* MAERT 300 ppmv (3-hr average)/100 ppmv (annual average) maximum 99.25 ton/hr (24-hr average)
NCG Oxidation Unit	TRS - Combustion Chamber temperature Excess O_2 in exhaust SO_2 - pH of scrubbing liquid SO_2 - Liquid flow rate	Title V CAM* with a minimum temperature of 1579^{O}F. <20 ppmv of Methanol (3-hour rolling averaging period) 4% minimum 7.0 minimum# 150 gpm minimum#

* The specific limit is included in the “Additional Monitoring Requirements Section” in the Title V permit (Permit No. O-01378).

H-see NSPS BB for recordkeeping requirements.

I-see NSPS D for recordkeeping requirements.

CAM Requirements for SO_2 emissions from NCGO1: In order to maintain adequate SO_2 control for the emissions associated with the NCG Oxidation Unit, the control device associated with this source shall be monitored according to the following:

Table 2: Monitoring Parameters for NCG Oxidation Unit

Control Device	Monitoring Parameter	Minimum Monitoring Frequency**	Deviation limit
NCG Oxidation Unit Scrubber (NCGO1)	pH	once per day	7.0 minimum
	Liquid flow rate	once per day	150 gpm

** International Paper may elect to collect monitoring data on a more frequent basis than is required by the minimum frequency and calculate a daily average for purposes of determining whether a deviation has occurred. However, the additional points must be collected on a regular basis and shall not be collected and used in particular instances in order to avoid reporting deviations.

pH: Each monitoring devices shall be cleaned with an automatic cleaning system, or cleaned weekly using hydraulic, chemical, or mechanical cleaning. Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least weekly, whichever is more frequent, and shall be accurate to within +0.5 pH unit.

Liquid flow rate: Each monitoring device shall be calibrated at a frequency in accordance with the manufacturer's specifications, other written procedures that provide an adequate assurance that the device is calibrated accurately, or at least annually, whichever is more frequent, and shall be accurate to within one of the following:

- ±2% of span; or
- ±5% of design liquid flow rate

The monitoring parameter must be measured and recorded at the frequency indicated above. Immediate corrective action should be taken if the monitoring parameter falls outside of the range specified in this condition.

22. Disposal of particulate collected in all control devices shall be accomplished in such a manner which will prevent PM from becoming airborne.

23. The permit holder shall install, calibrate, and maintain a continuous emission monitoring system (CEMS) to measure and record the in-stack concentration of NO_x and SO_2 from Power Boiler No. 2 (EPN PBO2), TRS, and SO_2 from Recovery Furnace No. 1 (EPNs RBO1A and RBO1B) and Recovery Furnace No. 2 (EPNs RBO2A and RBO2B), and TRS from Lime Kiln Nos. 1 and 2 (EPNs LKO1 and LKO2).

    A. The CEMS shall meet the design and performance specifications, pass the field tests, and meet the installation requirements and the data analysis and reporting requirements specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B. If there are no applicable performance specifications in 40 CFR Part 60, Appendix B, contact

the TCEQ Office of Permitting, and Registration, Air Permits Division for requirements to be met.

B. Section 1 below applies to sources subject to the quality-assurance requirements of 40 CFR Part 60, Appendix F; section 2 applies to all other sources:

(1) The permit holder shall assure that the CEMS meets the applicable quality-assurance requirements specified in 40 CFR Part 60, Appendix F, Procedure 1. Relative accuracy exceedances, as specified in 40 CFR Part 60, Appendix F, § 5.2.3 and any CEMS downtime shall be reported to the appropriate TCEQ Regional Director, and necessary corrective action shall be taken. Supplemental stack concentration measurements may be required at the discretion of the appropriate TCEQ Tyler Regional Director. Downtime is not considered to include periods when the CEMS is operational but the 24-hour span drift exceeds the allowable amounts.

(2) The system shall be zeroed and spanned daily and corrective action taken when the 24-hour span drift exceeds two times the amounts specified in the applicable Performance Specification Nos. 1 through 9, 40 CFR Part 60, Appendix B, or as specified by the TCEQ if not specified in Appendix B. Zero and span are not required on weekends and plant holidays if instrument technicians are not normally scheduled on those days, unless the monitor is required by a subpart of NSPS or NESHAPS in which case zero and span shall be done daily without exception.

Each monitor shall be quality-assured at least quarterly using cylinder gas audits (CGA) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, § 5.1.2, with the following exception: RATAs are not required for these systems. For non-NSPS sources, an equivalent quality-assurance method approved by the TCEQ may also be used and an annual RATA is not required.

C. The monitoring data shall be reduced to hourly average concentrations at least weekly, using a minimum of four equally-spaced data points from each one-hour period. The individual average concentrations shall be reduced to units of the permit allowable ER in pounds per hour (lb/hr) at least once every calendar quarter (except for O_2) as follows:

The measured hourly average concentration from the CEMS shall be multiplied by the gas flow rate (either as measured according to 40 CFR Part 60, Appendix A, Methods 1 through 4, or as calculated by appropriate F factor according to 40 CFR Part 60, Appendix A, Method 19) to determine the hourly ER.

D. All monitoring data and quality-assurance data shall be maintained for a period of 60 months. The data from the CEMS may, at the discretion of the TCEQ, be used to determine compliance with the conditions of this permit.

E. For SO_2 from EPNs RBO1A & RBO1B and EPNs RBO2A & RBO2B, and TRS from EPNs LKO1 and LKO2, up to 5 percent invalid monitoring data on a rolling 12-month basis is acceptable provided it is only generated when the monitor is broken down, out-of-control (producing inaccurate data); being repaired, having maintenance performed, or being calibrated (data not obtained during any daily zero and span performed is not considered invalid data).

The data availability shall be calculated as the total fired unit operating hours for which quality-assured data was recorded divided by the total fired unit operating hours. The measurements missed shall be estimated using engineering judgment and the methods used recorded. Options to increase system reliability to an acceptable value, including a redundant CEMS, may be required by the TCEQ Tyler Regional Director.

24. The holder of this permit shall install, calibrate, and maintain a continuous opacity monitoring system (COMS) to measure and record the in-stack concentration of opacity from PB01. The COMS shall be operated in accordance with 40 CFR § 60.13. This special condition shall only apply when fuel oil is being fired in PB01. **(01/18)**

25. Upon request by the TCEQ Executive Director, the holder of this permit shall be required to perform stack sampling analysis for PM, total volatile organic compounds (VOC), NO_x, CO, SO_2, methanol, and formaldehyde and/or other testing as required to establish the actual pattern and quantities of air contaminants being emitted into the atmosphere from the facilities covered by this permit. Sampling must be conducted in accordance with appropriate procedures of the TCEQ Sampling Procedures Manual or in accordance with applicable U.S. Environmental Protection Agency Code of Federal Regulations procedures. Any deviations from those procedures must be approved by the TCEQ Executive Director prior to sampling. The holder of this permit is responsible for providing sampling and testing facilities and conducting the sampling and testing operations at his expense.

    The facilities shall operate at the maximum achievable fuel-firing rate during stack emission testing. Primary operating parameters that enable determination of fuel-firing rate shall be monitored and recorded during the stack test. These parameters are to be determined at the pretest meeting. If the facilities are unable to operate at maximum fuel-firing rate during testing, then future fuel-firing rate may be limited to the rate established during testing. Additional stack testing may be required when higher fuel-firing rates are achieved.

26. Upon request by the Executive Director of the TCEQ or any local air pollution control program having jurisdiction, the holder of this permit shall provide a sample and/or an analysis of the fuel utilized in this facility or shall allow air pollution control agency representatives to obtain a sample for analysis.

27. Due to the high moisture content in the gas stream exiting the scrubber, a continuous opacity monitor as specified in NSPS D is not feasible. To verify the particulate emissions are within NSPS limits, the Power Boiler No. 2 shall be tested once a year for total suspended particulate and any other pollutant at the request of the TCEQ Regional Office.

Recordkeeping Requirements

28. Records shall be maintained at this facility site and made available at the request of personnel from the TCEQ or any other air pollution control program having jurisdiction to demonstrate compliance with permit limitations. These records shall be totaled for each calendar month, retained for a rolling 60-month period, and include the following:

    A. Records of all production rates, ERs, and operating parameters necessary to demonstrate compliance with this permit on-site for a rolling five-year period. Records shall include certification from all suppliers of used railroad crossties that all railroad crossties received at the site meet the specifications of 40 CFR Part 241, Subpart B, § 241.4(a). The holder shall provide access and/or copies of these records to the Executive Director of the TCEQ and/or his representatives and any local air pollution control program upon request. **(11/22)**

    B. The quantity of each fuel (MMBtu/hr basis) fired per month (PB01 only).

    C. The quantity of calcium oxide (tons) produced per day.

D. Annual report from the natural gas supplier identifying total H_2S content and from the fuel oil supplier identifying total sulfur content of Nos. 2, 4, and 6 fuel oils sold to permit holder to demonstrate compliance with this permit.

E. Copies of stack sampling reports conducted on the facilities covered by this permit. The stack sampling reports shall be kept at the site for a period of at least five years from the time sampling was completed.

F. Preventive maintenance, schedule maintenance, and repairs performed on any abatement devices shall be recorded as they occur.

29. All the records required by this condition shall be maintained for at least five years and made available to representatives of the TCEQ or any local air pollution control program having jurisdiction upon request.

Date: November 15, 2022

Emission Sources - Maximum Allowable Emission Rates

Permit Numbers 2975 and PSDTX778M2

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SM01	No. 1 Smelt Tank Scrubber	PM	10.90	47.74
		PM_{10}	10.90	47.74
		$PM_{2.5}$	10.90	47.74
		VOC (note a)	1.37	6.02
		SO_2	3.28	14.37
		H_2SO_4	0.15	0.66
		TRS (note b)	1.80	7.88
		NO_X	1.80	7.88
		NH_3	2.51	8.99
SM02	No. 2 Smelt Tank Scrubber	PM	19.85	86.94
		PM_{10}	19.85	86.94
		$PM_{2.5}$	19.85	86.94
		VOC	2.50	10.95
		SO_2	6.78	29.70
		H_2SO_4	0.31	1.36
		TRS	3.28	14.35
		NO_X	3.28	14.35
		NH_3	4.57	16.37
LK01** (A^1)	Lime Kiln No. 1	PM	27.60	99.80
		PM_{10}	27.60	99.80
		$PM_{2.5}$	27.60	99.80

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	2.20	8.10
		SO_2	2.30	8.40
		H_2SO_4	0.06	0.13
		TRS	2.60	9.30
		NO_X	18.90	49.50
		CO	6.80	14.20
PB01*** (A^1, A^2)	No. 1 Power Boiler (Natural Gas and Fuel Oil Firing)	PM	61.21	185.22
		PM_{10}	61.21	185.22
		$PM_{2.5}$	61.21	185.22
		VOC	8.26	16.70
		NO_X	567.60	1717.69
		SO_2	841.20	1328.25
		CO	264.88	801.59
		H_2SO_4	4.03	4.43
		TRS	0.67	0.26
LK02** (A^1)	Lime Kiln No. 2	PM	26.30	115.19
		PM_{10}	26.30	115.19
		$PM_{2.5}$	26.30	115.19
		NO_X	38.91	145.90
		SO_2	1.20	5.26
		H_2SO_4	0.25	1.07
		CO	4.44	19.45
		TRS	2.50	10.95
		VOC	4.00	17.52

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
PB02**** (A^1, A^2, A^3)	Power Boiler No. 2 (including MSS) (note c)	PM	108.70	466.58
		PM_{10}	108.70	466.58
		$PM_{2.5}$	108.70	466.58
		VOC	54.81	237.80
		NO_X	326.10	1399.75
		SO_2	770.00	780.66
		CO	1102.55	4732.57
		H_2SO_4	16.57	71.02
		TRS	1.66	6.74
RB01A** (A^1, A^2)	No. 1 Recovery Furnace North Stack (Normal ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01A** (A^4)	No. 1 Recovery Furnace North Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB01B** (A^1, A^2)	No. 1 Recovery Furnace South Stack (Normal Ops)	PM	26.58	116.43
		PM_{10}	26.58	116.43
		$PM_{2.5}$	26.58	116.43

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	13.13	57.52
		NO_X	63.12	276.45
		SO_2	210.94	307.98
		H_2SO_4	9.69	14.14
		CO	122.97	538.61
		TRS	1.87	8.19
RB01B** (A^4)	No. 1 Recovery Furnace South Stack (MSS)	PM	52.00	0.65
		PM_{10}	52.00	0.65
		$PM_{2.5}$	52.00	0.65
RB02A** (A^1, A^2)	No. 2 Recovery Furnace West Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02A** (A^4)	No. 2 Recovery Furnace West Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
RB02B** (A^1, A^2)	No. 2 Recovery Furnace East Stack (Normal Ops)	PM	42.59	177.23
		PM_{10}	42.59	177.23
		$PM_{2.5}$	42.59	177.23

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		VOC	23.92	99.51
		NO_X	112.42	467.76
		SO_2	375.71	521.11
		H_2SO_4	17.25	23.93
		CO	219.02	911.34
		TRS	3.33	13.86
RB02B** (A^4)	No. 2 Recovery Furnace East Stack (MSS)	PM	79.00	0.99
		PM_{10}	79.00	0.99
		$PM_{2.5}$	79.00	0.99
BG01 (A^1)	Lime System Baghouse No. 1	PM	0.06	0.21
		PM_{10}	0.06	0.21
		$PM_{2.5}$	0.06	0.21
BG02 (A^1)	Lime System Baghouse No. 2	PM	0.10	0.44
		PM_{10}	0.10	0.44
		$PM_{2.5}$	0.10	0.44
LS01	No. 1 Lime Slaker	PM	0.02	0.08
		PM_{10}	0.02	0.08
		$PM_{2.5}$	0.02	0.08
		VOC	0.39	1.41
		NH_3	9.39	33.63
LS02	No. 2 Lime Slaker	PM	0.02	0.10
		PM_{10}	0.02	0.10
		$PM_{2.5}$	0.02	0.10
		VOC	0.68	2.99

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
		NH_3	17.10	61.24
BP0351 (A^5)	Methanol Storage Tank	CH_3OH	19.03	0.73
BP0368 (A^5)	Hydrogen Peroxide Tank	H_2O_2	2.21	0.09
NCG01 (A^1, A^3)	NCG Oxidation Unit Scrubber	PM	2.57	9.19
		PM_{10}	2.57	9.19
		$PM_{2.5}$	2.57	9.19
		VOC (note a)	1.10	3.95
		NO_X	5.57	19.96
		SO_2	15.84	69.37
		CO	9.94	35.61
		H_2SO_4	6.01	26.28
		TRS	0.99	4.36
NCG02 (A^5)	Combined Contaminated Condensate Tank	TRS	<0.10	0.40
NCGF1	NCG Fugitives (4)	TRS	0.36	1.56
DIG1	Batch Digester Fugitives (4)	VOC	4.80	19.19
		TRS	0.87	3.46
WWTS1 (A^6, A^7)	Waste Water Treatment Fugitives (4)	VOC	348.16	740.78
		TRS	22.82	81.72
BP14#	B-Line Bleach Plant Scrubber (North)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BP15#	B-Line Bleach Plant Scrubber (South)(5)	Cl_2	0.07	0.32
		ClO_2	4.23	18.51
		CO	29.22	117.37
		VOC	3.06	12.28
		TRS	0.09	0.37
BP16#	A-Line Bleach Plant Scrubber (5)	Cl_2	0.20	0.86
		ClO_2	11.31	49.51
		CO	39.00	117.37
		VOC	4.17	12.28
		TRS	0.12	0.37
BP01	Bleach Plant Fugitives (4)	Cl_2	0.20	1.00
		ClO_2	0.20	1.00
CLT01 (A^5)	No. 1 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
CLT02 (A^5)	No. 2 Concentrated Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
WLT01 (A^5)	No. 1 Weak Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLT02 (A^5)	No. 2 Weak Liquor Storage Tank (5)	VOC	0.54	2.34
		TRS	0.12	0.51
HLT01 (A^5)	No. 1 Strong/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
HLT02 (A^5)	No. 2 Storage/Heavy Liquor Storage Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
SCT01 (A[5])	No. 1 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SCT02 (A[5])	No. 2 Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS01 (A[5])	No. 1 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SS02 (A[5])	No. 2 Soap Separator (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST01 (A[5])	No. 1 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
SST02 (A[5])	No. 2 Soap Storage Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
BLDF01 (A[5])	Black Liquor Digester Fill Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
CT01 (A[5])	Spill Collection Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
ST01 (A[5])	Swing Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST01 (A[5])	No. 1 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST02 (A[5])	No. 2 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
SLST03 (A[5])	No. 3 Spare Liquor Storage Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BOT01 (A^5)	Evaporator Boil Out Tank (5)	VOC	0.11	0.48
		TRS	0.19	0.84
DT01 (A^5)	Black Liquor Dump Tank (5)	VOC	0.54	2.37
		TRS	0.12	0.51
WLSC01 (A^5)	Weak Liquor Soap Conc. Tank (5)	VOC	0.03	0.12
		TRS	0.05	0.21
FOT (A^5)	Fuel Oil Tank (5)	VOC	1.52	6.64
		TRS	0.19	0.84
CPFUG (note d)	Caustic Plant Fugitives (4)	NH_3	7.31	26.17
		VOC	16.25	68.30
		TRS	3.18	13.91
CP01 (A^5)	No. 1 Causticizer Tanks (5)	NH_3	2.59	9.28
		VOC	0.01	0.03
CP02 (A^5)	No. 2 Causticizer Tank (5)	NH_3	4.72	16.89
		VOC	0.01	0.06
WLOXT1 (A^5)	White Liquor Oxidation Tank (5)	NH_3	0.10	0.44
		VOC	0.26	1.16
		TRS	0.56	2.45
KNCONV	A-and B-Line Knotter Conveyor (4)	VOC	0.01	0.04
AQS	A-Line Quaternary Screen (4)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
BQS	B-Line Quaternary Screen (4)	VOC	0.01	0.03
		TRS	<0.01	<0.01
ASDT (A^5)	A-Line Screen Dilution	VOC	0.01	0.02

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Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
	Tank (5)	TRS	<0.01	<0.01
BSDT (A^5)	B-Line Screen Dilution Tank (5)	VOC	<0.01	0.01
		TRS	<0.01	<0.01
ADHV1/ADSP1	A-Line Decker Hood Vent and A-Line Decker Seal Pit Vent (5)	VOC	9.24	27.20
		TRS	4.06	11.95
BDHV1/BDSP1	B-Line Decker Hood Vent and B-Line Decker Seal Pit Vent (5)	VOC	13.55	54.41
		TRS	5.95	23.89
CPS1 (note e)	Chip/Bark Handling Fugitives (4)	PM	3.35	13.59
		PM_{10}	1.58	6.43
		$PM_{2.5}$	1.58	6.43
REJBIN2	Reject Bin	CH_3OH	0.03	0.10
LOG-1A	Log Processing 1A (4)	PM	0.73	3.20
		PM_{10}	0.22	0.96
		$PM_{2.5}$	0.22	0.96
HDST1 (A^5)	No. 1 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
HDST2 (A^5)	No. 2 Brown Stock High Density Stock Tank (5)	VOC	4.80	21.02
		TRS	0.44	1.94
ALDST (A^5)	A-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
BLDST (A^5)	B-Line Low Density Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
AWTST (A^5)	A-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94

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Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
BWTST (A[5])	B-Line Waste Stock Chest (5)	VOC	4.80	21.02
		TRS	0.44	1.94
(note f)	Extruder No. 5 Vents and Fugitives (4)	PM	3.18	13.91
		PM_{10}	3.18	13.91
		$PM_{2.5}$	3.18	13.91
		VOC	2.07	9.05
		NO_X	0.29	1.29
		CO	0.25	1.08
		SO_2	<0.01	0.01
(note f)	Extruder No. 7 Vents and Fugitives (4)	PM	3.18	13.92
		PM_{10}	3.18	13.92
		$PM_{2.5}$	3.18	13.92
		VOC	2.07	9.05
		NO_X	0.30	1.33
		CO	0.26	1.12
		SO_2	<0.01	0.01
(note g)	Nos. 1 and 3 Paper Machines and Dryer Exhaust (5)	PM	0.19	0.83
		PM_{10}	0.19	0.83
		$PM_{2.5}$	0.19	0.83
		VOC	8.74	38.27
		NO_X	2.50	10.93
		CO	2.10	9.18
		SO_2	0.01	0.07
TNK0115, TNK0116,	Starch Silo Nos. 1 -3	PM	0.02	0.02

Emission Sources - Maximum Allowable Emission Rates

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * (6)	
			lbs/hour	TPY
and TNK0175 (A[1])		PM_{10}	0.02	0.02
		$PM_{2.5}$	0.02	0.02
PAINTYD (A[8])	Sitewide Painting Activities (4)	PM	70.31	32.72
		PM_{10}	70.31	32.72
		$PM_{2.5}$	70.31	32.72
		VOC	96.05	28.94
BSS1 – BSS5 (A[5])	Nos. 1-5 Bleached Stock Storage Tanks (4)	VOC	0.04	0.17
(note h)	Paper Machine Tanks and Chests (4)	VOC	0.16	0.68
HVLC-1	HVLC Vent	VOC	157.78	23.09
		CO	3.19	0.51
		TRS	33.30	4.77
AWSST (A[5])	A-Line Washed Stock Chest (5)	VOC	0.72	3.16
		TRS	0.28	1.21
BWSST (A[5])	B-Line Washed Stock Chest (5)	VOC	0.74	3.26
		TRS	0.28	1.21

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) PM - particulate matter, suspended in the atmosphere, including PM_{10}
PM_{10} - total particulate matter equal to or less than 10 microns in diameter, including $PM_{2.5}$, as represented
$PM_{2.5}$ - particulate matter equal to or less than 2.5 microns in diameter
Emissions of $PM_{2.5}$ is added to the Maximum Allowable Emission Rates Table (MAERT) upon issuance of the permit. These emissions were previously quantified and authorized as PM or PM_{10}, but were not speciated in the MAERT.
VOC - volatile organic compounds as defined in Title 30 Texas Administrative Code §101.1
SO_2 - sulfur dioxide
H_2SO_4 - sulfuric acid
TRS - total reduced sulfur
NO_x - nitrogen oxides
NH_3 - ammonia
Cl_2 - chlorine
ClO_2 - chlorine dioxide (chlorine peroxide)

Emission Sources - Maximum Allowable Emission Rates

CO - carbon monoxide
H_2S - hydrogen sulfide
CH_3OH - methanol
H_2O_2 - hydrogen peroxide
$CHCl_3$ - chloroform
$CHBrCl_2$ - bromodichloromethane

(4) Fugitive emissions are an estimate only and should not be considered as a maximum allowable emission rate.
(5) The VOC and TRS emission rates for this point are considered to be estimates only and are not intended to be enforceable limits.
(6) Planned startup and shutdown emissions are included, as well as planned maintenance activities identified as part of permit alteration issued on April 24, 2013.
A^1 Emissions from planned startup and shutdown activities included.
A^2 Emissions from soot blowing included.
A^3 Emissions from control device for evaporator and concentrators boil outs included.
A^4 Emissions from planned MSS activities included.
A^5 Emissions from draining/degassing included.
A^6 Emissions from dredging and other maintenance (e.g., ponds and collection system) included.
A^7 Emissions from maintenance throughout the mill included.
A^8 Emissions from maintenance painting included.

* Unless otherwise specified, emission rates are based on operating 8,760 hours per year or 817,803 air dried unbleached tons per year 736,022 bone dry unbleached tons per year of pulp.

** Pound per hour rates, TRS emissions based on a 12-hour averaging time, PM/PM_{10} and SO_2 based on a 3-hour averaging time, all other pollutants are based on a 24-hour averaging time.

*** Pound per hour rates, SO_2 and NO_x emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

**** Pounds per hour rates, SO_2 emissions are based on a 3-hour averaging time while all other pollutants are based on a 24-hour averaging time.

Emissions from the Bleach Plant Scrubbers (EPNs BP14, BP15, and BP16) should be summed up when determining compliance since individual emissions may vary.

Notes:

(a) All VOCs are reported as carbon unless otherwise specified.
(b) All TRS emission rates are reported as H_2S unless otherwise specified.
(c) The SO_2 hourly rates for the Power Boiler No. 2 include combustion of total reduced sulfur compounds during periods when the NCG oxidizer is inoperable.
(d) Green liquor clarifiers (2), green liquor storage tanks (3), weak wash storage tanks (2), white liquor clarifiers (2), white liquor storage tanks (4), white liquor/digestor fill tank, mud washers (2), mud storage tanks (2), mud precoat filters (2), and dregs filter.
(e) These fugitives occur from the chip and RDF handling operations.
(f) Includes the pre-treater stacks (EX5PRE1, EX5PRE2, EX7PRE1, EX7PRE2), the laminator stack (EX5LAM1, EX5LAM2, EX7LAM1, EX7LAM2), the post-treater stack (EX5POSTTR, EX7POSTTR), and fugitives (EXFUG5, EXFUG7) for each extruder.
(g) The Paper Machine Nos.1 and 3 consist of 18 exhaust vents and fugitive emissions.
(h) Includes pine tanks (PINETK3, PINETK1S, PINETK1), hardwood tanks (HDWD1, HDWD3), machine chests (MACHCH1, MACHCH3), and broke storage tanks (BRST1A, BRST1B, BRST3A).

Date: August 10, 2017

Last Page of Report

Source Test Report

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source Tested:
No. 2 Smelt Tank Scrubber (SM02)

Test Date:
October 28, 2025

Project No. AST-2025-3989

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citations	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameters*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
W Graphic Packaging International Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

Field Team Leader
Timothy Branham
timothy.branham@alliancetg.com
(479) 206-1993

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Report Reviewers
Tyler Winslow
tyler.winslow@alliancetg.com
(812) 549-8434

Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

COMPANY:		Graphic Packaging International		SOURCE:		SM02	
REVIEWER:				DATE OF SAMPLING:		October 28, 2025	
These are suggested items to be checked in test reports. Some items may not be applicable (N/A) while additional information may be necessary.							
1.	Page i	Address of company being tested (Company)					
2.	Page i	Name and Address of testing organization (Consultant)					
3.	Page i	Name of sampling team leader					
4.	Page i	Facility or unit being tested					
5.	Page i	Sampling requirement identified					
6.	Sec. 1	Description (schematic) of process being sampled					
7.	Sec. 3	Applicable reference method (or approved alternate method)					
8.	Sec. 2	All pollutants sampled as required (NSPS, Permit, etc.)					
9.	Sec. 2	Pollutants in (8.) Compared to applicable standards of allowables					
10.	App. D	Operating levels of facility					
11.	N.A.	Isokinetic sampling if applicable					
12.	App. D	Operating parameters of the pollution control equipment					
13.	App. D	Process (facility) parameters taken during testing					
14.	N.A.	Facility soot blowing procedures and schedule					
15.	N.A.	Dates and time soot blowing occurred during testing					
16.	App. G	Schematic of sampling device					
17.	N.A.	List of deviations from standard or reference methods					
18.	N.A.	Approval of deviations					
19.	Sec. 3	Analytical procedures used to analyze the samples					
20.	App. B	All emission calculations (field data and lab analysis)					
21.	App. C	Calibration worksheets/records					
		X	Gas meters		Thermometers	X	Pitots
		X	Nozzles	X	Barometers	X	Analyzers
22.	N.A.	Calibration logs of instruments used in determination of pertinent process					
		parameters that determine emission rates or allowables (flow rates, etc.)					
23.	App. B	First impinger analyzed for particulates and compared to TACB Regulation I.					
24.	App. B	Impinger weights consistent:			No backups:		
25.	N.A.	Analysis of fuel for % sulfur, % ash, heat content, etc.					
26.	App. B	Schematic of stack showing nearest disturbance					
27.	App. B	Stack cross section (dimensioned and points labeled)					
28.	N.A.	Orsats taken:		Orsats consistent:			
29.	App. B	Copies of all field data, strip charts, etc. from original field data sheets					
30.	N.A.	Chain of custody of samples					
31.	N.A.	Laboratory data:	Blanks:	x	Tare weights:		x
			Results of analysis:		x		
32.	App. B	Cyclonic flow check and documented					
33.	N.A.	Audit sample and cylinder results					
34.	N.A.	TCEQ cover and summary forms					
35.	N.A.	Thirty 6-minute opacities for NSPS particulate sources					
36.	App. C	Calibration gases and permeation devices meet specification (NBS traceable or EPA protocol)					

Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the sources and operating conditions that were tested during the specific test date and times identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections of this test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

November 17, 2025

Riley Wilson – Operations Manager
Alliance Technical Group, LLC

Date

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APPENDICES

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Appendix D Facility Data
Appendix E SSTP and Associated Documentation
Appendix F Field Raw Data
Appendix G Illustrations
Appendix H Resume of Field Team Leader

Introduction

1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to the provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing was conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Tested Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

1.1 Project Team

Personnel involved in this project are identified in the following table.

Table 1-2: Project Team

Facility Personnel	John Fussell
Alliance Personnel	Riley Wilson Timothy Branham

1.2 Site Specific Test Plan & Notification

Testing was conducted in accordance with the Site Specific Test Plan (SSTP) that was developed by Alliance and approved by GPI. The SSTP is presented in Appendix E.

1.3 Technical Discussion

No operational or sampling pauses were recorded, and no technical difficulties or protocol deviations were encountered during this test program.

Summary of Results

2.0 Summary of Results

Alliance conducted compliance testing at the GPI facility in Queen City, TX on October 28, 2025. Testing consisted of determining the concentration and emission rate of TRS at the exhaust of SM02.

Table 2-1 provides a summary of the emission testing results with comparisons to the applicable NSPS or TCEQ permit limits. Any difference between the summary of results listed in the following table and the detailed results contained in the appendices is due to rounding for presentation.

Table 2-1: Summary of Results

Run Number	Run 1	Run 2	Run 3	Average
Date	**10/28/25**	**10/28/25**	**10/28/25**	**--**
Total Reduced Sulfur (as H_2S) Data				
Emission Rate, lb/hr	0.70	0.91	0.91	0.84
Permit Limit, lb/hr	--	--	--	3.28
Percent of Limit, %	--	--	--	**26**
Emission Factor, lb/ton of black liquor solids	0.0075	0.0097	0.0097	0.0089
NSPS Limit, lb/ton of black liquor solids	--	--	--	0.033
Percent of Limit, %				**27**

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods that are listed in Table 3-1. Method descriptions are provided below, and quality assurance/quality control data is provided in Appendix C.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Total Reduced Sulfur	16	Instrumental Analysis
Gas Dilution System Certification	205	---

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and the number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1 requirements. The inside diameter of the stack was determined. The upstream and downstream distances between the sampling point and the nearest flow disturbance were measured. The distance between each flow disturbance and the sampling point was expressed in units of stack diameters or stack equivalent diameter. In order to determine the minimum number of traverse points, the upstream and downstream distances were compared to Figure 1-2 (measuring velocity alone) in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas pressure differential (impact pressure vs. static pressure), static pressure and temperature at each measurement point. Pressure differential and static pressure were determined using an S-type pitot tube, an inclined manometer and flexible tubing used to connect both parts of the system. Stack gas temperature was determined using a K-type thermocouple and a pyrometer. The sensor tip of the K-type thermocouple was aligned with the nozzles of the S-type pitot tube in accordance with method requirements.

Stack gas pressure differential, static pressure and temperature measurements were recorded during each test run and were utilized to calculate stack gas velocity in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A –Oxygen and Carbon Dioxide Concentrations – Instrumental

The oxygen (O_2) and carbon dioxide (CO_2) concentrations were determined in accordance with U.S. EPA Reference Test Method 3A. Data was continuously collected and reported as one-minute averages. The sampling system consisted of a stainless-steel probe, unheated Teflon sample line(s), a gas conditioning system and the identified gas analyzer. The gas conditioning system consisted of a filter to remove particulate matter, and a non-contact condenser used to remove moisture from the stack gas. A portable non-contact condenser was placed in the system directly after the probe. A single-point sampling location was used for the determination of the stack gas molecular weight. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 16 – Total Reduced Sulfur

The total reduced sulfur testing was conducted in accordance with U.S. EPA Reference Test Method 16. The total reduced sulfur compounds consisted of hydrogen sulfide (H_2S), methyl mercaptan (MeSH), dimethyl sulfide (DMS), and dimethyl disulfide (DMDS).

The sampling system consisted of a heated Teflon probe, heated Teflon sample line, gas conditioning system, leak-free pump, unheated Teflon sample line, and a gas chromatograph (GC), which was equipped with a flame photometric detector (FPD). The gas conditioning system consisted of three (3) Teflon impingers. The first two (2) impingers each contained 100 mL of citrate buffer (for SO_2 removal), and the third impinger was empty. Each test run consisted of 16 injections, which were performed over a period of at least 3 hours.

The GC/FPD was calibrated for each reduced sulfur compound (H_2S, COS and CS_2) with a certified calibration gas, which was diluted with a dilution system. The dilution system was validated in accordance with EPA Method 205 to produce three (3) or more concentration levels, which spanned the linear range of the FPD. Calibration precision and calibration drift test values were maintained in accordance with EPA Method 16 requirements.

3.4 U.S. EPA Reference Test Method 205 – Gas Dilution System Certification

A calibration gas dilution system field check was conducted in accordance with U.S. EPA Reference Test Method 205. An initial three-point calibration was conducted with individual Protocol 1 gases on the analyzer used to complete the dilution system field check. Multiple dilution rates and total gas flow rates were utilized to force the dilution system to perform two (2) dilutions on each mass flow controller. The diluted calibration gases were sent directly to the analyzer, and the analyzer's response was recorded in an electronic field data sheet. A mid-level supply gas, which was certified to a concentration that was within 10% of one of the gas divider settings described above, was introduced directly to the analyzer, and the analyzer response was recorded in an electronic field data sheet. The analyzer's response was within 2% of the cylinder's concentration. These steps were repeated three (3) times. The average analyzer response was within 2% of the predicted gas concentration. No single injection differed by more than 2% from the average instrument response for its corresponding dilution. The Method 205 data is included in the Quality Assurance/Quality Control Appendix.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

All the cylinder calibration gases used during the testing met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates are included in the Quality Assurance/Quality Control Appendix.

Direct Calibration & Calibration Error Test

Direct calibration consisted of introducing Low-Level gas directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration, and once the analyzer reading was stabilized, the analyzer value was recorded. This process was repeated with the High-Level gas. The Calibration Error Test consisted of sequentially introducing Low, Mid, and High-Level calibration gases directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

The system bias and response time were determined by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe, and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it

reached a stable value, and this value was recorded. Next, Low-Level gas was introduced at the probe, and the time that was required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) was recorded. If the Low-Level gas was zero gas, the response was 0.5% or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and the initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

Post test system bias checks were conducted by introducing High or Mid-Level gas (whichever was closer to the stack gas concentration) at the probe. Once the analyzer reading stabilized, the analyzer value was recorded. Next, Low-Level gas was introduced at the probe, and the analyzer response was recorded once it stabilized. If the System Bias was not within 5.0 percent of the Calibration Span or 0.5% absolute difference, the data was invalidated, and the Calibration Error Test and System Bias were repeated.

Post Test Drift Checks

Drift between pre- and post-run System Bias was within 3 percent of the Calibration Span or 0.5% absolute difference. If the drift exceeded 3 percent or 0.5%, the Calibration Error Test and System Bias were repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check was conducted prior to initiating testing. The pollutant concentrations were measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point was sampled for a minimum of twice the system response time.

The pollutant concentration at each traverse point did not differ more than 5 percent or 0.5 ppmv/0.3% (whichever was less restrictive) of the average pollutant concentration. A single point was sampled during the test runs. Copies of stratification check data can be found in the Quality Assurance/Quality Control Appendix.

Data Collection

A Data Acquisition System equipped with a battery backup was used to record the instrument response as one (1) minute averages. This data was continuously stored as a *.CSV file in Excel format, which was saved to the computer's hard drive. At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Upon arrival at Alliance's office, all written and electronic data was relinquished to the report coordinator, and a final review was performed by the Project Manager.

Appendix A - Example Calculations

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb	--	= barometric pressure, in. Hg
ΔH	--	= pressure differential of orifice, in H_2O
Pm	--	= in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb	29.63	= barometric pressure, in. Hg
Pg	-0.50	= static pressure, in. H_2O
Ps	29.59	= in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.636 \times Vm \times Pm \times Y}{Tm}$$

where,

Y	0.000	= meter correction factor
Vm	--	= meter volume, cf
Pm	--	= absolute meter pressure, in. Hg
Tm	--	= absolute meter temperature, °R
Vmstd	--	= dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04716 \times Vlc$$

where,

Vlc	--	= weight of H_2O collected, g
Vwstd	--	= scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{\wedge}\left(6.37 - \left(\frac{2{,}827}{Ts + 364.47}\right)\right)}{Ps}$$

where,

Ts	146.6	= stack temperature, °F
Ps	29.6	= absolute stack gas pressure, in. Hg
BWSsat	0.233	= dimensionless

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd	--	= standard wet volume, scf
Vmstd	--	= standard meter volume, dscf
BWS	--	= dimensionless

Moisture Fraction (BWS), dimensionless

BWS = BWSmsd unless BWSsat < BWSmsd

where,

BWSsat	0.233	= moisture fraction (theoretical at saturated conditions)
BWSmsd	--	= moisture fraction (measured)
BWS	0.233	

Location	**Graphic Packaging International Texarkana Mill - Queen City, TX**
Source	**No. 2 Smelt Tank Scrubber (SM02)**
Project No.	**AST-2025-4218**
Run No.	**1**
Parameter(s)	**VFR**

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times [100 - \%CO_2 - \%O_2])$$

where,

CO_2	0.1	= carbon dioxide concentration, %
O_2	20.5	= oxygen concentration, %
Md	28.84	= lb/lb mol

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = (Md \times [1 - BWS]) + (18.015 \times BWS)$$

where,

Md	28.84	= molecular weight (DRY), lb/lb mol
BWS	0.233	= moisture fraction, dimensionless
Ms	26.32	= lb/lb mol

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

Cp	0.84	= pitot tube coefficient
$\Delta P^{1/2}$	0.619	= average pre/post test velocity head of stack gas, $(\text{in. } H_2O)^{1/2}$
Ts	606.3	= average pre/post test absolute stack temperature, °R
Ps	29.59	= absolute stack gas pressure, in. Hg
Ms	26.32	= molecular weight of stack gas, lb/lb mol
Vs	39.1	= ft/sec

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

Vs	39.1	= stack gas velocity, ft/sec
As	18.99	= cross-sectional area of stack, ft^2
Qa	44,542	= acfm

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = \frac{17.636 \times Qa \times (1 - BWS) \times Ps}{Ts}$$

where,

Qa	44,542	= average stack gas flow at stack conditions, acfm
BWS	0.233	= moisture fraction, dimensionless
Ps	29.59	= absolute stack gas pressure, in. Hg
Ts	606.3	= average pre/post test absolute stack temperature, °R
Qs	29,416	= dscfm

Dry Gas Meter Calibration Check (Yqa), percent

$$Yqa = \frac{Y - \left(\frac{\Theta}{Vm} \sqrt{\frac{K \times Tm \times 29}{\Delta H@ \times \left(Pb + \frac{\Delta Havg.}{13.6} \right) \times Md}} \sqrt{\Delta H}\ avg. \right)}{Y} \times 100$$

where,

Y	0	= meter correction factor, dimensionless
Θ	0	= run time, min.
Vm	--	= total meter volume, dcf
K	0.0319	= K-factor, (in. Hg/°R) * cfm^2
Tm	--	= absolute meter temperature, °R
ΔH@	0	= orifice meter calibration coefficient, in. H_2O
Pb	--	= barometric pressure, in. Hg
ΔH avg	--	= average pressure differential of orifice, in H_2O
Md	--	= molecular weight (DRY), lb/lb mol
$(\Delta H)^{1/2}$	#VALUE!	= average square root pressure differential of orifice, $(\text{in. } H_2O)^{1/2}$
Yqa	--	= percent

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 3A

O_2 - Outlet Concentration (C_{O_2}), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	20.1	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.0	= actual concentration of calibration gas, % dry
C_M	9.9	= average of pretest & posttest calibration responses, % dry
C_{O_2}	20.5	= O_2 Concentration, % dry

CO_2 - Outlet Concentration (C_{CO_2}), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	0.2	= average analyzer value during test, % dry
C_o	0.1	= average of pretest & posttest zero responses, % dry
C_{MA}	10.1	= actual concentration of calibration gas, % dry
C_M	9.7	= average of pretest & posttest calibration responses, % dry
C_{CO_2}	0.1	= CO_2 Concentration, % dry

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Run No. /Method Run 1 / Method 16

TRS - Outlet Concentration (C_{TRS}), ppmvd

$$C_{TRS} = (C_{obs} - C_0) \times \left(\frac{C_{MA}}{(C_M - C_0)} \right)$$

where,

C_{obs}	3.8	= average analyzer value during test, ppmvd
C_o	NA	= average of pretest & posttest zero responses, ppmvd
C_{MA}	NA	= actual concentration of calibration gas, ppmvd
C_M	NA	= average of pretest & posttest calibration responses, ppmvd
C_{TRS}	4.5	= TRS Concentration, ppmvd

TRS - Outlet Emission Rate (ER_{TRS}), lb/hr

$$ER_{TRS} = \frac{C_{TRS} \times MW \times Qs \times 60 \ \frac{min}{hr} \times 28.32 \ \frac{L}{ft^3}}{24.04 \ \frac{L}{g-mole} \times 1.0E06 \times 453.592 \frac{g}{lb}}$$

where,

C_{TRSc}	4.5	= TRS - Outlet Concentration, ppmvd
MW	34.081	= TRS molecular weight, g/g-mole
Qs	29,416	= stack gas volumetric flow rate at standard conditions, dscfm
ER_{TRS}	0.70	= lb/hr as H_2S

TRS - Outlet Emission Factor (EF_{TRSPPT}), lb/ton

$$EF_{TRS} = \frac{ER_{TRS} \times 2{,}000 \ \frac{lb}{ton}}{FR}$$

where,

ER_{TRS}	0.70	= TRS - Outlet Emission Rate, lb/hr as H_2S
FR	188,000	= Feed Rate, lb/hr
EF_{TRS}	0.007	= lb/ton

Appendix B - Field Data

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

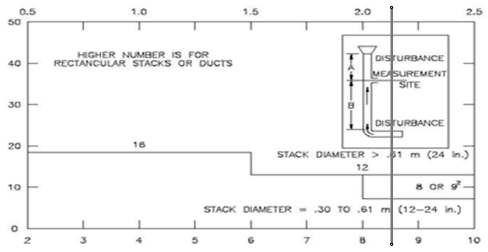
Run Number		Run 1	Run 2	Run 3	Average
Date		10/28/25	10/28/25	10/28/25	--
Start Time		8:15	11:35	14:58	--
Stop Time		11:14	14:34	17:57	--
Source Data					
Feed Rate, ton/hr BLS	FR	94	94	94	94
Input Data - Outlet					
Volumetric Flow Rate (M1-4), dscfm	Qs	29,416	29,913	29,037	29,455
Calculated Data - Outlet					
O_2 Concentration, % dry	C_{O_2}	20.46	20.48	20.50	20.48
CO_2 Concentration, % dry	C_{CO_2}	0.12	0.09	0.08	0.10
TRS (as SO_2) Concentration, ppmvd	C_{TRS}	4.5	5.7	5.9	5.4
TRS (as H_2S) Emission Rate, lb/hr	ER_{TRSc}	0.70	0.91	0.91	0.84
TRS (as H_2S) Emission Factor, lb/ton BLS	EF_{TRSc}	0.0075	0.0097	0.0097	0.0089

Method 1 Data

Location	Graphic Packaging International Texarkana Mill - Queen City, TX
Source	No. 2 Smelt Tank Scrubber (SM02)
Project No.	AST-2025-4218
Date	10/28/25

Stack Parameters

Duct Orientation:	Vertical	
Duct Design:	Circular	
Distance from Far Wall to Outside of Port:	63.00	in
Nipple Length:	4.00	in
Depth of Duct:	59.00	in
Cross Sectional Area of Duct:	18.99	ft^2
No. of Test Ports:	2	
Number of Readings per Point:	1	
Distance A:	55.0	ft
Distance A Duct Diameters:	11.2	**(must be ≥ 0.5)**
Distance B:	42.0	ft
Distance B Duct Diameters:	8.5	**(must be ≥ 2)**
Minimum Number of Traverse Points:	12	
Actual Number of Traverse Points:	12	
Measurer (Initial and Date):	TJB 10/28/25	
Reviewer (Initial and Date):	RW 10/28/25	



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

**Percent of stack diameter from inside wall to traverse point.*

Traverse Point	% of Diameter	Distance from inside wall (in)	Distance from outside of port (in)
1	4.4	2.60	6 5/8
2	14.6	8.61	12 5/8
3	29.6	17.46	21 7/16
4	70.4	41.54	45 9/16
5	85.4	50.39	54 3/8
6	95.6	56.40	60 3/8
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

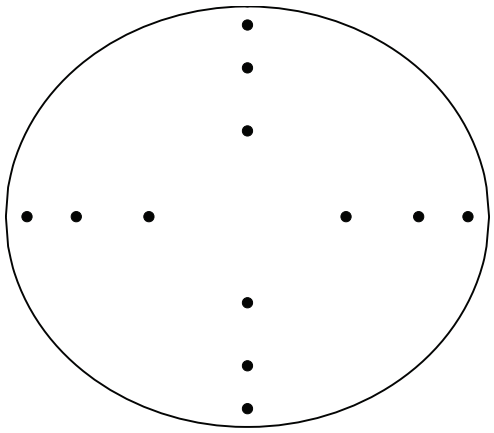
Stack Diagram

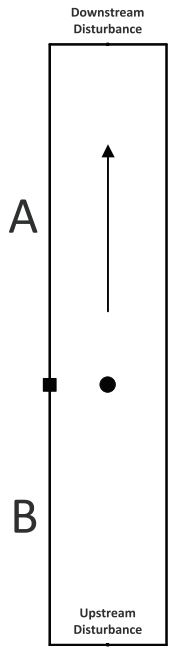
A = 55 ft.

B = 42 ft.

Depth of Duct = 59 in.

Cross Sectional Area





Cyclonic Flow Check

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Date 10/28/25

Sample Point	Angle (ΔP=0)
1	2
2	5
3	5
4	1
5	6
6	8
7	5
8	2
9	2
10	0
11	8
12	5
Average	4.1

Field Data
Method 2 Data

Location Graphic Packaging International Texarkana Mill - Queen City, TX

Source No. 2 Smelt Tank Scrubber (SM02)

Project No. AST-2025-4218

Run No.	1		2		3	
Date	10/28/25		10/28/25		10/28/25	
Status	VALID		VALID		VALID	
Start Time	10:45		11:50		16:20	
Stop Time	10:55		12:00		16:32	
Leak Check	Pass		Pass		Pass	
Traverse Point	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**	**Δ P (in. WC)**	**Ts (°F)**
A-1	0.25	146	0.24	145	0.26	145
2	0.29	146	0.33	145	0.28	146
3	0.37	147	0.39	146	0.35	146
4	0.52	147	0.55	147	0.51	147
5	0.48	147	0.47	147	0.45	147
6	0.45	146	0.42	147	0.40	148
B-1	0.36	145	0.38	146	0.35	145
2	0.31	146	0.33	146	0.33	147
3	0.35	147	0.36	147	0.35	148
4	0.39	147	0.42	147	0.38	148
5	0.45	148	0.47	145	0.45	149
6	0.42	147	0.40	145	0.43	148

					Average
Square Root of ΔP, (in. WC)$^{1/2}$	$(\Delta P)^{1/2}$	0.619	0.627	0.612	0.619
Average ΔP, in. WC	(ΔP)	0.39	0.40	0.38	0.39
Pitot Tube Coefficient	(Cp)	0.838	0.838	0.838	0.838
Barometric Pressure, in. Hg	(Pb)	29.63	29.63	29.63	29.63
Static Pressure, in. WC	(Pg)	-0.50	-0.48	-0.45	-0.48
Stack Pressure, in. Hg	(Ps)	29.59	29.59	29.60	29.59
Average Temperature, °F	(Ts)	146.6	146.1	147.0	146.6
Average Temperature, °R	(Ts)	606.3	605.8	606.7	606.2
Moisture Fraction @ Saturation	(BWSsat)	0.233	0.230	0.235	0.233
Moisture Fraction	(BWS)	0.233	0.230	0.235	0.233
O2 Concentration, %	(O_2)	20.46	20.48	20.50	20.5
CO2 Concentration, %	(CO_2)	0.12	0.09	0.08	0.1
Molecular Weight, lb/lb-mole (dry)	(Md)	28.84	28.83	28.83	28.83
Molecular Weight, lb/lb-mole (wet)	(Ms)	26.32	26.35	26.29	26.32
Velocity, ft/sec	(Vs)	39.1	39.6	38.7	39.1
VFR at stack conditions, acfm	(Qa)	44,542	45,085	44,132	44,586
VFR at standard conditions, scfh	(Qsw)	2,300,688	2,330,761	2,278,220	2,303,223
VFR at standard conditions, scfm	(Qsw)	38,345	38,846	37,970	38,387
VFR at standard conditions, dscfm	(Qsd)	29,416	29,913	29,037	29,455

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.10	0.19	3.83
Cal Gas Concentration (C_{MA})	10.02	10.09	NA
Pretest System Zero Response	0.13	0.07	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.14	0.08	NA
Pretest System Cal Response	9.91	9.78	NA
Posttest System Cal Response	9.92	9.69	NA
Average Cal Response (C_M)	9.92	9.74	NA
Corrected Run Average (Corr)	20.46	0.12	4.49
8:15	20.27	0.19	2.90
8:16	20.27	0.18	2.98
8:17	20.25	0.18	3.06
8:18	20.23	0.18	3.01
8:19	20.19	0.19	3.11
8:20	20.18	0.19	3.10
8:21	20.16	0.19	3.19
8:22	20.13	0.19	3.27
8:23	20.09	0.20	3.35
8:24	20.08	0.20	3.46
8:25	20.07	0.20	3.55
8:26	20.05	0.20	3.64
8:27	20.02	0.20	3.59
8:28	19.97	0.20	3.69
8:29	20.00	0.20	3.97
8:30	20.06	0.19	3.98
8:31	20.07	0.19	3.97
8:32	20.09	0.19	3.90
8:33	20.11	0.19	3.80
8:34	20.12	0.18	3.60
8:35	20.14	0.18	3.38
8:36	20.14	0.18	3.33
8:37	20.15	0.18	3.45
8:38	20.14	0.19	3.33
8:39	20.12	0.19	3.26
8:40	20.09	0.19	3.38
8:41	20.09	0.20	3.48
8:42	20.05	0.20	3.35
8:43	20.04	0.21	3.24
8:44	20.07	0.19	3.17
8:45	20.09	0.18	3.15
8:46	20.09	0.18	3.09
8:47	20.10	0.18	3.04
8:48	20.14	0.17	3.12
8:49	20.16	0.17	3.13

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
8:50	20.15	0.17	3.02
8:51	20.17	0.17	2.96
8:52	20.13	0.18	3.02
8:53	20.13	0.18	3.04
8:54	20.13	0.18	3.05
8:55	20.14	0.18	3.06
8:56	20.15	0.18	3.08
8:57	20.13	0.18	3.04
8:58	20.14	0.18	3.02
8:59	20.14	0.18	3.07
9:00	20.13	0.18	3.12
9:01	20.15	0.18	3.24
9:02	20.15	0.18	3.20
9:03	20.17	0.18	3.12
9:04	20.15	0.18	3.20
9:05	20.15	0.18	3.17
9:06	20.12	0.18	3.17
9:07	20.12	0.18	3.19
9:08	20.13	0.18	3.26
9:09	20.13	0.18	3.21
9:10	20.11	0.18	3.26
9:11	20.06	0.19	3.32
9:12	20.03	0.19	3.34
9:13	20.07	0.19	3.44
9:14	20.07	0.19	3.47
9:15	20.03	0.20	3.49
9:16	20.03	0.20	3.42
9:17	20.09	0.19	3.49
9:18	20.10	0.19	3.48
9:19	20.15	0.18	3.49
9:20	20.18	0.18	3.46
9:21	20.15	0.19	3.47
9:22	20.10	0.19	3.49
9:23	20.12	0.19	3.41
9:24	20.15	0.19	3.40
9:25	20.13	0.19	3.52
9:26	20.15	0.19	3.58
9:27	20.08	0.20	3.54
9:28	19.93	0.22	3.61
9:29	19.90	0.22	3.73
9:30	19.93	0.22	3.78
9:31	19.82	0.24	3.90
9:32	19.80	0.24	4.04
9:33	19.81	0.24	4.04
9:34	19.93	0.22	3.97

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
9:35	20.02	0.21	3.86
9:36	20.06	0.20	3.76
9:37	20.10	0.19	3.72
9:38	20.11	0.19	3.65
9:39	20.10	0.19	3.58
9:40	20.09	0.19	3.58
9:41	20.13	0.18	3.60
9:42	20.14	0.18	3.54
9:43	20.15	0.18	3.53
9:44	20.11	0.19	3.51
9:45	20.11	0.19	3.59
9:46	20.12	0.18	3.68
9:47	20.07	0.19	3.66
9:48	20.03	0.20	3.71
9:49	20.09	0.19	3.71
9:50	20.11	0.19	3.76
9:51	20.16	0.18	3.78
9:52	20.15	0.18	3.81
9:53	20.14	0.18	3.78
9:54	20.11	0.19	3.76
9:55	20.14	0.19	3.75
9:56	20.16	0.19	3.68
9:57	20.14	0.20	3.76
9:58	20.11	0.20	3.80
9:59	20.13	0.20	3.76
10:00	20.17	0.19	3.71
10:01	20.16	0.20	3.73
10:02	20.14	0.22	3.75
10:03	20.16	0.20	3.91
10:04	20.08	0.22	4.02
10:05	20.07	0.23	4.08
10:06	20.09	0.23	4.12
10:07	20.13	0.21	4.14
10:08	20.15	0.19	4.23
10:09	20.15	0.20	4.21
10:10	20.12	0.21	4.29
10:11	20.11	0.22	4.29
10:12	20.10	0.22	4.28
10:13	20.11	0.20	4.31
10:14	20.11	0.21	4.28
10:15	20.05	0.23	4.28
10:16	20.05	0.21	4.33
10:17	20.12	0.20	4.25
10:18	20.10	0.22	4.23
10:19	20.10	0.20	4.25

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
10:20	20.09	0.20	4.26
10:21	20.11	0.20	4.36
10:22	20.15	0.18	4.38
10:23	20.11	0.18	4.34
10:24	20.09	0.19	4.30
10:25	20.09	0.19	4.37
10:26	20.12	0.18	4.49
10:27	20.16	0.18	4.39
10:28	20.16	0.18	4.29
10:29	20.10	0.18	4.25
10:30	20.05	0.19	4.32
10:31	20.02	0.19	4.37
10:32	20.02	0.19	4.43
10:33	20.02	0.20	4.46
10:34	20.03	0.20	4.55
10:35	20.06	0.20	4.61
10:36	20.08	0.19	4.65
10:37	20.11	0.18	4.64
10:38	20.07	0.19	4.61
10:39	20.06	0.18	4.58
10:40	20.10	0.18	4.56
10:41	20.11	0.19	4.60
10:42	20.13	0.18	4.55
10:43	20.12	0.18	4.53
10:44	20.10	0.18	4.51
10:45	20.07	0.19	4.49
10:46	20.08	0.18	4.48
10:47	20.10	0.18	4.56
10:48	20.10	0.18	4.50
10:49	20.12	0.18	4.50
10:50	20.15	0.19	4.37
10:51	20.14	0.19	4.29
10:52	20.11	0.19	4.19
10:53	20.10	0.19	4.34
10:54	20.02	0.20	4.34
10:55	20.04	0.21	4.40
10:56	20.07	0.21	4.41
10:57	20.17	0.19	4.47
10:58	20.11	0.19	4.51
10:59	20.11	0.18	4.41
11:00	20.08	0.20	4.43
11:01	20.08	0.21	4.61
11:02	20.03	0.22	4.64
11:03	20.05	0.20	4.62
11:04	20.10	0.19	4.66

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
11:05	20.11	0.18	4.65
11:06	20.14	0.18	4.58
11:07	20.12	0.20	4.58
11:08	20.14	0.19	4.49
11:09	20.20	0.20	4.44
11:10	20.17	0.19	4.51
11:11	20.20	0.17	4.50
11:12	20.24	0.16	4.47
11:13	20.23	0.17	4.43
11:14	20.23	0.17	4.42

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.12	0.17	4.95
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.08	NA
Posttest System Zero Response	0.15	0.09	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.69	NA
Posttest System Cal Response	9.92	9.68	NA
Average Cal Response (C_M)	9.92	9.69	NA
Corrected Run Average (Corr)	20.48	0.09	5.72
11:35	20.16	0.20	4.78
11:36	20.21	0.20	4.72
11:37	20.21	0.18	4.64
11:38	20.19	0.18	4.57
11:39	20.19	0.18	4.55
11:40	20.19	0.18	4.62
11:41	20.24	0.17	4.52
11:42	20.20	0.19	4.52
11:43	20.20	0.18	4.49
11:44	20.21	0.17	4.46
11:45	20.21	0.17	4.49
11:46	20.23	0.16	4.51
11:47	20.22	0.17	4.52
11:48	20.17	0.18	4.43
11:49	20.07	0.20	4.53
11:50	20.13	0.19	4.48
11:51	20.14	0.20	4.52
11:52	20.15	0.20	4.54
11:53	20.20	0.17	4.54
11:54	20.27	0.16	4.53
11:55	20.26	0.16	4.58
11:56	20.22	0.16	4.56
11:57	20.18	0.16	4.57
11:58	20.16	0.17	4.59
11:59	20.19	0.16	4.63
12:00	20.21	0.16	4.64
12:01	20.23	0.17	4.68
12:02	20.21	0.18	4.70
12:03	20.21	0.17	4.74
12:04	20.21	0.17	4.65
12:05	20.21	0.18	4.60
12:06	20.16	0.20	4.58
12:07	19.99	0.23	4.72
12:08	20.01	0.20	4.81
12:09	20.05	0.19	4.87

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:10	20.06	0.19	5.00
12:11	20.10	0.18	5.06
12:12	20.17	0.17	5.01
12:13	20.22	0.17	4.93
12:14	20.20	0.17	4.87
12:15	20.20	0.17	4.95
12:16	20.23	0.16	4.82
12:17	20.24	0.16	4.73
12:18	20.24	0.16	4.66
12:19	20.27	0.16	4.69
12:20	20.25	0.16	4.68
12:21	20.18	0.17	4.74
12:22	20.20	0.16	4.79
12:23	20.14	0.17	4.67
12:24	20.15	0.17	4.75
12:25	20.19	0.16	4.75
12:26	20.19	0.16	4.78
12:27	20.18	0.17	4.91
12:28	20.17	0.17	4.94
12:29	20.17	0.16	4.90
12:30	20.18	0.16	4.87
12:31	20.16	0.17	4.87
12:32	20.19	0.16	4.95
12:33	20.22	0.16	4.93
12:34	20.23	0.16	4.94
12:35	20.23	0.16	4.91
12:36	20.21	0.16	4.87
12:37	20.22	0.15	4.65
12:38	20.25	0.15	4.35
12:39	20.23	0.15	4.31
12:40	20.22	0.15	4.43
12:41	20.16	0.16	4.53
12:42	20.05	0.18	4.59
12:43	19.92	0.19	4.76
12:44	19.90	0.19	4.86
12:45	19.97	0.18	4.97
12:46	20.06	0.17	4.92
12:47	20.11	0.16	4.93
12:48	20.12	0.16	4.97
12:49	20.18	0.15	4.94
12:50	20.22	0.15	4.96
12:51	20.23	0.15	4.89
12:52	20.21	0.15	4.80
12:53	20.18	0.16	4.72
12:54	20.13	0.16	4.72

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
12:55	20.11	0.17	4.68
12:56	20.07	0.17	4.74
12:57	20.08	0.17	4.76
12:58	20.02	0.17	4.83
12:59	19.94	0.18	4.96
13:00	19.97	0.18	5.01
13:01	19.94	0.18	4.99
13:02	19.97	0.18	5.08
13:03	20.01	0.17	5.21
13:04	20.05	0.17	5.33
13:05	20.09	0.16	5.35
13:06	20.11	0.16	5.40
13:07	20.11	0.16	5.39
13:08	20.11	0.16	5.35
13:09	20.09	0.16	5.30
13:10	20.07	0.17	5.25
13:11	20.08	0.17	5.24
13:12	20.02	0.18	5.32
13:13	19.98	0.18	5.37
13:14	20.01	0.17	5.39
13:15	19.98	0.18	5.51
13:16	19.95	0.18	5.59
13:17	20.00	0.18	5.53
13:18	20.06	0.17	5.50
13:19	20.06	0.17	5.51
13:20	20.03	0.18	5.42
13:21	20.08	0.18	5.37
13:22	20.08	0.17	5.37
13:23	20.05	0.18	5.35
13:24	20.11	0.17	5.16
13:25	20.15	0.17	5.14
13:26	20.17	0.17	5.14
13:27	20.18	0.17	5.10
13:28	20.18	0.17	5.13
13:29	20.20	0.17	5.22
13:30	20.20	0.17	5.14
13:31	20.17	0.17	5.13
13:32	20.14	0.17	5.16
13:33	20.16	0.18	5.17
13:34	20.17	0.17	5.11
13:35	20.14	0.18	5.15
13:36	20.13	0.18	5.06
13:37	20.10	0.19	5.06
13:38	20.15	0.18	5.10
13:39	20.20	0.17	5.10

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
13:40	20.22	0.16	5.02
13:41	20.21	0.17	4.90
13:42	20.18	0.17	4.88
13:43	20.18	0.17	4.86
13:44	20.13	0.17	4.86
13:45	20.11	0.18	4.87
13:46	20.14	0.18	4.93
13:47	20.12	0.18	4.90
13:48	20.15	0.18	4.87
13:49	20.15	0.17	4.92
13:50	20.16	0.17	4.86
13:51	20.16	0.17	4.86
13:52	20.14	0.17	4.95
13:53	20.13	0.17	4.97
13:54	20.08	0.18	5.00
13:55	20.00	0.19	4.97
13:56	19.97	0.19	5.02
13:57	19.96	0.19	5.07
13:58	19.94	0.19	5.01
13:59	19.96	0.19	5.08
14:00	19.99	0.18	5.17
14:01	20.01	0.18	5.26
14:02	20.01	0.18	5.34
14:03	19.96	0.19	5.33
14:04	19.91	0.19	5.45
14:05	19.97	0.18	5.53
14:06	20.00	0.18	5.32
14:07	19.99	0.18	5.28
14:08	20.02	0.18	5.25
14:09	19.98	0.18	5.25
14:10	20.00	0.18	5.31
14:11	20.03	0.18	5.29
14:12	19.98	0.19	5.24
14:13	20.04	0.18	5.23
14:14	19.97	0.19	5.16
14:15	19.97	0.19	5.25
14:16	20.02	0.18	5.28
14:17	20.01	0.18	5.22
14:18	20.05	0.17	5.17
14:19	20.07	0.17	5.14
14:20	20.06	0.17	5.10
14:21	20.07	0.17	5.18
14:22	20.08	0.17	5.25
14:23	20.07	0.17	5.23
14:24	20.03	0.17	5.07

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
14:25	20.03	0.17	4.96
14:26	20.05	0.17	4.98
14:27	20.13	0.16	4.94
14:28	20.15	0.16	4.93
14:29	20.16	0.16	4.95
14:30	20.19	0.16	4.95
14:31	20.21	0.15	4.90
14:32	20.20	0.16	4.87
14:33	20.22	0.15	4.85
14:34	20.22	0.15	4.70

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time Unit Status	O_2 - Outlet % dry Valid	CO_2 - Outlet % dry Valid	TRS - Outlet ppmvd Valid
Uncorrected Run Average (C_{obs})	20.16	0.16	5.31
Cal Gas Concentration (C_{MA})	10.02	10.09	15.00
Pretest System Zero Response	0.15	0.09	NA
Posttest System Zero Response	0.15	0.08	NA
Average Zero Response (Co)	0.15	0.09	NA
Pretest System Cal Response	9.92	9.68	NA
Posttest System Cal Response	9.95	9.65	NA
Average Cal Response (C_M)	9.94	9.67	NA
Corrected Run Average (Corr)	20.50	0.08	5.91
14:58	20.01	0.20	4.79
14:59	19.99	0.20	4.82
15:00	20.00	0.20	4.85
15:01	20.01	0.19	4.81
15:02	20.04	0.19	4.80
15:03	20.06	0.18	4.78
15:04	20.06	0.18	4.78
15:05	20.07	0.18	4.84
15:06	20.12	0.17	4.86
15:07	20.14	0.17	4.96
15:08	20.16	0.17	4.99
15:09	20.13	0.17	4.90
15:10	20.12	0.17	4.93
15:11	20.14	0.17	4.91
15:12	20.18	0.16	4.83
15:13	20.23	0.16	4.77
15:14	20.22	0.16	4.73
15:15	20.26	0.15	4.72
15:16	20.25	0.16	4.59
15:17	20.26	0.15	4.48
15:18	20.28	0.15	4.42
15:19	20.24	0.15	4.41
15:20	20.27	0.14	4.35
15:21	20.28	0.15	4.39
15:22	20.23	0.15	4.53
15:23	20.31	0.14	4.50
15:24	20.18	0.16	4.53
15:25	20.09	0.17	4.67
15:26	20.05	0.18	4.71
15:27	19.95	0.19	4.80
15:28	19.96	0.18	4.93
15:29	19.94	0.19	5.02
15:30	19.96	0.18	5.31
15:31	20.00	0.17	5.56
15:32	20.05	0.17	5.58

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
15:33	20.10	0.16	5.51
15:34	20.16	0.16	5.41
15:35	20.19	0.15	5.40
15:36	20.20	0.15	5.37
15:37	20.21	0.15	5.28
15:38	20.24	0.15	5.17
15:39	20.21	0.15	5.15
15:40	20.20	0.15	5.20
15:41	20.17	0.15	5.15
15:42	20.17	0.15	5.16
15:43	20.19	0.15	5.05
15:44	20.20	0.14	4.97
15:45	20.20	0.14	5.00
15:46	20.21	0.14	4.90
15:47	20.19	0.15	4.92
15:48	20.24	0.14	4.68
15:49	20.22	0.15	4.60
15:50	20.20	0.15	4.63
15:51	20.16	0.16	4.63
15:52	20.15	0.16	4.63
15:53	20.17	0.16	4.66
15:54	20.19	0.15	5.06
15:55	20.22	0.15	5.10
15:56	20.22	0.15	5.13
15:57	20.21	0.15	5.09
15:58	20.20	0.15	4.92
15:59	20.18	0.16	4.91
16:00	20.17	0.16	5.00
16:01	20.19	0.15	4.98
16:02	20.18	0.16	4.89
16:03	20.19	0.15	4.87
16:04	20.21	0.15	4.89
16:05	20.23	0.15	4.84
16:06	20.25	0.15	4.81
16:07	20.27	0.14	4.85
16:08	20.29	0.14	4.91
16:09	20.28	0.14	4.83
16:10	20.28	0.14	4.76
16:11	20.30	0.14	4.85
16:12	20.31	0.14	4.89
16:13	20.28	0.14	4.79
16:14	20.27	0.14	4.70
16:15	20.24	0.15	4.69
16:16	20.24	0.15	4.73
16:17	20.24	0.15	4.93

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
16:18	20.16	0.16	5.01
16:19	20.13	0.16	4.93
16:20	20.15	0.16	4.95
16:21	20.11	0.17	4.98
16:22	20.09	0.17	5.06
16:23	20.04	0.17	5.23
16:24	19.93	0.19	5.39
16:25	19.91	0.20	5.53
16:26	19.96	0.19	5.63
16:27	20.00	0.19	5.72
16:28	20.06	0.18	5.89
16:29	20.12	0.17	6.01
16:30	20.10	0.17	5.94
16:31	20.13	0.17	5.88
16:32	20.11	0.18	5.78
16:33	19.99	0.19	5.78
16:34	19.89	0.21	5.95
16:35	19.91	0.21	6.06
16:36	19.96	0.19	6.07
16:37	20.02	0.18	6.04
16:38	20.07	0.18	6.15
16:39	20.09	0.17	6.07
16:40	20.11	0.16	5.95
16:41	20.17	0.16	5.92
16:42	20.19	0.15	5.79
16:43	20.17	0.16	5.66
16:44	20.21	0.15	5.57
16:45	20.23	0.15	5.43
16:46	20.26	0.15	5.31
16:47	20.26	0.15	5.16
16:48	20.27	0.15	5.07
16:49	20.28	0.15	5.03
16:50	20.26	0.15	4.97
16:51	20.26	0.15	5.08
16:52	20.28	0.15	5.16
16:53	20.28	0.15	5.10
16:54	20.29	0.15	5.06
16:55	20.31	0.15	5.10
16:56	20.30	0.16	5.05
16:57	20.24	0.16	4.98
16:58	20.10	0.18	4.92
16:59	19.97	0.20	4.88
17:00	19.91	0.20	5.33
17:01	19.92	0.20	5.99
17:02	19.96	0.19	6.20

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:03	20.01	0.17	6.25
17:04	20.06	0.17	6.23
17:05	20.07	0.16	6.12
17:06	20.05	0.16	6.12
17:07	20.01	0.17	6.20
17:08	20.09	0.16	6.22
17:09	20.13	0.16	6.13
17:10	20.18	0.15	6.07
17:11	20.19	0.15	6.08
17:12	20.18	0.15	5.96
17:13	20.19	0.15	5.93
17:14	20.17	0.16	5.90
17:15	20.15	0.16	5.90
17:16	20.13	0.16	5.87
17:17	20.17	0.16	5.95
17:18	20.13	0.16	5.84
17:19	20.13	0.16	5.85
17:20	20.14	0.17	6.02
17:21	20.13	0.17	6.18
17:22	20.15	0.17	6.14
17:23	20.16	0.16	6.02
17:24	20.16	0.16	6.00
17:25	20.13	0.17	5.95
17:26	20.15	0.16	5.87
17:27	20.15	0.16	5.84
17:28	20.17	0.16	5.89
17:29	20.23	0.15	5.91
17:30	20.23	0.15	5.89
17:31	20.25	0.14	5.91
17:32	20.24	0.15	5.83
17:33	20.20	0.15	5.74
17:34	20.19	0.15	5.65
17:35	20.18	0.15	5.72
17:36	20.20	0.15	5.73
17:37	20.17	0.16	5.69
17:38	20.15	0.16	5.72
17:39	20.22	0.15	5.71
17:40	20.26	0.15	5.67
17:41	20.27	0.15	5.74
17:42	20.26	0.15	5.72
17:43	20.28	0.15	5.62
17:44	20.30	0.15	5.69
17:45	20.29	0.15	5.61
17:46	20.28	0.15	5.49
17:47	20.29	0.15	5.31

Run 1 - RM Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Time	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Unit	% dry	% dry	ppmvd
Status	Valid	Valid	Valid
17:48	20.28	0.15	5.42
17:49	20.29	0.15	5.47
17:50	20.27	0.15	5.54
17:51	20.28	0.15	5.25
17:52	20.28	0.15	5.11
17:53	20.28	0.15	5.20
17:54	20.28	0.15	5.17
17:55	20.27	0.15	5.20
17:56	20.26	0.15	5.35
17:57	20.26	0.15	5.40

Appendix C - QA/QC

M205 QA Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date

Method Criteria	EPA
Parameter	O_2
Make	Servomex
Model	4900
S/N	900006
Span	19.9
Cylinder Number ID	
Zero	NA
Mid	CC780763
High	EB0074264
Cylinder Certified Values	
Zero	0.00
Mid	10.02
High	19.90
Instrument Response (% or ppm)	
Zero	0.00
Mid	10.04
High	19.91
Calibration Gas Selection (% of Span)	
Mid	50.4
High	100.0
Calibration Error Performance (% of Span)	
Zero	0.0
Mid	0.1
High	0.1
Linearity (% of Range)	
	0.1

Environics ID:	8033
Environics MFC Configuration:	10L, 10L, 1L
Component/Balance Gas:	O_2/N_2
Cylinder Gas ID (Dilution):	EB0074264
Cylinder Gas Concentration (Dilution), %:	19.90
Cylinder Gas ID (Mid-Level):	CC780763
Cylinder Gas Concentration (Mid-Level), %:	10.02

Target Mass Flow Contollers	Target Dilution (%)	Target Flow Rate lpm	Target Concentration (%)	Actual Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)
10L/10L*	90.0	7.0	17.9	17.9	17.95	18.04	18.08	18.02	0.12
10L/10L*	50.0	7.0	10.0	10.0	10.01	10.06	10.04	10.04	0.04
10L/1L	20.0	4.0	4.0	4.0	3.98	3.98	3.95	3.97	-0.03
10L/1L	10.0	4.0	2.0	2.0	1.99	2.05	2.04	2.03	0.03

*Not all AST Environics Units have 2-10L Mass Flow Controllers. For these units the 90% @ 7lpm and 80% @ 7lpm injections will not be conducted.

Average Analyzer Concentration (%)	Injection 1 Error (±2%)	Injection 2 Error (±2%)	Injection 3 Error (±2%)
18.02	-0.4%	0.1%	0.3%
10.04	-0.3%	0.2%	0.0%
3.97	0.3%	0.3%	-0.5%
2.03	-1.8%	1.2%	0.7%

Mid-Level Supply Gas Calibration Direct to Analyzer

Calibration Gas Concentration (%)	Injection 1 Analyzer Concentration (%)	Injection 2 Analyzer Concentration (%)	Injection 3 Analyzer Concentration (%)	Average Analyzer Concentration (%)	Difference (%)	Average Error (±2%)
10.02	10.05	10.07	10.04	10.05	0.03	0.3%

Location Graphic Packaging International Texarkana Mill - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218
Parameter(s) VFR

Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?	
10/28/25	PT-201-7	no	no	no	
Date	**Probe or Thermocouple ID**	**Reference Temp. (°F)**	**Indicated Temp. (°F)**	**Difference**	**Criteria**
10/28/25	PR-208-1	145.0	147.0	0.3%	± 1.5 % (absolute)
Date	**Barometric Pressure**	**Evidence of damage?**	**Reading Verified**	**Calibration or Repair required?**	**Weather Station Location**
10/28/25	Weather Station	NA	NA	NA	Texarkana, TX

Location Graphic Packaging International - Queen City, TX
Source No. 2 Smelt Tank Scrubber (SM02)
Project No. AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Make	Servomex	Servomex	Ametek
Model	4900	4900	9900
S/N	900006	900006	S13821
Operating Range	0-25	0-25	0-100
Cylinder ID			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	CC780763	CC780763	CC331726
High	EB0074264	EB0074264	CC331726
Cylinder Certified Values			
Zero	0.0	0.0	0.0
Low	NA	NA	NA
Mid	10.02	10.09	125.6
High	19.9	19.83	125.6
Cylinder Expiration Date			
Zero	NA	NA	NA
Low	NA	NA	NA
Mid	9/16/33	9/16/33	3/7/27
High	8/12/32	8/12/32	3/7/27
Type of Sample Line	Unheated Sample Line		

Stratification Check

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/2025

Traverse Point	Time	O_2 (%)	CO_2 (%)
A-1	8:15	20.27	0.19
2	8:17	20.25	0.18
3	8:19	20.19	0.19
Average		20.2	0.2
Criteria Met		Single Point	Single Point

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	O_2 - Outlet	CO_2 - Outlet	TRS - Outlet
Expected Average Concentration	19.00	1.00	7.00
Span Between			
Low	19.00	1.00	7.00
High	95.00	20.00	35.00
Desired Span	19.90	19.83	30.00
Low Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Mid Range Gas			
Low	7.96	7.93	12.00
High	11.94	11.90	18.00
High Range Gas			
Low	NA	NA	NA
High	NA	NA	NA
Actual Concentration (% or ppm)			
Zero	0.00	0.00	0.00
Low	NA	NA	NA
Mid	10.02	10.09	15.00
High	19.90	19.83	30.00
Response Time (seconds)	45.00	45.00	45.00
Upscale Calibration Gas (C_{MA})	Mid	Mid	Mid
Instrument Response (% or ppm)			
Zero	-0.03	0.01	0.15
Low	NA	NA	NA
Mid	9.96	9.90	15.61
High	19.88	19.74	30.22
Performance (% of Span or Cal. Gas Conc.)			
Zero	0.15	0.05	0.50
Low	NA	NA	NA
Mid	0.30	0.96	2.03
High	0.10	0.45	0.73
Status			
Zero	PASS	PASS	PASS
Low	NA	NA	NA
Mid	PASS	PASS	PASS
High	PASS	PASS	PASS

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Parameter	O_2 - Outlet	CO_2 - Outlet
Run 1 Date 10/28/25		
Span Value	19.90	19.83
Initial Instrument Zero Cal Response	-0.03	0.01
Initial Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.13	0.07
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.91	9.78
Posttest System Upscale Response	9.92	9.69
Bias (%)		
Pretest Zero	0.80	0.30
Posttest Zero	0.90	0.35
Pretest Span	-0.25	-0.61
Posttest Span	-0.20	-1.06
Drift (%)		
Zero	0.10	0.05
Mid	0.05	-0.45
Run 2 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.08
Posttest System Zero Response	0.15	0.09
Pretest System Upscale Response	9.92	9.69
Posttest System Upscale Response	9.92	9.68
Bias (%)		
Pretest Zero	0.90	0.35
Posttest Zero	0.90	0.40
Pretest Span	-0.20	-1.06
Posttest Span	-0.20	-1.11
Drift (%)		
Zero	0.00	0.05
Mid	0.00	-0.05
Run 3 Date 10/28/25		
Span Value	19.90	19.83
Instrument Zero Cal Response	-0.03	0.01
Instrument Upscale Cal Response	9.96	9.90
Final Instrument Zero Cal Response	-0.03	0.01
Final Instrument Upscale Cal Response	9.96	9.90
Pretest System Zero Response	0.15	0.09
Posttest System Zero Response	0.15	0.08
Pretest System Upscale Response	9.92	9.68
Posttest System Upscale Response	9.95	9.65
Bias (%)		
Pretest Zero	0.90	0.40
Posttest Zero	0.90	0.35
Pretest Span	-0.20	-1.11
Posttest Span	-0.05	-1.26
Drift (%)		
Zero	0.00	-0.05
Mid	0.15	-0.15

Post Test Calibration Drift Data

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter		TRS (w SO2 gas) - Outlet
Actual Concentration (ppm)		
Mid		15.0
Instrument Response (ppm)		
Mid	**Initial**	15.6
	Post Test	15.7
Performance (% of Calibration Gas)		
Mid		0.3
Status		
Mid		PASS

Note: TRS calibrations were conducted using SO2/N2 calibration gas. Analyzer calibration drift was calculated by evaluating the initial instrument response versus the final instrument response. Performance is acceptable if this value is less than or equal to 3% or 0.5 ppmv.

System Performance Determinations

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218
Date: 10/28/25

Parameter	TRS - Outlet
H2S Gas Concentration, ppm	26
Cylinder Certification Number	CC194342
Run 1	
Pretest System Response, ppm	24.67
Posttest System Response, ppm	22.18
Pretest System Performance (%)	94.9
Posttest System Performance (%)	85.3
Run 2	
Posttest System Response, ppm	22.47
Posttest System Performance (%)	86.4
Run 3	
Posttest System Response, ppm	23.36
Posttest System Performance (%)	89.8

Response Times

Location: Graphic Packaging International - Queen City, TX
Source: No. 2 Smelt Tank Scrubber (SM02)
Project No.: AST-2025-4218

Response Times, seconds			
Parameter	**O_2 - Outlet**	**CO_2 - Outlet**	**TRS - Outlet**
Zero	35	35	45
Low	NA	NA	NA
Mid	35	35	45
Average	35.0	35.0	45.0

Alliance
SOURCE TESTING

Mass Flow Controller Calibration

Dilution System Make:	Environics
Dilution System Model:	4040
Dilution System S/N:	8033
Calibration Equipment Make:	Alicat Scientific
Calibration Equipment Model:	M-10SLPD/5MM-D/5M, M-1SLPM-D/5
Calibration Equipment S/N:	NC00075907 / NC0007908
Flow Cell S/N:	272121
Flow Cell S/N:	272120
Calibration Gas:	Nitrogen
Barometric Pressure, mmHg:	29.94
Ambient Temperature, °F:	68

Mass Flow Controller ID	#1			# 2			# 3		
Size, ccm:	10,000			10,000			1,000		
Make:	Environics			Environics			Environics		
Model:	EFC 202			EFC 202			EFC 202		
S/N:	455242005			455242006			455238003		
	Set Flow cc/min	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**	**Set Flow cc/min**	**True Flow cc/min**	**Difference**
5%	500	494	1.2%	500	490	2.0%	50	48	4.0%
10%	1,000	1,006	0.6%	1,000	1,004	0.4%	100	97	3.0%
20%	2,000	2,025	1.3%	2,000	2,025	1.3%	200	195	2.5%
30%	3,000	3,046	1.5%	3,000	3,040	1.3%	300	294	2.0%
40%	4,000	4,050	1.3%	4,000	4,050	1.3%	400	391	2.3%
50%	5,000	5,066	1.3%	5,000	5,070	1.4%	500	490	2.0%
60%	6,000	6,086	1.4%	6,000	6,088	1.5%	600	589	1.8%
70%	7,000	7,103	1.5%	7,000	7,111	1.6%	700	691	1.3%
80%	8,000	8,133	1.7%	8,000	8,130	1.6%	800	795	0.6%
90%	9,000	9,167	1.9%	9,000	9,170	1.9%	900	904	0.4%
100%	10,000	10,202	2.0%	10,000	10,193	1.9%	1,000	1,016	1.6%

Note: The mass flow controller's calibration values are used by the dilution system's operating software to improve accuracy. These calibrations are not necessarily indicative of the systems overall performance. Performance is verified by conducting a Method 205 prior to each field use.

Calibration Performed By Timothy Branham

Date 2/21/25

Equipment Detail

Model: Type S
ID: 201-7

Calibration Detail

Time: 9:18
T_s: 69 °F
Pb: 29.47 in. Hg
Std Pitot ID: DAL 1
C_{pstd}: 0.990

Flow	ΔPstd			High Side - "A"			Low Side - 'B"		
	Standard	Start	End	ΔPs		σ	ΔPs		σ
fps	in. WC	in. WC	in. WC	in. WC	Cp(a)	Deviation	in. WC	Cp(b)	Deviation
20	0.09	0.09	0.09	0.13	0.840	0.002	0.13	0.840	0.007
30	0.20	0.20	0.20	0.29	0.829	-0.009	0.29	0.822	-0.011
40	0.36	0.36	0.36	0.51	0.832	-0.006	0.51	0.832	-0.001
50	0.56	0.56	0.56	0.78	0.839	0.001	0.79	0.834	0.001
60	0.81	0.81	0.81	1.15	0.831	-0.007	1.15	0.831	-0.002
70	1.10	1.10	1.10	1.50	0.848	0.010	1.55	0.834	0.001
80	1.44	1.44	1.44	2.00	0.840	0.002	2.00	0.840	0.007
90	1.82	1.82	1.83	2.50	0.846	0.008	2.60	0.829	-0.004
EPA Method 2 Section 10.1.3 QA/QC									
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.826	-0.007
50	0.56	0.55	0.55	0.78	0.831	-0.007	0.79	0.829	-0.004
				Average	0.838	0.006		0.833	0.004
				Acceptability Criteria	--	≤ 0.01		--	≤ 0.01
					|Cp(a)-Cp(b)|≤ 0.01			|Cp(a)-Cp(b)|=	0.005

Personnel

Calibrated By: Alaina Drouin
Calibration Date: 12/30/24
Reviewed By: Timothy Branham

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12025

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC780763	**Certification Date:**	09/18/2025
Product ID Number:	124300	**Expiration Date:**	09/16/2033
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC780763.20250911-0	**Lot Number:**	CC780763.20250911
Customer PO. NO.:		**Tracking Number:**	113447110
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**10.09 %**	±0.08 %	NDIR	09/18/2025
Oxygen	**10.02 %**	±0.03 %	MPA	09/18/2025
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC726840	CC726840.20211123	04/18/2031	GMIS	N2	O2	9.35 %	0.163	SRM 2659a
CC770488	CC770488.20240512	02/02/2033	GMIS	N2	O2	24.01 %	0.145	C2459101.03
EB0073532	EB0073532.20230816	09/17/2032	GMIS	N2	CO2	9.47 %	0.176	C2281801.04
EB0078951	EB0078951.20230816	09/17/2032	GMIS	N2	CO2	12.44 %	0.227	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i-HL	1162980025	09/08/2025
CO2	NDIR	Thermo	410i-HL	1162980025	09/10/2025

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-N, Revised on 2024-11-03

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12024

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0074264	**Certification Date:**	08/14/2024
Product ID Number:	124240	**Expiration Date:**	08/12/2032
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0074264.20240730-0	**Lot Number:**	EB0074264.20240730
Customer PO. NO.:		**Tracking Number:**	084251978
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**19.83 %**	±0.08 %	FTIR	08/14/2024
Oxygen	**19.90 %**	±0.04 %	MPA	08/08/2024
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
FF61042	71-F-31	02/27/2026	SRM	N2	O2	20.753 %	0.101	SRM 2659a
EB0022009	EB0022009.20201022	04/05/2030	GMIS	N2	CO2	24.76 %	0.237	C1847810.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/07/2024
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	08/14/2024

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Gabriel Ouma
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-K, Revised on 2023-09-07

Airgas Specialty Gases
Airgas USA LLC
9810 BAY AREA BLVD
Pasadena, TX 77507
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	GRAPHIC PACKAGING INTERNATIONAL		
Part Number:	E02NI99E15A0005	Reference Number:	163-401487138-1
Cylinder Number:	CC331726	Cylinder Volume:	144.4 CF
Laboratory:	124 - Pasadena (SG06) - TX	Cylinder Pressure:	2015 PSIG
PGVP Number:	A32019	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	May 07, 2019

Expiration Date: May 07, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	125.0 PPM	125.6 PPM	G1	+/- 0.8% NIST Traceable	04/30/2019, 05/07/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11010402	KAL004739	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Jul 28, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SO2-L-NICOLET iS50 AUP2010248	FTIR	Apr 13, 2019

Triad Data Available Upon Request

Signature on file

Approved for Release

Red Ball Technical Gas Services
14200 Beamer Road
Friendswood, TX 77546

PJLA Calibration and Testing Accreditation #112095

Certificate of Analysis

Certified Standard

ALLIANCE SOURCE
NORTH LITTLE ROCK, AR

Blend Type:	GAS	MOL	
Pressure:	1800	psia	**Sales Order: 1394449**
Volume:	125.0	cf	
Dew Point:	0 C		**RBTGS Part No.:** 130254

Cylinder Size: I-150
Valve Outlet: CGA 330 SS
Cylinder No.: **CC194342**
Bar Code No.: 040319029

Lot No.: RR2503141153
Analysis Date: March 24, 2025
Date Issued: March 24, 2025
Expiration Date: March 24, 2026

Component	CAS No.	Requested Concentration		Certified Concentration Mol	Weight	Volume	Units	Analytical Uncertainty ±	Analytical Principle
Hydrogen Sulfide	7783-06-4	25.0	ppm	26.0	31.4	26.0	ppm	2%	G
Oxygen	7782-44-7	5.0	%	5.10	5.78	5.10	%	2%	H
Nitrogen	7727-37-9		Balance				Balance		

Key to Analytical Principle:

A: Gas Chromatograph with Flame Photometric Detector
B: Gas Chromatograph with Flame Ionization Detector
C: Flame Ionization with Methanizer
D: Gas Chromatograph with Thermal Conductivity Detector
E: Gas Chromatograph with Pulsed Discharge Helium Ionization Detector
F: Electrolytic Hygrometer
G: Electrochemical H2S Analyzer
H: Paramagnetic Oxygen Analyzer
I: Total Sulfur Analyzer - MWDXRF
J: Infrared - NDIR
K: Coulometric Titration
L: Detector Tube
M: Gravimetric
N: Total Hydrocarbon Analyzer - FID

Authorized By: **Jerry Menindez, Analytical Chemist**
Assay Laboratory: Red Ball TGS-Houston

N.I.S.T. Traceability Statement

The results published on this certificate apply only to the items described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. The stability of this mixture cannot be guaranteed if the pressure falls below ten percent of the original certified pressure and/or beyond the expiration date. The concentration may vary with changes in temperature and pressure. Store mixture above the specified dew point. This blend was gravimetrically produced at a minimum of ±1% accuracy to the above specified dew point. The scales used have weekly calibration checks for process control purposes. All scales are calibrated annually with N.I.S.T. traceable weights and performed to NIST Handbook 44, Section N by Nicol Scales. • Best measurement of uncertainty calculated using a coverage factor of K=2. This provides a confidence level of 95%. NIST Test No.'s.: 148544, 148545, 148759, 148549, 148548, 148550, 148546 • Using Standards 2K7Z, 4VBJ, 4VBB, 4VBC, 4VBD, 4VBE, 4VBF • License No.: 717525.

This product was manufactured in the United States of America.

Appendix D - Facility Data

#2 Smelt Diss. Tnk. Scrubber Process Data

	Start Time:	10/28/2025 14:58:00 PM	10/28/25 11:35	10/28/25 8:15	
	End Time:	10/28/25 17:58	10/28/25 14:35	10/28/25 11:15	
	Run #	3	2	1	
Tag					Avg
FY2190E.pv	Steam load (kpph)	657.19	656.52	663.25	659.0
FIC2037E.pv	Pri. Air load -- Total (kpph)	372.32	377.74	372.32	374.1
FIC2038E.pv	Sec. Air load (kpph)	332.76	331.01	331.99	331.9
FIC2039E.pv	Tertiary Air load (kpph)	195.07	195.46	197.83	196.1
AT2197E.pv	Excess O2	2.64	2.47	2.48	2.5
PIC2192E.pv	Furnace Press. (in. w.c.)	0.20	0.20	0.20	0.2
SIC2084E.pv	"A" I.D. fan speed (rpm)	75.33	75.54	74.73	75.2
SIC2085E.pv	"B" I.D. fan speed (rpm)	76.15	76.37	75.54	76.0
FY2103E.pv	Bl. Liq. Burn flow (gpm)	408.46	408.93	413.13	410.2
NM2102E.pv	Bl. Liq. % density (%)	71.92	71.85	71.32	71.7
TT2105E.pv	Bl. Liq. Nozzle temp. (F)	259.22	258.75	259.05	259.0
FYC2102E.pv	Bl. Liq. Flow (ton/hr)	95.05	95.04	95.07	95.1
FT2257E.pv	Nat. Gas Flow (kcfh)	0.00	0.00	0.00	0.0
FT2013E.pv	Weak Wash flow to fan (gpm)	81.72	78.89	73.06	77.9
FT2004E.pv	Weak Wash flow to scrubber (gpm)	94.46	87.14	87.83	89.8
TT2268E.PV	Precip. Ash Tank Temp. (F)	224.93	224.46	224.04	224.5
IT3028e.pv	Scrubber fan amps	45.79	45.62	45.26	45.6

Appendix E - Test Plan

Site Specific Test Plan

Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Source to be Tested:
No. 2 Smelt Tank Scrubber (SM02)

Proposed Test Dates:
October 29, 2025

Project No. AST-2025-4218

Prepared By
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Regulatory Information

TCEQ RN No.	RN100543115
TCEQ CN No.	CN601710460
TCEQ Permit Nos.	2975; PSDTX778M2
Regulatory Citation	40 CFR 60, Subpart BBa

Source Information

Source Name	*Source ID*	*Target Parameter*
No. 2 Smelt Tank Scrubber	SM02	TRS

Contact Information

Test Location
Graphic Packaging International
Texarkana Mill
9978 FM 3129
Queen City, TX 75572

Facility Contact
John Fussell
john.t.fussell@graphicpkg.com
(903) 796-1505

Test Company
Alliance Technical Group, LLC
15 Maumelle Curve Ct., Suite B
North Little Rock, AR 72113

Project Manager
Riley Wilson
riley.wilson@alliancetg.com
(479) 857-2146

QA/QC Manager
Kathleen Shonk
katie.shonk@alliancetg.com
(812) 452-4785

Test Plan/Report Coordinator
Brendon Vyain
brendon.vyain@alliancetg.com
(765) 432-5129

Test Plan/Report Reviewer
Michael Mowery
mike.mowery@alliancetg.com
(865) 310-0439

Analytical Laboratory
Alliance Technical Group, LLC
214 Central Circle SW
Decatur, AL 35603
John Lawrence
john.lawrence@alliancetg.com
(256) 351-0121 ext. 124
TCEQ Certification TX-C24-00053

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1.0 Introduction

Alliance Technical Group, LLC (Alliance) was retained by Graphic Packaging International (GPI) to conduct compliance testing at the Texarkana Mill located in Queen City, Texas. Portions of the facility are subject to provisions of 40 CFR 60, Subpart BBa, and the facility operates under Texas Commission on Environmental Quality (TCEQ) Air Permit Nos. 2975 and PSDTX778M2. Testing will be conducted as outlined in Table 1-1 below.

Table 1-1: Test Matrix

Emission Source	Parameters
No. 2 Smelt Tank Scrubber (SM02)	Total Reduced Sulfur (TRS)

This site-specific test plan (SSTP) has been prepared to address the notification and testing requirements of the TCEQ permits and the NSPS.

1.1 Project Team

Personnel planned to be involved in this project are identified in the following table.

Table 1-1: Project Team

Facility Personnel	John Fussell
Regulatory Agency	TCEQ
Alliance Personnel	Riley Wilson other field personnel assigned at time of testing event

1.2 Safety Requirements

Testing personnel will undergo site-specific safety training for all applicable areas upon arrival at the site. Alliance personnel will have current OSHA or MSHA safety training and be equipped with hard hats, safety glasses with side shields, steel-toed safety shoes, hearing protection, fire resistant clothing, and fall protection (including shock corded lanyards and full-body harnesses). Alliance personnel will conduct themselves in a manner consistent with Client and Alliance's safety policies.

A Job Safety Analysis (JSA) will be completed daily by the Alliance Field Team Leader.

2.0 Summary of Test Program

To satisfy the requirements of the TCEQ permits and the NSPS, the facility will conduct a performance test program to determine the compliance status of the No. 2 Smelt Tank Scrubber (SM02).

2.1 General Description

All testing will be performed in accordance with specifications stipulated in U.S. EPA Reference Test Methods 1, 2, 3A, 4, and 16C. Table 2-1 presents an outline and tentative schedule for the emissions testing program. The following is a summary of the test objectives.

- Testing will be performed to demonstrate compliance with the TCEQ Air Permit Nos. 2975 and PSDTX778M2 and 40 CFR 60, Subpart BBa.
- Emissions testing will be conducted on the exhaust of the No. 2 Smelt Tank Scrubber (SM02).
- Performance testing will be conducted at the maximum normal operation load.
- Each of the three (3) test runs will be approximately 3 hours in duration.

2.2 Process/Control System Parameters to be Monitored and Recorded

Plant personnel will collect operational and parametric data at least once every 15 minutes during the testing. The following list identifies the measurements, observations and records that will be collected during the testing program:

- Steam Load, kPPH
- Fuel Data
- Scrubber fan flow, gpm
- Scrubber spray flow, gpm
- Scrubber fan amps

2.3 Proposed Test Schedule

Table 2-1 presents an outline and tentative schedule for the emissions testing program.

Table 2-1: Program Outline and Tentative Test Schedule

Testing Location	Parameter	US EPA Method	No. of Runs	Run Duration	Est. Onsite Time
DAY 1 – October 29, 2025					
Equipment Setup & Pretest QA/QC Checks					12 hr
No. 2 Smelt Tank Scrubber (SM02)	VFR	1-2	3	180 min	
	O_2/CO_2	3A			
	BWS	4			
	TRS	16C			
DAY 2 – October 30, 2025					
Contingency Day (if needed)					

2.4 Emission Limits

Emission limits for each pollutant are below.

Table 2-2: Emission Limits

Source	Pollutant	Citation
No. 2 Smelt Tank Scrubber (SM02)	TRS – 0.033 lb/ton of black liquor solids (BLS) as hydrogen sulfide (H_2S)	60, Subpart BBa
	TRS – 3.28 lb/hr	TCEQ Permit Nos. 2975 and PSDTX778M2

2.5 Test Report

The final test report must be submitted within 60 days of the completion of the performance test and will include the following information. In addition to the final test report, the test results must be entered into the U.S. EPA Electronic Reporting Tool (ERT) for submittal via CEDRI.

- *Introduction* – Brief discussion of project scope of work and activities.
- *Results and Discussion* – A summary of test results and process/control system operational data with comparison to regulatory requirements or vendor guarantees along with a description of process conditions and/or testing deviations that may have affected the testing results.
- *Methodology* – A description of the sampling and analytical methodologies.
- *Sample Calculations* – Example calculations for each target parameter.
- *Field Data* – Copies of actual handwritten or electronic field data sheets.
- *Quality Control Data* – Copies of all instrument calibration data and/or calibration gas certificates.
- *Process Operating/Control System Data* – Process operating and control system data (as provided by GPI) to support the test results.

3.0 Testing Methodology

This section provides a description of the sampling and analytical procedures for each test method that will be employed during the test program. All equipment, procedures and quality assurance measures necessary for the completion of the test program meet or exceed the specifications of each relevant test method. The emission testing program will be conducted in accordance with the test methods listed in Table 3-1.

Table 3-1: Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1 & 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Moisture Content	4	Gravimetric Analysis
Total Reduced Sulfur	16C	Instrumental Analysis

All stack diameters, depths, widths, upstream and downstream disturbance distances and nipple lengths will be measured on site with a verification measurement provided by the Field Team Leader.

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points will be selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances will be equated into equivalent diameters and compared to Figure 1-1 (for isokinetic sampling) in U.S. EPA Reference Test Method 1.

Full velocity traverses will be conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system will consist of a pitot tube and inclined manometer. The stack gas temperature will be measured with a K-type thermocouple and pyrometer.

Stack gas velocity pressure and temperature readings will be recorded during each test run. The data collected will be utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3A – Oxygen/Carbon Dioxide

The oxygen (O_2) and carbon dioxide (CO_2) testing will be conducted in accordance with U.S. EPA Reference Test Method 3A. Data will be collected online and reported in one-minute averages. The sampling system will consist of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system will be a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line is used, then a portable non-contact condenser will be placed in the system directly after the probe. Otherwise, a heated Teflon sample line will be used. The quality control measures are described in Section 3.5.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content will be determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train will consist of a series of chilled impingers. Prior to testing, each impinger will be filled with a

known quantity of water or silica gel. Each impinger will be analyzed gravimetrically before and after each test run on the same analytical balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Method 16C – Total Reduced Sulfur

The total reduced sulfur testing will be conducted in accordance with U.S. EPA Reference Test Method 16C. Data will be collected online and reported in one-minute averages during each test run. The sampling system will consist of a heated Teflon-lined probe, gas conditioning system, Teflon sample line(s), tube furnace and the identified analyzer. The gas conditioning system will consist of three (3) chilled Teflon impingers. The first and second impingers will contain 100 mL of citrate buffer solution while the third impinger will be empty. The citrate buffer solution will be used to remove any sulfur dioxide that will be present in the stack gas. The tube furnace will be operated at 800°C ±100°C. The quality control measures are described in Section 3.6.

3.5 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3A

EPA Protocol 1 Calibration Gases

Cylinder calibration gases will meet EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates will be included in the Quality Assurance/Quality Control Appendix of the report.

Direct Calibration & Calibration Error Test

Low-Level gas will be introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading is stable, the analyzer value will be recorded. This process will be repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases will be sequentially introduced directly to the analyzer. The Calibration Error for each gas must be within 2.0 percent of the Calibration Span or 0.5% absolute difference.

System Bias and Response Time

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5% (whichever was less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. Next, Low-Level gas will be introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5% (whichever was less restrictive) will be recorded. If the Low-Level gas is zero gas, the acceptable response must be 5.0 percent of the upscale gas concentration or 0.5% (whichever was less restrictive). The analyzer reading will be observed until it reaches a stable value, and this value will be recorded. The measurement system response time and initial system bias will be determined from these data. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference.

Post Test System Bias Checks

High or Mid-Level gas (whichever is closer to the stack gas concentration) will be introduced at the probe. After the analyzer response is stable, the value will be recorded. Next, Low-Level gas will be introduced at the probe, and the analyzer value will be recorded once it reaches a stable response. The System Bias for each gas must be within 5.0 percent of the Calibration Span or 0.5% absolute difference or the data is invalidated, and the Calibration Error Test and System Bias must be repeated.

Post Test Drift Checks

The Drift between pre- and post-run System Bias must be within 3 percent of the Calibration Span or 0.5% absolute difference or the Calibration Error Test and System Bias must be repeated.

Stratification Check

To determine the number of sampling points, a gas stratification check will be conducted prior to initiating testing. The pollutant concentrations will be measured at twelve traverse points (as described in Method 1) or three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point will be sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point do not differ more than 5% or 0.3% (whichever is less restrictive) of the average pollutant concentration, then single point sampling will be conducted during the test runs. If the pollutant concentration does not meet these specifications but differs less than 10% or 0.5% from the average concentration, then three (3) point sampling will be conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter – 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differs by more than 10% or 0.5% from the average concentration, then sampling will be conducted at a minimum of twelve (12) traverse points. Copies of stratification check data will be included in the Quality Assurance/Quality Control Appendix of the report.

Data Collection

A Data Acquisition System with battery backup will be used to record the instrument response in one (1) minute averages. The data will be continuously stored as a *.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data will also be saved to the Alliance server. All data will be reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data will be relinquished to the report coordinator and then a final review will be performed by the Project Manager.

3.6 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 16C

EPA Protocol 1 Calibration Gases

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Direct Calibration

Low-Level sulfur dioxide (SO_2) gas will be introduced directly to analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading will be stable, the analyzer value will be recorded. This process will be repeated for the Mid-Level gas. Next, High-Level gas will be introduced directly to the analyzer, and the response recorded when it will be stable. All values will be within 5.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

System Performance Check

A system performance check will be completed prior to sample collection and after each run. The post-test system performance check will be conducted prior to making any sampling system modifications. The SO_2 scrubber system will be pre-conditioned with stack gas for approximately 10 minutes at 2 liters/min. Prior to starting the test run, Hydrogen Sulfide calibration gas ($\leq$ 100 ppmv) will be introduced at the probe tip and the time required for the analyzer reading to reach 95 percent or 0.5 ppm (whichever will be less restrictive) of the gas concentration will be recorded. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The system performance check will be repeated after the conclusion of each test run. The system performance must be within 80 and 120 percent of the calibration gas concentration. The raw run data will be corrected using the post-test system performance values.

Post-Test Direct Calibration Drift Check

Following the completion testing, a post-test calibration drift check will be performed. Mid-level SO_2 calibration gas will be introduced directly to the analyzer. The analyzer reading will be observed until it has reached a stable value and this value will be recorded. The drift value did not differ from the certified calibration gas value by more than 3% or 0.5 ppmv.

4.0 Quality Assurance Program

Alliance follows the procedures outlined in the Quality Assurance/Quality Control Management Plan to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Adherence to prescribed procedures is quite often the most applicable QC check.

4.1 Equipment

Field test equipment is assigned a unique, permanent identification number. Prior to mobilizing for the test program, equipment is inspected before being packed to detect equipment problems prior to arriving on site. This minimizes lost time on the job site due to equipment failure. Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. Therefore, replacements for critical equipment or components are brought to the job site. Equipment returning from the field is inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned and recalibrated where necessary.

Calibrations are conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the U.S. EPA Methods, and those recommended within the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III (EPA-600/R-94/038c, September 1994) are utilized. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing and Materials (ASTM) or other nationally recognized agency may be used. Data obtained during calibrations is checked for completeness and accuracy. Copies of calibration forms are included in the report.

The following sections elaborate on the calibration procedures followed by Alliance for these items of equipment.

- Dry Gas Meter and Orifice. A full meter calibration using critical orifices as the calibration standard is conducted at least semi-annually, more frequently if required. The meter calibration procedure determines the meter correction factor (Y) and the meter's orifice pressure differential (ΔH@). Alliance uses approved Alternative Method 009 as a post-test calibration check to ensure that the correction factor has not changed more than 5% since the last full meter calibration. This check is performed after each test series.
- Pitot Tubes and Manometers. Type-S pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.84 unless a specific coefficient has been determined from a wind tunnel calibration. If a specific coefficient from a wind tunnel calibration has been obtained that coefficient will be used in lieu of 0.84. Standard pitot tubes that meet the geometric criteria required by U.S. EPA Reference Test Method 2 are assigned a coefficient of 0.99. Any pitot tubes not meeting the appropriate geometric criteria are discarded and replaced. Manometers are verified to be level and zeroed prior to each test run and do not require further calibration.
- Temperature Measuring Devices. All thermocouple sensors mounted in Dry Gas Meter Consoles are calibrated semi-annually with a NIST-traceable thermocouple calibrator (temperature simulator) and verified during field use using a second NIST-traceable meter. NIST-traceable thermocouple calibrators are calibrated annually by an outside laboratory.
- Barometer. The barometric pressure is obtained from a nationally recognized agency or a calibrated barometer. Calibrated barometers are checked prior to each field trip against a mercury barometer. The barometer is acceptable if the values agree within ± 2 percent absolute. Barometers not meeting this requirement are adjusted or taken out of service.

- Balances and Weights. Balances are calibrated annually by an outside laboratory. A functional check is conducted on the balance each day it is use in the field using a calibration weight. Weights are re-certified every two (2) years by an outside laboratory or internally. If conducted internally, they are weighed on a NIST traceable balance. If the weight does not meet the expected criteria, they are replaced.
- Other Equipment. Other equipment such as probes, umbilical lines, cold boxes, etc. are routinely maintained and inspected to ensure that they are in good working order. They are repaired or replaced as needed.

4.2 Field Sampling

Field sampling will be done in accordance with the Standard Operating Procedures (SOP) for the applicable test method(s). General QC measures for the test program include:

- Cleaned glassware and sample train components will be sealed until assembly.
- Sample trains will be leak checked before and after each test run.
- Appropriate probe, filter and impinger temperatures will be maintained.
- The sampling port will be sealed to prevent air from leaking from the port.
- Dry gas meter, ΔP, ΔH, temperature and pump vacuum data will be recorded during each sample point.
- All raw data will be maintained in organized manner.
- All raw data will be reviewed on a daily basis for completeness and acceptability.

Appendix F - Field Raw Data

Scaling	0-25	0-25	0-1000
Daisy Lab Channel	0	1	2
DAQ Channel	1	2	3
Time	O2 A	CO2 A	CO A
10/28/25 18:45	20.63	0.14	5.55
10/28/25 18:46	20.63	0.14	5.52
10/28/25 18:47	20.63	0.15	5.63
10/28/25 18:48	20.63	0.15	5.58
10/28/25 18:49	20.63	0.14	5.69
10/28/25 18:50	20.63	0.14	5.69
10/28/25 18:51	20.63	0.14	5.7
10/28/25 18:52	20.63	0.14	5.48
10/28/25 18:53	20.63	0.14	5.52
10/28/25 18:54	20.63	0.14	5.5
10/28/25 18:55	20.63	0.14	5.46
10/28/25 18:56	20.63	0.14	5.47
10/28/25 18:57	20.63	0.14	5.57
10/28/25 18:58	20.63	0.14	5.53
10/28/25 18:59	20.63	0.14	5.51
10/28/25 19:00	20.63	0.14	5.47
10/28/25 19:01	20.63	0.14	5.76
10/28/25 19:02	20.63	0.14	5.8
10/28/25 19:03	20.63	0.14	5.59
10/28/25 19:04	20.63	0.14	5.8
10/28/25 19:05	20.63	0.14	5.72
10/28/25 19:06	20.63	0.14	5.39
10/28/25 19:07	20.63	0.13	5.42
10/28/25 19:08	20.63	0.14	5.63
10/28/25 19:09	20.63	0.13	5.4
10/28/25 19:10	20.63	0.13	5.52
10/28/25 19:11	20.63	0.13	5.49
10/28/25 19:12	20.63	0.13	5.5
10/28/25 19:13	20.62	0.13	5.31
10/28/25 19:14	20.62	0.13	5.3
10/28/25 19:15	20.62	0.13	5.45
10/28/25 19:16	20.62	0.13	5.61
10/28/25 19:17	20.62	0.13	5.44
10/28/25 19:18	20.62	0.13	5.27
10/28/25 19:19	20.62	0.13	5.28
10/28/25 19:20	20.62	0.13	5.26
10/28/25 19:21	20.62	0.13	5.41
10/28/25 19:22	20.62	0.13	5.45
10/28/25 19:23	20.62	0.13	5.46
10/28/25 19:24	20.63	0.13	5.33
10/28/25 19:25	20.62	0.13	5.25
10/28/25 19:26	20.62	0.13	5.18
10/28/25 19:27	20.62	0.13	5.26
10/28/25 19:28	20.62	0.13	5.18
10/28/25 19:29	20.62	0.13	5.18
10/28/25 19:30	20.62	0.13	5.17
10/28/25 19:31	20.62	0.13	5.2
10/28/25 19:32	20.62	0.13	5.25

10/28/25 19:33	20.62	0.13	5.24
10/28/25 19:34	20.62	0.13	5.23
10/28/25 19:35	20.63	0.13	5.19
10/28/25 19:36	20.62	0.13	5.19
10/28/25 19:37	20.62	0.13	5.07
10/28/25 19:38	20.62	0.12	5.1
10/28/25 19:39	20.62	0.13	5.1
10/28/25 19:40	20.62	0.13	5.07
10/28/25 19:41	20.62	0.13	5.06
10/28/25 19:42	20.62	0.13	5.01
10/28/25 19:43	20.62	0.12	5.02
10/28/25 19:44	20.62	0.13	5.14
10/28/25 19:45	20.63	0.12	5.04
10/28/25 19:46	20.63	0.12	5.01
10/28/25 19:47	20.63	0.12	5.03
10/28/25 19:48	20.63	0.12	5.05
10/28/25 19:49	20.63	0.12	5.06
10/28/25 19:50	20.63	0.12	5.01
10/28/25 19:51	20.63	0.12	5.18
10/28/25 19:52	20.63	0.12	5.22
10/28/25 19:53	20.63	0.12	5.35
10/28/25 19:54	20.63	0.12	5.09
10/28/25 19:55	20.64	0.12	5.16
10/28/25 19:56	20.64	0.12	5.09
10/28/25 19:57	20.64	0.12	5.06
10/28/25 19:58	20.64	0.12	5.04
10/28/25 19:59	20.64	0.12	5.31
10/28/25 20:00	20.64	0.12	5.11
10/28/25 20:01	20.64	0.12	5.21
10/28/25 20:02	20.63	0.12	5.12
10/28/25 20:03	20.63	0.12	5.08
10/28/25 20:04	20.64	0.12	5.46
10/28/25 20:05	20.64	0.12	5.02
10/28/25 20:06	20.64	0.12	4.91
10/28/25 20:07	20.64	0.12	5.04
10/28/25 20:08	20.63	0.12	5.32
10/28/25 20:09	20.64	0.12	5
10/28/25 20:10	20.64	0.12	4.93
10/28/25 20:11	20.63	0.12	4.98
10/28/25 20:12	20.63	0.12	5.05
10/28/25 20:13	20.63	0.12	5.09
10/28/25 20:14	20.63	0.12	5
10/28/25 20:15	20.63	0.12	5.18
10/28/25 20:16	20.63	0.12	5.05
10/28/25 20:17	20.63	0.12	4.89
10/28/25 20:18	20.63	0.12	4.92
10/28/25 20:19	20.63	0.12	4.86
10/28/25 20:20	20.63	0.12	5.13
10/28/25 20:21	20.63	0.12	5.12
10/28/25 20:22	20.63	0.12	5.23
10/28/25 20:23	20.63	0.12	5.12
10/28/25 20:24	20.63	0.12	5.22
10/28/25 20:25	20.63	0.12	4.93
10/28/25 20:26	20.64	0.12	4.95
10/28/25 20:27	20.64	0.12	5.25

10/28/25 20:28	20.63	0.12	4.93
10/28/25 20:29	20.64	0.12	4.96
10/28/25 20:30	20.64	0.11	4.88
10/28/25 20:31	20.64	0.12	4.92
10/28/25 20:32	20.64	0.11	4.91
10/28/25 20:33	20.64	0.12	5.02
10/28/25 20:34	20.64	0.12	4.85
10/28/25 20:35	20.64	0.12	4.89
10/28/25 20:36	20.64	0.12	4.94
10/28/25 20:37	20.64	0.11	4.91
10/28/25 20:38	20.64	0.11	5.16
10/28/25 20:39	20.64	0.11	4.94
10/28/25 20:40	20.64	0.11	4.82
10/28/25 20:41	20.64	0.11	4.86
10/28/25 20:42	20.64	0.12	4.88
10/28/25 20:43	20.64	0.11	4.86
10/28/25 20:44	20.64	0.11	4.87
10/28/25 20:45	20.64	0.11	4.83
10/28/25 20:46	20.64	0.11	4.83
10/28/25 20:47	20.64	0.11	4.81
10/28/25 20:48	20.64	0.11	4.86
10/28/25 20:49	20.64	0.11	4.82
10/28/25 20:50	20.64	0.11	4.84
10/28/25 20:51	20.64	0.11	4.83
10/28/25 20:52	20.63	0.11	4.92
10/28/25 20:53	20.63	0.11	4.84
10/28/25 20:54	20.64	0.11	4.83
10/28/25 20:55	20.63	0.11	4.84
10/28/25 20:56	20.63	0.11	4.86
10/28/25 20:57	20.64	0.11	4.86
10/28/25 20:58	20.64	0.11	4.85
10/28/25 20:59	20.64	0.11	4.83
10/28/25 21:00	20.64	0.11	4.86
10/28/25 21:01	20.64	0.11	4.9
10/28/25 21:02	20.64	0.11	4.85
10/28/25 21:03	20.64	0.11	4.87
10/28/25 21:04	20.64	0.11	4.88
10/28/25 21:05	20.64	0.11	4.86
10/28/25 21:06	20.64	0.11	4.9
10/28/25 21:07	20.64	0.11	4.87
10/28/25 21:08	20.64	0.11	4.85
10/28/25 21:09	20.64	0.11	4.88
10/28/25 21:10	20.64	0.11	4.87
10/28/25 21:11	20.64	0.11	4.84
10/28/25 21:12	20.64	0.11	4.88
10/28/25 21:13	20.64	0.11	4.89
10/28/25 21:14	20.63	0.11	4.86
10/28/25 21:15	20.63	0.11	4.88
10/28/25 21:16	20.63	0.11	4.87
10/28/25 21:17	20.64	0.11	4.89
10/28/25 21:18	20.63	0.11	4.9
10/28/25 21:19	20.63	0.11	4.88
10/28/25 21:20	20.63	0.11	4.88
10/28/25 21:21	20.63	0.11	4.89
10/28/25 21:22	20.63	0.11	4.85

10/28/25 21:23	20.63	0.11	4.89
10/28/25 21:24	20.63	0.11	4.93
10/28/25 21:25	20.63	0.11	4.93
10/28/25 21:26	20.63	0.11	4.95
10/28/25 21:27	20.63	0.11	4.89
10/28/25 21:28	20.64	0.11	4.88
10/28/25 21:29	20.64	0.11	4.96
10/28/25 21:30	20.64	0.11	4.94
10/28/25 21:31	20.64	0.11	4.92
10/28/25 21:32	20.64	0.11	4.85
10/28/25 21:33	20.64	0.11	4.89
10/28/25 21:34	20.64	0.11	4.91
10/28/25 21:35	20.64	0.11	4.93
10/28/25 21:36	20.64	0.11	4.9
10/28/25 21:37	20.64	0.11	4.96
10/28/25 21:38	20.64	0.11	4.93
10/28/25 21:39	20.64	0.11	4.9
10/28/25 21:40	20.64	0.11	4.94
10/28/25 21:41	20.64	0.11	5.06
10/28/25 21:42	20.64	0.11	4.98
10/28/25 21:43	20.64	0.11	4.99
10/28/25 21:44	20.64	0.11	5.02
10/28/25 21:45	20.64	0.11	4.99
10/28/25 21:46	20.64	0.11	4.96
10/28/25 21:47	20.64	0.11	4.98
10/28/25 21:48	20.64	0.11	5.03
10/28/25 21:49	20.64	0.11	5
10/28/25 21:50	20.64	0.11	5.03
10/28/25 21:51	20.64	0.11	4.97
10/28/25 21:52	20.64	0.11	5.06
10/28/25 21:53	20.64	0.11	5.01
10/28/25 21:54	20.63	0.11	5.03
10/28/25 21:55	20.63	0.11	5.03
10/28/25 21:56	20.63	0.11	5.04
10/28/25 21:57	20.63	0.11	5.06
10/28/25 21:58	20.63	0.11	5.04
10/28/25 21:59	20.63	0.11	5.04
10/28/25 22:00	20.64	0.11	5.04
10/28/25 22:01	20.64	0.11	5.09
10/28/25 22:02	20.64	0.11	5.06
10/28/25 22:03	20.65	0.11	5.07
10/28/25 22:04	20.64	0.11	5.08
10/28/25 22:05	20.65	0.11	5.06
10/28/25 22:06	20.64	0.11	5.05
10/28/25 22:07	20.64	0.11	5.07
10/28/25 22:08	20.64	0.11	5.06
10/28/25 22:09	20.64	0.11	5.05
10/28/25 22:10	20.64	0.11	5.02
10/28/25 22:11	20.64	0.11	5.07
10/28/25 22:12	20.64	0.11	5.06
10/28/25 22:13	20.64	0.11	5.07
10/28/25 22:14	20.64	0.11	5.09
10/28/25 22:15	20.64	0.11	5.07
10/28/25 22:16	20.64	0.11	5.06
10/28/25 22:17	20.64	0.11	5.09

10/28/25 22:18	20.64	0.11	5.25
10/28/25 22:19	20.64	0.11	5.06
10/28/25 22:20	20.64	0.11	5.07
10/28/25 22:21	20.64	0.11	5.08
10/28/25 22:22	20.64	0.11	5.1
10/28/25 22:23	20.64	0.11	5.12
10/28/25 22:24	20.64	0.11	5.11
10/28/25 22:25	20.64	0.11	5.09
10/28/25 22:26	20.64	0.11	5.05
10/28/25 22:27	20.64	0.11	5.11
10/28/25 22:28	20.65	0.11	5.28
10/28/25 22:29	20.64	0.11	5.17
10/28/25 22:30	20.65	0.11	5.16
10/28/25 22:31	20.64	0.11	5.23
10/28/25 22:32	20.64	0.11	5.16
10/28/25 22:33	20.64	0.11	5.15
10/28/25 22:34	20.64	0.11	5.12
10/28/25 22:35	20.64	0.11	5.16
10/28/25 22:36	20.64	0.11	5.23
10/28/25 22:37	20.64	0.11	5.09
10/28/25 22:38	20.64	0.1	5.29
10/28/25 22:39	20.64	0.1	5.15
10/28/25 22:40	20.64	0.1	5.17
10/28/25 22:41	20.64	0.11	5.25
10/28/25 22:42	20.64	0.11	5.26
10/28/25 22:43	20.64	0.1	5.18
10/28/25 22:44	20.64	0.1	5.1
10/28/25 22:45	20.64	0.1	5.17
10/28/25 22:46	20.64	0.1	5.13
10/28/25 22:47	20.64	0.1	5.28
10/28/25 22:48	20.64	0.1	5.18
10/28/25 22:49	20.64	0.1	5.26
10/28/25 22:50	20.64	0.1	5.21
10/28/25 22:51	20.64	0.1	5.37
10/28/25 22:52	20.64	0.1	5.47
10/28/25 22:53	20.64	0.1	5.36
10/28/25 22:54	20.64	0.1	5.43
10/28/25 22:55	20.64	0.1	5.45
10/28/25 22:56	20.65	0.1	5.35
10/28/25 22:57	20.65	0.1	5.23
10/28/25 22:58	20.65	0.1	5.33
10/28/25 22:59	20.65	0.1	5.23
10/28/25 23:00	20.65	0.1	5.27
10/28/25 23:01	20.65	0.1	5.22
10/28/25 23:02	20.65	0.1	5.13
10/28/25 23:03	20.65	0.1	5.19
10/28/25 23:04	20.65	0.1	5.4
10/28/25 23:05	20.65	0.1	5.47
10/28/25 23:06	20.65	0.1	5.19
10/28/25 23:07	20.64	0.1	5.13
10/28/25 23:08	20.64	0.1	5.2
10/28/25 23:09	20.64	0.1	5.26
10/28/25 23:10	20.64	0.1	5.4
10/28/25 23:11	20.64	0.1	5.66
10/28/25 23:12	20.64	0.1	5.41

10/28/25 23:13	20.64	0.1	5.27
10/28/25 23:14	20.64	0.1	5.26
10/28/25 23:15	20.64	0.1	5.41
10/28/25 23:16	20.64	0.1	5.47
10/28/25 23:17	20.64	0.1	5.36
10/28/25 23:18	20.64	0.1	5.19
10/28/25 23:19	20.64	0.1	5.18
10/28/25 23:20	20.64	0.1	5.27
10/28/25 23:21	20.64	0.09	5.25
10/28/25 23:22	20.64	0.09	5.18
10/28/25 23:23	20.64	0.09	5.24
10/28/25 23:24	20.64	0.09	5.24
10/28/25 23:25	20.64	0.09	5.19
10/28/25 23:26	20.64	0.1	5.22
10/28/25 23:27	20.64	0.09	5.19
10/28/25 23:28	20.64	0.09	5.34
10/28/25 23:29	20.64	0.09	5.22
10/28/25 23:30	20.65	0.09	5.29
10/28/25 23:31	20.65	0.09	5.25
10/28/25 23:32	20.65	0.09	5.25
10/28/25 23:33	20.65	0.1	5.3
10/28/25 23:34	20.65	0.1	5.27
10/28/25 23:35	20.65	0.1	5.29
10/28/25 23:36	20.65	0.1	5.34
10/28/25 23:37	20.65	0.1	5.33
10/28/25 23:38	20.65	0.1	5.43
10/28/25 23:39	20.65	0.1	5.36
10/28/25 23:40	20.65	0.1	5.34
10/28/25 23:41	20.65	0.1	5.33
10/28/25 23:42	20.65	0.1	5.52
10/28/25 23:43	20.65	0.1	5.38
10/28/25 23:44	20.65	0.1	5.45
10/28/25 23:45	20.65	0.1	5.35
10/28/25 23:46	20.64	0.1	5.36
10/28/25 23:47	20.64	0.1	5.41
10/28/25 23:48	20.65	0.1	5.49
10/28/25 23:49	20.64	0.1	5.51
10/28/25 23:50	20.64	0.1	5.65
10/28/25 23:51	20.65	0.1	5.59
10/28/25 23:52	20.65	0.1	5.56
10/28/25 23:53	20.65	0.1	5.52
10/28/25 23:54	20.65	0.1	5.6
10/28/25 23:55	20.65	0.1	5.57
10/28/25 23:56	20.65	0.1	5.55
10/28/25 23:57	20.66	0.09	5.37
10/28/25 23:58	20.66	0.1	5.51
10/28/25 23:59	20.65	0.09	5.47
10/29/25 0:00	20.65	0.09	5.43
10/29/25 0:01	20.65	0.09	5.37
10/29/25 0:02	20.65	0.09	5.63
10/29/25 0:03	20.65	0.09	5.4
10/29/25 0:04	20.65	0.09	5.55
10/29/25 0:05	20.65	0.1	5.76
10/29/25 0:06	20.65	0.1	5.89
10/29/25 0:07	20.65	0.1	5.52

10/29/25 0:08	20.65	0.09	5.71
10/29/25 0:09	20.65	0.1	6
10/29/25 0:10	20.65	0.1	5.65
10/29/25 0:11	20.65	0.09	5.43
10/29/25 0:12	20.65	0.1	5.51
10/29/25 0:13	20.65	0.1	5.7
10/29/25 0:14	20.65	0.1	6.08
10/29/25 0:15	20.65	0.1	5.57
10/29/25 0:16	20.65	0.09	5.58
10/29/25 0:17	20.65	0.09	5.58
10/29/25 0:18	20.65	0.09	5.74
10/29/25 0:19	20.65	0.09	5.52
10/29/25 0:20	20.65	0.09	5.48
10/29/25 0:21	20.65	0.09	5.47
10/29/25 0:22	20.65	0.09	5.47
10/29/25 0:23	20.65	0.09	5.48
10/29/25 0:24	20.65	0.09	5.48
10/29/25 0:25	20.65	0.09	5.47
10/29/25 0:26	20.65	0.09	5.43
10/29/25 0:27	20.65	0.09	5.46
10/29/25 0:28	20.65	0.09	5.49
10/29/25 0:29	20.65	0.09	5.45
10/29/25 0:30	20.65	0.09	5.56
10/29/25 0:31	20.65	0.09	5.51
10/29/25 0:32	20.64	0.09	5.48
10/29/25 0:33	20.65	0.09	5.53
10/29/25 0:34	20.65	0.09	5.52
10/29/25 0:35	20.65	0.09	5.49
10/29/25 0:36	20.65	0.09	5.54
10/29/25 0:37	20.65	0.09	5.56
10/29/25 0:38	20.65	0.09	5.54
10/29/25 0:39	20.65	0.09	5.5
10/29/25 0:40	20.65	0.09	5.54
10/29/25 0:41	20.65	0.09	5.53
10/29/25 0:42	20.65	0.09	5.53
10/29/25 0:43	20.65	0.09	5.53
10/29/25 0:44	20.65	0.09	5.6
10/29/25 0:45	20.65	0.09	5.56
10/29/25 0:46	20.65	0.09	5.58
10/29/25 0:47	20.65	0.09	5.62
10/29/25 0:48	20.65	0.09	5.54
10/29/25 0:49	20.65	0.09	5.54
10/29/25 0:50	20.65	0.09	5.57
10/29/25 0:51	20.65	0.09	5.63
10/29/25 0:52	20.65	0.09	5.56
10/29/25 0:53	20.65	0.09	5.55
10/29/25 0:54	20.65	0.09	5.6
10/29/25 0:55	20.65	0.09	5.6
10/29/25 0:56	20.65	0.09	5.6
10/29/25 0:57	20.65	0.09	5.58
10/29/25 0:58	20.65	0.09	5.62
10/29/25 0:59	20.66	0.09	5.6
10/29/25 1:00	20.66	0.09	5.61
10/29/25 1:01	20.66	0.09	5.59
10/29/25 1:02	20.66	0.09	5.6

10/29/25 1:03	20.66	0.09	5.6
10/29/25 1:04	20.66	0.09	5.57
10/29/25 1:05	20.66	0.09	5.6
10/29/25 1:06	20.66	0.09	5.62
10/29/25 1:07	20.66	0.09	5.65
10/29/25 1:08	20.66	0.09	5.63
10/29/25 1:09	20.66	0.09	5.6
10/29/25 1:10	20.66	0.09	5.63
10/29/25 1:11	20.66	0.09	5.63
10/29/25 1:12	20.66	0.09	5.64
10/29/25 1:13	20.66	0.09	5.66
10/29/25 1:14	20.66	0.09	5.6
10/29/25 1:15	20.66	0.09	5.65
10/29/25 1:16	20.66	0.09	5.65
10/29/25 1:17	20.66	0.09	5.63
10/29/25 1:18	20.66	0.09	5.62
10/29/25 1:19	20.66	0.09	5.68
10/29/25 1:20	20.66	0.09	5.66
10/29/25 1:21	20.66	0.09	5.65
10/29/25 1:22	20.66	0.09	5.65
10/29/25 1:23	20.66	0.09	5.66
10/29/25 1:24	20.65	0.09	5.66
10/29/25 1:25	20.65	0.09	5.7
10/29/25 1:26	20.66	0.09	5.73
10/29/25 1:27	20.66	0.09	5.68
10/29/25 1:28	20.66	0.09	5.7
10/29/25 1:29	20.66	0.09	5.69
10/29/25 1:30	20.67	0.09	5.7
10/29/25 1:31	20.66	0.09	5.76
10/29/25 1:32	20.67	0.09	5.76
10/29/25 1:33	20.66	0.09	5.76
10/29/25 1:34	20.66	0.09	5.77
10/29/25 1:35	20.66	0.09	5.74
10/29/25 1:36	20.66	0.09	5.74
10/29/25 1:37	20.66	0.09	5.77
10/29/25 1:38	20.66	0.09	5.74
10/29/25 1:39	20.66	0.09	5.78
10/29/25 1:40	20.66	0.09	5.79
10/29/25 1:41	20.66	0.09	5.77
10/29/25 1:42	20.66	0.09	5.79
10/29/25 1:43	20.66	0.09	5.77
10/29/25 1:44	20.66	0.09	5.82
10/29/25 1:45	20.66	0.09	5.84
10/29/25 1:46	20.66	0.09	5.79
10/29/25 1:47	20.66	0.09	5.84
10/29/25 1:48	20.66	0.09	5.82
10/29/25 1:49	20.65	0.09	5.89
10/29/25 1:50	20.65	0.09	5.83
10/29/25 1:51	20.65	0.09	5.8
10/29/25 1:52	20.65	0.09	5.84
10/29/25 1:53	20.65	0.09	5.81
10/29/25 1:54	20.65	0.09	5.89
10/29/25 1:55	20.65	0.09	5.84
10/29/25 1:56	20.65	0.09	5.9
10/29/25 1:57	20.65	0.09	5.86

10/29/25 1:58	20.65	0.09	5.85
10/29/25 1:59	20.65	0.09	5.85
10/29/25 2:00	20.65	0.09	5.85
10/29/25 2:01	20.65	0.09	5.83
10/29/25 2:02	20.65	0.09	5.86
10/29/25 2:03	20.65	0.09	5.9
10/29/25 2:04	20.65	0.09	5.89
10/29/25 2:05	20.65	0.09	5.89
10/29/25 2:06	20.65	0.09	5.88
10/29/25 2:07	20.65	0.09	5.89
10/29/25 2:08	20.65	0.09	5.85
10/29/25 2:09	20.66	0.09	5.95
10/29/25 2:10	20.66	0.09	5.91
10/29/25 2:11	20.66	0.09	5.88
10/29/25 2:12	20.65	0.09	5.92
10/29/25 2:13	20.65	0.09	5.92
10/29/25 2:14	20.65	0.09	5.93
10/29/25 2:15	20.66	0.09	5.95
10/29/25 2:16	20.66	0.09	5.92
10/29/25 2:17	20.66	0.09	5.94
10/29/25 2:18	20.67	0.09	5.92
10/29/25 2:19	20.67	0.08	5.91
10/29/25 2:20	20.67	0.09	5.97
10/29/25 2:21	20.66	0.09	5.89
10/29/25 2:22	20.66	0.08	5.97
10/29/25 2:23	20.67	0.09	5.98
10/29/25 2:24	20.67	0.09	5.97
10/29/25 2:25	20.67	0.09	5.95
10/29/25 2:26	20.67	0.09	5.98
10/29/25 2:27	20.66	0.08	5.99
10/29/25 2:28	20.67	0.08	5.99
10/29/25 2:29	20.66	0.08	5.97
10/29/25 2:30	20.66	0.08	5.99
10/29/25 2:31	20.66	0.08	6.02
10/29/25 2:32	20.66	0.08	6.01
10/29/25 2:33	20.66	0.08	5.98
10/29/25 2:34	20.66	0.08	5.94
10/29/25 2:35	20.66	0.08	6.06
10/29/25 2:36	20.66	0.08	5.99
10/29/25 2:37	20.66	0.08	6.03
10/29/25 2:38	20.66	0.08	6.03
10/29/25 2:39	20.66	0.08	6.03
10/29/25 2:40	20.66	0.08	6
10/29/25 2:41	20.67	0.08	6.02
10/29/25 2:42	20.67	0.08	6
10/29/25 2:43	20.67	0.08	6.05
10/29/25 2:44	20.67	0.08	6.04
10/29/25 2:45	20.67	0.08	6.01
10/29/25 2:46	20.67	0.08	5.99
10/29/25 2:47	20.67	0.08	6.04
10/29/25 2:48	20.67	0.08	6.1
10/29/25 2:49	20.67	0.08	6.1
10/29/25 2:50	20.67	0.08	6.11
10/29/25 2:51	20.67	0.08	6.07
10/29/25 2:52	20.67	0.08	6.11

10/29/25 2:53	20.67	0.08	6.1
10/29/25 2:54	20.67	0.08	6.14
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10/29/25 2:56	20.67	0.08	6.04
10/29/25 2:57	20.66	0.08	6.12
10/29/25 2:58	20.66	0.08	6.14
10/29/25 2:59	20.66	0.08	6.12
10/29/25 3:00	20.66	0.08	6.15
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10/29/25 3:02	20.66	0.08	6.11
10/29/25 3:03	20.66	0.08	6.12
10/29/25 3:04	20.66	0.08	6.14
10/29/25 3:05	20.67	0.08	6.16
10/29/25 3:06	20.66	0.08	6.13
10/29/25 3:07	20.66	0.08	6.14
10/29/25 3:08	20.66	0.08	6.19
10/29/25 3:09	20.66	0.08	6.17
10/29/25 3:10	20.66	0.08	6.13
10/29/25 3:11	20.66	0.08	6.18
10/29/25 3:12	20.66	0.08	6.18
10/29/25 3:13	20.66	0.08	6.21
10/29/25 3:14	20.66	0.08	6.19
10/29/25 3:15	20.66	0.08	6.2
10/29/25 3:16	20.66	0.08	6.14
10/29/25 3:17	20.66	0.08	6.16
10/29/25 3:18	20.66	0.08	6.23
10/29/25 3:19	20.66	0.08	6.24
10/29/25 3:20	20.66	0.08	6.23
10/29/25 3:21	20.66	0.08	6.16
10/29/25 3:22	20.66	0.08	6.21
10/29/25 3:23	20.66	0.08	6.2
10/29/25 3:24	20.66	0.08	6.26
10/29/25 3:25	20.67	0.08	6.22
10/29/25 3:26	20.67	0.08	6.23
10/29/25 3:27	20.67	0.08	6.26
10/29/25 3:28	20.67	0.08	6.25
10/29/25 3:29	20.67	0.08	6.28
10/29/25 3:30	20.67	0.08	6.29
10/29/25 3:31	20.67	0.08	6.31
10/29/25 3:32	20.67	0.08	6.27
10/29/25 3:33	20.67	0.08	6.28
10/29/25 3:34	20.67	0.08	6.23
10/29/25 3:35	20.67	0.08	6.25
10/29/25 3:36	20.67	0.08	6.28
10/29/25 3:37	20.67	0.08	6.3
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10/29/25 3:39	20.67	0.08	6.35
10/29/25 3:40	20.67	0.08	6.29
10/29/25 3:41	20.67	0.08	6.26
10/29/25 3:42	20.67	0.08	6.3
10/29/25 3:43	20.67	0.08	6.32
10/29/25 3:44	20.67	0.08	6.3
10/29/25 3:45	20.67	0.08	6.29
10/29/25 3:46	20.67	0.08	6.28
10/29/25 3:47	20.67	0.08	6.34

10/29/25 3:48	20.67	0.08	6.37
10/29/25 3:49	20.67	0.08	6.38
10/29/25 3:50	20.67	0.08	6.32
10/29/25 3:51	20.67	0.08	6.34
10/29/25 3:52	20.68	0.08	6.32
10/29/25 3:53	20.68	0.08	6.39
10/29/25 3:54	20.68	0.08	6.37
10/29/25 3:55	20.68	0.08	6.42
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10/29/25 3:57	20.68	0.08	6.37
10/29/25 3:58	20.68	0.08	6.38
10/29/25 3:59	20.67	0.08	6.37
10/29/25 4:00	20.67	0.08	6.44
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10/29/25 4:03	20.67	0.08	6.42
10/29/25 4:04	20.67	0.08	6.38
10/29/25 4:05	20.67	0.08	6.41
10/29/25 4:06	20.67	0.08	6.42
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10/29/25 4:08	20.67	0.08	6.44
10/29/25 4:09	20.67	0.08	6.41
10/29/25 4:10	20.67	0.08	6.42
10/29/25 4:11	20.66	0.08	6.44
10/29/25 4:12	20.66	0.08	6.44
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10/29/25 4:14	20.66	0.08	6.5
10/29/25 4:15	20.66	0.08	6.45
10/29/25 4:16	20.66	0.08	6.43
10/29/25 4:17	20.66	0.08	6.47
10/29/25 4:18	20.66	0.08	6.49
10/29/25 4:19	20.66	0.08	6.46
10/29/25 4:20	20.66	0.08	6.48
10/29/25 4:21	20.66	0.08	6.45
10/29/25 4:22	20.66	0.08	6.49
10/29/25 4:23	20.66	0.08	6.49
10/29/25 4:24	20.67	0.08	6.47
10/29/25 4:25	20.67	0.08	6.53
10/29/25 4:26	20.67	0.08	6.54
10/29/25 4:27	20.67	0.08	6.53
10/29/25 4:28	20.67	0.08	6.52
10/29/25 4:29	20.67	0.08	6.54
10/29/25 4:30	20.67	0.08	6.52
10/29/25 4:31	20.67	0.08	6.55
10/29/25 4:32	20.67	0.08	6.5
10/29/25 4:33	20.67	0.08	6.58
10/29/25 4:34	20.67	0.08	6.57
10/29/25 4:35	20.67	0.08	6.57
10/29/25 4:36	20.67	0.07	6.55
10/29/25 4:37	20.67	0.08	6.56
10/29/25 4:38	20.67	0.08	6.57
10/29/25 4:39	20.67	0.08	6.57
10/29/25 4:40	20.67	0.07	6.56
10/29/25 4:41	20.67	0.07	6.6
10/29/25 4:42	20.67	0.07	6.65

10/29/25 4:43	20.67	0.07	6.63
10/29/25 4:44	20.67	0.08	6.66
10/29/25 4:45	20.67	0.08	6.65
10/29/25 4:46	20.67	0.08	6.6
10/29/25 4:47	20.67	0.08	6.61
10/29/25 4:48	20.67	0.08	6.62
10/29/25 4:49	20.67	0.08	6.64
10/29/25 4:50	20.67	0.08	6.63
10/29/25 4:51	20.67	0.07	6.67
10/29/25 4:52	20.67	0.08	6.69
10/29/25 4:53	20.68	0.08	6.59
10/29/25 4:54	20.67	0.08	6.61
10/29/25 4:55	20.67	0.07	6.64
10/29/25 4:56	20.67	0.08	6.58
10/29/25 4:57	20.67	0.08	6.65
10/29/25 4:58	20.67	0.08	6.66
10/29/25 4:59	20.68	0.08	6.63
10/29/25 5:00	20.67	0.07	6.68
10/29/25 5:01	20.67	0.07	6.68
10/29/25 5:02	20.67	0.07	6.71
10/29/25 5:03	20.67	0.08	6.68
10/29/25 5:04	20.67	0.07	6.7
10/29/25 5:05	20.67	0.07	6.74
10/29/25 5:06	20.67	0.07	6.71
10/29/25 5:07	20.67	0.07	6.73
10/29/25 5:08	20.67	0.08	6.66
10/29/25 5:09	20.67	0.08	6.62
10/29/25 5:10	20.67	0.08	6.68
10/29/25 5:11	20.67	0.07	6.71
10/29/25 5:12	20.67	0.07	6.7
10/29/25 5:13	20.67	0.07	6.7
10/29/25 5:14	20.67	0.07	6.74
10/29/25 5:15	20.67	0.07	6.77
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10/29/25 5:20	20.68	0.07	6.77
10/29/25 5:21	20.68	0.07	6.76
10/29/25 5:22	20.68	0.07	6.77
10/29/25 5:23	20.68	0.07	6.76
10/29/25 5:24	20.67	0.07	6.8
10/29/25 5:25	20.67	0.07	6.78
10/29/25 5:26	20.68	0.07	6.75
10/29/25 5:27	20.67	0.07	6.81
10/29/25 5:28	20.68	0.07	6.81
10/29/25 5:29	20.68	0.07	6.84
10/29/25 5:30	20.68	0.07	6.8
10/29/25 5:31	20.68	0.07	6.86
10/29/25 5:32	20.67	0.07	6.87
10/29/25 5:33	20.67	0.07	6.82
10/29/25 5:34	20.67	0.07	6.84
10/29/25 5:35	20.67	0.07	6.88
10/29/25 5:36	20.67	0.07	6.87
10/29/25 5:37	20.68	0.07	6.85

10/29/25 5:38	20.67	0.07	6.83
10/29/25 5:39	20.67	0.07	6.83
10/29/25 5:40	20.67	0.07	6.82
10/29/25 5:41	20.67	0.07	6.87
10/29/25 5:42	20.67	0.07	6.88
10/29/25 5:43	20.67	0.07	6.9
10/29/25 5:44	20.67	0.07	6.89
10/29/25 5:45	20.67	0.07	6.88
10/29/25 5:46	20.67	0.07	6.89
10/29/25 5:47	20.67	0.07	6.87
10/29/25 5:48	20.67	0.07	6.89
10/29/25 5:49	20.67	0.07	6.87
10/29/25 5:50	20.67	0.07	6.87
10/29/25 5:51	20.67	0.07	6.89
10/29/25 5:52	20.67	0.07	6.93
10/29/25 5:53	20.67	0.07	6.89
10/29/25 5:54	20.67	0.07	6.9
10/29/25 5:55	20.67	0.07	6.93
10/29/25 5:56	20.68	0.07	6.91
10/29/25 5:57	20.68	0.07	6.92
10/29/25 5:58	20.68	0.07	6.96
10/29/25 5:59	20.68	0.07	7.01
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10/29/25 6:02	20.68	0.07	6.95
10/29/25 6:03	20.68	0.07	6.95
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10/29/25 6:05	20.68	0.07	7.02
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10/29/25 6:08	20.68	0.07	6.98
10/29/25 6:09	20.68	0.07	7.01
10/29/25 6:10	20.67	0.07	7
10/29/25 6:11	20.68	0.07	7.02
10/29/25 6:12	20.67	0.07	7.03
10/29/25 6:13	20.67	0.07	7.01
10/29/25 6:14	20.67	0.07	7.01
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10/29/25 6:18	20.67	0.07	7.01
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10/29/25 6:22	20.67	0.07	7.02
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10/29/25 6:24	20.68	0.07	7.07
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10/29/25 6:26	20.68	0.07	7.07
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10/29/25 6:32	20.68	0.07	7.06

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10/29/25 6:34	20.68	0.07	7.14
10/29/25 6:35	20.68	0.07	7.13
10/29/25 6:36	20.68	0.07	7.13
10/29/25 6:37	20.68	0.07	7.09
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10/29/25 6:41	20.68	0.07	7.11
10/29/25 6:42	20.68	0.07	7.13
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10/29/25 6:49	20.68	0.07	7.18
10/29/25 6:50	20.68	0.07	7.12
10/29/25 6:51	20.68	0.07	7.18
10/29/25 6:52	20.67	0.07	7.21
10/29/25 6:53	20.68	0.07	7.19
10/29/25 6:54	20.68	0.07	7.13
10/29/25 6:55	20.68	0.07	7.14
10/29/25 6:56	20.68	0.07	7.16
10/29/25 6:57	20.68	0.07	7.2
10/29/25 6:58	20.67	0.07	7.24
10/29/25 6:59	20.67	0.07	7.2
10/29/25 7:00	20.67	0.07	7.22
10/29/25 7:01	20.67	0.07	7.18
10/29/25 7:02	20.67	0.07	7.17
10/29/25 7:03	20.67	0.07	7.18
10/29/25 7:04	20.67	0.07	7.21
10/29/25 7:05	20.68	0.07	7.16
10/29/25 7:06	20.68	0.07	7.21
10/29/25 7:07	20.68	0.07	7.29
10/29/25 7:08	20.67	0.07	7.23
10/29/25 7:09	20.68	0.07	7.22
10/29/25 7:10	20.68	0.07	7.28
10/29/25 7:11	20.68	0.06	7.26
10/29/25 7:12	20.68	0.06	7.28
10/29/25 7:13	20.68	0.06	7.21
10/29/25 7:14	20.67	0.06	7.24
10/29/25 7:15	20.67	0.07	7.26
10/29/25 7:16	20.67	0.06	7.27
10/29/25 7:17	20.68	0.07	7.3
10/29/25 7:18	20.67	0.07	7.24
10/29/25 7:19	20.68	0.07	7.25
10/29/25 7:20	20.68	0.07	7.22
10/29/25 7:21	20.68	0.07	7.21
10/29/25 7:22	20.68	0.06	7.29
10/29/25 7:23	20.68	0.06	7.26
10/29/25 7:24	20.68	0.06	7.34
10/29/25 7:25	20.68	0.07	7.28
10/29/25 7:26	20.68	0.06	7.28
10/29/25 7:27	20.68	0.07	7.27

10/29/25 7:28	20.68	0.06	7.3
10/29/25 7:29	20.68	0.06	7.33
10/29/25 7:30	20.68	0.06	7.3
10/29/25 7:31	20.68	0.07	7.32
10/29/25 7:32	20.69	0.06	7.33
10/29/25 7:33	20.68	0.06	7.35
10/29/25 7:34	20.68	0.06	7.36
10/29/25 7:35	20.68	0.07	7.33
10/29/25 7:36	20.67	0.06	7.4
10/29/25 7:37	1.55	0	7
10/29/25 7:38	0.01	-0.04	0.57
10/29/25 7:39	0.64	0.62	-0.31
10/29/25 7:40	19.82	20.37	-2.23
10/29/25 7:41	19.93	20.06	-0.95
10/29/25 7:42	19.91	19.84	-1
10/29/25 7:43	19.85	18.85	-0.72
10/29/25 7:44	13.6	9.81	-0.27
10/29/25 7:45	9.96	9.9	-0.93
10/29/25 7:46	13.12	7.43	-0.51
10/29/25 7:47	4.95	0.79	374.64
10/29/25 7:48	0.01	0	508.49
10/29/25 7:49	5.45	0.01	376.72
10/29/25 7:50	0.08	0.01	245
10/29/25 7:51	0	0	250.39
10/29/25 7:52	12.62	0.02	93.49
10/29/25 7:53	4.68	0.1	0.84
10/29/25 7:54	0.14	0.07	0.75
10/29/25 7:55	0.13	0.07	0.79
10/29/25 7:56	7.09	6.93	10.06
10/29/25 7:57	9.9	9.75	0.07
10/29/25 7:58	9.91	9.8	-0.22
10/29/25 7:59	4.02	4.07	134.83
10/29/25 8:00	0.14	0.17	245.75
10/29/25 8:01	0.28	0.38	246.27
10/29/25 8:02	7.18	10.59	118.02
10/29/25 8:03	7.48	11.08	105.74
10/29/25 8:04	7.11	11.45	97.46
10/29/25 8:05	6.94	11.6	101.63
10/29/25 8:06	6.66	11.92	108.9
10/29/25 8:07	6.5	12.08	103.51
10/29/25 8:08	6.46	12.11	99.21
10/29/25 8:09	6.44	12.13	97.83
10/29/25 8:10	6.41	12.17	103.77
10/29/25 8:11	6.52	12.06	102.59
10/29/25 8:12	6.45	12.13	95.36
10/29/25 8:13	6.15	12.43	91.71
10/29/25 8:14	6.07	12.52	100.52
10/29/25 8:15	6.02	12.51	100.74
10/29/25 8:16	6.03	12.58	100.01
10/29/25 8:17	6.07	12.48	96.08
10/29/25 8:18	5.93	12.64	113.7
10/29/25 8:19	5.84	12.67	122.24
10/29/25 8:20	5.82	12.83	143.96
10/29/25 8:21	5.89	12.8	152.03
10/29/25 8:22	6.33	12.6	133.36

10/29/25 8:23	6.99	12.06	111.26
10/29/25 8:24	6.93	12.12	109.96
10/29/25 8:25	7.22	11.83	108.88
10/29/25 8:26	6.76	12.22	104.57
10/29/25 8:27	7.06	12.12	108.43
10/29/25 8:28	7.32	11.73	102.05
10/29/25 8:29	7.16	11.73	106.7
10/29/25 8:30	6.44	12.2	103.21
10/29/25 8:31	6.33	12.31	93.73
10/29/25 8:32	6.61	12.14	97.91
10/29/25 8:33	6.76	11.95	104.8
10/29/25 8:34	6.5	12.18	104.31
10/29/25 8:35	6.84	11.96	112.74
10/29/25 8:36	6.92	11.89	120.98
10/29/25 8:37	6.94	11.93	127.88
10/29/25 8:38	6.96	11.9	123.12
10/29/25 8:39	7.23	11.68	116.59
10/29/25 8:40	7.1	11.78	102.97
10/29/25 8:41	6.94	11.86	98.76
10/29/25 8:42	6.92	11.95	97.81
10/29/25 8:43	7.01	11.88	94.02
10/29/25 8:44	6.37	12.27	85.88
10/29/25 8:45	6.06	12.69	117.2
10/29/25 8:46	6.19	12.57	99.4
10/29/25 8:47	6.26	12.56	97.01
10/29/25 8:48	6.34	12.5	101.28
10/29/25 8:49	6.48	12.38	98.39
10/29/25 8:50	6.6	12.26	106.15
10/29/25 8:51	7.23	11.7	117
10/29/25 8:52	7.27	11.49	110.87
10/29/25 8:53	7.73	11.08	114.55
10/29/25 8:54	7.7	11.01	119.61
10/29/25 8:55	7.54	11.2	115.1
10/29/25 8:56	7.38	11.3	109.92
10/29/25 8:57	7.71	11.16	113.74
10/29/25 8:58	8.22	10.63	112.26
10/29/25 8:59	8.63	10.19	113.78
10/29/25 9:00	8.61	10.2	112.03
10/29/25 9:01	8.58	10.22	117.38
10/29/25 9:02	8.74	10.03	130.19
10/29/25 9:03	8.48	10.28	123.51
10/29/25 9:04	8.27	10.47	125.77
10/29/25 9:05	8.43	10.37	126.13
10/29/25 9:06	8.45	10.34	123.98
10/29/25 9:07	2.66	2.93	80.51
10/29/25 9:08	0.12	0.17	1.25
10/29/25 9:09	0.45	0.45	3.82
10/29/25 9:10	9.64	9.27	6.47
10/29/25 9:11	9.89	9.82	0.26
10/29/25 9:12	5.11	5.07	111.86
10/29/25 9:13	0.13	0.2	246.08
10/29/25 9:14	1.04	1.18	237.16
10/29/25 9:15	8.67	9.75	110.4
10/29/25 9:16	8.56	10.17	104.76
10/29/25 9:17	8.4	10.32	108.36

10/29/25 9:18	8.55	10.18	107.87
10/29/25 9:19	8.07	10.31	87.08
10/29/25 9:20	7.21	10.9	75.09
10/29/25 9:21	6.99	11.15	77.89
10/29/25 9:22	7.01	11.14	87.09
10/29/25 9:23	6.75	11.38	93.57
10/29/25 9:24	6.5	11.58	92.06
10/29/25 9:25	6.08	11.97	105.13
10/29/25 9:26	5.9	12.19	124.1
10/29/25 9:27	5.92	12.16	111.41
10/29/25 9:28	5.81	12.2	123.78
10/29/25 9:29	5.38	12.57	192.52
10/29/25 9:30	5.14	12.84	298.1
10/29/25 9:31	4.87	13.04	451.86
10/29/25 9:32	4.65	13.27	667.98
10/29/25 9:33	4.73	13.24	720.14
10/29/25 9:34	4.82	13.14	659.46
10/29/25 9:35	4.88	13.07	495.39
10/29/25 9:36	4.77	13.11	505.47
10/29/25 9:37	4.89	13.11	502.15
10/29/25 9:38	4.92	13.07	432.78
10/29/25 9:39	4.9	13.08	541.3
10/29/25 9:40	4.79	13.29	268.14
10/29/25 9:41	4.73	13.53	346.34
10/29/25 9:42	5.41	13.16	125.42
10/29/25 9:43	5.54	13.11	137.51
10/29/25 9:44	5.84	12.95	155.19
10/29/25 9:45	6.07	12.63	116.18
10/29/25 9:46	5.72	12.96	155.28
10/29/25 9:47	5.73	12.94	132.63
10/29/25 9:48	5.8	12.8	151.02
10/29/25 9:49	5.63	12.87	176.23
10/29/25 9:50	5.4	12.97	220.92
10/29/25 9:51	5.49	12.9	250.12
10/29/25 9:52	5.34	12.73	488.76
10/29/25 9:53	4.79	13.21	446.14
10/29/25 9:54	4.93	13.11	426.5
10/29/25 9:55	5.01	12.99	463.16
10/29/25 9:56	5.09	12.87	496.5
10/29/25 9:57	5.12	12.92	507.97
10/29/25 9:58	4.99	12.95	458.33
10/29/25 9:59	5.18	12.88	505.37
10/29/25 10:00	5.1	12.98	499.24
10/29/25 10:01	5.07	13.04	477.39
10/29/25 10:02	5.34	12.83	342.41
10/29/25 10:03	5.65	12.57	217.28
10/29/25 10:04	5.45	12.73	303.13
10/29/25 10:05	5.22	13.01	374.23
10/29/25 10:06	5.24	12.96	422.22
10/29/25 10:07	5.02	13.2	472.75
10/29/25 10:08	5.12	13.12	479.64
10/29/25 10:09	5.31	12.95	275.07
10/29/25 10:10	5.75	12.6	140.9
10/29/25 10:11	5.87	12.42	142.68
10/29/25 10:12	6.04	12.29	129.79

10/29/25 10:13	5.86	12.43	160.52
10/29/25 10:14	5.79	12.53	172.32
10/29/25 10:15	5.45	12.79	232.78
10/29/25 10:16	5.36	12.92	209.37
10/29/25 10:17	5.2	13	330.03
10/29/25 10:18	5.25	13.01	262.69
10/29/25 10:19	5.18	13.1	324.51
10/29/25 10:20	5.34	13.03	244.33
10/29/25 10:21	5.24	13.05	285.74
10/29/25 10:22	4.8	13.45	449.33
10/29/25 10:23	5.45	13.16	137.64
10/29/25 10:24	5.78	12.81	90.75
10/29/25 10:25	6.2	12.48	85.14
10/29/25 10:26	6.44	12.4	92.94
10/29/25 10:27	6.62	12.21	97.2
10/29/25 10:28	6.48	12.31	91.74
10/29/25 10:29	6.33	12.45	88.69
10/29/25 10:30	6.4	12.42	94.54
10/29/25 10:31	6.45	12.31	90.21
10/29/25 10:32	6.3	12.44	88.04
10/29/25 10:33	6.51	12.24	92.9
10/29/25 10:34	6.56	12.14	83.19
10/29/25 10:35	6.68	12.02	89.65
10/29/25 10:36	6.73	11.96	83.19
10/29/25 10:37	6.82	11.86	84.09
10/29/25 10:38	6.76	11.92	80.68
10/29/25 10:39	6.95	11.75	86.73
10/29/25 10:40	6.86	11.84	90.97
10/29/25 10:41	7.03	11.72	101.99
10/29/25 10:42	7.3	11.47	107.6
10/29/25 10:43	7.55	11.22	100.07
10/29/25 10:44	7.48	11.28	104.97
10/29/25 10:45	7.49	11.26	112.86
10/29/25 10:46	7.46	11.34	123.89
10/29/25 10:47	7.74	11.08	134.37
10/29/25 10:48	8.1	10.73	152.96
10/29/25 10:49	8.35	10.44	164.43
10/29/25 10:50	8.53	10.28	169.92
10/29/25 10:51	8.61	10.21	168.64
10/29/25 10:52	8.1	10.62	155.16
10/29/25 10:53	0.78	0.94	51.89
10/29/25 10:54	0.11	0.16	1.35
10/29/25 10:55	2.32	2.26	8.17
10/29/25 10:56	9.8	9.49	2.21
10/29/25 10:57	9.88	9.83	0.39
10/29/25 10:58	3	3	164.51
10/29/25 10:59	0.12	0.18	246.57
10/29/25 11:00	2.21	3.82	197.04
10/29/25 11:01	6.73	11.77	75.99
10/29/25 11:02	6.48	12.13	68.31
10/29/25 11:03	6.68	11.93	69.49
10/29/25 11:04	6.41	12.18	68.69
10/29/25 11:05	6.42	12.21	69.49
10/29/25 11:06	6.42	12.2	66.82
10/29/25 11:07	6.57	12.07	68.15

10/29/25 11:08	6.73	11.95	71.54
10/29/25 11:09	7.02	11.63	74.48
10/29/25 11:10	6.87	11.74	70.39
10/29/25 11:11	6.66	11.91	72.12
10/29/25 11:12	6.55	12.06	65.52
10/29/25 11:13	6.61	12.02	65.71
10/29/25 11:14	6.49	12.13	73.96
10/29/25 11:15	6.97	11.78	80.42
10/29/25 11:16	6.97	11.7	82.58
10/29/25 11:17	6.95	11.7	82.88
10/29/25 11:18	6.82	11.81	88.05
10/29/25 11:19	6.58	12.05	74.05
10/29/25 11:20	6.39	12.21	71.2
10/29/25 11:21	6.33	12.32	66.3
10/29/25 11:22	6.36	12.28	69.97
10/29/25 11:23	6.47	12.13	70.42
10/29/25 11:24	6.02	12.48	63.54
10/29/25 11:25	5.9	12.66	69.42
10/29/25 11:26	5.72	12.84	77.51
10/29/25 11:27	5.88	12.73	73.9
10/29/25 11:28	5.79	12.74	71.42
10/29/25 11:29	5.81	12.78	68.31
10/29/25 11:30	5.65	12.85	61.19
10/29/25 11:31	5.69	12.94	69.6
10/29/25 11:32	5.82	12.74	64.59
10/29/25 11:33	6.18	12.48	61.15
10/29/25 11:34	6.09	12.53	61.58
10/29/25 11:35	6.3	12.36	59.63
10/29/25 11:36	6.23	12.36	59.1
10/29/25 11:37	6.25	12.35	60.69
10/29/25 11:38	6.21	12.39	65.46
10/29/25 11:39	6.11	12.48	69.07
10/29/25 11:40	6.1	12.51	68.52
10/29/25 11:41	6.25	12.39	69.68
10/29/25 11:42	6.15	12.42	69.98
10/29/25 11:43	6.15	12.49	71.15
10/29/25 11:44	6.64	12.06	75.24
10/29/25 11:45	6.82	11.78	74.62
10/29/25 11:46	7	11.69	85.95
10/29/25 11:47	7.39	11.29	91.23
10/29/25 11:48	7.24	11.37	89.26
10/29/25 11:49	7.1	11.49	83.81
10/29/25 11:50	7.04	11.62	82.07
10/29/25 11:51	7.38	11.34	88.55
10/29/25 11:52	7.2	11.4	83.02
10/29/25 11:53	7.16	11.5	76.27
10/29/25 11:54	7.26	11.41	82.19
10/29/25 11:55	7.31	11.34	75.45
10/29/25 11:56	7.06	11.55	78.39
10/29/25 11:57	7.12	11.53	80.1
10/29/25 11:58	7.22	11.42	79.95
10/29/25 11:59	6.92	11.68	75.06
10/29/25 12:00	6.67	11.94	77.39
10/29/25 12:01	6.78	11.85	71.09
10/29/25 12:02	6.87	11.77	70.75

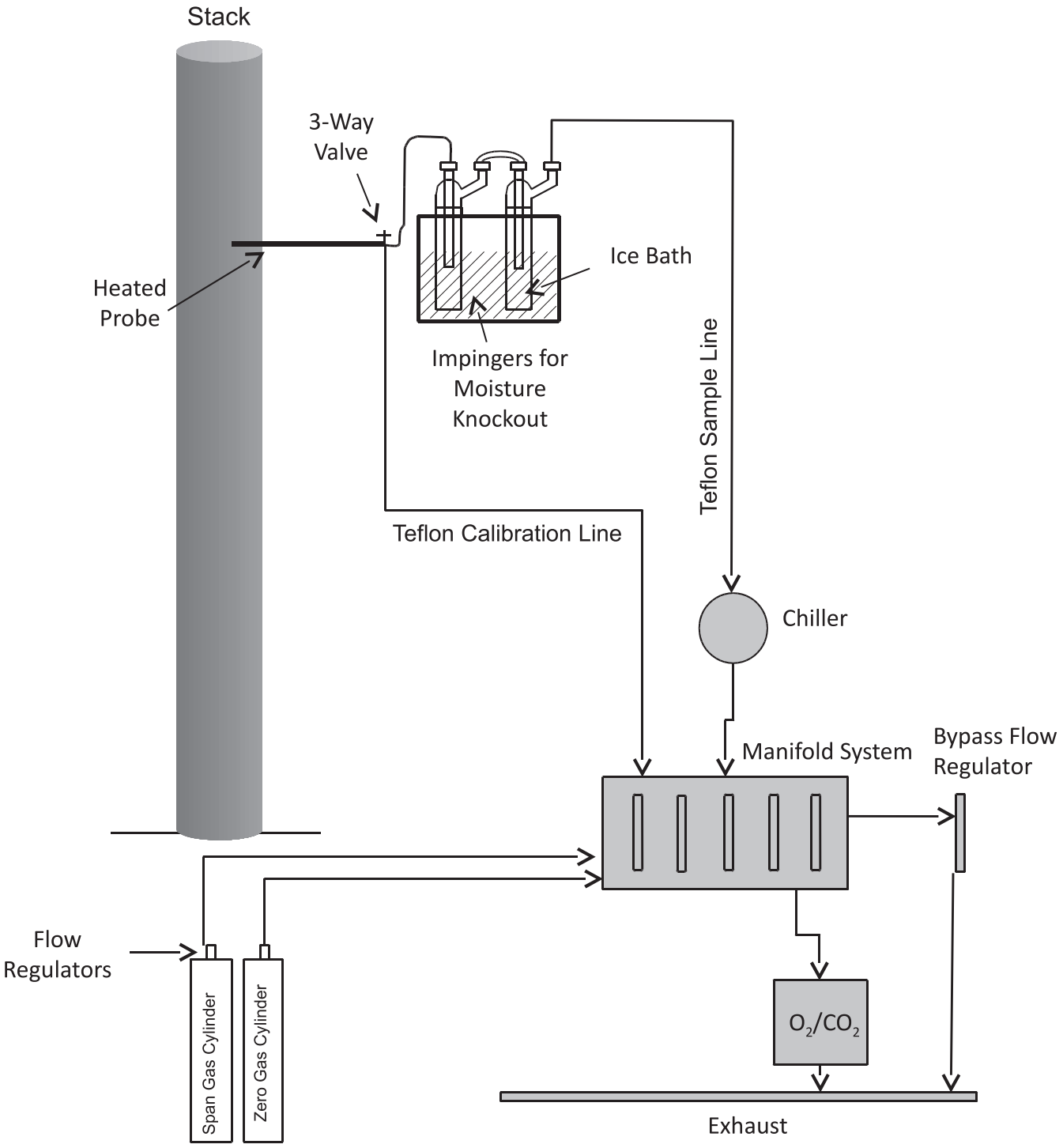
10/29/25 12:03	6.74	11.86	70.52
10/29/25 12:04	6.64	11.98	72.06
10/29/25 12:05	6.54	12.09	75.47
10/29/25 12:06	6.27	12.24	75.6
10/29/25 12:07	6.29	12.33	73.28
10/29/25 12:08	5.93	12.52	62.8
10/29/25 12:09	5.82	12.7	62.04
10/29/25 12:10	5.99	12.56	66.77
10/29/25 12:11	6.32	12.33	73.55
10/29/25 12:12	6.42	12.19	75
10/29/25 12:13	6.69	11.96	81.43
10/29/25 12:14	6.87	11.76	79.58
10/29/25 12:15	6.76	11.83	76.43
10/29/25 12:16	6.59	11.96	73.49
10/29/25 12:17	6.31	12.25	68.89
10/29/25 12:18	6.33	12.24	66.36
10/29/25 12:19	6.08	12.49	66.6
10/29/25 12:20	6.11	12.52	62.54
10/29/25 12:21	6.18	12.53	59.56
10/29/25 12:22	6	12.7	62.08
10/29/25 12:23	6.03	12.87	66.62
10/29/25 12:24	6.15	12.81	73.16
10/29/25 12:25	6.51	12.59	80.26
10/29/25 12:26	6.63	12.42	81.18
10/29/25 12:27	6.59	12.51	82.03
10/29/25 12:28	6.85	12.3	87.4
10/29/25 12:29	6.78	12.32	89.7
10/29/25 12:30	6.92	12.17	92.66
10/29/25 12:31	6.76	12.23	92.53
10/29/25 12:32	6.84	12.1	87.96
10/29/25 12:33	6.59	12.21	70.61
10/29/25 12:34	6.5	12.17	66.5
10/29/25 12:35	1.12	2.01	48.93
10/29/25 12:36	0.11	0.19	1.06
10/29/25 12:37	1.41	1.42	6.94
10/29/25 12:38	9.75	9.39	3.01
10/29/25 12:39	9.87	9.81	0.2
10/29/25 12:40	3.78	3.8	144.62
10/29/25 12:41	0.12	0.2	245.87
10/29/25 12:42	5.17	0.16	193.14
10/29/25 12:43	20.49	0.17	2.71
10/29/25 12:44	20.58	0.17	1.32
10/29/25 12:45	20.6	0.16	1.07
10/29/25 12:46	20.6	0.16	1.06
10/29/25 12:47	14.98	0.16	37.83
10/29/25 12:48	0.06	0.1	3.81
10/29/25 12:49	1.28	1.04	20.66
10/29/25 12:50	-0.02	0.04	0.97
10/29/25 12:51	-0.02	0.01	0.11
10/29/25 12:52	0.69	0.06	25.34
10/29/25 12:53	-0.02	0.01	49.78
10/29/25 12:54	-0.02	0	44.14
10/29/25 12:55	-0.02	0	24.69
10/29/25 12:56	-0.02	0	18.39
10/29/25 12:57	-0.02	0	11.58

10/29/25 12:58	3.1	0.08	7.17
10/29/25 12:59	0.8	0.26	2
10/29/25 13:00	0.08	0.08	0.17
10/29/25 13:01	0.69	0.73	4.9
10/29/25 13:02	9.73	9.52	5.26
10/29/25 13:03	9.87	9.76	0.44
10/29/25 13:04	4.61	4.53	3.62
10/29/25 13:05	0.11	0.17	11.98
10/29/25 13:06	2.12	0.51	12
10/29/25 13:07	14.65	3.36	2.28
10/29/25 13:08	15.1	3.24	1
10/29/25 13:09	15.16	3.23	0.98
10/29/25 13:10	14.7	3.49	0.6
10/29/25 13:11	14.48	3.61	0.48
10/29/25 13:12	14.55	3.57	0.56
10/29/25 13:13	14.74	3.47	0.57
10/29/25 13:14	14.6	3.55	0.48
10/29/25 13:15	14.27	3.73	0.42
10/29/25 13:16	13.83	3.98	0.37
10/29/25 13:17	13.46	4.19	0.32
10/29/25 13:18	13.77	4.01	0.3
10/29/25 13:19	13.71	4.05	0.36
10/29/25 13:20	13.5	4.17	0.29
10/29/25 13:21	13.09	4.4	0.29
10/29/25 13:22	13.06	4.41	0.24
10/29/25 13:23	12.61	4.66	0.27
10/29/25 13:24	12.52	4.71	0.24
10/29/25 13:25	12.57	4.68	0.21
10/29/25 13:26	12.63	4.65	0.26
10/29/25 13:27	12.7	4.61	0.24
10/29/25 13:28	12.72	4.61	0.24
10/29/25 13:29	12.73	4.6	0.24
10/29/25 13:30	12.68	4.63	0.23
10/29/25 13:31	12.71	4.62	0.25
10/29/25 13:32	12.6	4.67	0.23
10/29/25 13:33	12.64	4.65	0.18
10/29/25 13:34	12.68	4.63	0.17
10/29/25 13:35	12.68	4.63	0.21
10/29/25 13:36	12.68	4.62	0.17
10/29/25 13:37	12.65	4.64	0.2
10/29/25 13:38	12.81	4.55	0.18
10/29/25 13:39	12.83	4.54	0.12
10/29/25 13:40	12.69	4.62	0.07
10/29/25 13:41	12.68	4.62	0.1
10/29/25 13:42	12.65	4.64	0.09
10/29/25 13:43	12.87	4.51	0.09
10/29/25 13:44	12.94	4.48	0.05
10/29/25 13:45	12.77	4.57	0.06
10/29/25 13:46	12.7	4.61	0.03
10/29/25 13:47	12.64	4.64	0.02
10/29/25 13:48	12.65	4.63	0.07
10/29/25 13:49	12.7	4.61	0.06
10/29/25 13:50	12.68	4.62	0.07
10/29/25 13:51	12.69	4.62	0.03
10/29/25 13:52	12.86	4.52	0.07

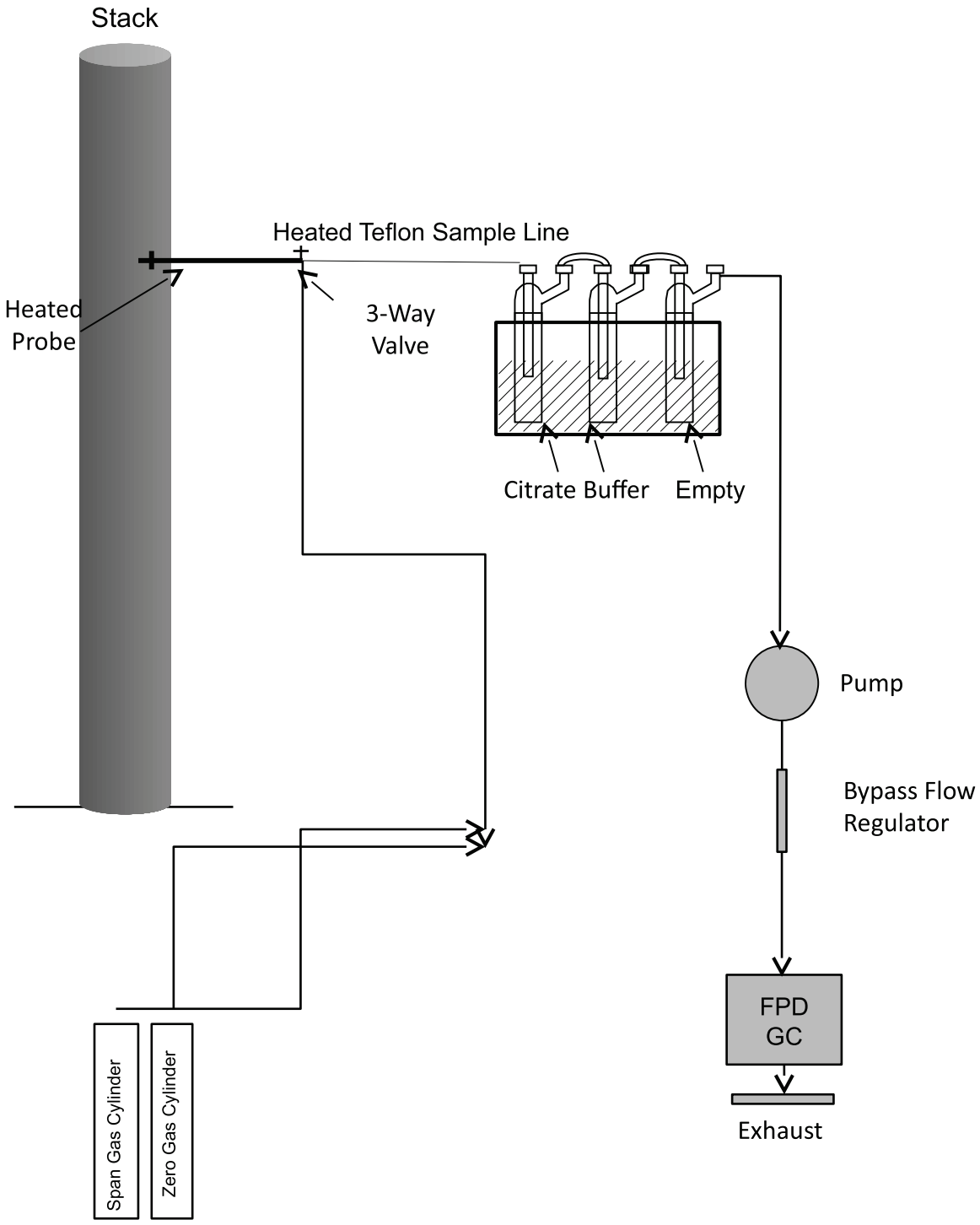
10/29/25 13:53	12.77	4.58	0.04
10/29/25 13:54	12.64	4.66	0.01
10/29/25 13:55	12.6	4.68	0.05
10/29/25 13:56	12.57	4.69	0.01
10/29/25 13:57	12.62	4.66	0.03
10/29/25 13:58	12.63	4.66	0.04
10/29/25 13:59	12.63	4.66	0.04
10/29/25 14:00	12.64	4.65	0.07
10/29/25 14:01	12.6	4.67	0.02
10/29/25 14:02	12.61	4.66	0.05
10/29/25 14:03	12.6	4.68	0.04
10/29/25 14:04	12.57	4.69	0.04
10/29/25 14:05	12.59	4.67	0
10/29/25 14:06	12.6	4.66	0
10/29/25 14:07	12.63	4.65	0
10/29/25 14:08	12.69	4.61	0
10/29/25 14:09	12.67	4.62	0.05
10/29/25 14:10	12.62	4.65	0
10/29/25 14:11	12.62	4.67	0.37
10/29/25 14:12	12.58	4.7	0.44
10/29/25 14:13	12.66	4.57	0.03
10/29/25 14:14	12.73	4.54	0.01
10/29/25 14:15	12.62	4.58	0.04
10/29/25 14:16	12.63	4.58	0
10/29/25 14:17	12.65	4.59	0
10/29/25 14:18	12.59	4.61	0.06
10/29/25 14:19	12.54	4.65	0.07
10/29/25 14:20	12.61	4.61	0.09
10/29/25 14:21	12.71	4.55	0.09
10/29/25 14:22	13.06	4.35	0.04
10/29/25 14:23	13.17	4.3	0.03
10/29/25 14:24	13.19	4.29	0.04
10/29/25 14:25	13.01	4.37	0.08
10/29/25 14:26	1.18	0.53	2.94
10/29/25 14:27	0.08	0.08	0.13
10/29/25 14:28	2.27	2.19	7.35
10/29/25 14:29	9.75	9.42	1.37
10/29/25 14:30	9.84	9.72	-0.5
10/29/25 14:31	2.9	2.88	4.67
10/29/25 14:32	0.08	0.13	11.88
10/29/25 14:33	6.19	0.09	10.72
10/29/25 14:34	20.53	0.11	0.81
10/29/25 14:35	20.6	0.1	0.41
10/29/25 14:36	20.61	0.1	0.45
10/29/25 14:37	20.6	0.1	0.57
10/29/25 14:38	18.89	0.1	0.57

Appendix G - Illustrations

Reference Method Monitors Sampling System
(EPA Method 3A)



Reference Method Monitor Sampling System
(EPA Method 16)



Appendix H - Resume of FTL

CAREER SUMMARY

Mr. Branham is a Project Scientist who has worked in the environmental fieldfor over 7 years. He has been involved with field testing activities on a broad scale and within several different industry types. Over this time, he has developed skills in several areas of emission testing including mobile laboratory operation, meter box operation, and field team supervision.

Education

BS, Parks, Recreation, and Hospitality Administration; Emphasis – Natural Resource Management

Arkansas Tech University

Russellville, AR

Certifications

Visible Emissions Evaluator

Joined Firm

2015

CORE SKILLS

- Perform Multiple EPA Reference Test Methods
- Mobile Laboratory Operation
- Meter Box Console Operation
- Field Team Supervision

REPRESENTATIVE PROJECTS

Lake City Army Ammunition – Independence, Missouri

Project included sampling for Dioxins and Furans on a hazardous waste combustor via U.S. EPA Reference Test Method 0023a, as well as a RATA to determine relative accuracy of a CO/O2 analyzer they had onsite to monitor emissions from that combustor. Testing was observed by the state regulatory agency. Responsibilities included field organization as well as general field operations.

Martin Marietta Materials – Malvern, Arkansas

Conducted and field managed EPA Method 9 testing at the Jones Mill Quarry location. Responsibilities included project coordination and field operations. Testing parameters included the determination of plume and fugitive emissions opacity.

Clean Harbors – El Dorado, Arkansas

Project included sampling for Carbon Monoxide, Nitrogen Oxides, Sulfur Dioxide, Total Hydrocarbons, Particulate Matter, Metals, Chlorobenzene, and Hydrogen Cyanide on a hazardous waste incinerator in support of a Comprehensive Performance Test. This project included U.S. EPA Reference Test Methods 6C, 10, 7E, 25A, 5/202, 0030, 29, and OTM-29. Responsibilities included meter box operation, field organization, and general field operations.

Nucor Yamato Steel– Blytheville, Arkansas

Conducted annual compliance and performance specification testing on sources at varying operating conditions to demonstrate compliance with federal and state requirements. Testing involved wet chemistry methods and instrumental analysis including U.S. EPA Reference Test Methods 5/202 (particulate matter & condensable particulate matter), 12 (lead), 25A (volatile organic compounds), 7E (nitrogen oxides), 6C (sulfur dioxide) and 10 (carbon monoxide). Responsibilities included meter box operation, field organization, and general field operations.

Acme Brick

Conducted and assisted with BMACT testing at multiple locations in Texas and Arkansas. Responsibilities included meter box operation and field organization. Testing parameters included Oxygen, Carbon Dioxide, Nitrogen Oxides, Carbon Monoxide, Non-Methane Volatile Organic Compounds and Total Hydrocarbons, Halide testing with isokinetic train and FTIR, Metals, and Mercury. EPA Methods 3A, 7E, 10, 25A, 26, 29, 30B, and 320. Responsibilities included meter box operation, general field operations, and field organization.

Training

- TVTC Training
- CPR and First Aid
- MSHA Part 46
- Safeland

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