TCEQ DOCKET NO. 2015-1489-AIR

APPLICATION BY	**§**	**BEFORE THE**
HALYARD ENERGY HENDERSON, LLC	**§**	
NEW SOURCE REVIEW	**§**	**TEXAS COMMISSION ON**
AIR QUALITY	**§**	
PERMIT NO. 122733	**§**	**ENVIRONMENTAL QUALITY**

APPLICANT HALYARD ENERGY HENDERSON, LLC'S
RESPONSE TO THE KING'S REIN INC.'S REQUEST FOR RECONSIDERATION

TO THE COMMISSIONERS OF THE TCEQ:

The King's Rein Inc. ("***King's Rein***") requests that the Commissioners of the Texas Commission on Environmental Quality ("***TCEQ***") reconsider the Executive Director's ("***ED's***") decision that the above-referenced Halyard Energy Henderson, LLC ("***Halyard***") permit application meets the requirements of applicable law. As set forth below, King's Rein's request provides no cognizable basis for reconsideration and should be denied.

I. "Adequate Margin of Safety" (ED Response to Comment 1)

King's Rein first argues that the Commissioners should reconsider the ED's decision based on King's Rein's assertion that the "adequate margin of safety" requirement for national ambient air quality standards ("NAAQS") referenced in the ED's Response to Public Comment regarding Comment 1 is insufficient. Specifically, King's Rein claims that an "adequate margin of safety" does not (1) provide its clients with "confidence that they will not experience potential harmful effects from the plant's emissions," or (2) "help [such clients] feel at ease for their welfare." King's Rein also states that TCEQ and Halyard cannot "offer any guarantees that emissions from the plant will not affect any of [its clients]."

In its discussion of "adequate margin of safety," King's Rein makes no allegation that the ED's decision is inconsistent with any law, regulation, or standard. The "adequate margin of

safety" referenced in the ED's Response to Public Comments to which King's Reign refers is a phrase used in § 109(b)(1) of the federal Clean Air Act, which provides:

> National primary ambient air quality standards, prescribed under subsection (a) of this section shall be ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health. Such primary standards may be revised in the same manner as promulgated.[1]

The U.S. Environmental Protection Agency has set the primary NAAQS at levels to be protective of the health of even the most sensitive members of the general population, which include the very young, the very old, and those with pre-existing medical conditions.[2] In the application process, Halyard submitted information to TCEQ, including air dispersion modeling results, demonstrating that the proposed facility will meet the NAAQS and other air-related standards and requirements applicable to the facility.

Utilizing the same modeling input files, methodology, and assumptions that TCEQ accepted for Halyard's demonstration of compliance with the NAAQS,[3] Halyard conducted additional predictive air dispersion modeling to determine the level of constituents from the proposed Halyard facility at the King's Rein's property.[4] The predicted levels at the King's Rein property are extremely low. At only small fractions of the applicable standards and guideline levels, the low levels of constituent concentrations at that property provide a margin of safety

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[1] 42 U.S.C. § 7409 (b)(1) (emphasis added).

[2] The legislative history of § 109 of the Clean Air Act indicates that a primary standard is to be set at "the maximum permissible ambient air level . . . which will protect the health of any [sensitive] group of the population," and that for this purpose "reference should be made to a representative sample of persons comprising the sensitive group rather than to a single person in such a group." S. Rep. No. 91-1196, 91st Cong., 2d Sess. 10 (1970).

[3] *See* Attachment A, Air Quality Analysis Audit – Halyard Energy Henderson LLC (RN107670341), TCEQ Interoffice Memorandum from Reece Parker and Dan Jamieson to Joe Janecka, March 9, 2015.

[4] King's Rein's property is owned by Ms. Shannon DeCraene. It is the same property that is the subject of Ms. DeCraene's request for a contested case hearing regarding Halyard's application for Air Quality Permit No. 122733.

that is significantly greater than that which is required by law. Specifically, modeled criteria pollutant concentrations at King's Rein's property range from 0.001% to 2.77% of the applicable NAAQS (i.e., 36 to more than 100,000 times lower than the NAAQS).[5] Halyard also conducted predictive air dispersion modeling at King's Rein's property for all other constituents to be emitted from the proposed Halyard facility, as noted above - utilizing the same modeling input files, methodology, and assumptions that TCEQ accepted for Halyard's demonstration of compliance with the NAAQS. That additional modeling demonstrated that at the King's Rein property the maximum predicted airborne concentrations of air contaminants with a state Net Ground Level Concentration standard range from 0.01% to 0.04% of the State of Texas standard (i.e., 2,500 to 10,000 times lower than the state standard). Additionally, at the King's Rein property the maximum predicted airborne concentrations of air contaminants for which Texas Effects Screening Level ("***ESL***") guideline concentrations have been developed range from less than 0.00001% to 18.5% of the ESLs for those constituents (i.e., five times to one million times lower than the applicable ESLs).[6]

Dr. Thomas Dydek, a board certified toxicologist and licensed professional engineer, reviewed and relied on these models to render an opinion about the likelihood of any adverse health and welfare effects at the King's Rein property.[7] Dr. Dydek's report explains that the applicable air quality standards and guidelines used in the review of Halyard's permit application are set low enough to protect the health of the most sensitive members of the population, as well as the safety and welfare of property, farm animals, wildlife, and the environment. In his

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[5] *See* Exhibit A (Criteria Pollutant Modeling Results Summary, Trinity Consultants, Inc. Memorandum from Michael Meister to Laura LaValle, October 26, 2015) to Attachment B (Affidavit of Michael T. Meister).

[6] *See* Exhibit B (State Health Effects Evaluation Air Dispersion Modeling Report, Trinity Consultants, Inc., October 2015) to Attachment B (Affidavit of Michael T. Meister).

[7] *See* Attachment C, Affidavit of Dr. Thomas Dydek, PhD, DABT, PE.

opinion, Halyard's air modeling demonstrates that the Halyard plant will pose no actual or imminent risk of adverse effects to the health, safety, or welfare of any person on King's Rein's property. Additionally, Dr. Dydek concludes that the emissions from the proposed Halyard facility will not pose any risk of adverse effects to King's Rein's properties, animals, local wildlife, or the environment.

In reviewing Halyard's permit application, TCEQ evaluated the predicted emissions from the proposed Halyard facility and determined that emissions from the facility will be protective of human health and the environment. Halyard's additional modeling provides confirmation that all air contaminant concentrations from the proposed Halyard facility will meet all applicable standards and guidelines and will be protective of human health and the environment, at the King's Rein property and elsewhere. In sum, King's Rein's assertions about the protectiveness of the NAAQS and sufficiency of TCEQ's review of the application provide no basis for reconsideration of the ED's decision.

II. Noise from the Proposed Facility (ED Responses to Comments 1 and 2)

King's Rein's second stated basis for requesting reconsideration is its concern "about any *potential* noise discharges that *may* affect the behavior of a horse during a session and *potentially* [adversely affect a client]."[8] Halyard agrees with the ED's statement in his Response to Public Comment that "TCEQ does not have jurisdiction to consider noise . . . when determining whether to approve or deny a permit application."[9] King's Rein's concerns potentially relate to a zoning issue that may be appropriate for local officials to regulate, but are outside of the scope of what can be taken into account in the ED's decision regarding whether Halyard's application

[8] Emphasis added.

[9] Executive Director's Response to Public Comment Halyard Energy Henderson, LLC, Permit No. 122733, p. 5.

meets the requirements of applicable laws and regulations relating to air contaminant emissions. Accordingly, King's Rein's comment regarding potential noise from the proposed facility does not provide a basis for reconsideration of the ED's decision.

III. Property Values/Aesthetics/Light/Noise/Traffic (ED Response to Comment 2)

King's Rein next alleges that the proposed facility will adversely affect its non-profit operation because its clients, "who are afraid of being so close to chemical emissions and pollutants, will stop participating." No state or federal law or regulation applicable to the review of Halyard's air permit application allows TCEQ to take into consideration whether a facility will cause one to experience an emotional response. Rather, the relevant standards are set at levels determined to be protective of human health and the environment. As noted above, predictive air dispersion modeling demonstrates that the off-property concentrations of all constituents will be far below applicable state and federal standards and guidelines and therefore protective of human health and the environment.

King's Rein also notes that TCEQ must consider possible adverse health effects on individuals attending schools within 3,000 feet from the proposed facility. Although King's Rein does not operate a school and no school exists within 3,000 feet of the proposed Halyard plant, TCEQ and Halyard have closely and carefully considered the potential for off-property impacts from the proposed Halyard facility, including at King's Rein's property. As outlined above, predictive air dispersion modeling demonstrates that at King's Rein's property the levels of all constituents from the proposed Halyard facility will be significantly below all standards and guidelines – and only small fractions of applicable standards and guidelines – such that even

concentrations significantly higher than those from the proposed Halyard facility would pose no risk of adverse effects on human health or the environment.[10]

In the header for the third section of its request for reconsideration, King's Rein references property values, aesthetics, light, noise, and traffic. Although King's Rein merely lists (and does not discuss) these topics in its request for reconsideration, Halyard notes that, by law, none of these are subjects that TCEQ has authority to consider in connection with reviewing Halyard's air permit application. Accordingly, they do not provide a basis for reconsideration of the ED's decision.

In sum, King's Rein has failed to assert any error in the ED's decision that Halyard's application meets all applicable requirements. Accordingly, King's Rein's Request for Reconsideration should be denied.

Respectfully submitted,

BEVERIDGE & DIAMOND, P.C.
98 San Jacinto Blvd., Suite 1420
Austin, Texas 78701
t: 512.391.8020
f: 512.391.8099
e: llavalle@bdlaw.com

/s/ *Laura LaValle*
Laura LaValle/SBN 00789058

COUNSEL FOR APPLICANT
HALYARD ENERGY HENDERSON, LLC

[10] *See* predictive modeling and expert toxicologist opinion cited in notes 3 through 6, above.

CERTIFICATE OF SERVICE

I certify that a true and complete copy of the foregoing brief was served on the following parties on October 26, 2015.

VIA ELECTRONIC FILING
Bridget C. Bohac
Texas Commission on Environmental Quality
Office of Chief Clerk, MC-105
P.O. Box 13087
Austin, Texas 787111-3087
t: 512.239.3300
f: 512.239.3311

VIA EMAIL
Sierra Redding, Staff Attorney
Texas Commission on Environmental Quality
Environmental Law Division, MC-173
P.O. Box 13087
Austin, TX 78711-3087
t: 512.239.0600
f: 512.239.0606
Sierra.Redding@tceq.texas.gov

Joseph Janecka, Technical Staff
Texas Commission on Quality
Air Permits Division, MC-163
P.O. Box 13087
Austin, Texas 78711-3087
t: 512.239.1353
f: 512.239.7815
Joseph.janecka@tceq.texas.gov

Brian Christian, Director
Texas Commission on Environmental Quality
Environmental Assistance Division
Public Education Program, MC-108
P.O. Box 13087
Austin, Texas 78711-3087
t: 512.239.4000
f: 512.239.5678
Brian.Christian@tceq.texas.gov

Vic McWherter, Attorney
Texas Commission on Environmental Quality
Public Interest Counsel, MC-103
P.O. Box 13087
Austin, Texas 78711-3087
t: 512.239.6363
f: 512.239.6377
Vic.McWherter@tceq.texas.gov

Kyle Lucas
Texas Commission on Environmental Quality
Alternative Dispute Resolution, MC-222
P.O. Box 13087
Austin, Texas 78711-3087
t: 512.239.4010
f: 512.239.4015
Kyle.lucas@tceq.texas.gov

VIA FED EX AND EMAIL
The King's Rein Inc.
c/o Shannon DeCraene
13323 FM 2588
Larue, Texas 75770
Sdecraene@centurylink.net

/s/ Laura LaValle
Laura LaValle

ATTACHMENT A

TCEQ Interoffice Memorandum

To: Joe Janecka, P.E.
Combustion/Coatings Section

Thru: Daniel Menendez, Team Leader
Air Dispersion Modeling Team (ADMT)

From: Reece Parker and Dan Jamieson
ADMT

Date: March 9, 2015

Subject: Air Quality Analysis Audit – Halyard Energy Henderson LLC (RN107670341)

1. Project Identification Information

Permit Application Number: 122733
NSR Project Number: 216318
ADMT Project Number: 4469
NSRP Document Number: 525701
County: Henderson
ArcReader Published Map: \\\tceq4apmgisdata\GISWRK\APD\MODEL PROJECTS\4469\4469.pmf

Air Quality Analysis: Submitted by Trinity Consultants, November 2014, on behalf of Halyard Energy Henderson LLC. Additional information and modeling files were submitted January, February, and March 2015.

2. Report Summary

The air quality analysis is acceptable for all review types and pollutants. The results are summarized below.

A. Minor Source NSR Analysis

Table 1. Site-wide Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax (µg/m^3)	Standard (µg/m^3)
SO_2	1-hr	0.9	1021
H_2SO_4	1-hr	0.02	50

Pollutant	Averaging Time	GLCmax (µg/m^3)	Standard (µg/m^3)
H_2SO_4	24-hr	0.003	15

Table 2. Modeling Results for Minor NSR De Minimis

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.9	7.8
SO_2	3-hr	0.7	25
SO_2	24-hr	0.3	5
SO_2	Annual	0.05	1
PM_{10}	24-hr	1.1	5
$PM_{2.5}$	24-hr	1	1.2
$PM_{2.5}$	Annual	0.14	0.3
NO_2	1-hr	7.3	7.5
NO_2	Annual	0.3	1
CO	1-hr	705	2000
CO	8-hr	352	500

The 1-hr NO_2 GLCmax is the highest five-year average of the maximum predicted 1-hr concentrations determined for each receptor. The annual NO_2 GLCmax is the maximum predicted concentration associated with five years of meteorological data.

The GLCmax for all other pollutants and averaging times are the maximum predicted concentrations associated with one year of meteorological data.

The justification for selecting the EPA's interim 1-hr NO_2 and 1-hr SO_2 De Minimis levels was based on the assumptions underlying EPA's development of the 1-hr NO_2 and 1-hr SO_2 De Minimis levels. As explained in EPA guidance memoranda[1,2], the EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr NO_2 and 1-hr SO_2 NAAQS.

[1] www.epa.gov/region07/air/nsr/nsrmemos/appwso2.pdf

The applicant provided an evaluation of ambient $PM_{2.5}$ monitoring data, consistent with EPA guidance for $PM_{2.5}$[3], for using the $PM_{2.5}$ De Minimis levels. Background concentrations for $PM_{2.5}$ were obtained from the EPA AIRS monitor 483491051 located at Corsicana Airport, Corsicana, Navarro County. The three-year average (2011-2013) of the 98th percentile of the annual distribution of the 24-hr concentrations was used for the 24-hr value (21 µg/m^3) and the three-year average (2011-2013) of the annual concentrations was used for the annual value (9 µg/m^3). The use of this monitor is reasonable based on the applicants analysis of county-wide emissions, population, and emissions near the project and monitor sites.

3. Model Used and Modeling Techniques

AERMOD (Version 14134) was used in a refined screening mode.

The proposed project consists of two turbines. Three different turbine models with two different configurations for each model are being considered for the proposed site: the General Electric 7FA.03 Option 1, the General Electric 7FA.03 Option 2, the General Electric 7FA.05 Option 1, the General Electric 7FA.05 Option 2, the SiemensF5ee Option 1, and the SiemensF5ee Option 2. To determine the worst-case operating scenario, each of the proposed turbine model/configuration options was modeled. The results presented above represent the results from the worst-case scenario.

The applicant also modeled emissions associated with the turbines undergoing startup/shutdown (SUSD) operations.

A. Land Use

Medium roughness and elevated terrain were used in the modeling analysis. These selections are consistent with the AERSURFACE analysis, topographic map, DEMs, and aerial photography. The selection of medium roughness is reasonable.

B. Meteorological Data

Surface Station and ID: Corsicana, TX (Station #: 53912)
Upper Air Station and ID: Shreveport, LA (Station #: 13957)
Meteorological Dataset: 2008-2012 for NO_2; 2012 for all other pollutants
Profile Base Elevation: 136 meters

[2] www.epa.gov/nsr/documents/20100629no2guidance.pdf
[3] www.epa.gov/ttn/scram/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf

C. Receptor Grid

The grid modeled was sufficient in density and spatial coverage to capture representative maximum ground-level concentrations.

D. Building Wake Effects (Downwash)

Input data to Building Profile Input Program Prime (Version 04274) are consistent with the plot plan and modeling report.

4. Modeling Emissions Inventory

The modeled emission point and area source parameters and rates were consistent with the modeling report. The source characterizations used to represent the sources were appropriate.

The emergency generator and firewater pump engines were evaluated following EPA guidance on intermittent emissions for the 1-hr NO_2 NAAQS analysis. According to the applicant, each engine is tested no more than 100 hours per year, and on the same day. Annual average emission rates were used for the 1-hr NO_2 NAAQS modeling based on 100 operational hours per year.

For the PM_{10}/$PM_{2.5}$ NAAQS analyses, the modeled emission rates were based on the duration of operations within a 24-hr period:

- The modeled emission rates of the emergency generator and firewater pump engines were based on the duration of testing the engines in a 24-hr period (one hour).
- The SUSD emissions of the turbines were modeled using emission rates based on six hours of operation per day.
- The modeled emission rates for other MSS activities (turbine washing, turbine filter change-out, and dust hopper dumping) were based on the duration of the activities in a 24-hr period (one hour for each activity).

NO_x to NO_2 conversion factors of 0.75 and 0.8 were applied to the modeled annual and 1-hr NO_x emission rates, respectively, which is consistent with guidance for combustion sources.

Except for SO_2 and the items noted above, maximum allowable hourly emission rates were used for the short-term averaging time analyses, and annual average emission rates were used for the annual averaging time analyses. For SO_2, maximum allowable hourly emission rates were used for the short-term and annual averaging time analyses.

ATTACHMENT B

TCEQ DOCKET NO. 2015-1489-AIR

APPLICATION BY	§	**BEFORE THE**
HALYARD ENERGY HENDERSON, LLC	§	
NEW SOURCE REVIEW	§	**TEXAS COMMISSION ON**
AIR QUALITY	§	
PERMIT NO.122733	§	**ENVIRONMENTAL QUALITY**

AFFIDAVIT OF MICHAEL T. MEISTER

State of Texas §
County of Rockwall §

Before me, the undersigned Notary Public in and for Rockwall County Texas, personally appeared MICHAEL T. MEISTER, the affiant, whose identity is known to me. After I administered the oath, affiant testified as follows:

1. As Principal Consultant, I serve as an environmental consultant and lead the consulting operations of the Dallas headquarters office of Trinity Consultants, Inc. ("Trinity"). Since joining Trinity fifteen years ago I have assisted regulated entities in Texas and other states with environmental regulatory research, air dispersion modeling, and air permit application preparation. Prior to joining Trinity I earned my Bachelor of Science and Master of Science degrees in Agricultural Engineering from Texas A&M University.

2. During my tenure at Trinity I have provided a broad range of services relating to federal and state Clean Air Act requirement, including but not limited to Best Available Control Technology ("BACT") analyses, emissions calculations, evaluation of New Source Performance Standards ("NSPS") requirements, and Toxic Release Inventory ("TRI") report preparation. I have extensive experience with the air dispersion models known as SCREEN3, ISCST3, ISC-PRIME, AERMOD, as well as other U.S. Environmental Protection Agency-approved air dispersion models. I am active participant in the implementation plan for AERMOD in the state of Texas. I have also taught Trinity's *Air Dispersion Modeling Laboratory* course and facilitated the development and delivery of custom modeling training in Colombia.

3. In support of Halyard Energy Henderson, LLC's ("Halyard's") response to pending contested case hearing requests regarding Halyard's application to the Texas Commission on Environmental Quality ("TCEQ") for Air Quality Permit No. 122733 for the construction of a peaking electrical power generating plant near Dallas, in Henderson County, Texas, I conducted a review of the criteria pollutant modeling results obtained for TCEQ's technical review of said application, and completed additional criteria pollutant modeling and analysis. A description of that review, modeling, and the results obtained therefrom are documented in the memorandum entitled "Criteria Pollutant Modeling Results Summary" dated October 26, 2015, which is attached to this affidavit as Exhibit A and incorporated by reference as if fully set forth within this affidavit.

4. Additionally, I completed a health effects evaluation for speciated volatile organic compound ("VOC") emissions from the proposed Halyard facility in accordance with the July 2009 Modeling and Effects Review Applicability ("MERA") guidance from the TCEQ Toxicology and Risk Assessment section. I conducted that modeling analysis using the modeling input files, methodology, and assumptions that TCEQ had previously accepted for Halyard's demonstration of compliance with the NAAQS. A report regarding the method and results of the health effects evaluation I conducted for speciated VOC emissions from the proposed Halyard facility, entitled "State Health Effects Evaluation Air Dispersion Modeling Report" and dated October 2015, is attached to this affidavit as Exhibit B and incorporated by reference as if fully set forth within this affidavit.

Furthermore Affiant sayeth not.

Michael T. Meister

Sworn and subscribed before me by Michael T. Meister on October 25, 2015.

LEANN REBECCA EISENBISE
Notary Public, State of Texas
My Commission Expires
June 16, 2019

Leann Rebecca Eisenbise

Notary Public in and for the State of Texas

My commission expires: June 16, 2019

<u>EXHIBIT A</u>
TO
ATTACHMENT B

MEMORANDUM

To: Ms. Laura LaValle, Beveridge and Diamond, PC
CC: Mr. Karl Dahlstrom, Halyard Energy Ventures
Mr. Chris DePodesta, Halyard Energy Ventures
Ms. Aubrey Jones, Trinity Consultants, Inc.
From: Mr. Michael Meister, Trinity Consultants, Inc.
Date: October 26, 2015
RE: Criteria Pollutant Modeling Results Summary

Halyard Energy Henderson, LLC ("Halyard") proposes to construct the Halyard Henderson Energy Center ("HHEC"), a greenfield simple cycle peaker units electric generating station located near Dallas, Henderson County, Texas. Halyard submitted an application for a minor New Source Review (NSR) permit to the Texas Commission on Environmental Quality (TCEQ) on August 12, 2014. Halyard has been assigned TCEQ Customer Number (CN) 604656827. The HHEC has been assigned Regulated Entity Number (RN) 107670341.

The proposed facility will be a minor source under the Prevention of Significant Deterioration (PSD) program as emissions of criteria pollutants do not exceed respective Significant Emission Rates (SER), and thus do not trigger PSD review. In support of the minor NSR application, a Class II air quality analysis was completed to demonstrate that proposed emissions of nitrogen oxides (NO_X), carbon monoxide (CO), sulfur dioxide (SO_2) and particulate matter (PM) including particulate matter less than 10 microns (PM_{10}) and particulate matter less than 2.5 microns ($PM_{2.5}$) from the HHEC will not cause or contribute to a violation of any applicable National Ambient Air Quality Standards (NAAQS). The primary NAAQS are the maximum concentration ceilings, measured in terms of total concentration of a pollutant in the atmosphere, which define the "levels of air quality which the U.S. Environmental Protection Agency (EPA) judges are necessary, with an adequate margin of safety, to protect the public health."[1] The air dispersion modeling analysis was submitted to TCEQ in November 2014.

The Significant Impact Level (SIL) is the threshold below which maximum modeled ambient concentrations from a project's emissions increases are determined not to significantly impact the surrounding area. Thus, if the highest modeled ambient concentration for a pollutant is less than its SIL when emission increases from only the project are modeled, then further analysis (i.e., a "full" NAAQS demonstration) is not required to be performed. As documented in the previously submitted modeling report, modeled concentrations from proposed sources of NO_X (evaluated as nitrogen dioxide [NO_2]), CO, PM_{10}, $PM_{2.5}$, and SO_2 at the HHEC were below the corresponding SILs for all pollutants/averaging periods.

Based on a review of aerial imagery, the property owned by Ms. Shannon DeCraene, the only person who lives within one mile of the proposed HHEC who requested a contested case hearing, consists of a residence and associated acreage located approximately 0.8 km to the southeast of the proposed HHEC. The extent of Ms. DeCraene's property is shown in Figure 1 below.

[1] 40 CFR §50.2(b).

Figure 1. DeCraene Receptor

Trinity extracted modeled concentrations for the receptors on the DeCraene property from the modeling files previously submitted to TCEQ in support of the minor NSR application. The maximum predicted concentrations occurring on this property for each criteria pollutant are summarized in Table 1 below. Modeled concentrations for all pollutants/averaging periods are less than 3% of the NAAQS. As such, the potential impacts from the HHEC will not cause any adverse impacts at this nearby property.

The maximum predicted concentrations of all modeled criteria pollutants are within approximately 0.31 miles of the property lines of the HHEC. The air dispersion modeling performed for this project has shown predicted air contaminant concentrations become progressively smaller at receptor locations farther away from the receptors at which the maxima occur. Ms. DeCraene's property is farther away from the HHEC property line than the maximally impacted receptors; therefore, predicted air concentrations at her property should be less than the maxima anywhere. This has been confirmed by examining the predicted maximum air concentrations at her property, as documented above. The property of the other hearing requestor, Carson Shultz, at 7290 County Road 4328, Larue, Texas 75770, is located over five and a half miles from the proposed Halyard site. It follows that the predicted air concentrations of all modeled criteria pollutants at the Shultz property will be even smaller than those at the DeCraene property since the Shultz property is located much farther away from the proposed Halyard site.

Table 1. Summary of Modeled Concentrations at DeCraene Receptor

Pollutant	Averaging Period	Significant Impact Level (SIL) ($\mu g/m^3$)	National Ambient Air Quality Standard (NAAQS) ($\mu g/m^3$)	Operational Scenario	Maximum Concentration at DeCraene Property[1] ($\mu g/m^3$)	Percent of NAAQS
CO	1-hour	500	40,000	Normal	114.93	0.29%
				MSS	115.53	0.29%
	8-hour	2,000	10,000	Normal	34.96	0.35%
				MSS	35.25	0.35%
NO_2[2]	1-hour	7.5	188	Normal	3.99	2.12%
				MSS	5.20	2.77%
	Annual	1	100	Normal + SUSD	0.02	0.02%
SO_2[2, 3]	1-hour	7.8	196	Normal	0.15	0.08%
				MSS	0.15	0.08%
	3-hour	25	1,300	Normal	0.10	0.01%
				MSS	0.10	0.01%
	24-hour	5	365	Normal	0.02	0.01%
				MSS	0.03	0.01%
	Annual	1	80	Normal	0.001	0.001%
				MSS	0.001	0.001%
PM_{10}[4]	24-hour	5	150	Normal	0.17	0.11%
				MSS	0.09	0.06%
	Annual	1	50	Normal + SUSD	0.005	0.01%
$PM_{2.5}$[5]	24-hour	1	35	Normal	0.17	0.48%
				MSS	0.09	0.26%
	Annual	0.3	12	Normal + SUSD	0.004	0.03%

1. High-first-high modeled concentration.
2. SILs for the 1-hour NO_2 and SO_2 standards have not yet been proposed; however, interim SILs of 3 ppb (~7.8 $\mu g/m^3$) for SO_2 and 4 ppb (~7.5 $\mu g/m^3$) for NO_2 were provided by EPA in general guidance implementation memos dated August 23, 2010 and June 28, 2010, respectively.
3. The 24-hour and annual SO_2 standards will be revoked one year after an area is designated for the 2010 standard. The 3-hour standard is a secondary standard.
4. The annual PM_{10} NAAQS was revoked, effective December 19, 2006 (71 FR 61144).
5. On January 22, 2013 the U.S. DC Court of Appeals vacated/remanded the $PM_{2.5}$ SILs, except for the portion in 40 CFR §51.165(b)(2).

<u>EXHIBIT B</u>
TO
ATTACHMENT B

STATE HEALTH EFFECTS EVALUATION
AIR DISPERSION MODELING REPORT
Halyard Energy Henderson, LLC

Halyard Energy
HENDERSON

Halyard Henderson Energy Center

Prepared By:

TRINITY CONSULTANTS
12770 Merit Drive
Dallas, TX 75251
(972) 661-8100

October 2015

10/26/2015

Project 154401.0084

Trinity Consultants

Environmental solutions delivered uncommonly well

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1. EXECUTIVE SUMMARY

Halyard Energy Henderson, LLC ("Halyard") proposes to construct the Halyard Henderson Energy Center ("HHEC"), a greenfield simple cycle peaker units electric generating station located near Dallas, Henderson County, Texas. Halyard submitted an application for a minor New Source Review (NSR) permit to the Texas Commission on Environmental Quality (TCEQ) on August 12, 2014. Halyard has been assigned TCEQ Customer Number (CN) 604656827. The HHEC has been assigned Regulated Entity Number (RN) 107670341.

Halyard completed a health effects evaluation for speciated volatile organic compound (VOC) emissions in accordance with the July 2009 Modeling and Effects Review Applicability (MERA) guidance from the TCEQ Toxicology and Risk Assessment (TARA) section.[1] This modeling analysis was conducted using the modeling input files, methodology, and assumptions submitted by Halyard to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS), which were reviewed and approved by TCEQ, as a basis for setting up the effects evaluation model input files.[2]

This health effects evaluation demonstrates that predicted concentrations from the proposed emissions of each of the fifty-three (53) constituents evaluated are in compliance with the toxicology division's Effects Screening Levels (ESL) guidelines and the NAAQS for the criteria pollutant Lead (Pb). This analysis assesses compliance with both the TCEQ's March 2014 and September 2015 ESL lists.

The air quality dispersion modeling analysis results discussed in this report can be summarized as follows:

- Of the fifty-three (53) constituents evaluated, thirty-seven (37) screen out at or before Step 4 and thus no modeling was required to be completed for these constituents.
- Of the remaining sixteen (16) constituents, maximum ground-level concentrations (GLC_{max}) for fifteen (15) are less than 10% of the corresponding ESL.
- The GLC_{max} for the remaining constituent, formaldehyde, is less than 50% of the ESL.
- The maximum modeled concentration for Pb, when added to a conservative background monitor value, is below its NAAQS.

Based on the above, emissions from the HHEC will not cause any adverse impacts to the health or property of the public.

A CD enclosed with this modeling report contains all relevant modeling input and output files for the State Health Effects evaluation (refer to Appendix F for a list of all files included on the CD).

The remainder of this modeling report is organized as follows: Section 2 provides a description of the proposed project. Section 3 describes the selection of dispersion model, meteorological data, data inputs, and the modeling methodologies that were followed in conducting the State Health Effects evaluation. Finally, Section 4 presents the results of the State Health Effects evaluation.

[1] TCEQ Modeling and Effects Review Applicability: How to Determine the Scope of Modeling and Effects Review for Air Permits, APDG 5874v3, July 2009.

[2] In support of the August 14, 2014 Minor NSR permit application, Halyard submitted an air quality modeling analysis on November 21, 2014, with supplemental information submitted on January 20, 2014, February 24, 2015, and March 3, 2015. These submittals are collectively referred to in this report as the Minor NSR Air Quality Modeling Analysis.

2. PROJECT DESCRIPTION

The following section provides a more detailed description of the proposed project.

2.1. PROJECT OVERVIEW

The HHEC will be designed to have a total gross power generation capacity of approximately 386 megawatts ("MW") to 464 MW for peaking load operation. Halyard proposes to install two (2) simple cycle natural gas-fired combustion turbines with a maximum operating schedule of 2,500 hours per year (hrs/yr) per turbine including startup and shutdown ("SUSD") activities. The combustion turbines that Halyard is proposing to install are either two (2) GE 7FA.03, two (2) GE 7FA 5-series (.05), or two (2) Siemens F5ee turbines. These models have a nominal base-load electric power output of 193MW to 232 MW per turbine. Halyard proposes to select any of these three types of turbines to operate for up to 2,500 hrs/yr per turbine of normal operation and SUSD operation combined ("Normal + SUSD" operation), with a maximum of 630 SUSD hours per turbine per year. The turbines will be equipped with Dry Low-NO_X ("DLN") burners.

The proposed HHEC will include the following emission points:

- Two (2) Combustion Turbines – two (2) GE 7FA.03 (EPNs CTGE.03-1 and CTGE.03-2), two (2) GE 7FA.05 (EPNs CTGE.05-1 and CTGE.05-2), or two (2) Siemens F5ee (EPNs CTSF5-1 and CTSF5-2);
- Combustion Turbine Startup, and Shutdown (SUSD) Operations - two (2) GE 7FA.03 (EPNs CTGE.03-1S and CTGE.03-2S), two (2) GE 7FA.05 (EPNs CTGE.05-1S and CTGE.05-2S), or two (2) Siemens F5ee (EPNs CTSF5-1S and CTSF5-2S);
- One (1) Diesel Fire Water Pump (EPN FWP-01);
- One (1) Diesel Emergency Generator (EPN EGEN-01);
- Two (2) Diesel Storage Tanks (EPNs TK-01 and TK-02);
- One (1) Natural Gas-Fired Heater (EPN HTR-01);
- Two (2) Lube Oil Vents (EPNs LOV1 and LOV2) – one for each turbine;
- Fugitive Emissions (EPN FUG) – emissions from fugitive components (valves, connectors, pumps, etc.); and
- Miscellaneous Maintenance Activity (EPNs MMA1 and MMA2) emissions from each turbine – Two (2).

An area map showing the location of the proposed HHEC is provided in Appendix A. There are six (6) configurations under consideration as presented in the permit application. Plot plans for each of the six (6) configurations are provided in Appendix B.

3. AIR DISPERSION MODELING METHODOLOGY

This section of the modeling report describes the procedures and data resources utilized in the air quality modeling analysis. The air dispersion modeling analysis was conducted in accordance with applicable TCEQ guidance documents, including the following:

- TCEQ Modeling and Effects Review Applicability: How to Determine the Scope of Modeling and Effects Review for Air Permits, APDG 5874v3, July 2009.
- TCEQ, *Air Quality Modeling Guidelines*, APDG 6232, April 2015.

3.1. DISPERSION MODEL SELECTION

Dispersion models predict pollutant concentrations downwind of a source by simulating the evolution of the pollutant plume over time and space given data inputs that include the quantity of emissions and the initial exhaust release conditions (e.g., velocity, flow rate, and temperature). AERMOD Version 14134 was used to estimate the GLC_{max}. AERMOD is a refined, steady-state, multiple source, dispersion model and was promulgated in December 2005 as the preferred model to use for industrial sources.[3]

In this analysis, modeling was performed using the regulatory default options, which include stack heights adjusted for stack-tip downwash, buoyancy-induced dispersion, and final plume rise. Ground-level concentrations occurring during "calm" wind conditions were calculated by the model using the calm processing feature. Regulatory default values for wind profile exponents and vertical potential temperature gradients were used since no representative on-site meteorological data are available. As per EPA requirements, direction-specific building dimensions were used in the downwash algorithms. Table 3-1 summarizes the AERMOD model options employed in this air quality dispersion modeling analysis.

[3] 40 CFR 51, Appendix W – *Guideline on Air Quality Models*, Appendix A.1 – AMS/EPA Regulatory Model (AERMOD).

Table 3-1. Summary of AERMOD Model Options

```
*** AERMOD - VERSION  14134 ***

*Model Is Setup For Calculation of Average CONCentration Values.

  --  DEPOSITION LOGIC  --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
**Model Uses NO WET DEPLETION.  WETDPLT  =  F

**Model Uses RURAL Dispersion Only.

**Model Uses Regulatory DEFAULT Options:
      1. Stack-tip Downwash.
      2. Model Accounts for ELEVated Terrain Effects.
      3. Use Calms Processing Routine.
      4. Use Missing Data Processing Routine.
      5. No Exponential Decay.

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of:  OTHER

**Model Calculates  1 Short Term Average(s) of:   1-HR
   and Calculates ANNUAL Averages

**This Run Includes:     12 Source(s);      2 Source Group(s); and    3252 Receptor(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date:  12345

**Output Options Selected:
       Model Outputs Tables of ANNUAL Averages by Receptor
       Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
       Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                        m for Missing Hours
                                        b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   136.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
            Emission Units = GRAMS/SEC                        ;  Emission Rate Unit Factor =   0.10000E+07
            Output Units   = MICROGRAMS/M**3
```

3.2. STATE HEALTH EFFECTS EVALUATION

Emissions of fifty-three (53) speciated non-criteria pollutants were evaluated per the July 2009 MERA guidance. ESLs for each constituent were obtained from the March 2014 ESL List, which was effective at the time of the application submittal, and the September 2015 ESL List published by the TCEQ Toxicology Division on September 30, 2015.[4] Emissions were evaluated using Steps 4C, 4D, and 11.

3.2.1. Steps 4C and 4D

Per the MERA Guidance, Step 4C is as follows:

[4] TCEQ Toxicology ESL Lists (March 2014 and September 2015), as obtained from http://www.tceq.texas.gov/toxicology/esl/list_main.html.

Are short-term emissions increases (total for a constituent from all EPNs) within one of the three following de minimis levels, and the annual ESL is ≥ 10 percent of the short-term ESL?

Table 3-2. Step 4C De Minimis Levels

Short-term ESL ($\mu g/m^3$)	Short-term Emissions Increases (lb/hr)
≥ 2 < 500	≤ 0.04
≥ 500 < 3500	≤ 0.1
≥ 3500	≤ 0.4

The total short-term emission rate for each constituent, including normal operation and MSS, was determined and compared to the criteria in Table 3-2 above. Constituents not meeting the criteria of Step 4C were further evaluated under Step 4D:

Is the project increase 0.04 pound per hour (lb/hr) and the constituent's ESL < 2 $\mu g/m^3$?

If the total emission rate increase for a constituent is less than or equal to 0.04 lb/hr and its ESL is less than 2 micrograms per cubic meter ($\mu g/m^3$), Air Permits Division (APD) may require further analysis on a case-by-case basis, and the constituent may be further evaluated in Step 11.

A summary of the Step 4C/4D analysis is provided in Appendix C.

3.2.2. Step 11 – Site-wide Modeling

AERMOD runs were performed for each of the sixteen (16) constituents that did not screen out at or before Step 4. Constituents with a GLC_{max} less than the corresponding ESLs do not require any further evaluation and compliance with Step 11 of the State Health Effects Evaluation is therefore demonstrated. Modeled concentrations of all sixteen (16) constituents are below the ESLs. The GLC_{max} for twelve (12) of the constituents are less than 1% of the ESLs, three (3) are less than 6% of the ESLs, and one (1) is less than 50% of the ESL.

3.2.3. NAAQS Analysis for Pb

Since Pb is regulated as a criteria pollutant there is no associated ESL. As such, the maximum modeled concentration was added to a conservative background monitor concentration and compared to the NAAQS. The NAAQS define the "levels of air quality which the U.S. EPA judges are necessary, with an adequate margin of safety, to protect the public health."[5]

Because there is no Pb monitor in Henderson County, available Pb monitors in Texas were evaluated to locate a monitor in an industrial area to serve as a conservative representation of Pb background concentrations. The two active monitors in Harris County (i.e., EPA ID 482011034, located at 1262 ½ Mae Drive in Houston, and EPA ID 482011039, located at 4514 ½ Durant St. in Deer Park) are located in the vicinity (i.e., within about 10 km) of the Deer Park, Pasadena, and Channelview industrial areas. Considering that the HHEC is located in a rural area with no industrial sites located in the immediate vicinity (i.e., there is no significant activity within 10 km of the site), HHEC considers these monitor locations to be a conservative representation of Pb background concentrations for the Pb NAAQS Analysis.

[5] 40 CFR 50.2(b)

Calendar Year 2014 data from the monitor located at 4514 ½ Durant St., Deer Park, Texas (EPA ID 482011039) was chosen as a representative Pb background concentration, as discussed above. It should be noted that the Durant Street Monitor, like other Pb monitors available through TCEQ, does not provide quarterly (i.e., 3-month rolling average) concentrations. Therefore, the maximum 24-hr concentration reported in 2014 by the Durant Street Monitor was used as a conservative representation of the quarterly concentration.

For the NAAQS compliance demonstration, this background concentration was added to the maximum modeled Pb concentration (conservatively assessed as a monthly concentration) for each scenario and compared to the NAAQS. As summarized in Table 3-3, this analysis shows that Pb emissions from the Robstown Facility will not result in an exceedance of the Pb NAAQS.

Table 3-3. Pb NAAQS Compliance Demonstration Summary

Maximum Modeled 3-month Rolling Average Concentration ($\mu g/m^3$)[1]	Background Concentration ($\mu g/m^3$)[2]	Modeled + Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
1.00E-05	0.009	0.009	0.15

[1] 3-month rolling average.

[2] Deer Park 4514 ½ Durant Street Monitor, EPA ID 482011039, representing H1H 24-hr concentration for 2014.

Since the resulting concentration was below the NAAQS, the proposed HHEC will not cause or contribute to any violations of the Pb NAAQS.

Supporting documentation, including the background monitor data, a population comparison, and a Pb emissions comparison between the Harris/Galveston County area and Henderson County, are included in Appendix E.

3.3. BUILDING DOWNWASH

Building structures that obstruct wind flow near emission points may cause stack discharges to become caught in the turbulent wakes of these structures leading to downwash of the plumes. Wind blowing around a building creates zones of turbulence that are greater than if the building were absent. These effects generally cause higher ground-level pollutant concentrations since building downwash inhibits dispersion from elevated stack discharges. For this reason, building downwash algorithms are considered an integral component of the selected air quality model. Downwash effects are addressed through use of the AERMOD model, which has the Plume Rise Modeling Enhancements (PRIME) incorporated in the regulatory version. The direction-specific building downwash dimensions used as input to AERMOD were determined by the Building Profile Input Program, PRIME version (BPIP PRIME), version 04274.[6] BPIP PRIME is designed to incorporate the concepts and procedures expressed in the Good Engineering Practice (GEP) Technical Support document, the Building Downwash Guidance document and other related documents[7], while incorporating the PRIME enhancements to improve prediction of modeled off-property concentrations in building cavities and wake regions.

[6] Earth Tech, Inc., Addendum to the ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model, November 1997.

[7] EPA, Office of Air Quality Planning and Standards, Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack height Regulations) (Revised), Research Triangle Park, North Carolina, EPA 450/4-80-023R, June 1985.

Tables summarizing the structures considered in the modeling analysis and their corresponding heights are provided in Appendix D.

3.4. TREATMENT OF TERRAIN

Receptor terrain elevations input to the AERMOD model were interpolated from 1/3 arc second (approximately 10 meter resolution) National Elevation Dataset (NED) data obtained from the U.S. Geological Survey (USGS). The receptor elevations were interpolated using the latest version of the AERMOD terrain preprocessor, AERMAP (version 11103). The ground level elevation of the proposed HHEC will be 559 feet above mean sea level upon completion of construction. Therefore, all the proposed sources and buildings were included at their actual heights above ground-level (559 ft).

Through the use of AERMAP, AERMOD incorporates not only the source, building and receptor heights, but also an effective height (hill height scale) that represents the significant terrain features surrounding a given receptor that could lead to plume recirculation and other terrain interaction.

3.5. METEOROLOGICAL DATA

The air dispersion modeling for the proposed HHEC, which will be located in Henderson County, was performed using AERMOD-ready meteorological data for Henderson County made available and approved by the TCEQ. The model runs were performed using preprocessed meteorological data for 2012. TCEQ has processed the meteorological data set using the albedo and Bowen Ratio representative of Henderson County. The data set is based on surface data from Corsicana Campbell Field (Surface ID: CRS; National Weather Service [NWS] Station Number 53912) and upper air data from Shreveport, LA (Upper Air ID: SHV; NWS Station Number 13957). The windrose for Corsicana from 2012 is provided as Figure 3-1 to supplement the meteorological data used in the modeling analyses. The windrose shows the direction towards which wind is blowing.

Each TCEQ-provided data set processed with AERMET includes three different files, each representing a different surface roughness category:

- L – low surface roughness (0.05 m)
- M – medium surface roughness (0.5 m)
- H – high surface roughness (1.0 m)

The HHEC will be located in a rural area surrounded by fields and trees. The typical surface roughness for this type of land use is generally between 0.1 – 0.7 m, which corresponds to the medium surface roughness category.

To define the land use characteristics and micrometeorological parameters in the areas of interest, the AERSURFACE utility is used to perform a digital mapping of land use and cover in accordance with the procedures identified in the *AERMOD Implementation Guideline* and the *AERSURFACE User's Guide*.[8] Using publicly available digital land cover datasets and lookup tables of surface characteristics that vary by season and land cover type, the AERSURFACE tool can generate realistic and reproducible surface characteristics for any site of interest that can then be directly imported into AERMET for generating AERMOD-ready meteorological datasets. AERSURFACE is run by TCEQ to determine the appropriate surface characteristics for input to AERMET for development of the preprocessed meteorological data sets.

[8] EPA, Office of Air Quality Planning and Standards. AERSURFACE User's Guide. EPA 454/B-08-001. Research Triangle Park, North Carolina. January 2008.

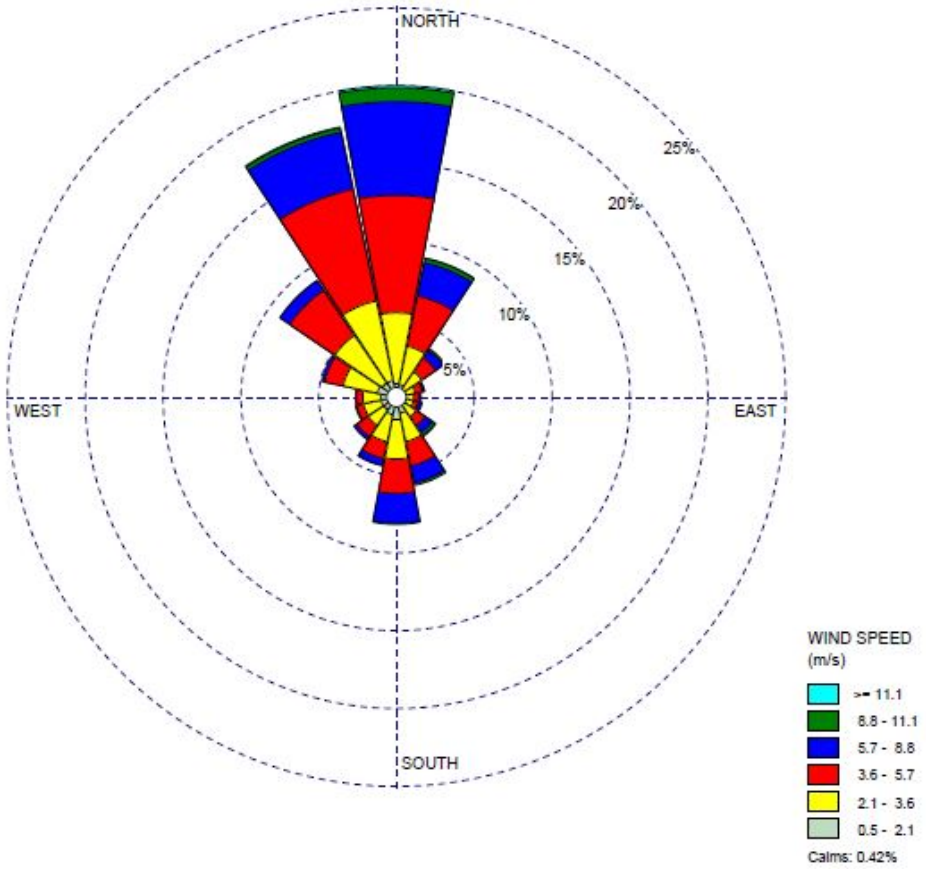
An analysis was performed using the latest version of AERSURFACE (13016) to confirm the appropriate surface roughness category for the proposed HHEC. As recommended by the AERSURFACE User's Guide, the land use analysis was prepared using digital LULC data developed by the Multi-Resolution Land Characteristics Consortium (MRLC). One of the objectives of the MRLC, a partnership of the EPA, NASA, NOAA, USGS, and U.S. Forest Service, among other federal agencies, was the production of land cover data derived from images acquired by Landsat's Thematic Mapper (TM) sensor. The 1992 National Land Cover Dataset (NLCD92), the only dataset currently accepted by AERSURFACE, is provided for public download as georeferenced images on the MRLC website.[9] The USGS NLCD92 data utilized by AERSURFACE provides land cover with a spatial resolution of 30 meters based on a 21-category classification scheme.

As Bowen Ratio and albedo do not vary significantly over the area immediately surrounding a meteorological observation or plant site, AERSURFACE uses a simple unweighted geometric mean for a default domain defined by a 10 km by 10 km area centered on the site of interest. However, based on the method for constructing realistic planetary boundary layer (PBL) similarity profiles in AERMOD and the heterogeneity of land use typical to areas surrounding an observation site at an airport or an industrial facility, accurately characterizing the surface roughness length, the key parameter in characterizing the mechanical turbulence in the approach wind flow, is the most important consideration in the AERSURFACE analysis. As such, AERSURFACE determines the surface roughness length based on an inverse distance weighted geometric mean (which can be varied by sector to account for consistent variations in the land cover near the site of interest provided the sector widths are no smaller than 30 degrees) for a default upwind distance of 1 km.

AERSURFACE was executed for a circle with a radius of 1 km centered on the proposed HHEC using the average moisture condition for the annual period. The resulting surface roughness estimate of 0.148 falls into the medium category per TCEQ guidance. Thus the TCEQ meteorological data set for Henderson County processed with medium surface characteristics was used in the modeling analysis. An electronic copy of the AERSURFACE output file and NLCD92 data are provided on a CD with this air dispersion modeling report.

[9] http://www.mrlc.gov/viewerjs/

Figure 3-1. Frequency of Wind Speed and Direction for Meteorological Year 2012



3.6. COORDINATE SYSTEM

In all modeling analysis data files, the location of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km). The datum for this modeling analysis is based on North American Datum 1983 (NAD 83). UTM coordinates for this analysis all reside within UTM Zone 15.

3.7. RECEPTOR GRIDS

Ground-level concentrations were calculated for receptors covering a region that extends 10 km from all edges of the proposed HHEC property line. The grids are defined as follows:

- The "property line grid" is a discrete receptor grid with the receptors spaced at 25-m intervals along the property line.
- The "tight grid" contains 25-m spaced receptors extending at least 300 m from the property line exclusive of the receptors within the property line.

- The "fine grid" contains 100-m spaced receptors extending at least 1 km from the property line exclusive of the receptors in the property line and tight grids.
- The "medium grid" contains 500-meter spaced receptors extending 5 km from the property line exclusive of receptors in the property line, tight, and fine grids.
- The "coarse grid" contains 1,000-meter spaced receptors extending 10 km from the property line exclusive of receptors in the property line, tight, fine, and medium grids.

Plots depicting these five receptor grids are provided in Appendix B.

3.8. MODELED SOURCE TYPES AND STACK PARAMETERS

In a typical air dispersion modeling analysis, emission sources can be represented as point, area, line, volume, or open pit sources. As specified in the Minor NSR Air Quality Modeling Analysis, fugitive emissions at the proposed HHEC were represented as area sources and all other sources were represented as point or pseudo point sources. Tables summarizing all modeled emission sources and stack parameters are included in Appendix E.

3.8.1. Point Sources

The turbines, heater, emergency generator, and firewater pump were all modeled as point sources. The lube oil vents were modeled as pseudo-point sources with an exit velocity of 0.001 m/s and diameter of 0.001 m.

The proposed natural gas heater has two (2) burners and two (2) exhaust stacks separated by a distance of 5 feet. The natural gas heater stack exhaust at the HHEC will be oriented 45 degrees relative to the ground. The exit velocity from these stacks was calculated based on the following formula:

V_a = Sin (angle)* (V_0)

Where: V_a = angled release velocity
V_0 = vertical release velocity

3.8.2. Area Sources

The miscellaneous maintenance area surrounding each turbine was modeled as an area source with a release height equal to half the height of the turbine structure, as documented in the Table 1(a) submitted with the application. The initial vertical dimension was conservatively set to zero.

3.9. MODELED SCENARIOS

As noted in the Minor NSR Air Quality Modeling Analysis, Halyard proposes to use either two (2) GE7FA.03 Turbines, two (2) GE7FA.05 Turbines, or two (2) Siemens F5ee Turbines. There are two (2) plot plan options for each turbine model. Therefore, Halyard modeled the following six (6) different scenarios:

- GE7FA.03 Option 1: Two (2) GE7FA.03 turbines with Option 1 layout.
- GE7FA.03 Option 2: Two (2) GE7FA.03 turbines with Option 2 layout.
- GE7FA.05 Option 1: Two (2) GE7FA.05 turbines with Option 1 layout.
- GE7FA.05 Option 2: Two (2) GE7FA.05 turbines with Option 2 layout.

- Siemens F5ee Option 1: Two (2) Siemens F5ee turbines with Option 1 layout.
- Siemens F5ee Option 2: Two (2) Siemens F5ee turbines with Option 2 layout.

In each scenario, the two (2) turbines (MSS or normal emissions) were modeled along with one (1) firewater pump, one (1) emergency generator, one (1) natural gas heater, and miscellaneous maintenance activity emissions (MMA1 and MMA2) from each turbine.

The two (2) turbines can either operate in normal mode or Startup –Shutdown (SUSD) mode in a given hour. The worst-case was determined by modeling each mode (normal or SUSD) and reporting the highest off-property concentration. For the Siemens F5ee turbines startup-shutdown, Halyard will only operate in the fast SUSD mode. There will be a maximum of six (6) SUSD events in a day.

The turbine maintenance emissions will not occur simultaneously with the normal and/or SUSD emissions; however, the turbine maintenance emissions were conservatively modeled as occurring concurrently with both normal and SUSD emissions. Additionally, maximum short-term emission rates were conservatively modeled for the annual averaging period.

4. AIR DISPERSION MODELING RESULTS

This section summarizes the results of the State Health Effects evaluation for the HHEC.

4.1. SITE-WIDE MODELING RESULTS (STEP 11)

Each of the sixteen (16) constituents which did not screen out at or before Step 4 were evaluated according to Step 11 of the MERA guidance package. The modeled GLC_{max} values for each constituent were compared against their respective 2014 and 2015 ESL values. The results for the short-term and annual averaging periods are summarized in Tables 4-1 and 4-2, respectively.

As shown in the Tables 4-1 and 4-2, the maximum predicted short-term and annual concentrations from the proposed emissions sources for of all sixteen (16) constituents are below their respective ESLs. The short-term $GLCs_{max}$ for twelve (12) of the constituents are less than 1% of their corresponding short-term ESLs, three (3) are less than 6% of their corresponding short-term ESLs, and one (1) is less than 50% of its corresponding short-term ESL. The annual $GLCs_{max}$ for fifteen (15) of the constituents are less than 1% of their corresponding 2014 annual ESLs, and one (1) is less than 3% of its corresponding annual ESL. The annual ESL for lube oil was reduced from 110 $\mu g/m^3$ (2014) to 2 $\mu g/m^3$ (2015). The annual GLC_{max} for lube oil is less than 39% of the corresponding 2015 annual ESL. It should be noted that the maximum hourly emission rate was used for the annual averaging period for each modeled constituent.

Since maximum modeled concentrations for all constituents are below the respective short-term and annual ESLs, the predicted concentrations from the proposed emission sources will not cause any adverse impacts to the health or property of the public.

Table 4-1. Summary of Maximum 1-hour Modeled Concentrations

Constituent	CAS No.	Short-term ESL[1] (µg/m^3) 2014 / 2015	Operational Scenario	GLC_{max} (µg/m^3)	Percent of ESL (%) 2014 / 2015
Ethylbenzene	100-41-4	740 / 26000	Normal	1.16E-02	0.002 / 4.45E-05
			MSS	3.09E-01	0.042 / 0.001
p-Xylene	106-42-3	250 / 2200	Normal	2.02E-01	0.081 / 0.009
			MSS	6.19E-01	0.248 / 0.028
1,3-Butadiene	106-99-0	510 / 510	Normal	2.77E-02	0.005 / 0.005
			MSS	2.77E-02	0.005 / 0.005
Acrolein	107-02-8	3.2 / 3.2	Normal	6.55E-02	2.046 / 2.046
			MSS	6.64E-02	2.076 / 2.076
m-Xylene	108-38-3	340 / 2200	Normal	2.02E-01	0.059 / 0.009
			MSS	6.19E-01	0.182 / 0.028
Toluene	108-88-3	3500 / 4500	Normal	2.90E-01	0.008 / 0.006
			MSS	1.26E+00	0.036 / 0.028
n-Hexane	110-54-3	5300 / 6200	Normal	1.11E+00	0.021 / 0.018
			MSS	1.11E+00	0.021 / 0.018
Formaldehyde	50-00-0	15 / 15	Normal	8.40E-01	5.598 / 5.598
			MSS	6.86E+00	45.73 / 45.73
Benzene	71-43-2	170 / 170	Normal	6.60E-01	0.388 / 0.388
			MSS	6.62E-01	0.389 / 0.389
Arsenic	7440-38-2	3 / 3	Normal	1.20E-04	0.004 / 0.004
			MSS	1.20E-04	0.004 / 0.004
Chromium	7440-47-3	3.6 / 3.6	Normal	8.60E-04	0.024 / 0.024
			MSS	8.60E-04	0.024 / 0.024
Acetaldehyde	75-07-0	15 / 120	Normal	5.43E-01	3.618 / 0.452
			MSS	5.49E-01	3.658 / 0.457
Propylene Oxide	75-56-9	70 / 70	Normal	1.05E-02	0.015 / 0.015
			MSS	2.80E-01	0.400 / 0.400
Naphthalene	91-20-3	200 / 440	Normal	6.00E-02	0.030 / 0.014
			MSS	6.02E-02	0.030 / 0.014
o-Xylene	95-47-6	1600 / 2200	Normal	2.02E-01	0.013 / 0.009
			MSS	6.19E-01	0.039 / 0.028
Lube Oil[2]	--	1000 / 1000	Normal	5.84E+01	5.836 / 5.836
			MSS	5.84E+01	5.836 / 5.836

[1] ESLs from TCEQ's March 2014 and September 2015 ESL lists are shown for comparison purposes.

[2] Based on a revised MSS emissions estimate from testing/calibration of analytics equipment that limits the evaporation emissions to no more mass than is represented to have drained to the collection vessel in one hour.

Table 4-2. Summary of Maximum Annual Modeled Concentrations

Constituent	CAS No.	Long-term ESL[1] (µg/m^3) 2014 / 2015	Operational Scenario	GLC_{max} (µg/m^3)	Percent of ESL (%) 2014 / 2015
Ethylbenzene	100-41-4	570 / 570	Normal	1.60E-04	2.81E-05 / 2.81E-05
			MSS	4.25E-03	0.001 / 0.001
p-Xylene	106-42-3	180 / 180	Normal	9.29E-03	0.005 / 0.005
			MSS	9.84E-03	0.005 / 0.005
1,3-Butadiene	106-99-0	9.9 / 9.9	Normal	1.27E-03	0.013 / 0.013
			MSS	1.27E-03	0.013 / 0.013
Acrolein	107-02-8	0.82 / 0.82	Normal	3.01E-03	0.367 / 0.367
			MSS	3.06E-03	0.373 / 0.373
m-Xylene	108-38-3	180 / 180	Normal	9.29E-03	0.005 / 0.005
			MSS	9.84E-03	0.005 / 0.005
Toluene	108-88-3	1200 / 1200	Normal	1.34E-02	0.001 / 0.001
			MSS	1.77E-02	0.001 / 0.001
n-Hexane	110-54-3	200 / 200	Normal	3.69E-02	0.018 / 0.018
			MSS	3.69E-02	0.018 / 0.018
Formaldehyde	50-00-0	3.3 / 3.3	Normal	3.93E-02	1.189 / 1.189
			MSS	9.57E-02	2.901 / 2.901
Benzene	71-43-2	4.5 / 4.5	Normal	3.03E-02	0.673 / 0.673
			MSS	3.04E-02	0.676 / 0.676
Arsenic	7440-38-2	0.067 / 0.067	Normal	0.00E+00	0.000 / 0.000
			MSS	0.00E+00	0.000 / 0.000
Chromium	7440-47-3	0.041 / 0.041	Normal	3.00E-05	0.073 / 0.073
			MSS	3.00E-05	0.073 / 0.073
Acetaldehyde	75-07-0	45 / 45	Normal	2.49E-02	0.055 / 0.055
			MSS	2.53E-02	0.056 / 0.056
Propylene Oxide	75-56-9	7 / 7	Normal	1.40E-04	0.002 / 0.002
			MSS	3.85E-03	0.055 / 0.055
Naphthalene	91-20-3	50 / 50	Normal	2.76E-03	0.006 / 0.006
			MSS	2.77E-03	0.006 / 0.006
o-Xylene	95-47-6	180 / 180	Normal	9.29E-03	0.005 / 0.005
			MSS	9.84E-03	0.005 / 0.005
Lube Oil[2]	--	100 / 100	Normal	7.69E-01	0.769 / 0.769
			MSS	7.69E-01	0.769 / 0.769

[1] ESLs from TCEQ's March 2014 and September 2015 ESL lists are shown for comparison purposes.

[2] Based on a revised MSS emissions estimate from testing/calibration of analytics equipment that limits the evaporation emissions to no more mass than is represented to have drained to the collection vessel in one hour.

4.2. HEARING REQUESTOR RECEPTOR

Based on a review of aerial imagery, the property owned by Ms. Shannon DeCraene, the only person who lives within one mile of the proposed HHEC who requested a contested case hearing, is a residence and associated acreage located approximately 0.8 km to the southeast of the proposed HHEC. The extent of Ms. DeCraene's property is shown in Figure 4-1 below.

Figure 4-1. DeCraene Receptor

Halyard completed a review of the maximum predicted short-term and annual concentrations occurring on this property for each constituent, as summarized in Tables 4-3 and 4-4, respectively. As shown in Table 4-3, the only two (2) constituents above 1% of their corresponding short-term ESLs are acetaldehyde (1.04%) and formaldehyde (18.53%) under the MSS scenario. The short-term ESL for acetaldehyde was increased from 15 $\mu g/m^3$ to 120 $\mu g/m^3$; therefore, the modeled GLC_{max} from the MSS scenario for this compound drops below 1% of the corresponding 2015 ESL (0.13%). Short-term predicted concentrations for all sixteen (16) constituents are below 1% of their corresponding short-term ESLs during normal operations. Annual predicted concentrations for all (16) constituents are below 1% of their respective annual ESLs for all scenarios. It should be noted that the maximum hourly emission rate was used for the annual averaging period for each modeled constituent.

Table 4-3. Summary of 1-hour Modeled Concentrations at DeCraene Receptor

Constituent	CAS No.	Short-term ESL[1] (µg/m^3) 2014 / 2015	Operational Scenario	GLC_{max} (µg/m^3)	Percent of ESL (%) 2014 / 2015
Ethylbenzene	100-41-4	740 / 26000	Normal	5.17E-03	0.001 / 1.99E-05
			MSS	1.25E-01	0.017 / 4.82E-04
p-Xylene	106-42-3	250 / 2200	Normal	3.28E-02	0.013 / 0.001
			MSS	2.51E-01	0.100 / 0.011
1,3-Butadiene	106-99-0	510 / 510	Normal	4.46E-03	0.001 / 0.001
			MSS	4.49E-03	0.001 / 0.001
Acrolein	107-02-8	3.2 / 3.2	Normal	1.06E-02	0.331 / 0.331
			MSS	2.51E-02	0.783 / 0.783
m-Xylene	108-38-3	340 / 2200	Normal	3.28E-02	0.010 / 0.001
			MSS	2.51E-01	0.074 / 0.011
Toluene	108-88-3	3500 / 4500	Normal	4.72E-02	0.001 / 0.001
			MSS	5.09E-01	0.015 / 0.011
n-Hexane	110-54-3	5300 / 6200	Normal	7.46E-02	0.001 / 0.001
			MSS	7.46E-02	0.001 / 0.001
Formaldehyde	50-00-0	15 / 15	Normal	1.37E-01	0.916 / 0.916
			MSS	2.78E+00	18.53 / 18.53
Benzene	71-43-2	170 / 170	Normal	1.06E-01	0.063 / 0.063
			MSS	1.07E-01	0.063 / 0.063
Arsenic	7440-38-2	3 / 3	Normal	1.00E-05	3.33E-04 / 3.33E-04
			MSS	1.00E-05	3.33E-04 / 3.33E-04
Chromium	7440-47-3	3.6 / 3.6	Normal	6.00E-05	0.002 / 0.002
			MSS	3.60E-04	0.010 / 0.010
Acetaldehyde	75-07-0	15 / 120	Normal	8.77E-02	0.584 / 0.073
			MSS	1.57E-01	1.045 / 0.131
Propylene Oxide	75-56-9	70 / 70	Normal	4.68E-03	0.007 / 0.007
			MSS	1.14E-01	0.162 / 0.162
Naphthalene	91-20-3	200 / 440	Normal	9.68E-03	0.005 / 0.002
			MSS	9.75E-03	0.005 / 0.002
o-Xylene	95-47-6	1600 / 2200	Normal	3.28E-02	0.002 / 0.001
			MSS	2.51E-01	0.016 / 0.011
Lube Oil[2]	--	1000 / 1000	Normal	6.09E+00	0.609 / 0.609
			MSS	6.09E+00	0.609 / 0.609

[1] ESLs from TCEQ's March 2014 and September 2015 ESL lists are shown for comparison purposes.

[2] Based on a revised MSS emissions estimate from testing/calibration of analytics equipment that limits the evaporation emissions to no more mass than is represented to have drained to the collection vessel in one hour.

Table 4-4. Summary of Annual Modeled Concentrations at DeCraene Receptor

Constituent	CAS No.	Long-term ESL[1] (µg/m^3) 2014 / 2015	Operational Scenario	GLC_{max} (µg/m^3)	Percent of ESL (%) 2014 / 2015
Ethylbenzene	100-41-4	570 / 570	Normal	2.00E-05	3.51E-06 / 3.51E-06
			MSS	6.10E-04	1.07E-04 / 1.07E-04
p-Xylene	106-42-3	180 / 180	Normal	1.20E-04	6.67E-05 / 6.67E-05
			MSS	1.28E-03	7.11E-04 / 7.11E-04
1,3-Butadiene	106-99-0	9.9 / 9.9	Normal	1.00E-05	1.01E-04 / 1.01E-04
			MSS	2.00E-05	2.02E-04 / 2.02E-04
Acrolein	107-02-8	0.82 / 0.82	Normal	3.00E-05	3.66E-03 / 3.66E-03
			MSS	1.40E-04	1.71E-02 / 1.71E-02
m-Xylene	108-38-3	180 / 180	Normal	1.20E-04	6.67E-05 / 6.67E-05
			MSS	1.28E-03	7.11E-04 / 7.11E-04
Toluene	108-88-3	1200 / 1200	Normal	2.00E-04	1.67E-05 / 1.67E-05
			MSS	2.56E-03	2.13E-04 / 2.13E-04
n-Hexane	110-54-3	200 / 200	Normal	7.20E-04	3.60E-04 / 3.60E-04
			MSS	7.20E-04	3.60E-04 / 3.60E-04
Formaldehyde	50-00-0	3.3 / 3.3	Normal	8.20E-04	2.48E-02 / 2.48E-02
			MSS	1.38E-02	4.17E-01 / 4.17E-01
Benzene	71-43-2	4.5 / 4.5	Normal	2.80E-04	6.22E-03 / 6.22E-03
			MSS	4.60E-04	1.02E-02 / 1.02E-02
Arsenic	7440-38-2	0.067 / 0.067	Normal	0.00E+00	0.00E+00 / 0.00E+00
			MSS	0.00E+00	0.00E+00 / 0.00E+00
Chromium	7440-47-3	0.041 / 0.041	Normal	0.00E+00	0.00E+00 / 0.00E+00
			MSS	0.00E+00	0.00E+00 / 0.00E+00
Acetaldehyde	75-07-0	45 / 45	Normal	2.50E-04	5.56E-04 / 5.56E-04
			MSS	9.50E-04	2.11E-03 / 2.11E-03
Propylene Oxide	75-56-9	7 / 7	Normal	2.00E-05	2.86E-04 / 2.86E-04
			MSS	5.50E-04	7.86E-03 / 7.86E-03
Naphthalene	91-20-3	50 / 50	Normal	3.00E-05	6.00E-05 / 6.00E-05
			MSS	5.00E-05	1.00E-04 / 1.00E-04
o-Xylene	95-47-6	180 / 180	Normal	1.20E-04	6.67E-05 / 6.67E-05
			MSS	1.28E-03	7.11E-04 / 7.11E-04
Lube Oil[2]	--	100 / 100	Normal	1.88E-02	1.88E-02 / 1.88E-02
			MSS	1.88E-02	1.88E-02 / 1.88E-02

[1] ESLs from TCEQ's March 2014 and September 2015 ESL lists are shown for comparison purposes.

[2] Based on a revised MSS emissions estimate from testing/calibration of analytics equipment that limits the evaporation emissions to no more mass than is represented to have drained to the collection vessel in one hour.

Halyard further analyzed the results of the maximum modeled 1-hour concentrations predicted at Ms. DeCraene's property by reviewing the frequency (i.e., the number of hours) at which the model's predicted concentrations were above 1%, 5%, 10%, and 15% of the ESL. As noted in Table 4-3, only acetaldehyde and

formaldehyde emissions resulted in predicted concentrations of more than 1% of the ESL (March 2014 ESL list) at Ms. DeCraene's property. Evaluating against the September 2015 ESL list, only the formaldehyde emissions result in predicted concentrations of more than 1% of the ESL. Furthermore, these predicted concentrations only occurred during MSS activities. The results of the frequency analysis are summarized in Table 4-5.

Table 4-5. Frequency of Occurrence of Concentrations Greater than 1% of the ESL for Acetaldehyde and Formaldehyde at DeCraene Receptor

Constituent	CAS No.	Short-term ESL (µg/m3) 2014 / 2015	MSS - 1-HR Max. Conc.	Percent of ESL (%) 2014 / 2015	Frequency of Occurrence	
					% of ESL	No. Occurrences 2014 / 2015
Acetaldehyde	75-07-0	15 / 120	0.1567	1.04 / 0.13	>1%	1/0
Formaldehyde	50-00-0	15 / 15	2.7801	18.53/18.53	>1% >5% >10% >15%	109/109 25/25 9/9 2/2

As discussed in Section 3.9 of this report, the turbine maintenance emissions will not occur simultaneously with the normal and/or SUSD emissions; however, the turbine maintenance emissions were conservatively evaluated as occurring concurrently with both normal and SUSD emissions. Additionally, all sources were assumed to be emitting at their maximum short-term rates continuously (i.e., for 8,760 hours per year). This is a conservative approach given that 1) each turbine will only be permitted for 2,500 hr/yr of operation, and 2) the MSS activities will produce emissions for only a limited number of hours per year.

As such, modeled concentrations from the MSS scenario are intentionally overly conservative. Each turbine will be authorized for 630 SUSD events per year and each SUSD event will last approximately 20 minutes. This represents only 2.4% of the year. Given that the frequencies of occurrence summarized in Table 4-5 are based on continuous operation at SUSD emission levels, Halyard anticipates that the actual frequency of occurrence of concentrations at the levels noted will be significantly lower.

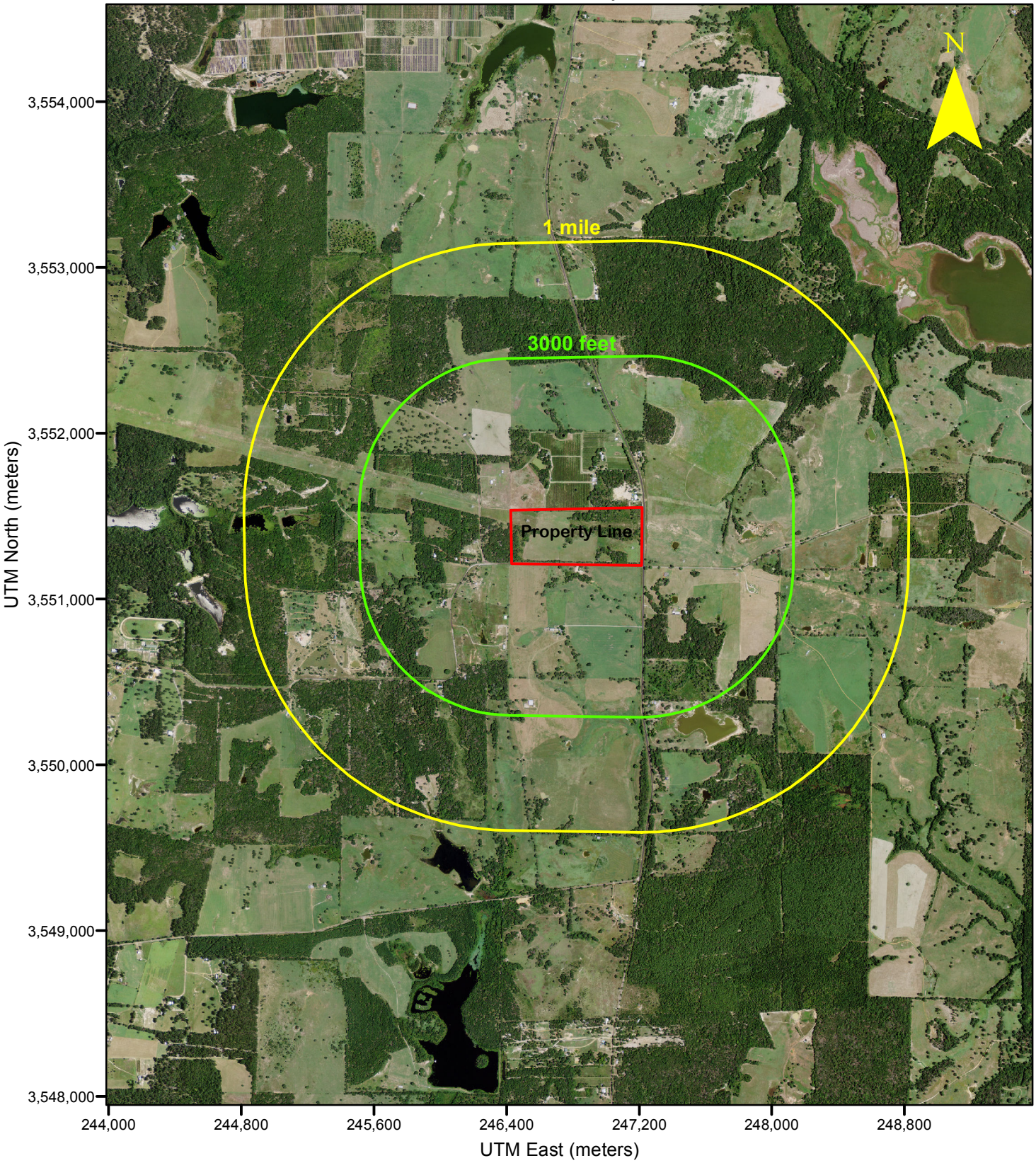
Based on the above, the potential impacts from the HHEC will not cause any adverse impacts at this nearby property.

The maximum predicted concentrations of all modeled non-criteria pollutants are within approximately 0.36 miles of the property lines of the HHEC. The air dispersion modeling performed for this project has shown predicted air contaminant concentrations become progressively smaller at receptor locations farther away from the receptors at which the maxima occur. Ms. DeCraene's property is farther away from the HHEC property line than the maximally impacted receptors; therefore, predicted air concentrations at her property should be less than the maxima anywhere. This has been confirmed by examining the predicted maximum air concentrations at her property, as documented above. The property of the other hearing requestor, Carson Shultz, at 7290 County Road 4328, Larue, Texas 75770, is located over five and a half miles from the proposed Halyard site. It follows that the predicted air concentrations of all modeled non-criteria pollutants at the Shultz property will be even smaller than those at the DeCraene property since the Shultz property is located much farther away from the proposed Halyard site.

APPENDIX A: AREA MAP

Halyard Henderson Energy Center

Area Map



Scales

0 1,000 2,000 3,000 4,000

Feet

0 500 1,000 1,500

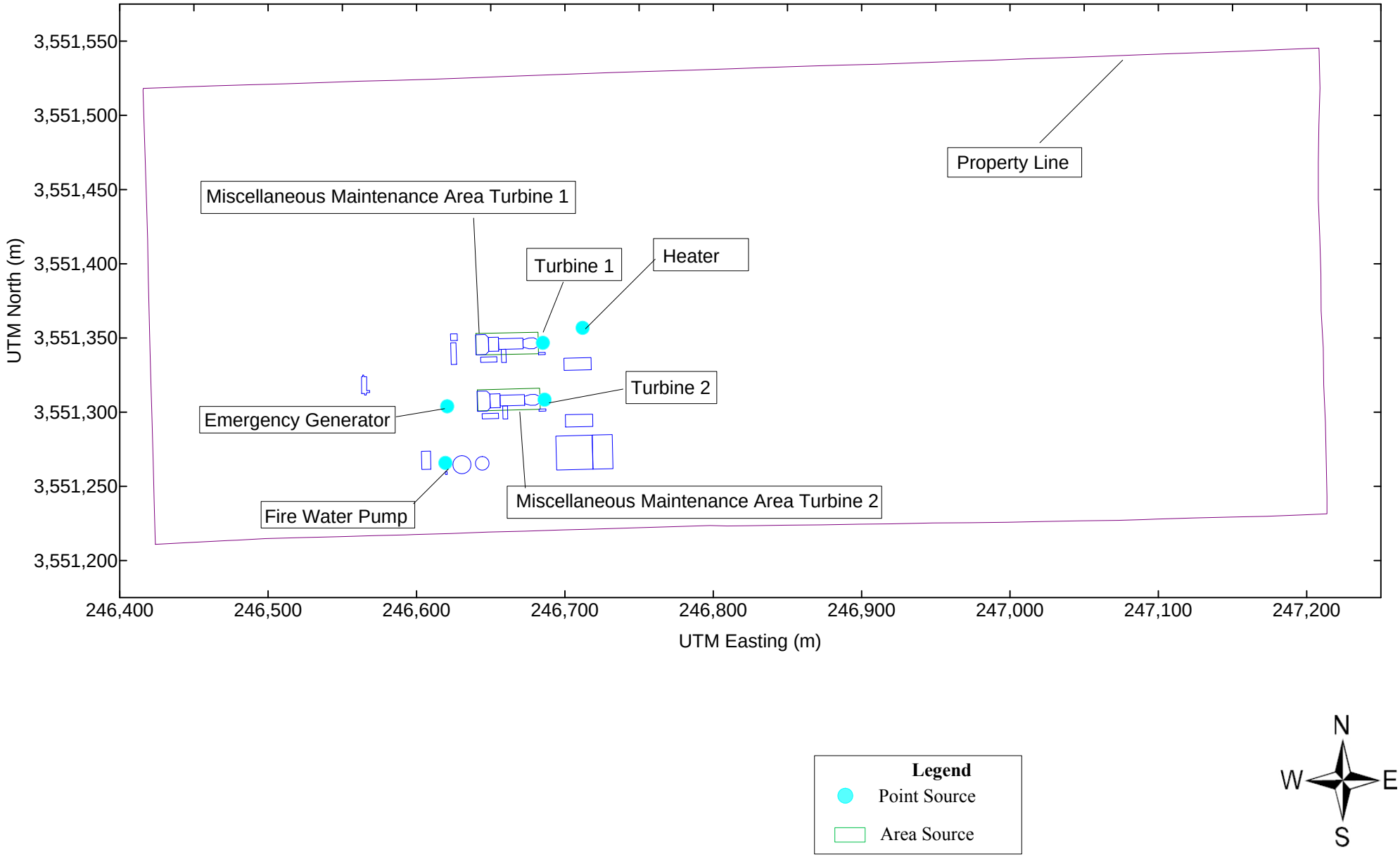
Meters

Coordinate System: NAD83 UTM Zone 15N
Map: National Agriculture Imagery Program (NAIP) 2012
Date: 10/20/2014

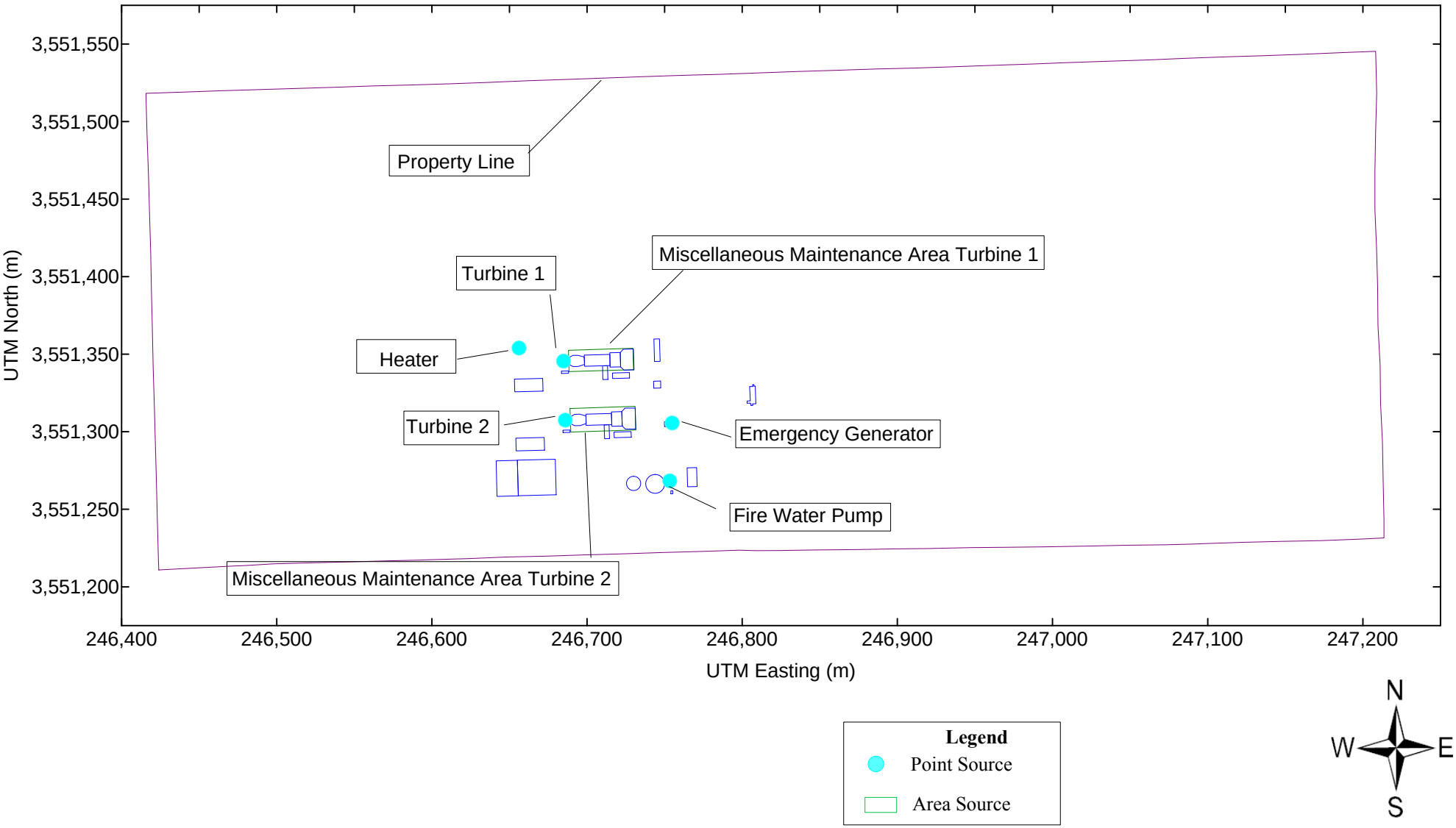
Trinity Consultants

APPENDIX B: PLOT PLANS

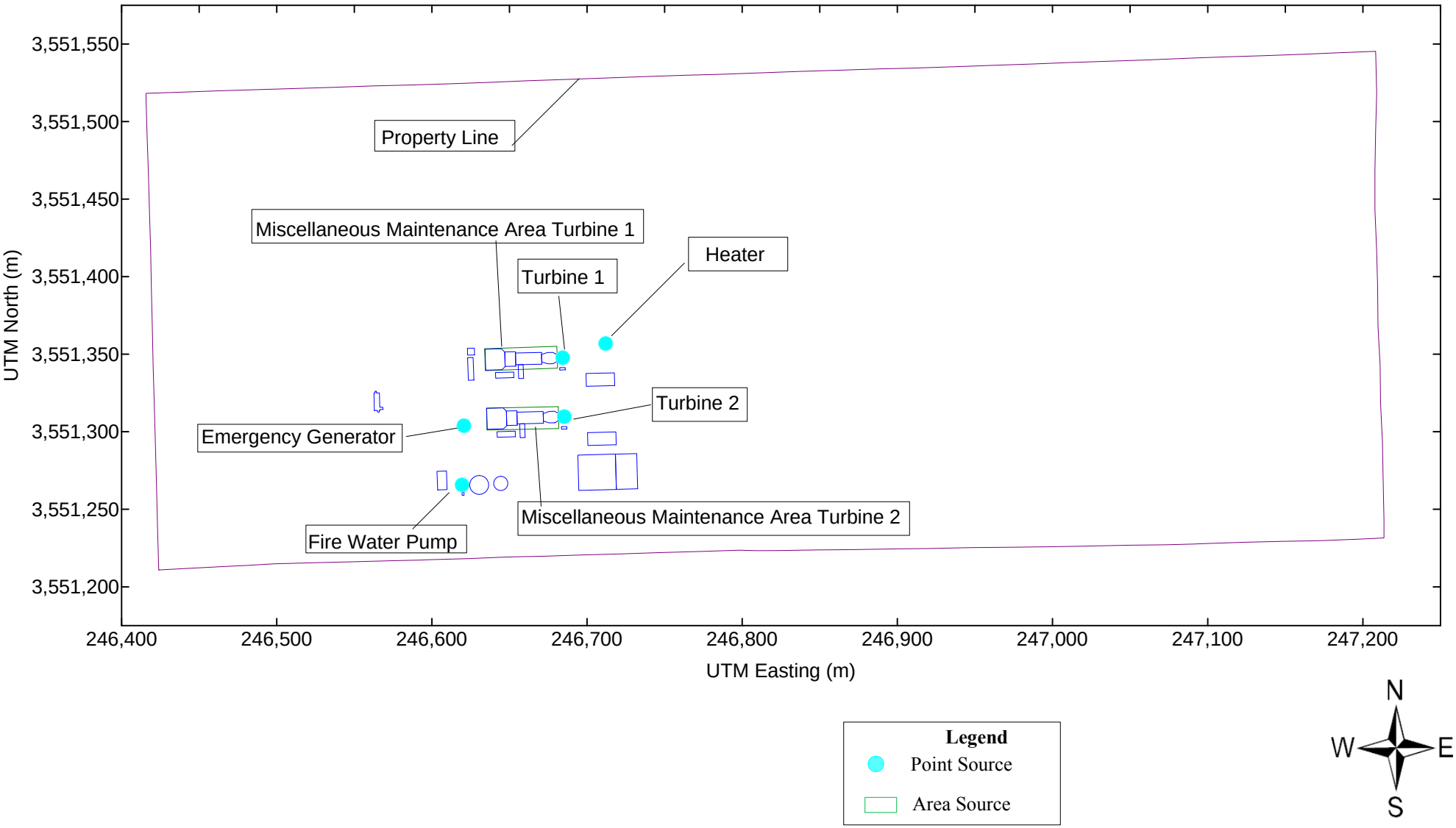
Location of Sources and Buildings/Structures - GE7FA.03 Option 1



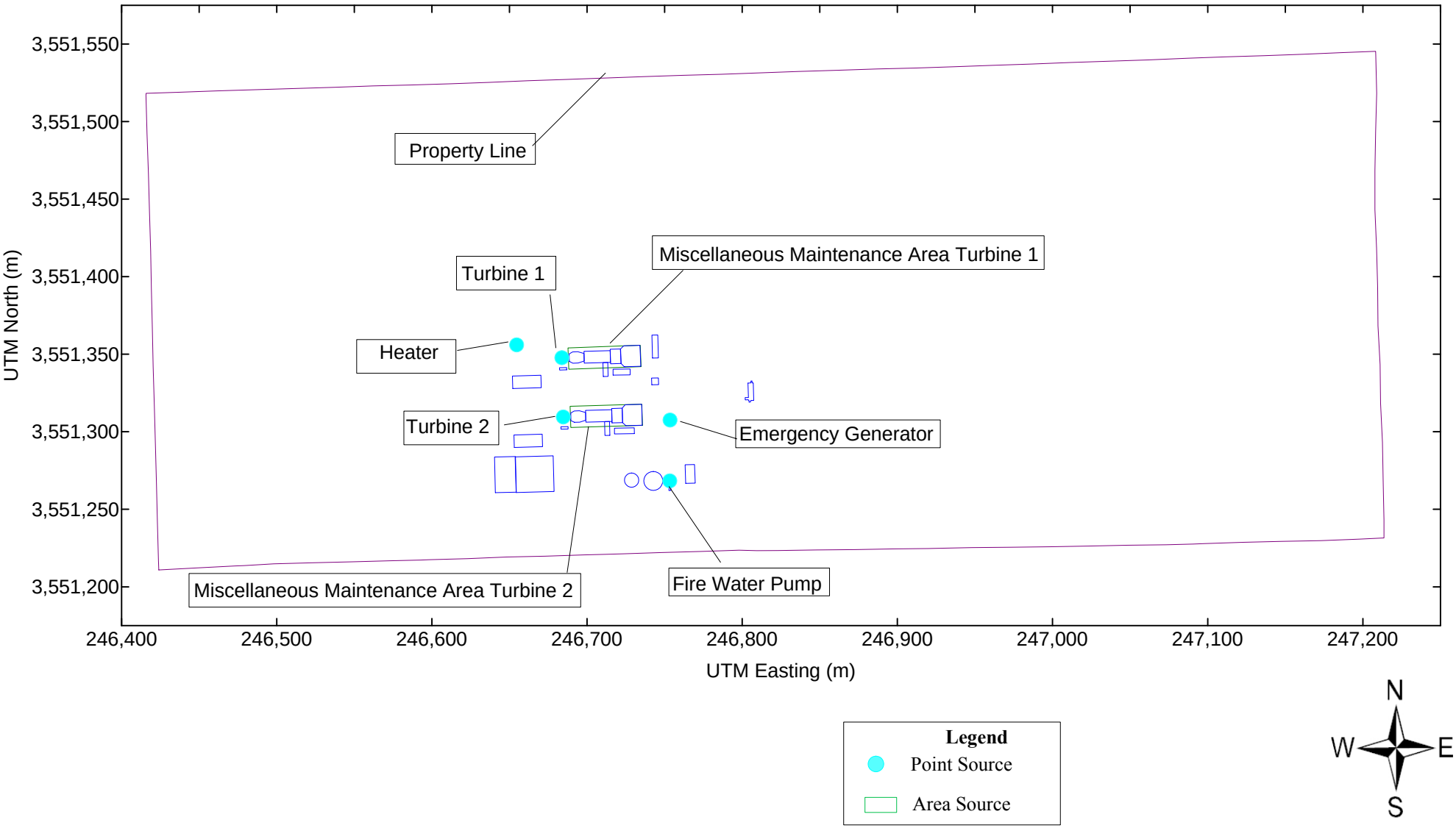
Location of Sources and Buildings/Structures - GE7FA.03 Option 2



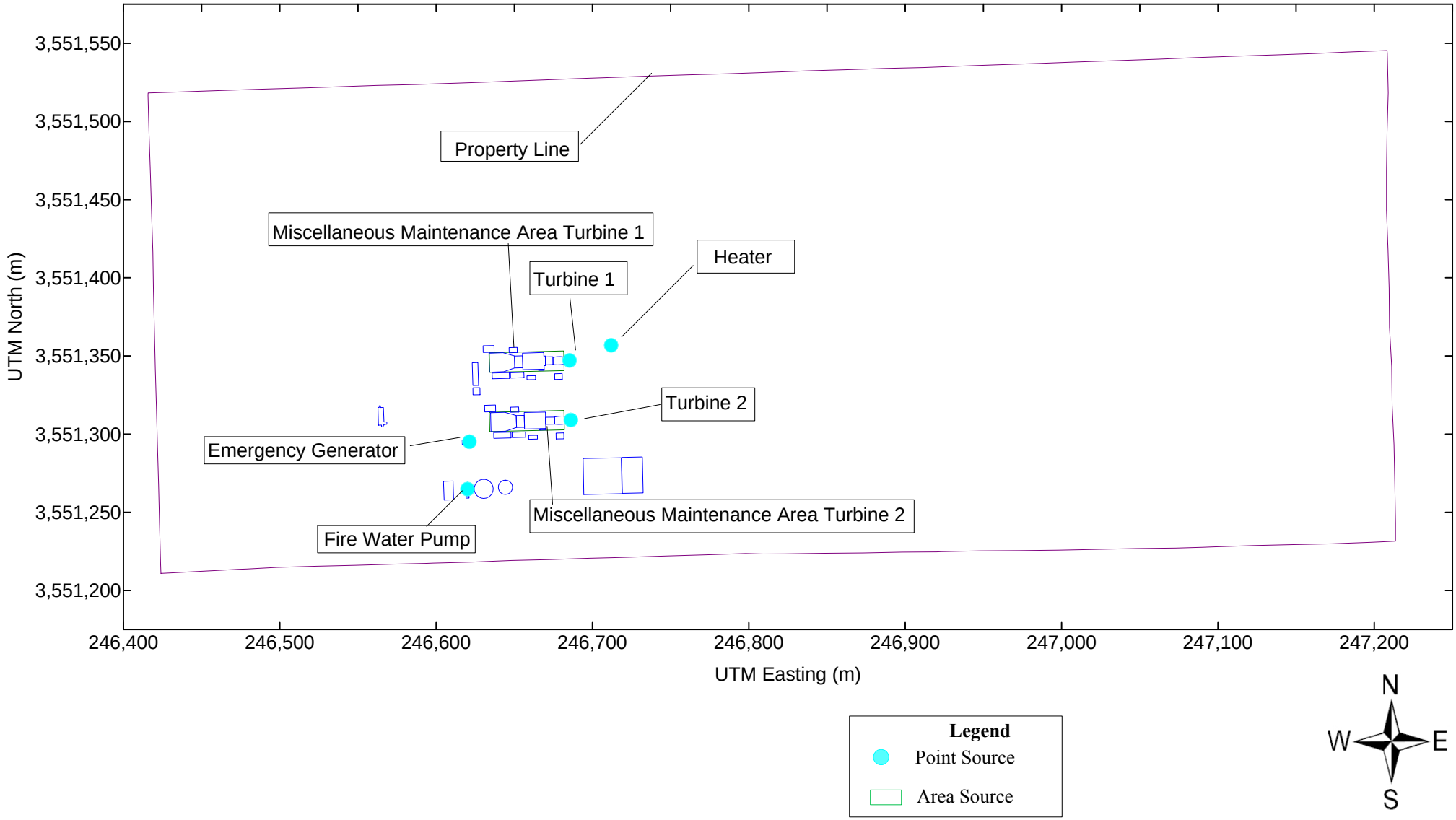
Location of Sources and Buildings/Structures - GE7FA.05 Option 1



Location of Sources and Buildings/Structures - GE7FA.05 Option 2



Location of Sources and Buildings/Structures - Siemens Option 1



Location of Sources and Buildings/Structures - Siemens Option 2

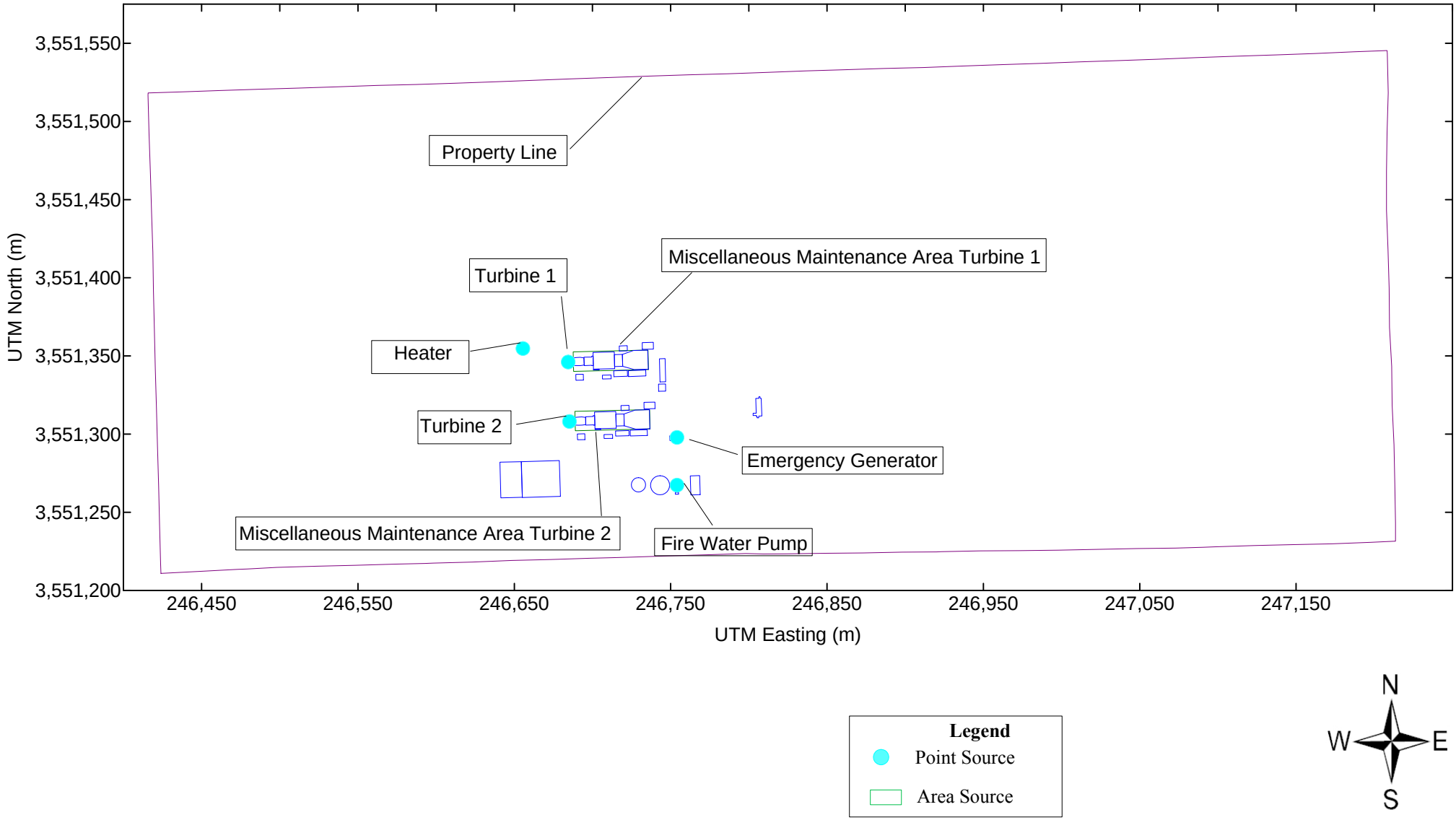


Figure B-1. Receptor Locations for the Property Line Grid

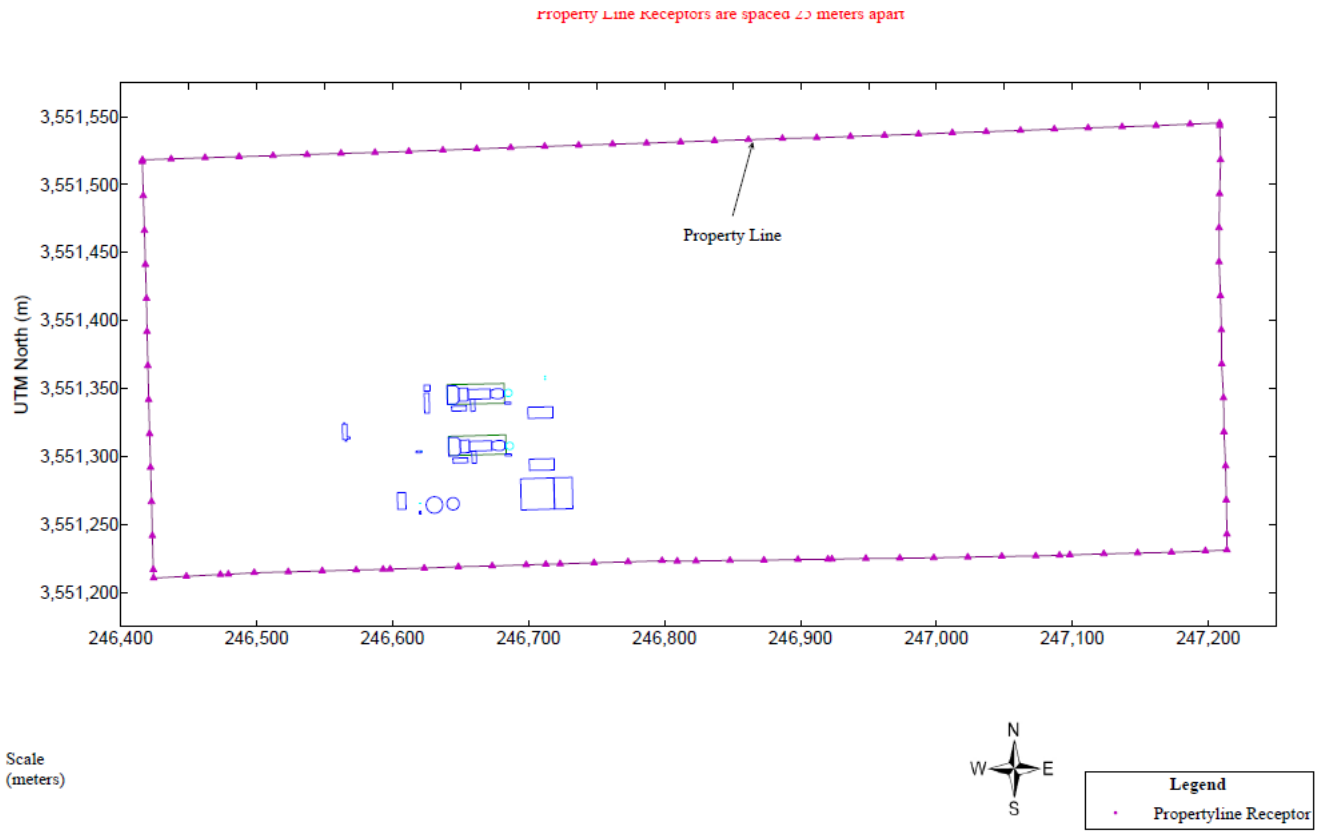


Figure B-2. Receptor Locations for the Tight Grid

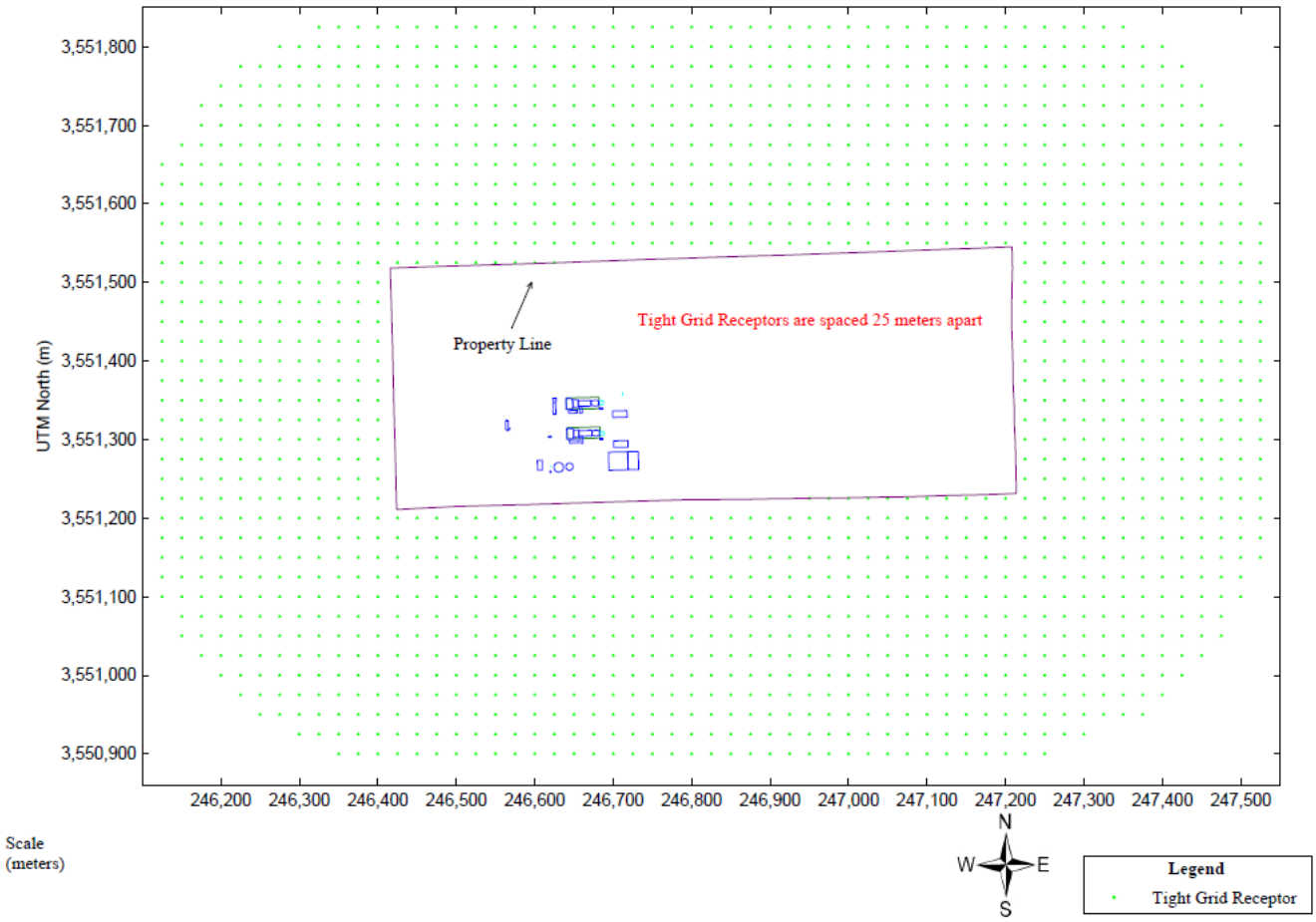


Figure B-3. Receptor Locations for the Fine Grid

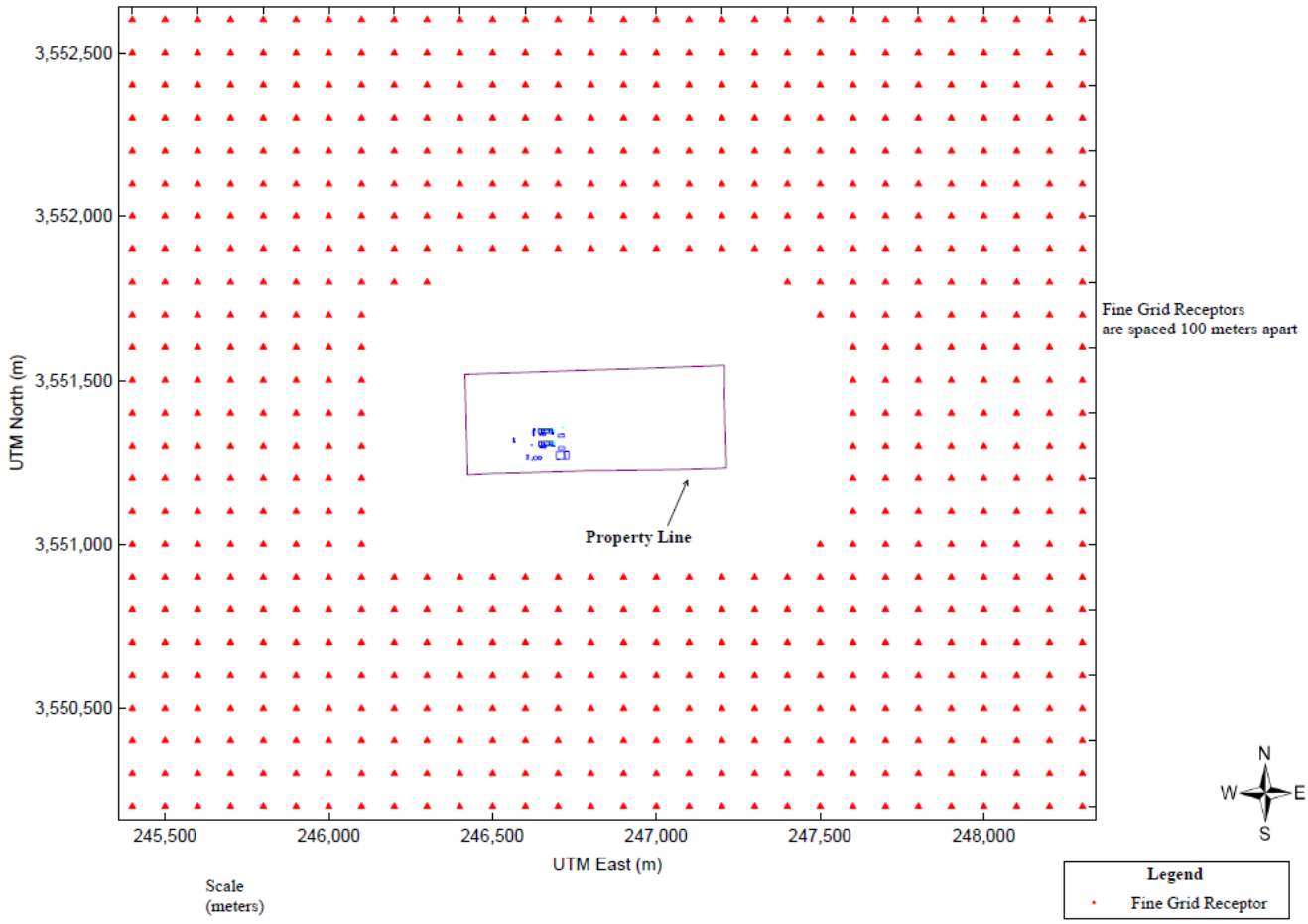


Figure B-4. Receptor Locations for the Medium Grid

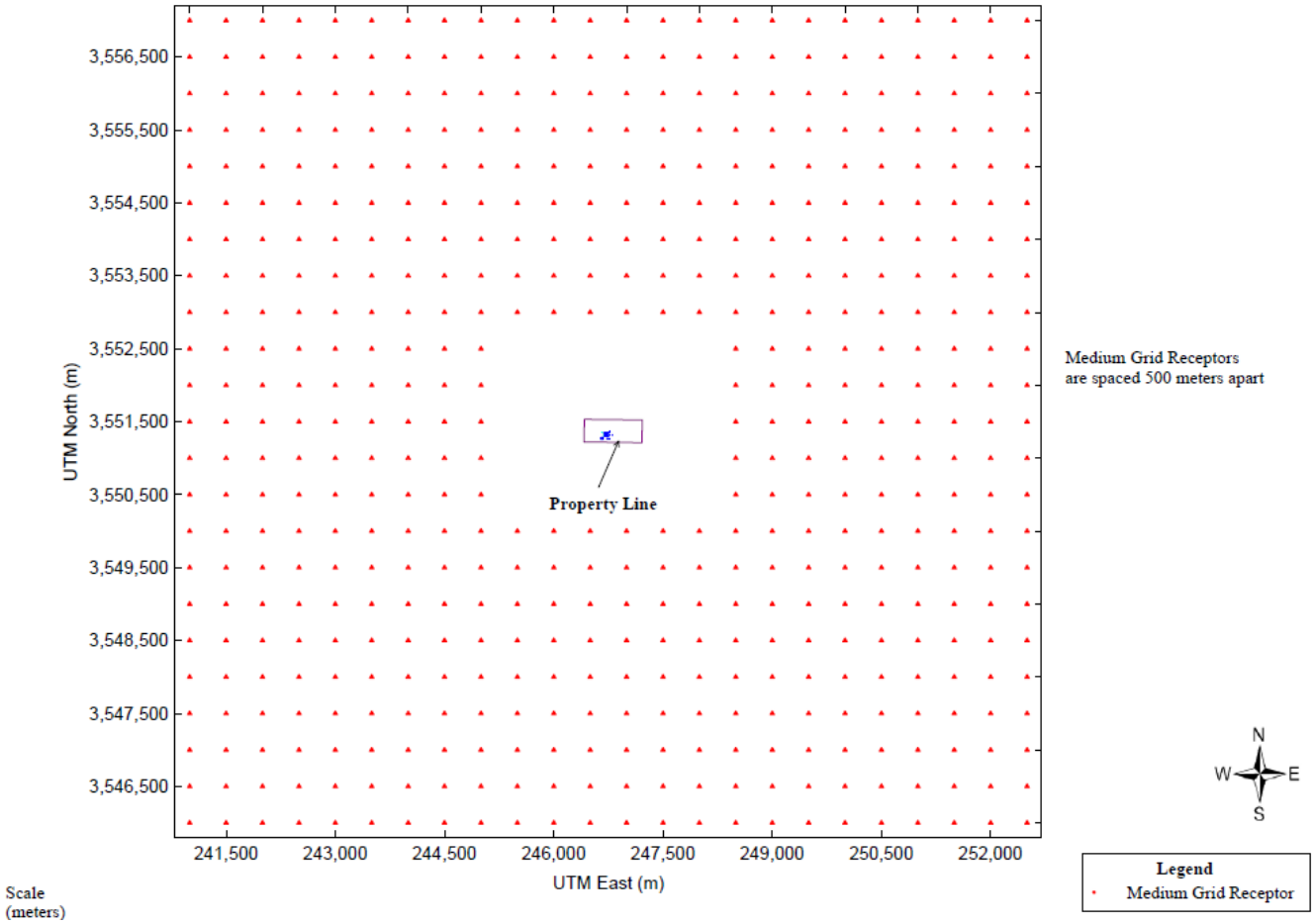
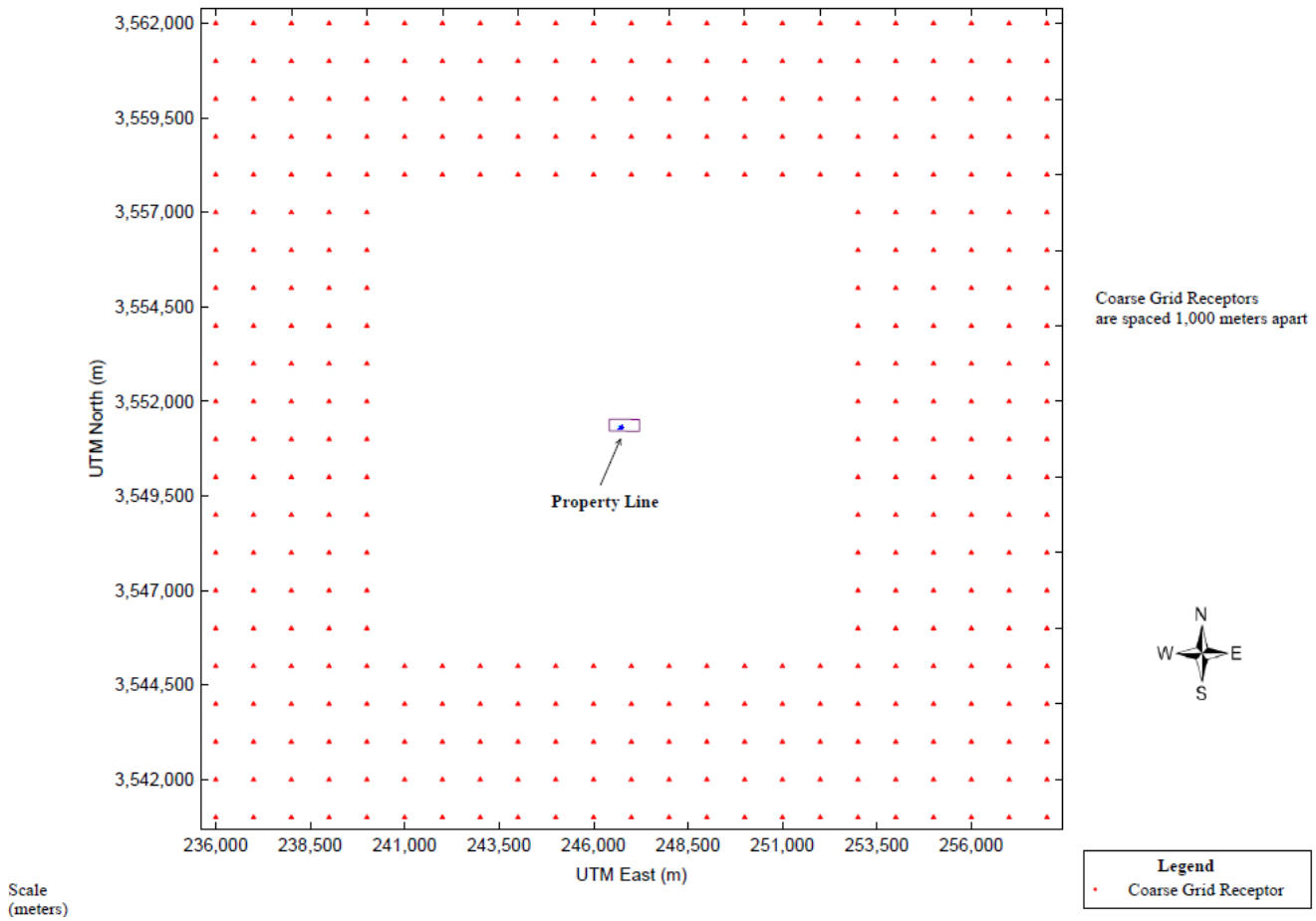


Figure B-5. Receptor Locations for the Coarse Grid



APPENDIX C: SUMMARY OF MERA STEPS 4C/4D

MERA Steps 4C/4D

Constituent	CAS No.	CTGE.03-1 and 2 Two (2) Turbines .03 - MSS (lb/hr)	CTGE.05-1 and 2 Two (2) Turbine .05 - MSS (lb/hr)	CTSF5-1 and 2 Two (2) Siemens F5ee Turbines - MSS (lb/hr)	FWP-01 Firewater Pump (lb/hr)	EGEN-01 Emergency Generator (lb/hr)	TK-01 Diesel Tank FWP (lb/hr)	TK-02 Diesel Tank Em. Gen. (lb/hr)	HTR-01 Heater (lb/hr)	FUG Fugitives (lb/hr)	LOV1 and 2 Two (2) Lube Oil Vents (lb/hr)	MMA1 and 2 MSS (lb/hr)
Ethylbenzene	100-41-4	5.95E-01	2.89E+00	2.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylene	106-42-3	1.19E+00	5.77E+00	4.26E+00	3.49E-04	7.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Butane	106-97-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-02	3.56E-06	0.00E+00	7.65E-05
1,3-Butadiene	106-99-0	7.99E-03	3.88E-02	2.86E-02	4.79E-05	1.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acrolein	107-02-8	1.19E-01	5.77E-01	4.26E-01	1.13E-04	2.49E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hexane	107-83-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylene	108-38-3	1.19E+00	5.77E+00	4.26E+00	3.49E-04	7.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	108-88-3	2.42E+00	1.17E+01	8.64E+00	5.01E-04	1.10E-03	0.00E+00	0.00E+00	3.00E-05	0.00E+00	0.00E+00	0.00E+00
N-Pentane	109-66-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-02	5.09E-07	0.00E+00	1.09E-05
Hexane	110-54-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-02	0.00E+00	0.00E+00	0.00E+00
Anthracene	120-12-7	0.00E+00	0.00E+00	0.00E+00	2.29E-06	5.04E-06	0.00E+00	0.00E+00	2.12E-08	0.00E+00	0.00E+00	0.00E+00
Pyrene	129-00-0	0.00E+00	0.00E+00	0.00E+00	5.86E-06	1.29E-05	0.00E+00	0.00E+00	4.41E-08	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	191-24-2	0.00E+00	0.00E+00	0.00E+00	5.99E-07	1.32E-06	0.00E+00	0.00E+00	1.06E-08	0.00E+00	0.00E+00	0.00E+00
Indeno(1,2,3-cd)pyrene	193-39-5	0.00E+00	0.00E+00	0.00E+00	4.59E-07	1.01E-06	0.00E+00	0.00E+00	1.59E-08	0.00E+00	0.00E+00	0.00E+00
Benzo(b)fluoranthene	205-99-2	0.00E+00	0.00E+00	0.00E+00	1.21E-07	2.67E-07	0.00E+00	0.00E+00	1.59E-08	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	206-44-0	0.00E+00	0.00E+00	0.00E+00	9.32E-06	2.05E-05	0.00E+00	0.00E+00	2.65E-08	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	207-08-9	0.00E+00	0.00E+00	0.00E+00	1.90E-07	4.18E-07	0.00E+00	0.00E+00	1.59E-08	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	208-96-8	0.00E+00	0.00E+00	0.00E+00	6.20E-06	1.36E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chrysene	218-01-9	0.00E+00	0.00E+00	0.00E+00	4.32E-07	0.00E+00	0.00E+00	0.00E+00	1.59E-08	0.00E+00	0.00E+00	0.00E+00
Dichlorobenzene	25321-22-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	0.00E+00	0.00E+00	0.00E+00
Formaldehyde	50-00-0	1.32E+01	6.40E+01	4.72E+01	1.45E-03	3.18E-03	0.00E+00	0.00E+00	6.62E-04	0.00E+00	0.00E+00	0.00E+00
Benzo(a)pyrene	50-32-8	0.00E+00	0.00E+00	0.00E+00	2.30E-07	5.07E-07	0.00E+00	0.00E+00	1.06E-08	0.00E+00	0.00E+00	0.00E+00
Dibenz(a,h)anthracene	53-70-3	0.00E+00	0.00E+00	0.00E+00	7.14E-07	1.57E-06	0.00E+00	0.00E+00	1.06E-08	0.00E+00	0.00E+00	0.00E+00
3-Methylchloranthrene	56-49-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-08	0.00E+00	0.00E+00	0.00E+00
Benzo(a)anthracene	56-55-3	0.00E+00	0.00E+00	0.00E+00	2.06E-06	4.53E-06	0.00E+00	0.00E+00	1.59E-08	0.00E+00	0.00E+00	0.00E+00
7,12-Dimethylbenz(a)anthracene	57-97-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-07	0.00E+00	0.00E+00	0.00E+00
Benzene	71-43-2	2.23E-01	1.08E+00	7.98E-01	1.14E-03	2.51E-03	0.00E+00	0.00E+00	1.85E-05	0.00E+00	0.00E+00	0.00E+00
Pb	7439-92-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-06	0.00E+00	0.00E+00	0.00E+00
Manganese	7439-96-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-06	0.00E+00	0.00E+00	0.00E+00
Nickel	7440-02-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-05	0.00E+00	0.00E+00	0.00E+00
Arsenic	7440-38-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-06	0.00E+00	0.00E+00	0.00E+00
Beryllium	7440-41-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-07	0.00E+00	0.00E+00	0.00E+00
Chromium	7440-47-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-05	0.00E+00	0.00E+00	0.00E+00
Cobalt	7440-48-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.42E-07	0.00E+00	0.00E+00	0.00E+00
Methane	74-82-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.86E-02	0.00E+00	1.05E+00
Ethane	74-84-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-02	8.24E-04	0.00E+00	1.77E-02
Propane	74-98-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	3.97E-05	0.00E+00	8.52E-04
Acetaldehyde	75-07-0	7.44E-01	3.61E+00	2.66E+00	9.40E-04	2.07E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-Butane	75-28-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-06	0.00E+00	6.56E-05
Propylene Oxide	75-56-9	5.39E-01	2.62E+00	1.93E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	7782-49-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-07	0.00E+00	0.00E+00	0.00E+00
I-Pentane	78-78-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-06	0.00E+00	2.19E-05
Acenaphthene	83-32-9	0.00E+00	0.00E+00	0.00E+00	1.74E-06	3.83E-06	0.00E+00	0.00E+00	1.59E-08	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	85-01-8	0.00E+00	0.00E+00	0.00E+00	3.60E-05	7.92E-05	0.00E+00	0.00E+00	1.50E-07	0.00E+00	0.00E+00	0.00E+00
Fluorene	86-73-7	0.00E+00	0.00E+00	0.00E+00	3.58E-05	7.87E-05	0.00E+00	0.00E+00	2.47E-08	0.00E+00	0.00E+00	0.00E+00
Naphthalene	91-20-3	2.42E-02	1.17E-01	8.64E-02	1.04E-04	2.29E-04	0.00E+00	0.00E+00	5.38E-06	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	91-57-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-07	0.00E+00	0.00E+00	0.00E+00
Xylene	95-47-6	1.19E+00	5.77E+00	4.26E+00	3.49E-04	7.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PAH	--	4.09E-02	1.98E-01	1.46E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.72E-06	0.00E+00	0.00E+00	0.00E+00
Mercury	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-06	0.00E+00	0.00E+00	0.00E+00
Lube Oil	--	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01	7.78E-03
Diesel Fuel	68334-30-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-03	1.38E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00

MERA Steps 4C/4D

Constituent	CAS No.	Total Hourly Emissions (lb/hr)	Short-Term ESL ($\mu g/m^3$)	Long-Term ESL ($\mu g/m^3$)	Annual ESL ≥ 10% Short-term ESL?	Flowchart Step 4C: Is Increase ≤ 0.04 lb/hr & 2 ≤ ESL < 500 $\mu g/m^3$? Is Increase ≤ 0.1 lb/hr & 500 ≤ ESL < 3500 $\mu g/m^3$? Is Increase ≤ 0.4 lb/hr& ESL ≥ 3500 $\mu g/m^3$?	Flowchart Step 4D: Is Increase ≤ 0.04 lb/hr & ESL < 2 $\mu g/m^3$?
Ethylbenzene	100-41-4	2.89E+00	740	570	Yes	No	No
Xylene	106-42-3	5.77E+00	250	180	Yes	No	No
Butane	106-97-8	1.86E-02	66000	7200	Yes	Yes, No Further Review	--
1,3-Butadiene	106-99-0	3.89E-02	510	9.9	No	No	No
Acrolein	107-02-8	5.78E-01	3.2	0.82	Yes	No	No
Hexane	107-83-5	0.00E+00	3500	350	Yes	Yes, No Further Review	--
Xylene	108-38-3	5.77E+00	340	180	Yes	No	No
Toluene	108-88-3	1.17E+01	3500	1200	Yes	No	No
N-Pentane	109-66-0	2.30E-02	4100	7100	Yes	Yes, No Further Review	--
Hexane	110-54-3	1.58E-02	5300	200	No	No	No
Anthracene	120-12-7	7.35E-06	0.5	0.05	Yes	No	Yes, APD Review Needed
Pyrene	129-00-0	1.88E-05	0.5	0.05	Yes	No	Yes, APD Review Needed
Benzo(g,h,i)perylene	191-24-2	1.93E-06	0.5	0.05	Yes	No	Yes, APD Review Needed
Indeno(1,2,3-cd)pyrene	193-39-5	1.49E-06	0.5	0.05	Yes	No	Yes, APD Review Needed
Benzo(b)fluoranthene	205-99-2	4.04E-07	0.5	0.05	Yes	No	Yes, APD Review Needed
Fluoranthene	206-44-0	2.99E-05	0.5	0.05	Yes	No	Yes, APD Review Needed
Benzo(k)fluoranthene	207-08-9	6.23E-07	0.5	0.05	Yes	No	Yes, APD Review Needed
Acenaphthylene	208-96-8	1.98E-05	1	0.1	Yes	No	Yes, APD Review Needed
Chrysene	218-01-9	4.48E-07	0.5	0.05	Yes	No	Yes, APD Review Needed
Dichlorobenzene	25321-22-6	1.06E-05	600	60	Yes	Yes, No Further Review	--
Formaldehyde	50-00-0	6.40E+01	15	3.3	Yes	No	No
Benzo(a)pyrene	50-32-8	7.48E-07	0.03	0.003	Yes	No	Yes, APD Review Needed
Dibenz(a,h)anthracene	53-70-3	2.30E-06	0.5	0.05	Yes	No	Yes, APD Review Needed
3-Methylchloranthrene	56-49-5	1.59E-08	0.02	0.002	Yes	No	Yes, APD Review Needed
Benzo(a)anthracene	56-55-3	6.60E-06	0.5	0.05	Yes	No	Yes, APD Review Needed
7,12-Dimethylbenz(a)anthracene	57-97-6	1.41E-07	0.5	0.05	Yes	No	Yes, APD Review Needed
Benzene	71-43-2	1.09E+00	170	4.5	No	No	No
Pb	7439-92-1	4.41E-06	must meet NAAQS	--	--	Must Meet NAAQS	Must Meet NAAQS
Manganese	7439-96-5	3.36E-06	2	0.2	Yes	Yes, No Further Review	--
Nickel	7440-02-0	1.85E-05	0.33	0.059	Yes	No	Yes, APD Review Needed
Arsenic	7440-38-2	1.76E-06	3	0.067	No	No	No
Beryllium	7440-41-7	1.06E-07	0.02	0.002	Yes	No	Yes, APD Review Needed
Chromium	7440-47-3	1.23E-05	3.6	0.041	No	No	No
Cobalt	7440-48-4	7.42E-07	0.2	0.02	Yes	No	Yes, APD Review Needed
Methane	74-82-8	1.09E+00	simple asphyxiant	--	--	Simple Asphyxiant, No Further Review	--
Ethane	74-84-0	4.59E-02	simple asphyxiant	--	--	Simple Asphyxiant, No Further Review	--
Propane	74-98-6	1.50E-02	simple asphyxiant	--	--	Simple Asphyxiant, No Further Review	--
Acetaldehyde	75-07-0	3.61E+00	15	45	Yes	No	No
I-Butane	75-28-5	6.86E-05	23000	7200	Yes	Yes, No Further Review	--
Propylene Oxide	75-56-9	2.62E+00	70	7	Yes	No	No
Selenium	7782-49-2	2.12E-07	2	0.2	Yes	Yes, No Further Review	--
I-Pentane	78-78-4	2.29E-05	3800	7100	Yes	Yes, No Further Review	--
Acenaphthene	83-32-9	5.58E-06	1	0.1	Yes	No	Yes, APD Review Needed
Phenanthrene	85-01-8	1.15E-04	0.5	0.05	Yes	No	Yes, APD Review Needed
Fluorene	86-73-7	1.14E-04	10	1	Yes	Yes, No Further Review	--
Naphthalene	91-20-3	1.18E-01	200	50	Yes	No	No
2-Methylnaphthalene	91-57-6	2.12E-07	30	3	Yes	Yes, No Further Review	--
Xylene	95-47-6	5.77E+00	1600	180	Yes	No	No
PAH	--	1.98E-01	0.5	0.05	Yes	Yes, No Further Review	--
Cadmium	--	9.72E-06	0.1	0.01	Yes	Yes, No Further Review	--
Mercury	--	2.30E-06	0.2	0.02	Yes	Yes, No Further Review	--
Lube Oil	--	2.07E-01	1000	100	Yes	No	No
Diesel Fuel	68334-30-5	2.07E-02	1000	100	Yes	Yes, No Further Review	--

APPENDIX D: SUMMARY OF DOWNWASH STRUCTURES

Table D-6. Table of Buildings Considered in the Modeling Analysis: GE7FA.03 Option 1

Model ID	Description	Height	
		ft	m
BLDG41	Administration Building	20.00	6.10
BLDGEN	Emergency Generator Enclosure	10.56	3.22
BLDG33B	Fin Fan Auxiliary Water Cooler 2	14.00	4.27
BLDG13B	Fire Protection CO2 Tank 2	15.00	4.57
BLDG13A	Fire Protection CO2 Tank 1	15.00	4.57
BLDG35	Deep Well and Pump House	5.00	1.52
BLDG57	Diesel Day Tank FWP	5.00	1.52
BLDG21	Electrical Equipment Building	20.00	6.10
BLDG18	Switchgear Enclosure	20.00	6.10
BLDG33A	Fin Fan Auxiliary Water Cooler 1	14.00	4.27
BLDG3B	Packaged Electrical Electronic Control Center (PEECC) 2	20.00	6.10
BLDG40	Service Buidling and Control Room	20.00	6.10
BLDG4B	Accessory Module 2	20.00	6.10
BLDG6B	Turbine Enclosure 2	34.00	10.36
BLDG5B	Generator Enclosure 2	52.00	15.85
BLDG4A	Accesory Module 1	20.00	6.10
BLDG3A	Packaged Electrical Electronic Control Center (PEECC) 1	20.00	6.10
BLDG5A	Generator Enclosure 1	52.00	15.85
BLDG6A	Turbine Enclosure 1	34.00	10.36
BLDG31	Raw Water Storage Tank	50.00	15.24
BLDG34	Demin. Water Tank	45.00	13.72
BLDG17	Relay House	15.00	4.57
BLDG7B	Exhaust Silencer 2	30.00	9.14
BLDG1B	Air Inlet and Filter with Evaporator Cooler 2	75.00	22.86
BLDG1A	Air Inlet and Filter with Evaporator Cooler 1	75.00	22.86
BLDG7A	Exhaust Silencer 1	30.00	9.14

1 = Turbine 1 Setup; 2 = Turbine 2 Setup

Table D-7. Table of Buildings Considered in the Modeling Analysis: GE7FA.03 Option 2

Model ID	Description	Height	
		ft	m
BLDG13A	Fire Protection CO2 Tank 1	15.00	4.57
BLDG13B	Fire Protection CO2 Tank 2	15.00	4.57
BLDG18	Switchgear Enclosure	20.00	6.10
BLDG21	Electrical Equipment Building	20.00	6.10
BLDG57	Diesel Day Tank FWP	5.00	1.52
BLDG35	Deep Well and Pump House	5.00	1.52
BLDG6B	Turbine Enclosure 2	34.00	10.36
BLDG5B	Generator Enclosure 2	52.00	15.85
BLDG4B	Accesory Module 2	20.00	6.10
BLDG3B	Packed Electrical Electronic Control Center (PEECC) 2	20.00	6.10
BLDG6A	Turbine Enclosure 1	34.00	10.36
BLDG5A	Generator Enclosure 1	52.00	15.85
BLDEGEN	Emergency Generator Enclosure	10.56	3.22
BLDG33B	Fin Fan Auxiliary Water Cooler 2	14.00	4.27
BLDG4A	Accesory Module 1	20.00	6.10
BLDG3A	Packed Electrical Electronic Control Center (PEECC) 1	20.00	6.10
BLDG33A	Fin Fan Auxiliary Water Cooler 1	14.00	4.27
BLDG40	Service Building and Control Room	20.00	6.10
BLDG41	Administration Building	20.00	6.10
BLDG31	Raw Water Storage Tank	50.00	15.24
BLDG33	Demin. Water Tank	45.00	13.72
BLDG17	Relay House	15.00	4.57
BLDG7B	Exhaust Silencer 2	30.00	9.14
BLDG1B	Air Inlet and Filter with Evaporator Cooler 2	75.00	22.86
BLDG7A	Exhaust Silencer 1	30.00	9.14
BLDG1A	Air Inlet and Filter with Evaporator Cooler 1	75.00	22.86

1 = Turbine 1 Setup; 2 = Turbine 2 Setup

Table D-8. Table of Buildings Considered in the Modeling Analysis: GE7FA.05 Option 1

Model ID	Description	Height	
		ft	m
BLDG35	Deep Well and Pump House	5.00	1.52
BLDG18	Switchgear Enclosure	20.00	6.10
BLDG21	Electrical Equipment Building	20.00	6.10
BLDG3A	Packaged Electrical Electronic Control Center (PEECC) 1	20.00	6.10
BLDG4A	Accessory Module 1	20.00	6.10
BLDG33A	Fin Fan Auxiliary Water Cooler 1	14.00	4.27
BLDG33B	Fin Fan Auxiliary Water Cooler 2	14.00	4.27
BLDG3B	Packaged Electrical Electronic Control Center (PEECC) 2	20.00	6.10
BLDG4B	Accessory Module 2	20.00	6.10
BLDG13B	Fire Protection CO2 tank 2	15.00	4.57
BLDG29	Diesel Tank FWP	5.00	1.52
BLDG40	Service Building	20.00	6.10
BLDG41	Administration Building	20.00	6.10
BLDG5B	Generator Enclosure 2	52.00	15.85
BLDG6B	Turbine Enclosure 2	34.00	10.36
BLDG5A	Generator Enclosure 5A	52.00	15.85
BLDG6A	Turbine Enclosure	34.00	10.36
BLDG31	Raw Water Storage Tank	50.00	15.24
BLDG34	Demin. Water Tank	45.00	13.72
BLDG17	Relay House	15.00	4.57
BLDGEGEN	Emergency Generator Building	10.56	3.22
BLDG13A	Fire Protection CO2 Tank 1	15.00	4.57
BLDG1B	Air Inlet and Filter with Evaporator Cooler 2	75.00	22.86
BLDG7B	Exhaust Silencer	75.00	22.86
BLDG1A	Air Inlet and Filter with Evaporator Cooler 1	75.00	22.86
BLDG7A	Exhaust Silencer	30.00	9.14

1 = Turbine 1 Setup; 2 = Turbine 2 Setup

Table D-9. Table of Buildings Considered in the Modeling Analysis: GE7FA.05 Option 2

Model ID	Description	Height	
		ft	m
BLDG33A	Fin Fan Auxiliary Water Cooler 1	14.00	4.27
BLDG33B	Fin Fan Auxiliary Water Cooler 2	14.00	4.27
BLDG41	Administration Building	20.00	6.10
BLDG40	Service Building and Control Room	20.00	6.10
BLDG4A	Accessory Module 1	20.00	6.10
BLDG3A	Packaged Electronic Control Center (PEECC) 1	20.00	6.10
BLDG13B	Fire Protection CO2 Tank 2	15.00	4.57
BLDG18	Switchgear Enclosure	20.00	6.10
BLDG21	Electrical Equipment Building	20.00	6.10
BLDG35	Deep Well and Pump House	5.00	1.52
BLDG57	Diesel Day Tank FWP	5.00	1.52
BLDG13A	Fire Protection CO2 Tank 1	15.00	4.57
BLDG6A	Turbine Enclosure 1	34.00	10.36
BLDG5A	Generator Enclosure	52.00	15.85
BLDG6B	Turbine Enclosre 2	34.00	10.36
BLDG5B	Generator Enclosure	52.00	15.85
BLDG4B	Accessory Module 2	20.00	6.10
BLDG3B	Packaged Electronic Control Center (PEECC) 2	20.00	6.10
BLDG31	Raw Water Storage tank	50.00	15.24
BLDG34	Demin. Water Tank	45.00	13.72
BLDG1A	Air Inlet and Filter with Evaporator Cooler 1	75.00	22.86
BLDG17	Relay House	15.00	4.57
BLDG7A	Exhaust Silencer 1	30.00	9.14
BLDG7B	Exhaust Silencer 2	30.00	9.14
BLDG1B	Air Inlet and Filter with Evaporator Cooler 2	75.00	22.86

1 = Turbine 1 Setup; 2 = Turbine 2 Setup

Table D-10. Table of Buildings Considered in the Modeling Analysis: Siemens Option 1

Model ID	Description	Height	
		ft	m
BLDG28	Administration Building	20	6.10
BLDG29	Service Building and Control Room	20	6.10
BLDG33	Deep Well and Pump House	5	1.52
BLDG16B	Exhaust Transition Duct 2	20	6.10
BLDG18B	Lube Oil Cooler 2	30	9.14
BLDG22B	Fire Protection Equipment 2	8	2.44
BLDG17B	Air Compression 2	8	2.44
BLDG57	Diesel Day Tank FWP	5	1.52
BLDG18A	Rotor Air Cooler 1	30	9.14
BLDG17A	Air Compression 1	8	2.44
BLDG19A	Lube Air Cooler 1	30	9.14
BLDG7A	Electrical Package 1	11	3.35
BLDG44	Electrical Equipment Building	20	6.10
BLDG43	Switchgear Enclosure	20	6.10
BLDG13A	SFC Package 1	11	3.35
BLDG21A	Generator Exhaust Duct 1	70	21.34
BLDG2A	Generator 1	10.5	3.20
BLDG13B	SFC Package 2	11	3.35
BLDG21B	Generator Exhaust Duct 2	70	21.34
BLDEGEN	Emergency Generator Enclosure	10.56	3.22
BLDG7B	Electrical Package 2	11	3.35
BLDG19B	Lube Oil Cooler 2	30	9.14
BLDG5B	Turbine Enclosure 2	31	9.45
BLDG2B	Generator 2	10.5	3.20
BLDG31	Demin. Water Tank	45	13.72
BLDG32	Raw Water Storage Tank	50	15.24
BLDG49	Relay House	15	4.57
BLDG3A	Exhaust Silencer 1	30	9.14
BLDG16A	Exhaust Transition Duct 1	20	6.10
BLDG5A	Turbine Enclosure 1	31	9.45
BLDG22A	Fire Protection Equipment 1	8	2.44
BLDG15A	Gas Turbine Air Inlet Filter 1	76	23.16
BLDG3B	Exhaust Silencer 2	30	9.14
BLDG15B	Gas Turbine Air Inlet Filter 2	76	23.16

1 = Turbine 1 Setup; 2 = Turbine 2 Setup

Table D-11. Table of Buildings Considered in the Modeling Analysis: Siemens Option 2

Model ID	Description	Height	
		ft	m
BLDG7A	Electrical Package 1	11.00	3.35
BLDG43	Switchgear Enclosure	20.00	6.10
BLDG44	Electrical Equipment Building	20.00	6.10
BLDG21A	Generator Exhaust Duct 1	70.00	21.34
BLDG19A	Lube Oil Cooler 1	30.00	9.14
BLDG22A	Fire Protection Equipment 1	8.00	2.44
BLDG13A	SFC Package 1	11.00	3.35
BLDG29	Service Building and Control Room	20.00	6.10
BLDG28	Administration Building	20.00	6.10
BLDG57	Diesel Day Tank FWP	5.00	1.52
BLDG33	Deep Well and Pump House	5.00	1.52
BLDEGEN	Emergency Generator Enclosure	10.56	3.22
BLDG17B	Air Compression 2	8.00	2.44
BLDG18B	Rotor Air Cooler 2	30.00	9.14
BLDG19B	Lube Oil Cooler 2	30.00	9.14
BLDG7B	Electrical Package 2	11.00	3.35
BLDG2B	Generator 2	10.50	3.20
BLDG5B	Turbine Enclosure 2	31.00	9.45
BLDG22B	Fire Protection Equipment 2	8.00	2.44
BLDG21B	Generator Exhaust Duct 2	70.00	21.34
BLDG13B	SFC Package 2	11.00	3.35
BLDG18A	Rotor Air Cooler 1	30.00	9.14
BLDG17A	Air Compression 1	8.00	2.44
BLDG2A	Generator 1	10.50	3.20
BLDG5A	Turbine Enclosure 1	31.00	9.45
BLDG31	Demin. Water Tank	45.00	13.72
BLDG32	Raw Water Storage Tank	50.00	15.24
BLDG49	Relay House	15.00	4.57
BLDG15B	Gas Turbine Air Inlet Filter 2	76.00	23.16
BLDG16B	Exhaust Transition Duct 2	20.00	6.10
BLDG3B	Exhaust Silencer 2	30.00	9.14
BLDG15A	Gas Turbine Air Inlet Filter 1	76.00	23.16
BLDG16A	Exhaust Transition Duct 1	20.00	6.10
BLDG3A	Exhaust Silencer 1	30.00	9.14

1 = Turbine 1 Setup; 2 = Turbine 2 Setup

APPENDIX E: MODELED SOURCE PARAMETERS AND EMISSION RATES

Point Source Parameters - GE7FA.03 Option 1

EPN	Model ID	Description	NAD83 (m)		Stack Height		Temperature		Stack Velocity		Stack Diameter		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(F)	(K)	(ft/s)	(m/s)	(ft)	(m)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
CTGE.03-1	03TBN1NH	.03 Turbine 1 Normal Hourly	246,685	3,551,347	80	24.38	1049.00	838.15	168.10	51.24	18.00	5.49	7.709E-03	1.542E-02	1.036E-04	1.542E-03	3.132E-02	0.000E+00	1.710E-01	2.891E-03	0.000E+00	0.000E+00	9.636E-03	6.986E-03	3.132E-04	0.000E+00	0.000E+00
CTGE.03-2	03TBN2NH	.03 Turbine 2 Normal Hourly	246,686	3,551,308	80	24.38	1049.00	838.15	168.10	51.24	18.00	5.49	7.709E-03	1.542E-02	1.036E-04	1.542E-03	3.132E-02	0.000E+00	1.710E-01	2.891E-03	0.000E+00	0.000E+00	9.636E-03	6.986E-03	3.132E-04	0.000E+00	0.000E+00
FWP-01	FWP	Firewater Pump	246,620	3,551,266	6.41	1.95	821.00	711.48	203.00	61.87	0.33	0.10	0.000E+00	4.399E-05	6.035E-06	1.428E-05	6.313E-05	0.000E+00	1.821E-04	1.440E-04	0.000E+00	0.000E+00	1.184E-04	0.000E+00	1.309E-05	0.000E+00	0.000E+00
EGEN-01	EGEN	Emergency Generator	246,621	3,551,304	10.07	3.07	1173.00	907.04	326.00	99.36	0.33	0.10	0.000E+00	9.678E-05	1.328E-05	3.141E-05	1.389E-04	0.000E+00	4.007E-04	3.168E-04	0.000E+00	0.000E+00	2.604E-04	0.000E+00	2.880E-05	0.000E+00	0.000E+00
HTR-01	HTR1	Nat Gas Heater Stack 1	246,712	3,551,357	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.888E-06	9.979E-04	4.167E-05	1.168E-06	1.111E-07	7.768E-07	0.000E+00	0.000E+00	3.391E-07	0.000E+00	2.778E-07
HTR-01	HTR2	Nat Gas Heater Stack 2	246,712	3,551,359	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.888E-06	9.979E-04	4.167E-05	1.168E-06	1.111E-07	7.768E-07	0.000E+00	0.000E+00	3.391E-07	0.000E+00	2.778E-07
CTGE.03-1S	03TBN1MH	.03 Turbine 1 MSS Hourly	246,685	3,551,347	80	24.38	1032.50	828.98	135.80	41.39	18.00	5.49	3.747E-02	7.495E-02	5.036E-04	7.495E-03	1.522E-01	0.000E+00	8.315E-01	1.405E-02	0.000E+00	0.000E+00	4.684E-02	3.396E-02	1.522E-03	0.000E+00	0.000E+00
CTGE.03-2S	03TBN2MH	.03 Turbine 2 MSS Hourly	246,686	3,551,308	80	24.38	1032.50	828.98	135.80	41.39	18.00	5.49	3.747E-02	7.495E-02	5.036E-04	7.495E-03	1.522E-01	0.000E+00	8.315E-01	1.405E-02	0.000E+00	0.000E+00	4.684E-02	3.396E-02	1.522E-03	0.000E+00	0.000E+00
LOV1-GE.03	LOV1	Lube Oil Vent 1 - GE 7FA.03 Turbine 1	246,674	3,551,347	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.143E-02	0.000E+00
LOV2-GE.03	LOV2	Lube Oil Vent 2 - GE 7FA.03 Turbine 2	246,675	3,551,309	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.143E-02	0.000E+00

Area Source Parameters - GE7FA.03 Option 1

EPN	Model ID	Description	NAD83 (m)		Release Height		X Length		Y Length		Angle	Initial Vertical Dimension		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(ft)	(m)	(ft)	(m)	degrees	(ft)	(m)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)
MMA1	MMA1	Miscellaneous Maintenance Activities 1	246,640	3,551,353	17	5.18	47.57	14.50	137.47	41.90	88.8	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.07E-07	0.00E+00
MMA2	MMA2	Miscellaneous Maintenance Activities 2	246,641	3,551,315	17	5.18	46.59	14.20	137.80	42.00	88.4	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.22E-07	0.00E+00

[1] The turbine maintenance emissions do not occur simultaneously with the normal and/or startup - shutdown emissions. However the turbine maintenance emissions are modeled along with both normal and startup-shutdown emissions to be conservative.

[2] The turbine stack parameters are vendor provided.

Point Source Parameters - GE7FA.03 Option 2

EPN	Model ID	Description	NAD83 (m)		Stack Height		Temperature		Stack Velocity		Stack Diameter		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(F)	(K)	(ft/s)	(m/s)	(ft)	(m)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
CTGE.03-1	03TBN1NH	.03 Turbine 1 Normal Hourly	246,685	3,551,346	80	24.38	1049.00	838.15	168.10	51.24	18.00	5.49	7.71E-03	1.54E-02	1.04E-04	1.54E-03	3.13E-02	0.00E+00	1.71E-01	2.89E-03	0.00E+00	0.00E+00	9.64E-03	6.99E-03	3.13E-04	0.00E+00	0.00E+00
CTGE.03-2	03TBN2NH	.03 Turbine 2 Normal Hourly	246,686	3,551,307	80	24.38	1049.00	838.15	168.10	51.24	18.00	5.49	7.71E-03	1.54E-02	1.04E-04	1.54E-03	3.13E-02	0.00E+00	1.71E-01	2.89E-03	0.00E+00	0.00E+00	9.64E-03	6.99E-03	3.13E-04	0.00E+00	0.00E+00
FWP-01	FWP	Firewater Pump	246,753	3,551,268	6.41	1.95	821.00	711.48	203.00	61.87	0.33	0.10	0.00E+00	4.40E-05	6.03E-06	1.43E-05	6.31E-05	0.00E+00	1.82E-04	1.44E-04	0.00E+00	0.00E+00	1.18E-04	0.00E+00	1.31E-05	0.00E+00	0.00E+00
EGEN-01	EGEN	Emergency Generator	246,755	3,551,306	10.07	3.07	1173.00	907.04	326.00	99.36	0.32	0.10	0.00E+00	9.68E-05	1.33E-05	3.14E-05	1.39E-04	0.00E+00	4.01E-04	3.17E-04	0.00E+00	0.00E+00	2.60E-04	0.00E+00	2.88E-05	0.00E+00	0.00E+00
HTR-01	HTR1	Nat Gas Heater Stack 1	246,656	3,551,354	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
HTR-01	HTR2	Nat Gas Heater Stack 2	246,656	3,551,355	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
CTGE.03-1S	03TBN1MH	.03 Turbine 1 MSS Hourly	246,685	3,551,346	80	24.38	1032.50	828.98	135.80	41.39	18.00	5.49	3.75E-02	7.49E-02	5.04E-04	7.49E-03	1.52E-01	0.00E+00	8.31E-01	1.41E-02	0.00E+00	0.00E+00	4.68E-02	3.40E-02	1.52E-03	0.00E+00	0.00E+00
CTGE.03-2S	03TBN2MH	.03 Turbine 2 MSS Hourly	246,686	3,551,307	80	24.38	1032.50	828.98	135.80	41.39	18.00	5.49	3.75E-02	7.49E-02	5.04E-04	7.49E-03	1.52E-01	0.00E+00	8.31E-01	1.41E-02	0.00E+00	0.00E+00	4.68E-02	3.40E-02	1.52E-03	0.00E+00	0.00E+00
LOV1-GE.03	LOV1	Lube Oil Vent 1 - GE 7FA.03 Turbine 1	246,695	3,551,347	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00
LOV2-GE.03	LOV2	Lube Oil Vent 2 - GE 7FA.03 Turbine 2	246,696	3,551,308	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00

Area Source Parameters - GE7FA.03 Option 2

EPN	Model ID	Description	NAD83 (m)		Release Height		X Length		Y Length		Angle	Initial Vertical Dimension		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(ft)	(m)	(ft)	(m)	degrees	(ft)	(m)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)
MMA1	MMA1	Miscellaneous Maintenance Activities 1	246,730	3,551,340	17	5.18	45.28	13.80	136.48	41.60	-91.7	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.54E-07	0.00E+00
MMA2	MMA2	Miscellaneous Maintenance Activities 2	246,689	3,551,315	17	5.18	49.87	15.20	137.80	42.00	88.1	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.68E-07	0.00E+00

[1] The turbine maintenance emissions do not occur simultaneously with the normal and/or startup - shutdown emissions. However the turbine maintenance emissions are modeled along with both normal and startup-shutdown emissions to be conservative.

[2] The turbine stack parameters are vendor provided.

Point Source Parameters - GE7FA.05 Option 1

EPN	Model ID	Description	NAD83 (m)		Stack Height		Temperature		Stack Velocity		Stack Diameter		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(F)	(K)	(ft/s)	(m/s)	(ft)	(m)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
CTGE.05-1	05TBN1NH	.05 Turbine 1 Normal Hourly	246,684	3,551,348	80	24.38	1055.00	841.48	184.80	56.33	18.00	5.49	8.75E-03	1.75E-02	1.18E-04	1.75E-03	3.55E-02	0.00E+00	1.94E-01	3.28E-03	0.00E+00	0.00E+00	1.09E-02	7.93E-03	3.55E-04	0.00E+00	0.00E+00
CTGE.05-2	05TBN2NH	.05 Turbine 2 Normal Hourly	246,685	3,551,310	80	24.38	1055.00	841.48	184.80	56.33	18.00	5.49	8.75E-03	1.75E-02	1.18E-04	1.75E-03	3.55E-02	0.00E+00	1.94E-01	3.28E-03	0.00E+00	0.00E+00	1.09E-02	7.93E-03	3.55E-04	0.00E+00	0.00E+00
FWP-01	FWP	Firewater Pump	246,620	3,551,266	6.41	1.95	821.00	711.48	203.00	61.87	0.33	0.10	0.00E+00	4.40E-05	6.03E-06	1.43E-05	6.31E-05	0.00E+00	1.82E-04	1.44E-04	0.00E+00	0.00E+00	1.18E-04	0.00E+00	1.31E-05	0.00E+00	0.00E+00
EGEN-01	EGEN	Emergency Generator	246,621	3,551,304	10.07	3.07	1173.00	907.04	326.00	99.36	0.33	0.10	0.00E+00	9.68E-05	1.33E-05	3.14E-05	1.39E-04	0.00E+00	4.01E-04	3.17E-04	0.00E+00	0.00E+00	2.60E-04	0.00E+00	2.88E-05	0.00E+00	0.00E+00
HTR-01	HTR1	Nat Gas Heater Stack 1	246,712	3,551,357	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
HTR-01	HTR2	Nat Gas Heater Stack 2	246,712	3,551,358	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
CTGE.05-1S	05TBN1MH	.05 Turbine 1 MSS Hourly	246,684	3,551,348	80	24.38	1053.60	840.71	151.30	46.12	18.00	5.49	1.82E-01	3.64E-01	2.44E-03	3.64E-02	7.39E-01	0.00E+00	4.03E+00	6.82E-02	0.00E+00	0.00E+00	2.27E-01	1.65E-01	7.39E-03	0.00E+00	0.00E+00
CTGE.05-2S	05TBN2MH	.05 Turbine 2 MSS Hourly	246,685	3,551,310	80	24.38	1053.60	840.71	151.30	46.12	18.00	5.49	1.82E-01	3.64E-01	2.44E-03	3.64E-02	7.39E-01	0.00E+00	4.03E+00	6.82E-02	0.00E+00	0.00E+00	2.27E-01	1.65E-01	7.39E-03	0.00E+00	0.00E+00
LOV1-GE.05	LOV1	Lube Oil Vent 1 - GE 7FA.05 Turbine 1	246,674	3,551,347	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00
LOV2-GE.05	LOV2	Lube Oil Vent 2 - GE 7FA.05 Turbine 2	246,675	3,551,309	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00

Area Source Parameters - GE7FA.05 Option 1

EPN	Model ID	Description	NAD83 (m)		Release Height		X Length		Y Length		Angle	Initial Vertical Dimension		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(ft)	(m)	(ft)	(m)	degrees	(ft)	(m)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)	($g/s\text{-}m^2$)
MMA1	MMA1	Miscellaneous Maintenance Activities 1	246,634	3,551,354	17	5.18	46.26	14.10	152.56	46.50	88	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E-07	0.00E+00
MMA2	MMA2	Miscellaneous Maintenance Activities 2	246,635	3,551,315	17	5.18	46.26	14.10	151.90	46.30	88.8	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.51E-07	0.00E+00

[1] The turbine maintenance emissions do not occur simultaneously with the normal and/or startup - shutdown emissions. However the turbine maintenance emissions are modeled along with both normal and startup-shutdown emissions to be conservative.

[2] The turbine stack parameters are vendor provided.

Point Source Parameters - GE7FA.05 Option 2

EPN	Model ID	Description	NAD83 (m)		Stack Height		Temperature		Stack Velocity		Stack Diameter		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(F)	(K)	(ft/s)	(m/s)	(ft)	(m)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
CTGE.05-1	05TBN1NH	.05 Turbine 1 Normal Hourly	246,684	3,551,348	80	24.38	1055.00	841.48	184.80	56.33	18.00	5.49	8.75E-03	1.75E-02	1.18E-04	1.75E-03	3.55E-02	0.00E+00	1.94E-01	3.28E-03	0.00E+00	0.00E+00	1.09E-02	7.93E-03	3.55E-04	0.00E+00	0.00E+00
CTGE.05-2	05TBN2NH	.05 Turbine 2 Normal Hourly	246,685	3,551,310	80	24.38	1055.00	841.48	184.80	56.33	18.00	5.49	8.75E-03	1.75E-02	1.18E-04	1.75E-03	3.55E-02	0.00E+00	1.94E-01	3.28E-03	0.00E+00	0.00E+00	1.09E-02	7.93E-03	3.55E-04	0.00E+00	0.00E+00
FWP-01	FWP	Firewater Pump	246,753	3,551,268	6.41	1.95	821.00	711.48	203.00	61.87	0.33	0.10	0.00E+00	4.40E-05	6.03E-06	1.43E-05	6.31E-05	0.00E+00	1.82E-04	1.44E-04	0.00E+00	0.00E+00	1.18E-04	0.00E+00	1.31E-05	0.00E+00	0.00E+00
EGEN-01	EGEN	Emergency Generator	246,754	3,551,308	10.07	3.07	1173.00	907.04	326.00	99.36	0.33	0.10	0.00E+00	9.68E-05	1.33E-05	3.14E-05	1.39E-04	0.00E+00	4.01E-04	3.17E-04	0.00E+00	0.00E+00	2.60E-04	0.00E+00	2.88E-05	0.00E+00	0.00E+00
HTR-01	HTR1	Nat Gas Heater Stack 1	246,655	3,551,356	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
HTR-01	HTR2	Nat Gas Heater Stack 2	246,655	3,551,357	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
CTGE.05-1S	05TBN1MH	.05 Turbine 1 MSS Hourly	246,684	3,551,348	80	24.38	1053.60	840.71	151.30	46.12	18.00	5.49	1.82E-01	3.64E-01	2.44E-03	3.64E-02	7.39E-01	0.00E+00	4.03E+00	6.82E-02	0.00E+00	0.00E+00	2.27E-01	1.65E-01	7.39E-03	0.00E+00	0.00E+00
CTGE.05-2S	05TBN2MH	.05 Turbine 2 MSS Hourly	246,685	3,551,310	80	24.38	1053.60	840.71	151.30	46.12	18.00	5.49	1.82E-01	3.64E-01	2.44E-03	3.64E-02	7.39E-01	0.00E+00	4.03E+00	6.82E-02	0.00E+00	0.00E+00	2.27E-01	1.65E-01	7.39E-03	0.00E+00	0.00E+00
LOV1-GE.05	LOV1	Lube Oil Vent 1 - GE 7FA.05 Turbine 1	246,695	3,551,347	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00
LOV2-GE.05	LOV2	Lube Oil Vent 2 - GE 7FA.05 Turbine 2	246,696	3,551,308	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	0.00E+00

Area Source Parameters - GE7FA.05 Option 2

EPN	Model ID	Description	NAD83 (m)		Release Height		X Length		Y Length		Angle	Initial Vertical Dimension		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(ft)	(m)	(ft)	(m)	degrees	(ft)	(m)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)
MMA1	MMA1	Miscellaneous Maintenance Activities 1	246,735	3,551,342	17	5.18	45.28	13.80	152.89	46.60	-92.1	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.62E-07	0.00E+00
MMA2	MMA2	Miscellaneous Maintenance Activities 2	246,736	3,551,304	17	5.18	44.95	13.70	151.57	46.20	-91.7	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.74E-07	0.00E+00

[1] The turbine maintenance emissions do not occur simultaneously with the normal and/or startup - shutdown emissions. However the turbine maintenance emissions are modeled along with both normal and startup-shutdown emissions to be conservative.

[2] The turbine stack parameters are vendor provided.

Point Source Parameters - SiemensF5ee Option 1

EPN	Model ID	Description	NAD83 (m)		Stack Height		Temperature		Stack Velocity		Stack Diameter		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(F)	(K)	(ft/s)	(m/s)	(ft)	(m)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
CTSF5-1	SFTBN1NH	Siemens Turbine 1 Normal Hourly	246,685	3,551,347	80	24.38	1092.00	862.04	192.60	58.70	18.00	5.49	9.06E-03	1.81E-02	1.22E-04	1.81E-03	3.68E-02	0.00E+00	2.01E-01	3.40E-03	0.00E+00	0.00E+00	1.13E-02	8.21E-03	3.68E-04	0.00E+00	0.00E+00
CTSF5-2	SFTBN2NH	Siemens Turbine 2 Normal Hourly	246,686	3,551,309	80	24.38	1092.00	862.04	192.60	58.70	18.00	5.49	9.06E-03	1.81E-02	1.22E-04	1.81E-03	3.68E-02	0.00E+00	2.01E-01	3.40E-03	0.00E+00	0.00E+00	1.13E-02	8.21E-03	3.68E-04	0.00E+00	0.00E+00
FWP-01	FWP	Firewater Pump	246,620	3,551,265	6.41	1.95	821.00	711.48	203.00	61.87	0.33	0.10	0.00E+00	4.40E-05	6.03E-06	1.43E-05	6.31E-05	0.00E+00	1.82E-04	1.44E-04	0.00E+00	0.00E+00	1.18E-04	0.00E+00	1.31E-05	0.00E+00	0.00E+00
EGEN-01	EGEN	Emergency Generator	246,621	3,551,295	10.07	3.07	1173.00	907.04	326.00	99.36	0.33	0.10	0.00E+00	9.68E-05	1.33E-05	3.14E-05	1.39E-04	0.00E+00	4.01E-04	3.17E-04	0.00E+00	0.00E+00	2.60E-04	0.00E+00	2.88E-05	0.00E+00	0.00E+00
HTR-01	HTR1	Nat Gas Heater Stack 1	246,712	3,551,357	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
HTR-01	HTR2	Nat Gas Heater Stack 2	246,712	3,551,355	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
CTSF5-1S	SFTBN1MH	Siemens Turbine 1 MSS Hourly	246,685	3,551,347	80	24.38	1068.93	849.22	171.42	52.25	18.00	5.49	1.34E-01	2.68E-01	1.80E-03	2.68E-02	5.45E-01	0.00E+00	2.97E+00	5.03E-02	0.00E+00	0.00E+00	1.68E-01	1.21E-01	5.45E-03	0.00E+00	0.00E+00
CTSF5-2S	SFTBN2MH	Siemens Turbine 2 MSS Hourly	246,686	3,551,309	80	24.38	1068.93	849.22	171.42	52.25	18.00	5.49	1.34E-01	2.68E-01	1.80E-03	2.68E-02	5.45E-01	0.00E+00	2.97E+00	5.03E-02	0.00E+00	0.00E+00	1.68E-01	1.21E-01	5.45E-03	0.00E+00	0.00E+00
LOV1-SF5	LOV1	Lube Oil Vent 1 - Siemens F5ee Turbine 1	246,674	3,551,347	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-02	0.00E+00
LOV2-SF5	LOV2	Lube Oil Vent 2 - Siemens F5ee Turbine 2	246,675	3,551,309	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-02	0.00E+00

Area Source Parameters - SiemensF5ee Option 1

EPN	Model ID	Description	NAD83 (m)		Release Height		X Length		Y Length		Angle	Initial Vertical Dimension		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(ft)	(m)	(ft)	(m)	degrees	(ft)	(m)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)
MMA1	MMA1	Miscellaneous Maintenance Activities 1	246,634	3,551,352	17	5.18	41.01	12.50	156.17	47.60	88.6	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.24E-07	0.00E+00
MMA2	MMA2	Miscellaneous Maintenance Activities 2	246,634	3,551,314	17	5.18	40.68	12.40	156.50	47.70	88.6	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.29E-07	0.00E+00

[1] The turbine maintenance emissions do not occur simultaneously with the normal and/or startup - shutdown emissions. However the turbine maintenance emissions are modeled along with both normal and startup-shutdown emissions to be conservative.

[2] The turbine stack parameters are vendor provided.

Point Source Parameters - SiemensF5ee Option 2

EPN	Model ID	Description	NAD83 (m)		Stack Height		Temperature		Stack Velocity		Stack Diameter		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(F)	(K)	(ft/s)	(m/s)	(ft)	(m)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
CTSF5-1	SFTBN1NH	Siemens Turbine 1 Normal Hourly	246,685	3,551,346	80	24.38	1092.00	862.04	192.60	58.70	18.00	5.49	9.06E-03	1.81E-02	1.22E-04	1.81E-03	3.68E-02	0.00E+00	2.01E-01	3.40E-03	0.00E+00	0.00E+00	1.13E-02	8.21E-03	3.68E-04	0.00E+00	0.00E+00
CTSF5-2	SFTBN2NH	Siemens Turbine 2 Normal Hourly	246,685	3,551,308	80	24.38	1092.00	862.04	192.60	58.70	18.00	5.49	9.06E-03	1.81E-02	1.22E-04	1.81E-03	3.68E-02	0.00E+00	2.01E-01	3.40E-03	0.00E+00	0.00E+00	1.13E-02	8.21E-03	3.68E-04	0.00E+00	0.00E+00
FWP-01	FWP	Firewater Pump	246,754	3,551,267	6.41	1.95	821.00	711.48	203.00	61.87	0.33	0.10	0.00E+00	4.40E-05	6.03E-06	1.43E-05	6.31E-05	0.00E+00	1.82E-04	1.44E-04	0.00E+00	0.00E+00	1.18E-04	0.00E+00	1.31E-05	0.00E+00	0.00E+00
EGEN-01	EGEN	Emergency Generator	246,754	3,551,298	10.07	3.07	1173.00	907.04	326.00	99.36	0.33	0.10	0.00E+00	9.68E-05	1.33E-05	3.14E-05	1.39E-04	0.00E+00	4.01E-04	3.17E-04	0.00E+00	0.00E+00	2.60E-04	0.00E+00	2.88E-05	0.00E+00	0.00E+00
HTR-01	HTR1	Nat Gas Heater Stack 1	246,656	3,551,355	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
HTR-01	HTR2	Nat Gas Heater Stack 2	246,656	3,551,356	20	6.10	325.00	435.93	12.75	3.89	2.00	0.61	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-06	9.98E-04	4.17E-05	1.17E-06	1.11E-07	7.77E-07	0.00E+00	0.00E+00	3.39E-07	0.00E+00	2.78E-07
CTSF5-1S	SFTBN1MH	Siemens Turbine 1 MSS Hourly	246,685	3,551,346	80	24.38	1068.93	849.22	171.42	52.25	18.00	5.49	1.34E-01	2.68E-01	1.80E-03	2.68E-02	5.45E-01	0.00E+00	2.97E+00	5.03E-02	0.00E+00	0.00E+00	1.68E-01	1.21E-01	5.45E-03	0.00E+00	0.00E+00
CTSF5-2S	SFTBN2MH	Siemens Turbine 2 MSS Hourly	246,685	3,551,308	80	24.38	1068.93	849.22	171.42	52.25	18.00	5.49	1.34E-01	2.68E-01	1.80E-03	2.68E-02	5.45E-01	0.00E+00	2.97E+00	5.03E-02	0.00E+00	0.00E+00	1.68E-01	1.21E-01	5.45E-03	0.00E+00	0.00E+00
LOV1-SF5	LOV1	Lube Oil Vent 1 - Siemens F5ee Turbine 1	246,695	3,551,347	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-02	0.00E+00
LOV2-SF5	LOV2	Lube Oil Vent 2 - Siemens F5ee Turbine 2	246,696	3,551,308	38	11.58	100.00	310.93	0.003	0.001	0.003	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-02	0.00E+00

Area Source Parameters - SiemensF5ee Option 2

EPN	Model ID	Description	NAD83 (m)		Release Height		X Length		Y Length		Angle	Initial Vertical Dimension		Ethylbenzene	Xylene	1,3-Butadiene	Acrolein	Toluene	Hexane	Formaldehyde	Benzene	Arsenic	Chromium	Acetaldehyde	Propylene Oxide	Naphthalene	Lube Oil	Pb
			UTM E	UTM N	(ft)	(m)	(ft)	(m)	(ft)	(m)	degrees	(ft)	(m)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)	(g/s-m^2)
MMA1	MMA1	Miscellaneous Maintenance Activities 1	246,736	3,551,341	17	5.18	41.01	12.50	157.15	47.90	-91.4	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.18E-07	0.00E+00
MMA2	MMA2	Miscellaneous Maintenance Activities 2	246,737	3,551,303	17	5.18	40.68	12.40	156.82	47.80	-91.4	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.27E-07	0.00E+00

[1] The turbine maintenance emissions do not occur simultaneously with the normal and/or startup - shutdown emissions. However the turbine maintenance emissions are modeled along with both normal and startup-shutdown emissions to be conservative.

[2] The turbine stack parameters are vendor provided.

Averaging Period	Year	Operational Scenario	Modeled Conc.[1] (µg/m^3)	Bkg. Conc. (µg/m^3)[2]	Total Ambient Conc. (µg/m^3)	NAAQS (µg/m^3)	Exceeds NAAQS?
Rolling 3-Month Average	2012	Normal	1.00E-05	0.009	0.009	0.15	No

[1] H1H for the monthly averaging period.

[2] Background concentration (H1H 24-hr averaging period for 2014) for the Deer Park 4514 1/2 Durant St. monitor (EPA ID 482011039).

Harris County Pb Monitor Data (2014 Data)[1]

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	44	0.006	0.005	0.005	0.005	None	1	482011034	1262 1/2 Mae Drive	Houston	Harris	TX	6
24 HOUR	60	0.009	0.004	0.004	0.003	None	1	482011039	4514 1/2 Durant St	Deer Park	Harris	TX	6
	Maximum	**0.009**											

[1]http://www.epa.gov/airdata/ad_rep_mon.html

County Comparison

County/MSA	Pb (tpy)[1,3]	Population 2012[2,3]
Harris/Galveston	0.3291	4,554,184
Henderson	0.0001	79,094

[1] https://www.tceq.texas.gov/airquality/point-source-ei/psei.html (2013 Data)

[2] https://www.tsl.texas.gov/ref/abouttx/popcnty2010-11.html

[3] Websites accessed 7/30/2015

APPENDIX F: MODELING FILES ON CD

The CD included with this appendix contains all input and output data files used to generate the results from the air quality analyses presented in Section 4. The following section provides a description of the contents of each folder included on the attached CD.

AERMAP

- Contains the TIF format NED data file and the AERMAP input and output files for the emission sources and receptor grids.

AERSURFACE

- Contains the NLCD92 data and AERSURFACE input (.inp) and output (.out) files for the HHEC based on average moisture conditions.

BPIP

- Contains the input, output, and summary files from the building downwash analysis. This analysis includes all modeled sources and buildings at the proposed HHEC.

BOUNDARY

- Contains the boundary file specifying the coordinates of the boundary receptors (.bln)

ESL

- 1,3-Butadiene – includes a zip file containing the AERMOD input (.inp), output (.out), plot (.plt) files, and post-processing spreadsheet for the 1,3-butadiene Step 11 modeling.
- Acetaldehyde - includes a zip file containing the AERMOD input (.inp), output (.out), plot (.plt) files, and post-processing spreadsheet for the acetaldehyde Step 11 modeling.
- Acrolein - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the acrolein Step 11 modeling.
- Arsenic - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the arsenic Step 11 modeling.
- Chromium - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the chromium Step 11 modeling.
- Ethylbenzene - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the ethylbenzene Step 11 modeling.
- Formaldehyde - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the formaldehyde Step 11 modeling.
- Hexane - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the hexane Step 11 modeling.
- Lube Oil - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the lube oil Step 11 modeling.
- Naphthalene - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the naphthalene Step 11 modeling.
- Propylene Oxide - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the propylene oxide Step 11 modeling.
- Toluene - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the toluene Step 11 modeling.
- Xylene - includes a zip file containing the AERMOD input (.inp), output (.lst), plot (.plt) files, and post-processing spreadsheet for the xylene Step 11 modeling.

MET

- Contains the TCEQ preprocessed surface (.sfc) and upper air (.pfl) meteorological data files used in this analysis.

ATTACHMENT C

TCEQ DOCKET NO. 2015-1489-AIR

APPLICATION BY HALYARD	§	**BEFORE THE TEXAS**
	§	
ENERGY HENDERSON, LLC	§	
	§	**COMMISSION ON**
PERMIT NO. 122733	§	
	§	
HENDERSON COUNTY, TEXAS	§	**ENVIRONMENTAL QUALITY**

AFFIDAVIT OF DR. THOMAS DYDEK, PhD, DABT, PE

State of Texas §
County of Travis §

Before me, the undersigned Notary Public in and for Travis County Texas, personally appeared THOMAS DYDEK, Ph.D., D.A.B.T., P.E., the affiant, whose identity is known to me. After I administered an oath, affiant testified as follows:

1. I am a Board Certified Toxicologist as a Diplomat of the American Board of Toxicology (D.A.B.T.) and a Licensed Professional Engineer (P.E.). I have over 30 years of continuous experience in the environmental field as a toxicologist focusing on human health risk assessments and evaluations of the potential for adverse public health effects of exposure to air contaminants. I have a Bachelor's Degree in Mechanical Engineering and a Master's Degree in Environmental Science and Engineering from Rice University in Houston, Texas. My doctoral degree is in Environmental Science and Engineering from the University of North Carolina School of Public Health. I have also done a Post-Doctoral Fellowship in Toxicology in the College of Pharmacy at the University of Texas at Austin.

2. Board certification in toxicology is similar to that in medical fields. The American Board of Toxicology is the organization that conducts board certification activities for toxicology in this country. Candidates for certification must demonstrate a high level of education and a sufficient number of years in professional practice to qualify to sit for the Board Certification examination. The examination is a two-day written test that covers all aspects of toxicology. If that examination is passed, the candidate becomes a Diplomate of the American Board of Toxicology, or D.A.B.T. for short. To keep one's certification current, it must be renewed every five years. I became Board-Certified in 1995 and I have been re-certified in 2000, 2005, 2010, and 2015. I became a Licensed Professional Engineer in Texas in 1992 and I have kept my P.E. license current since that time.

3. My chief area of expertise is the evaluation of human health and welfare effects of exposure to environmental pollution. While with the U.S. Fish and Wildlife Service in Albuquerque, New Mexico, I was responsible for control of air, water, and solid waste pollution at agency facilities in an eight-state area. I also worked for the U.S. Environmental Protection Agency in Dallas, Texas as a permit engineer in the National Pollutant Discharge Elimination System (NPDES)

program. During my doctoral program, I worked for the EPA in North Carolina in the area of air pollution research and air pollutant exposure studies using human volunteers. After returning to Texas in 1982, I taught several courses in the Environmental Studies Program at St. Edward's University in Austin. I then entered my Post-doctoral program at the University of Texas.

4. From 1984 to 1991, I was the Senior Staff Toxicologist at the Texas Air Control Board (a predecessor agency to the TCEQ) in Austin. In that job, I performed health and welfare effects evaluations for over 1,000 permit applications. I also reviewed many ambient air and contaminated soil sampling reports to determine the potential for adverse effects on public health. I participated in many Public Meetings and gave extensive expert toxicological testimony at agency Public Hearings.

5. In 1991, I joined the staff of Jones and Neuse, Inc., an environmental consulting services company in Austin, Texas. In that job, I performed quantitative human health risk assessments for chemical contamination of air, water, and soil. I have owned and operated my own toxicology and engineering consulting firm, Dydek Toxicology Consulting, since 1994. In my current job, I have continued my work on human health risk assessments for air quality permitting and other agency-related programs.

6. My additional professional activities include active membership in many technical associations and service on various City and State citizen committees in the areas of air quality, toxicology, risk assessment, and solid waste management. I have also served as an Adjunct Professor in the Environmental Health Division of the University of Texas School of Public Health in San Antonio (1987-2000). I have attended more than 130 technical environmental conferences and made presentations at more than 25 of these meetings. My current curriculum vitae is attached to this report as Exhibit A.

7. I have prepared this report in support of Halyard Energy Henderson's ("Halyard's") Air Quality Permit Application filed for this project. The opinions I give in this report were formulated based upon my experience, training and education in the fields of toxicology and engineering, and my review of information concerning air emissions from Halyard's proposed plant.

8. The information I reviewed included the results of air dispersion modeling. This modeling determined the maximum possible off-property airborne concentrations of air contaminants to be emitted by the proposed plant at any location off-property.

9. Based on my review of this information, and on my expertise and experience as a toxicologist, I have reached the conclusions set forth as follows in this report.

10. It is one of the basic tenets of toxicology that "the dose makes the poison". In other words, a person's exposure to a potentially toxic chemical will not result in any adverse effects unless that exposure is of sufficient magnitude, duration, and frequency to cause those effects. This concept is the basis for the setting of air quality standards and guidelines.

11. There are two major categories of air contaminants of concern in this type of health effects evaluation process: criteria air pollutants and non-criteria air pollutants. Criteria air contaminants are those for which a National Ambient Air Quality Standard (NAAQS) or a Texas Commission on Environmental Quality (TCEQ) Property Line or "Net Ground Level Concentration" (NGLC) Standard has been set.

12. The Primary NAAQSs and the health-based State of Texas NGLC standards have been set at levels protective of the health of even the most sensitive members of the general population with an adequate margin of safety. Sensitive members of the population include the very young, the very old, and people with pre-existing medical conditions such as asthma and other respiratory diseases and diseases of the cardiovascular system.

13. Secondary NAAQSs and State of Texas NGLC standards exist to protect against adverse effects on welfare. These standards are set to provide protection against decreased visibility and damage to wildlife, domestic animals, crops, vegetation, and buildings and other property.

14. Non-criteria air pollutants are those that have neither a NAAQS nor a State of Texas standard. While there are no air quality standards for these air contaminants, the TCEQ has established guideline exposure levels which are used to evaluate the potential for adverse health or welfare effects of community exposures to these air contaminants. Non-criteria air contaminants include, but are not limited to, those recognized as Hazardous Air Pollutants (HAPS) by the U.S. Environmental Protection Agency. These guideline levels are called Effects Screening Levels (ESLs). ESLs have been set at levels at or below which no adverse human health or welfare effects are expected.

15. Health-based ESLs have been set based on human or animal data that show the levels of chemical exposures at which no adverse effects (what's called a no adverse effects level or NOAEL) or very minor adverse effects (a low adverse effects level or LOAEL) occur. These NOAELs or LOAELs are then reduced by safety factors designed to make the data applicable to community exposures to air contaminants. ESLs are very conservative because they have been set at levels typically orders of magnitude smaller than exposure levels that can actually cause adverse health effects.

16. Welfare-based ESLs are based on prevention of odor nuisance and effects on vegetation. Most welfare-based ESLs have been set to prevent odor nuisances. These ESLs are set at the odor thresholds for chemicals as determined in a laboratory setting. These ESLs are very conservative as well, since the levels at which odors can be detected in the laboratory will be lower than those likely to be detected in a community setting. There are only a few vegetation-based ESLs (for hydrogen fluoride, other fluorides, and ethylene). These ESLs have been set at levels at which minor damage to plant species has been found.

17. The proposed Halyard plant will emit six air contaminants that have NAAQSs: carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). The proposed Plant will also emit two air contaminants that have State of Texas standards: sulfur dioxide and

sulfuric acid mist. Non-criteria air contaminants to be emitted from the proposed plant include very small amounts of various volatile organic compounds (VOCs).

18. The health effects evaluation procedure used in Texas in air quality permitting matters is to first predict the expected off-property airborne levels of air contaminants to be emitted from an industrial source and then to compare those predicted levels to the air quality standards and guidelines mentioned above. If predicted levels are less than health- and welfare-based standards and guidelines, no adverse effects will occur. This is a well-recognized, accepted, and scientifically reliable method of evaluating the human health and welfare risks (if any) of chemicals emitted into the air. As an independent toxicologist, I agree that this is the best way to evaluate the potential for adverse effects from air contaminant emissions in air quality permitting situations.

19. Since the TCEQ air quality permits are "pre-construction" permits, computer-based methods are used to predict the airborne concentrations resulting from emissions that will occur after the plants are built. This type of computer modeling is referred to as air dispersion modeling. Air dispersion modeling is a well-accepted and almost universally used method by which off-property air concentrations of chemicals emitted from emission sources are predicted.

20. The air dispersion model used in Texas is called AERMOD. This model was developed and tested by the U.S. Environmental Protection Agency and is used by permit applicants seeking air quality permits from the TCEQ. If predicted concentrations of any air pollutants are higher than EPA-specified thresholds (Significant Impact Levels, or "SILs"), the permit applicant is required to perform an additional analysis to consider existing levels of air pollutants and the contributions from other emission sources nearby the proposed plant location.

21. Halyard proposes to construct and operate a peaking electric power generating plant near Dallas, Texas. The emissions sources at this plant will include two natural gas-fired turbines, a natural gas-fired heater, diesel-powered emergency generator and firewater pump, and diesel fuel storage tanks. As noted above, the anticipated emissions from this plant include both criteria and non-criteria air contaminants.

As the name implies, the Halyard Henderson facility will only operate during periods of high demand for electricity. The turbines at the proposed facility will only operate for a maximum of 2,500 hours per year, or up to about 28% of the time. Startup and shutdown events will be limited to a maximum combined total of 630 per year, and each event will only last about 18 to 22 minutes, or about 2.2 to 2.6% of the time during the year.

22. Two individuals (Ms. Shannon DeCraene and Mr. Carson Shultz) have requested a Public Hearing for this project. Ms. DeCraene owns farm property at 13323 FM 2588 in the vicinity of the proposed plant site. She operates an "equine therapy program" on that property. She is concerned that emissions from the proposed plant will adversely affect the people who come to her for therapy and the horses she owns and uses in the therapy. Her property is approximately one-half mile from the proposed site.

Mr. Shultz operates the NY TX ZipLine Adventures at a site approximately five and one-half miles from the proposed Halyard site. His concerns include the potential for adverse effects on local citizens, wildlife, farm animals, and crops.

23. Air dispersion modeling was performed by Trinity Consultants on behalf of the Applicant to determine the maximum possible off-property airborne concentrations (i.e. airborne concentrations) of the air contaminants to be emitted from the proposed Halyard plant. In the air dispersion model, receptor points were located on the DeCraene property to ascertain specifically the predicted values of criteria air contaminants there.

This report will focus on the predicted impacts at the DeCraene property since it is so much closer to the proposed site. The results of the air dispersion modeling show that predicted airborne levels of pollutants emitted from the Halyard plant at the Shultz property will be much smaller than those at the DeCraene property.

24. The airborne concentrations predicted by the Applicant's air dispersion modeling are conservative; that is, they likely over-predict the levels of air contaminants that could actually occur in the vicinity of the proposed Halyard Plant and/or at the property of the Hearing Requestor. For example, it was assumed that the maximum emissions would occur during the hours in which meteorological conditions least favor the dispersion of those air contaminants.

25. It is a common and accepted practice to rely on the results of such modeling when determining compliance with NAAQSs, the Texas NGLC Standards, and the TCEQ Effects Evaluation process. The TCEQ Air Dispersion Modeling Team has reviewed and approved the NAAQS modeling submitted by Trinity Consultants for the Applicant for this plant (see TCEQ Interoffice Memorandum dated March 9, 2015).

26. I relied on those modeling results as well as the results of additional non-criteria pollutant modeling conducted for this project by Trinity Consultants in the preparation of this report. The modeling showed that the maximum airborne concentrations of these type of air contaminants anywhere off of the Halyard property would meet all applicable federal and state guidelines. The modeling also showed the maximum predicted airborne concentrations of NAAQS air contaminants were smaller than the applicable Significant Impact Levels. Thus no additional analyses were needed to include pre-existing background levels of NAAQS air contaminants in the geographical areas surrounding the proposed plant.

27. In this report, I will specifically list and discuss the maximum predicted airborne concentrations at the DeCraene property to determine the potential for adverse health and welfare effects at that location. According to the Permit Application for this project, there are no schools within 3,000 feet of the proposed plant. If it can be shown that the predicted levels of air contaminants at the DeCraene property meet all applicable air quality standards and guidelines, the same will certainly be true farther away at the Shultz property.

28. Table 1 at the end of this report summarizes the maximum predicted airborne concentrations at the DeCraene property resulting from the emissions of air contaminants having NAAQSs. The maximum predicted airborne concentrations there ranged from 0.001% to 2.77% of the

applicable NAAQSs. Another way to express this is that the predicted concentrations were from 36 to more than 100,000 times lower than the Federal Air Quality Standards.

Since all of the secondary (welfare-based) NAAQSs are either equal to or greater (less restrictive) than the primary NAAQSs, a demonstration that the primary NAAQSs will be met insures that no adverse effects on visibility, wildlife, domestic animals, crops, vegetation, or buildings and other property will occur.

29. Table 2 shows the maximum predicted airborne concentrations at the DeCraene property of air contaminants to be emitted having State of Texas NGLC standards. Those airborne concentrations ranged from 0.01% to 0.04% of the State of Texas Property Line Standards. In other words, these concentrations were from 2,500 to 10,000 times lower than those standards.

30. Table 3 shows the maximum predicted airborne concentrations at the DeCraene property for chemicals to be emitted that have ESLs. These airborne concentrations ranged from less than 0.00001% to 18.5% of the respective ESLs for those chemicals. Put another way, the highest concentrations at the DeCraene property were from greater than 5 to greater than 1 million times lower than the applicable ESLs.

In all but one instance, the maximum predicted airborne concentrations for these air contaminants were less than one percent of the respective ESLs. This air contaminant was formaldehyde. The maximum predicted airborne concentration of formaldehyde was 18% of the ESL and this only occurred once per year. For 98.8% of the year, the predicted airborne concentration of formaldehyde was less than 1% of the ESL.

As I mentioned above, ESLs are set at levels orders of magnitude lower than levels that can actually cause harm. Since the predicted off-property concentrations of all chemicals subject to ESL analysis are much smaller than the ESLs themselves, this demonstrates that the emissions from the proposed Halyard plant will definitely pose no risk to human health or welfare.

31. In conclusion, the maximum levels of all air contaminants resulting from emissions from the proposed Halyard plant near Dallas, Texas have been determined by air dispersion modeling. The predicted maximum airborne concentrations at Hearing Requestor Shannon DeCraene's property are from 5 to more than a million times lower than all Federal and State of Texas standards and guidelines, even considering the conservative assumptions mentioned above that went into the dispersion modeling that was done for this project.

32. Since the Carson Shultz property is much farther away from the proposed site, the expected levels of air contaminants to be emitted from the Halyard plant will be even smaller than those determined for the DeCraene property. Thus all air quality standards and guidelines will also be met at the Shultz property.

33. The air quality standards and guidelines discussed in this report have been set at levels low enough to protect even the most sensitive members of the general population, including the very young, the very old, and people with pre-existing medical conditions such as asthma and other respiratory diseases and diseases of the cardiovascular system. These standards and guidelines

are also in place to protect the safety and welfare of the public, their property, farm animals, wildlife, and the environment.

34. Going back to the point I made earlier in this report, the maximum (conservatively estimated) levels of air contaminants at Ms. DeCraene's and Mr. Shultz's properties resulting from emissions from the proposed Halyard plant (the "dose") are not great enough to cause any adverse effects (the "poison").

This analysis has shown the air emissions from the proposed Halyard plant will pose no actual or imminent risk of adverse effects on the health, safety, or welfare of Ms. DeCraene, Mr. Shultz, or any other person on their properties. Furthermore, the emissions will not pose any risk of adverse effects to their property, their animals, local wildlife, or the environment.

Furthermore Affiant sayeth not.

Thomas Dydek

Thomas Dydek, PhD, DABT, PE

October 26, 2015

Sworn and subscribed before me by Thomas Dydek on October 26, 2015.

NOTARY PUBLIC STATE OF TEXAS
INGRITH LICONA
NOTARY PUBLIC
STATE OF TEXAS
MY COMM. EXP. 6/17/17

Ingrith Licona

Notary Public in and for the State of Texas

My commission expires: June 17, 2017.

Table 1. Comparison of Predicted Air Contaminant Levels to the Primary NAAQSs (at the DeCraene Property)

Air Contaminant	Averaging Time	Maximum Predicted Concentration ($\mu g/m^3$)	NAAQS for Air Contaminant ($\mu g/m^3$)	Maximum Predicted Concentration as % of NAAQS
Carbon monoxide	1 hr.	115.53	40,000	0.29%
Carbon monoxide	8 hrs.	35.25	10,000	0.35%
Lead	3 months	0.00005	0.15	0.03%
Nitrogen dioxide	1 hr.	5.2	188	2.77%
Nitrogen dioxide	Annual	0.02	100	0.02%
PM-10	24 hrs.	0.09	150	0.06%
PM-2.5	24 hrs.	0.09	35	0.26%
PM-2.5	Annual	0.004	12	0.03%
Sulfur dioxide	1 hr.	0.15	196	0.08%

Table 2. Comparison of Predicted Air Contaminant Levels to Texas Property Line Standards (at the DeCraene Property)

Air Contaminant	Averaging Time	Maximum Predicted Concentration ($\mu g/m^3$)	NGLC for Air Contaminant ($\mu g/m^3$)	Maximum Predicted Concentration as % of NGLC
Sulfur dioxide	30 mins.	0.15	1,048	0.01%
Sulfuric acid*	1 hr.	0.02	50	0.04%
Sulfuric acid*	24 hrs.	0.003	15	0.02%

* Sulfuric acid concentrations shown are the maximum anywhere off-property. The predicted concentrations at the DeCraene property would be less than these amounts.

Table 3. Comparison of Predicted Air Contaminant Levels to TCEQ ESLs (at the DeCraene Property).

Air Contaminant	Averaging Time	Maximum Predicted Concentration (µg/m^3)	ESL for Air Contaminant (µg/m^3)	Maximum Concentration (as % of ESL)
Acetaldehyde	1 hr.	1.57E-01	120	0.1308%
Acetaldehyde	annual	9.50E-04	45	0.0021%
Acrolein	1 hr.	2.51E-02	3.2	0.7844%
Acrolein	annual	1.40E-04	0.82	0.0171%
Arsenic	1 hr.	1.00E-05	3.0	0.0003%
Arsenic	annual	0.00	0.067	0.00%
Benzene	1 hr.	1.07E-01	170	0.0629%
Benzene	annual	4.60E-04	4.5	0.0102%
butadiene, 1,3-	1 hr.	4.49E-03	510	0.0009%
butadiene, 1,3-	annual	2.00E-05	9.9	0.0002%
chromium	1 hr.	3.60E-04	3.6	0.0100%
chromium	annual	0.00	0.041	0.00%
ethyl benzene	1 hr.	4.76E-01	26,000	0.0183%
ethyl benzene	annual	6.10E-04	570	0.0001%
formaldehyde	1 hr.	2.78E+00	15	18.5333%
formaldehyde	annual	1.38E-02	3.3	0.4182%
hexane	1 hr.	7.46E-02	6,200	0.0012%
hexane	annual	7.20E-04	200	0.0004%
lube oil	1 hr.	6.09E+00	1000	0.6090%
lube oil	annual	1.88E-02	100	0.0188%
napthalene	1 hr.	9.75E-03	440	0.0022%
napthalene	annual	5.00E-05	50	0.0001%
propylene oxide	1 hr.	1.14E-01	70	0.1629%
propylene oxide	annual	5.50E-04	7	0.0079%
toluene	1 hr.	5.09E-01	4,500	0.0112%
toluene	annual	2.56E-03	1,200	0.0002%
xylene, m-	1 hr.	2.51E-01	2,200	0.0114%
xylene, m-	annual	1.28E-03	180	0.0007%
xylene, o-	1 hr.	2.51E-01	2,200	0.0114%
xylene, o-	annual	1.28E-03	180	0.0007%
xylene, p-	1 hr.	2.51E-01	2,200	0.0114%
xylene, p-	annual	1.28E-03	180	0.0007%

EXHIBIT A.

Current curriculum vitae for Dr. Thomas Dydek

CURRICULUM VITAE
Dr. Thomas Dydek, Ph.D., D.A.B.T., P.E.
Board-Certified Toxicologist and Professional Engineer

Dydek Toxicology Consulting
5208 Avenue H
Austin, Texas 78751

Phone: (512) 280-5477
Mobile: (512) 663-7836

E-mail: dydek@tox-expert.com
Web Page: http://www.tox-expert.com

I. AREAS OF EXPERTISE:

Evaluating the potential human health effects associated with exposure to toxic chemicals such as metals, gases, pesticides, petroleum products, oil and gas fracking emissions, solvents, and many other chemicals in occupational and community settings.

Evaluating the potential for odor nuisance conditions caused by airborne emissions of industrial chemicals such as those listed above.

Evaluating the potential for adverse health effects of implanted medical devices.

Preparing Baseline Risk Assessments, establishing clean-up guidelines or standards, conducting state of the art reviews, and doing chemical exposure assessments.

Investigating indoor air quality including projects involving exposure to molds and/or bacteria, and

Functioning as an expert witness in toxic tort cases, criminal proceedings, worker's compensation matters, and administrative hearings before environmental agencies.

II. EDUCATION:

A. Rice University, Houston, Texas. Bachelor of Arts degree in Mechanical Engineering. Major subjects were engineering, chemistry, physics, and mathematics.

B. Rice University, Houston, Texas. Master of Science degree in Environmental Science and Engineering. Major subjects were water and wastewater engineering and biology.

C. University of North Carolina School of Public Health. Doctorate in Environmental Science and Engineering, majoring in toxicology and minoring in epidemiology and biostatistics. Other major subjects were air pollution engineering and chemistry, aerosol science, biochemistry, and industrial hygiene.

D. University of Texas at Austin. Post-doctoral research fellowship in toxicology in the UT School of Pharmacy. Chief area of research was the effects of drugs and environmental contaminants on the respiratory systems of experimental animals.

III. WORK EXPERIENCE:

A. Dydek Toxicology Consulting, Austin, Texas. Dr. Dydek operates his own environmental consulting firm that specializes in toxicology and human health risk assessment. His work includes health risk analyses for site remediations, health effects evaluations for air and hazardous waste permitting, and other toxicological evaluations. He is very familiar with the State of Texas and the U.S. Environmental Protection Agency quantitative risk assessment methodologies and with other methods for assessing the potential for adverse effects from exposure to environmental contaminants. Dr. Dydek also serves as an expert witness in toxic tort cases, regulatory agency public hearings, and other legal proceedings.

B. Jones and Neuse, Inc., Austin, Texas. Dr. Dydek was employed as Senior Toxicologist and Project Engineer for this environmental consulting firm for three and one-half years. This job entailed health risk assessments, air emissions calculations, writing proposals, doing cost estimates and other functions associated with assisting clients in obtaining necessary permits and other authorizations to operate within the existing framework of environmental regulations in this country and abroad. This included work on Superfund and other remediation activities using the Risk Reduction Rules, air quality permitting, Resource and Recovery Act (RCRA) activities, preparing No-Migration Petitions, and expert testimony in public hearings as well as toxic tort and other legal cases.

C. Private Environmental Consulting Work, Austin, Texas. Dr. Dydek worked on several human health risk analysis projects on his own time while at the Texas Air Control Board. These included two reports on the potential human health effects of exposures to ambient levels of air pollutants in the Mexico City area, and an analysis of sulfur dioxide levels in an industrial area in Hong Kong.

D. Texas Air Control Board, Austin, Texas. Dr. Dydek was employed as the Senior Staff Toxicologist in the Health Effects Division. His major duty in this job was to assess the potential for adverse public health and welfare effects from emissions of air pollutants. He conducted extensive independent evaluations of the impacts of potentially-toxic air contaminants on human health and welfare. He participated in public meetings and testified as an expert witness in public hearings concerning air pollution hazards. He also monitored the scientific literature, attended workshops and conferences, and kept the health effects computerized databases current.

E. Saint Edward's University, Austin, Texas. Dr. Dydek taught several undergraduate courses in the Environmental Studies Program in the Department of Physical and Biological Sciences. These courses included Environmental Studies, Toxicology, Industrial Hygiene, and Urban Planning.

F. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. Dr. Dydek worked as a research scientist in the planning, implementation, and evaluation of air pollution control research projects, either as principal investigator or as project officer.

G. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. Dr. Dydek held several 20-hour per week appointments in various EPA research laboratories during doctoral program at the University of North Carolina School of Public Health. This work was in the areas of air quality data analysis and in human health effects of exposures to air pollutants at the EPA Human Exposures Laboratory.

H. U.S. Environmental Protection Agency, Dallas, Texas. Dr. Dydek worked as an environmental engineer in the area of water pollution control, writing water pollution (National Pollutant Discharge Elimination System) permits and compliance schedules for major industrial and Federal facilities.

I. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. Dr. Dydek was in charge of planning, designing, and inspecting facilities for water supply, wastewater pollution control, and solid waste management at Federal hatcheries and refuges in an eight-state area.

IV. CERTIFICATIONS, LICENSES, AFFILIATIONS, AND PROFESSIONAL ACTIVITIES:

A. Board Certified Toxicologist as a Diplomate of the American Board of Toxicology (D.A.B.T.).

B. Licensed and authorized to practice as a Professional Engineer in Texas (License No. 71831).

C. Adjunct Professor of Environmental Health at the University of Texas School of Public Health at San Antonio, Texas.

CERTIFICATIONS, LICENSES, AFFILIATIONS, AND PROFESSIONAL ACTIVITIES (continued):

D. Member of the Society of Toxicology, the American College of Toxicology, the Society for Risk Analysis, the Roundtable of Toxicology Consultants, the American Conference of Governmental Industrial Hygienists, and the Air and Waste Management Association (Vice-Chair of the Air Toxics Committee, International AWMA; Treasurer of Central Texas Chapter of AWMA; Membership Chair of Central Texas AWMA).

E. Professional Activities at Local Level: Member of the Citizen's Advisory Task Force on Solid Waste Management. Member of an ad hoc committee on air quality issues in Austin. Member of a steering committee which aided the City in working with the local mass transit authority (Capital Metro) on environmental compliance.

F. Professional Activities at State Level: Member of the Human Health Workgroup in the State of Texas Environmental Priorities Project (STEPP). This was the comparative risk project for Texas. Also provided comments for Sunset Review of Texas Natural Resource Conservation Commission.

G. Technical Advisor for television shows “CSI: Las Vegas”, and “Bones” (2009 to present).

H. Peer-reviewer for U.S. Environmental Protection Agency “Provisional Toxicity Value” documents (2011 to present).

V. HONORS AND AWARDS:

Dean's List, Rice University.
Special Achievement Award, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
Special Achievement Award, U.S. Environmental Protection Agency, Dallas, Texas.
Certificate of Appreciation, City of Austin (for work on the Solid Waste Management Task Force).
Outstanding Employee Award, Texas Air Control Board, Austin, Texas.
Austin City Council Award (for work on Clean Air committee).

VI. PERSONAL ACCOMPLISHMENTS

Member, National Championship Soccer Team (Veteran’s Cup, Over 50’s Division), 2000.
Member, National Championship Soccer Team (Veteran’s Cup, Over 60’s Division), 2007, 2008, 2009, 2010.
Member of Austin City League Championship Soccer Team (Over 50’s Division), 2007, 2010, and 2011.

VII. PUBLICATIONS:

"Spring Creek: Water Resource Planning for Local Development" Dydek, T., et al., Environmental Sciences and Engineering Report No. 1, Rice University, Houston, Texas, 1971.
"Effects of Chlorination on Bacterial Polysaccharide Material", Master's Thesis, Rice University, 1972.
"The Influence of Carbon-Nitrogen Ratio on the Chlorination of Microbial Aggregates", W.G. Characklis and S.T. Dydek, Water Research 10:515-522, 1976.
"Neutralization and Size Changes of Sulfuric Acid Mist Particles", Ph.D. Dissertation, University of North Carolina School of Public Health, 1981.
"Analysis of Pulmonary Collagen Production by HPLC Separation of Radiolabled Hydroxyproline and Proline", Proceedings of the Western Pharmacology Society 27:319, 1984.
"Effects of Sodium Chloride on the HPLC Separation of Hydroxyproline and Proline", Liquid Chromatography 2:536, 1984.
"Effects Evaluation of Accidental Releases of Air Toxics: A Case Study of a Vinyl Chloride/Hydrogen Chloride Release", in Toxics, CAER, and Title III, Proceedings of the APCA Southwest Section Technical Meeting, ed. J. Shields, Corpus Christi, Texas, 1988.

VII. PUBLICATIONS (continued):

"Use of Odor Thresholds for Predicting Off-Property Odor Impacts", Willhite, M.T. and S.T. Dydek, in Recent Developments and Current Practices in Odor Regulations, Controls and Technology, International Specialty Conference, Detroit, Michigan, Derenzo, D.R. and A. Gnyp, eds., Air & Waste Management Association, Pittsburgh, Pennsylvania, 1989, pp. 235-245.
"TNRCC's New Approach to Air Quality Permits", Texas Lawyer Environmental Law Issue, pp. 30-34, 1995.
"Health Risk Analysis Methods and the Law", The Texas Law Reporter, Volume 2, Issue 7, 1996.
"A Review of 'Microbial Toxins. Molecular and Cellular Biology'", International Journal of Toxicology 25:433-434, 2006.
"Investigating Carbon Monoxide Poisonings", book chapter in Carbon Monoxide Poisonings, 3rd Edition, D. Penney, ed., CRC Press, Taylor & Francis Group, Boca Raton, Florida, 2008.
"Shale Oil Toxicity", book chapter in the Encyclopedia of Toxicology, 3rd Edition, Elsevier Publishing Company, Waltham, Massachusetts, 2014.

VIII. TECHNICAL AND BUSINESS RELATED PRESENTATIONS:

"Effects of Dynamic Operating Parameters on the Calibration Stability of CHAMP Aerometric Sensors", Air Pollution Control Association Annual Meeting, Toronto, Canada (1977).
"Neutralization and Size Changes of Sulfuric Acid Mist Particles in a Model of the Human Upper Airways", American Association for Aerosol Research Annual Meeting; Santa Monica, California (1982).
"Studies of the Behavior of Sulfuric Acid Mist in a Model of the Human Upper Airways", Sixth World Congress on Air Quality, Paris, France (1983).
"Human Exposure to Potentially-Toxic Elements Through Ambient Air in Texas", Air Pollution Control Association Annual Meeting; San Francisco, California (1984).
"Ozone Health Effects", Ozone-Its Environmental and Economic Impact on Southeast Texas; Environmental Quality Council of Southeast Texas; Beaumont, Texas (1984).
"Risk Assessment in Health Effects Review of Air Permits in Texas", Air Pollution Control Association Annual Meeting; Detroit, Michigan (1985).
"Effects Evaluation of Non-Criteria Air Pollutant Emissions from Hazardous Waste Management Facilities in Texas", Control of Air Pollution from Hazardous/Solid Waste Management Facilities; Austin, Texas (1986).
"Texas Procedure for Assessing Air Toxics", Setting Air Toxics Standards; Society for Risk Analysis; Houston, Texas (1987).
"Texas Experience in Hazard, Exposure, and Risk Assessment Methods", Developing and Implementing Air Toxics Control Programs; USEPA; Boston, Massachusetts (1987).
"Texas Procedure for Assessing Air Toxics", Solid and Hazardous Waste Management Symposium; Texas Water Pollution Control Association; Houston, Texas (1987).
"Effects Evaluation of Hazardous Waste Handling Facilities", Annual Technical Meeting of the Southwest Section of the Air Pollution Control Association; Irving, Texas (1987).
"Air Toxics Regulation- Federal and State"; Meeting of the North Texas Chapter of the Air Pollution Control Association; Dallas, Texas (1987).
"Effects Evaluation of Accidental Releases or Air Toxics: A Case Study of a Vinyl Chloride Release", Southwest Section of the APCA Annual Meeting; Corpus Christi, Texas (1988).
"Risk Communication in Air Permitting in Texas" APCA Annual Meeting; Dallas, Texas (1988).
"Air Toxics", Texas Environmental Super Conference; Austin, Texas (1988).
"Update on the Gulf Coast Community Exposure Study", Community Leader/News Media Briefing; Port Arthur, Texas (1988).
"Air Toxics Review", Air Quality Permits Workshop, Texas Air Control Board, Austin, Texas (1988).
"Comparison of Health Risk Assessment Approaches for Carcinogenic Air Pollutants", APCA; Anaheim, California (1989) and Haztech International Conference; Houston, Texas (1990).
"Texas Air Control Board Programs Concerning Air Toxics", North Texas Council of Governments, Dallas, Texas (1989).
"Essentials of Qualitative Risk Assessment", Solid and Hazardous Waste Management Conference, Lafayette, Louisiana (1993).

VIII. TECHNICAL AND BUSINESS RELATED PRESENTATIONS (continued):

"Epidemiology: The Discipline and Its Uses", Sixth Annual Environmental Law Symposium, South Texas College of Law, Houston, Texas (1995).
"Introduction to Risk Assessment and Risk Reduction", Alamo Chapter of the Air and Waste Management Association San Antonio, Texas (1995).
"Toxicology, Epidemiology and Risk Assessment in Environmental Programs", Ninth Annual Texas Environmental Superconference, Austin, Texas (1997).
"Overview of Environmental Risk Assessment Programs", Southwestern Association of Toxicologists, Spring Technical Meeting, Fort Worth, Texas (1998).
"Quantitative Risk Assessment and its Applicability to Industrial Hygiene", American Industrial Hygiene Association Local Chapter meeting, Austin, Texas (1999).
“Adventures of an Expert Witness Toxicologist”, Air & Waste Management Association annual meeting, Salt Lake City, Utah (2000).
“So You Want to be a Toxicology Consultant”, American College of Toxicology annual meeting, San Diego, California (2000).
“Working with an Expert Witness”, Texas Environmental Superconference, Austin, Texas (2005).
“Toxicology in the Media”, Society of Environmental Journalists Annual Meeting, Austin, Texas (2005).
“The Toxicologist as an Expert Witness”, Roundtable of Toxicology Consultants Mid-Year Meeting, Tucson, Arizona (2008).
“Toxicology Consulting for the Chemical Industry”, Continuing Education Course at the American College of Toxicology Annual Meeting, Palm Springs, California (2009).

IX. CONFERENCES, SEMINARS, COURSES, AND WORKSHOPS ATTENDED:

"Environmental Law" (1972).
"New Horizons in Environmental Biology" (1973).
"Air Pollution and Public Health", University of Texas at Dallas course (Fall, 1975).
"Environmental Medicine", Southwestern Medical School course (1975).
"Introduction to Epidemiology", Southwestern Medical School course (1976).
"Principles and Practice of Air Pollution Control" (1976).
Science Seminar, National Institute of Environmental Health Sciences (1977).
* American Association for Aerosol Research Annual Meeting (1982).
"Hazardous Waste Management", University of Texas at Austin course (Fall, 1982).
* "World Congress on Air Quality" (1983).
"Structure-Activity Relationships and Toxicity Assessment" (1984).
"The Occupational Health and Safety Professional in the Legal Environment", Southwest Occupational Health Services (1984).
* Air Pollution Control Association Annual Meeting (1984).
"Update on Cancer in the Deep South", Deep South Section of the American Industrial Hygiene Association (1984).
"Evaluation of the Scientific Basis for the Ozone/Oxidant Standard", Air Pollution Control Association (1984).
* "Ozone-Its Environmental and Economic Impact on Southeast Texas", Environmental Quality Council of Southeast Texas (1984).
Society of Toxicology Annual Meeting (1985).
* Air Pollution Control Association Annual Meeting (1985).
“National Air Toxics Information Clearinghouse Database Seminar", U.S. Environmental Protection Agency (1985).
"Air Toxics Control: Clearing the Air", State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (1985).
"First National Regulatory Agency Resource Recovery Workshop", Northeast States for Coordinated Air Use Management and California Air Pollution Control Officers Association (1986).

* Dr. Dydek gave a presentation at this meeting or conference

IX. CONFERENCES, SEMINARS, COURSES, AND WORKSHOPS ATTENDED (continued):

American Public Health Association Annual Meeting (1986).
"Energy from Municipal Waste: Opportunities for the Southwest", U.S. Department of Energy (1986).
** State of New Mexico Environmental Improvement Board Hearings concerning an air toxics program for New Mexico (1986).
* "Setting Air Toxics Standards", Lone Star Chapter of the Society for Risk Analysis (1987).
"Drug Metabolism and Toxicokinetics", Continuing Education Course, Society of Toxicology (1987).
Society of Toxicology Annual Meeting (1987).
* "Developing and Implementing Air Toxics Control Programs", State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (1987).
* "Solid and Hazardous Waste Management Symposium" (1987).
* Annual Technical Meeting, Southwest Section of the Air Pollution Control Association (1987).
* "Air Toxics Regulation- Federal and State", North Texas Chapter of the Air & Waste Management Association (1987).
American Public Health Association Annual Meeting (1987).
Society for Risk Analysis Annual Meeting (1987).
"Respiratory Tract Toxicology", Continuing Education Course, Society of Toxicology (1988).
Society of Toxicology Annual Meeting (1988).
* Southwest Section of the Air Pollution Control Association Annual Meeting (1988).
"Environmental Health Faculty/Employer Forum", Association of Schools of Public Health (1988).
"Hospital Infectious Waste Incineration and Hospital Sterilization Workshop", State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (1988).
* Air Pollution Control Association Annual Meeting (1988).
* “Air Quality Permits Workshop@, Texas Air Control Board (1988).
"Regional Risk Assessment Workshop", U.S. Environmental Protection Agency (1988).
* "Texas Environmental Superconference", State Bar of Texas and the Southwest Section of the Air & Waste Management Association (1988).
* "Community Leader/News Media Briefing", Joint Industry Council of South Jefferson County (1988).
"Annual Conference on Occupational Health", American Academy of Occupational Medicine (1988).
"Benzene and Leukemia", Lone Star Chapter of the Society for Risk Analysis (1989).
"Regulatory Toxicology", Continuing Education Course, Society of Toxicology (1989).
Society of Toxicology Annual Meeting (1989).
* North Texas Council of Governments (1989).
Southwest Section of the Air Pollution Control Association Annual Meeting (1989).
* Air Pollution Control Association Annual Meeting (1989).
* "Haztech International Conference" (1990).
Air & Waste Management Association Annual Meeting (1990).
"Practical Strategies for Managing Environmental Liabilities" (1993).
* Solid and Hazardous Waste Management Conference, University of Southwest Louisiana and the Louisiana Department of Environmental Quality (1993).
Society of Toxicology Annual Meeting (1994).
Texas Natural Resource Conservation Commission Environmental Trade Fair (1994).
Air Quality Operating Permits Seminar, Texas Natural Resource Conservation Commission (1995).
* Sixth Annual Environmental Law Symposium, South Texas College of Law (1995).
* Lone Star Chapter of the Air & Waste Management Association (1995).
** Environmental Business Development Conference, American Institute for Environmental Education (1995).

* Dr. Dydek gave a presentation at this meeting or conference.
** Dr. Dydek moderated a panel at this meeting or conference.
*** Dr. Dydek provided expert witness testimony at this hearing

IX. CONFERENCES, SEMINARS, COURSES, AND WORKSHOPS ATTENDED (continued):

* Alamo Chapter of the Air & Waste Management Association (1995).
"Advanced Topics in Pharmacokinetics", Continuing Education Course, Society of Toxicology (1996).
Mid-America Toxicology Course, University of Kansas Medical Center (1995).
Air & Waste Management Association Annual Meeting (1995).
Environmental Remediation Opportunities Conference, U.S. Department of the Air Force and the U.S. Small Business Administration (1995).
Texas Natural Resource Conservation Commission Environmental Trade Fair (1995).
Society of Toxicology Annual Meeting (1996).
Texas Natural Resource Conservation Commission Environmental Trade Fair (1996).
Fifth Annual National Expert Witness and Litigation Seminar, S.E.A.K., Inc. (1996).
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (1996).
"Toxicology of Agents: Metals", Continuing Education Course, Society of Toxicology (1997).
Society of Toxicology Annual Meeting (1997).
Texas Natural Resource Conservation Commission Environmental Trade Fair (1997).
"Industrial Hygiene Calculations", Continuing Education Course, American Industrial Hygiene Association (1997).
American Industrial Hygiene Association Annual Meeting (1997).
"EPA's Planned Revisions to the Ozone and Particulate Matter National Ambient Air Quality Standards", Continuing Education Course, Air & Waste Management Association (1997).
Air & Waste Management Association Annual Meeting (1997).
* Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (1997).
"Improving the Practice of Risk Assessment", Society for Risk Analysis, Lone Star Chapter First Annual State Conference (1997).
* Southwestern Association of Toxicologists, Spring Technical Meeting (1998).
Texas Natural Resource Conservation Commission Environmental Trade Fair (1998).
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (1998).
"Hot Air Topics" Conference, Gulf Coast Chapter of the Air & Waste Management Association (1998).
"New Endpoints in Risk Assessment", Lone Star Chapter of the Society for Risk Analysis (1998).
"Assessing and Managing Risks in a Democratic Society", Society for Risk Analysis Annual Meeting (1998).
Texas Natural Resource Conservation Commission Environmental Trade Fair (1999).
** Air & Waste Management Association Annual Meeting (1999).
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (1999).
Roundtable of Toxicology Consultants Annual Meeting (1999).
"Hot Air Topics" Conference, Gulf Coast Chapter of the Air & Waste Management Association (1999).
* American Industrial Hygiene Association Hill Country Chapter meeting (1999).
Society for Risk Analysis, Lone Star Chapter Annual Meeting (1999).
Air & Waste Management Association National Conference on Ozone Action Programs (1999).
"The Role of Human Personal Exposure Assessment in Determining Health Impacts of Urban Air Toxics", National Urban Air Toxics Research Center (2000).
Society of Toxicology Annual Meeting (2000).
Texas Natural Resource Conservation Commission Environmental Trade Fair (2000).
* Air & Waste Management Association Annual Meeting (2000).
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (2000).
Indoor Air Quality Association Annual Meeting (2000).

* Dr. Dydek gave a presentation at this meeting or conference.
** Dr. Dydek was co-chairman of a technical session at this meeting or conference.

IX. CONFERENCES, SEMINARS, COURSES, AND WORKSHOPS ATTENDED (continued):

Expert Witness Workshop (2000).
* American College of Toxicology Annual Meeting (2000).
American Industrial Hygiene Association Symposium, "Molds in the Indoor Environment" (2000).
Air & Waste Management Association Annual Meeting (2001).
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (2001).
Texas Natural Resource Conservation Commission Environmental Trade Fair (2002).
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (2002).
Environmental Law Update Seminar, Fulbright & Jaworski (2002).
Society for Risk Analysis Annual Meeting (2002).
"Protecting the Central Texas Environment and Economy", Air and Waste Management Association, Central Texas Chapter (2004).
Texas Commission on Environmental Quality Environmental Trade Fair (2004).
American Bar Association Annual Meeting (as an exhibitor, 2004).
"Hot Air Topics" Conference, Gulf Coast Chapter of the Air & Waste Management Association (2004).
Environmental Law Update Seminar, Fulbright & Jaworski (2004).
Society of Toxicology Annual Meeting (2005).
Texas Commission on Environmental Quality Environmental Trade Fair (2005).
Texas Legislative Update Seminar (2005).
* Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (2005).
** Society of Environmental Journalists Annual Meeting (2005).
Society of Toxicology Annual Meeting (2006).
Texas Commission on Environmental Quality Environmental Trade Fair (2006).
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (2006).
Society of Toxicology Annual Meeting (2007).
Texas Commission on Environmental Quality Environmental Trade Fair (2007).
Environmental Law Update Seminar, Fulbright & Jaworski (2007).
Legislative Update Seminar, Vinson & Elkins (2007)
Texas Environmental Superconference, State Bar of Texas and the Southwest Section of the Air & Waste Management Association (2007).
"Chemical Specific Adjustment Factors", continuing education course taken at the Society for Risk Analysis Annual Meeting (2007).
Society for Risk Analysis Annual Meeting (2007).
Society of Toxicology Annual Meeting (2008).
Texas Commission on Environmental Quality Environmental Trade Fair (2008).
Texas Environmental Superconference (2008).
*,*** Roundtable of Toxicology Consultants Annual Meeting (2008).
American College of Toxicology Annual Meeting (2008).
"New Frontiers in Metal Toxicology: Genetic Susceptibility, Early Diagnosis, and Related Biological Indices", Continuing Education Course, Society of Toxicology (2009).
Society of Toxicology Annual Meeting (2009).
Texas Commission on Environmental Quality Environmental Trade Fair (2009).
Roundtable of Toxicologists Mid-Winter Meeting (2009).
* American College of Toxicology Annual Meeting, Continuing Education Course (2009).

* Dr. Dydek gave a presentation at this meeting or conference.
** Dr. Dydek served on a panel at this meeting or conference.
*** Dr. Dydek chaired a session at this meeting or conference.

IX. CONFERENCES, SEMINARS, COURSES, AND WORKSHOPS ATTENDED (continued):

Society of Toxicology Annual Meeting (2010).
Alliance for Risk Assessment, “Beyond Science and Decisions: from Problem Formulation to Dose-Response. Workshop Number 1” (2010).
Air and Waste Management Association Environmental Law Symposium (2010).
Texas Commission on Environmental Quality Environmental Trade Fair (2010).
National Urban Air Toxics Research Center “Air Toxics Symposium” (2010).
"Hot Air Topics" Conference, Gulf Coast Chapter of the Air & Waste Management Association (2011).
Society of Toxicology Annual Meeting (2011).
“Environmental Law Update Seminar”, Fulbright & Jaworski (2011).
Society of Toxicology Annual Meeting (2012).
Texas Commission on Environmental Quality Environmental Trade Fair (2012).
“Beyond Science and Decisions” Webinar (2012).
Society of Toxicology Annual Meeting (2013).
Texas Commission on Environmental Quality Environmental Trade Fair (2013).
Roundtable of Toxicology Consultants Mid-year Meeting (2013).
"Independent Workshop on Ozone NAAQS: Science Policy" Webinar (2015).