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# 2006 Emissions Inventory Guidelines

Air Quality Division

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

# 2006 Emissions Inventory Guidelines

Prepared by  
Industrial Emissions Assessment Section  
Air Quality Division  
Chief Engineer's Office

RG-360A/06  
January 2007



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# CHAPTER 1—GENERAL INFORMATION

## Introduction

As part of national and state efforts to protect human health and the environment, federal and state laws require companies to prepare and submit an annual emissions inventory (EI) detailing the actual annual emissions of the air pollutants released at their sites.

The Texas Commission on Environmental Quality (TCEQ) is authorized to request emissions inventories and supporting documentation under the provisions of:

- 40 Code of Federal Regulations, Part 51;
- the federal Clean Air Act;
- Title 30 of the Texas Administrative Code (TAC), § 101.10; and
- Texas Clean Air Act, Texas Health and Safety Code § 382.014.

To meet the reporting requirements of these regulations, you will be working with the Industrial Emissions Assessment Section (IEAS) of the TCEQ's Chief Engineer's Office.

The TCEQ utilizes the emissions inventory to plan pollution control programs, promote compliance with laws and regulations, conduct permit reviews, develop airshed modeling and rulemaking activities, and supply required data to the U.S. Environmental Protection Agency. In order to meet its goal of protecting human and natural resources, the TCEQ needs your full and complete cooperation.

## ***IEAS Objectives***

In order to improve the overall quality of the statewide emissions inventory and to meet the goals stated above, the IEAS operates with the following primary objectives:

- to ensure that the data requested in the emission inventory meet the requirements of the federal Clean Air Act and various other federal and state mandates;
- to collect data in a standard format using the IEAS forms and the emissions inventory questionnaire (EIQ);
- to ensure that companies consistently use the most current and accurate information on emissions determination available;
- to help industry accurately report emissions data, especially by offering assistance through the IEAS Help Line (512-239-1773);

- to maintain data in a standard format using the State of Texas Air Reporting System (STARS) database;
- to supply data to other personnel in the TCEQ; and
- to continually update IEAS publications in order to improve communication with companies submitting emissions inventories.

## ***What You Will Find in This Book***

This chapter discusses IEAS objectives, 30 TAC § 101.10, and what constitutes a complete emissions inventory submission. This information should help you to understand why the IEAS requires emissions inventories, to determine whether an emissions inventory is required for your site, and to correctly prepare a complete emissions inventory submission. The chapter concludes with a brief discussion of the IEAS's confidentiality policy.

Chapter 2 explains the emissions inventory process and its key concepts to those unfamiliar with the emissions inventory.

Chapter 3 discusses correct account structure (representing processes on EIQ forms), gives examples for some common industrial processes, and supplies guidance for modifying existing representations.

Chapter 4 presents information about requested emissions data; using acceptable actual emissions determination methodologies; speciating emissions; and correctly reporting actual annual emissions, ozone season emissions, and emissions due to emissions events and scheduled maintenance, startup, and shutdown activities.

Chapter 5 offers an example of creating an initial emissions inventory.

Chapter 6 contains instructions for updating an EIQ.

The appendixes contain:

- technical supplements intended to help you determine emissions from certain common sources;
- sample letters that may help you to address some common situations;
- EPA and TCEQ resources that are available to assist you in completing your inventory;
- information about qualifying for small business assistance;

- pollution prevention tips from the TCEQ Pollution Prevention and Industry Assistance Section; and
- a checklist designed to assist you in determining whether you have included all necessary information with your inventory.

Also included is a glossary with specialized terms, followed by information on contacting the IEAS.

*Note:* Due to space considerations, this year the Emission Inventory (EI) forms and instructions are available in a **separate companion document**, *2006 Emissions Inventory Forms and Instructions* (TCEQ publication RG-360B). This document can be found on the IEAS web page at <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>, or obtain a hard copy by contacting the IEAS. Any EI forms referred to in this chapter can be found in this new document.

## About 30 TAC § 101.10

This section includes a discussion of the emissions inventory process as a self-reporting process, the special inventory request, a copy of 30 TAC § 101.10, and maps and tables depicting the state's nonattainment and near-nonattainment areas. The maps and tables are intended to clarify reporting requirements and do not supersede or replace 30 TAC § 101.10. It is your responsibility to read and understand the rule.

### ***A Self-Reporting Process***

The emissions inventory process is a self-reporting process. You are responsible for determining whether 30 TAC § 101.10 applies to your site. For any site that meets the applicability requirements of 30 TAC § 101.10, or for which the IEAS requests a special inventory, the owner must submit an emissions inventory by the appropriate due date. Failure to do so is a violation of 30 TAC § 101.10 and may result in agency enforcement action against the company.

Requirements for submitting an emissions inventory are based on the site location and on the type and quantity of emissions released. This publication will help you decide whether you must submit an emissions inventory and, if so, how to determine emissions and how to prepare and submit the required forms.

### ***Nonattainment Designations***

To determine the attainment status of the county which your site is located, please consult the Glossary.

Effective June 15, 2004, EPA reclassified Texas counties under the new eight-hour ozone standard. The one-hour standard was revoked effective June 15, 2005 for most of Texas. Submission requirements for emissions inventories will apply to those accounts located in a county classified as in nonattainment under the eight-hour ozone standard. Effective June 15, 2005, the EPA revoked the one-hour ozone standard for all areas in Texas except the San Antonio area; the Victoria area is a maintenance area for the one-hour ozone standard (for the purposes of 40 CFR Part 51, Subpart X).

The map entitled “Eight-Hour Ozone Nonattainment Areas” will help you identify nonattainment counties. The map and its associated table are intended as guidance and do not supersede or replace any state or federal law, rule, or regulation.

## ***Special Inventory Request***

The IEAS, under the “special inventory” provisions of 30 TAC § 101.10(b)(3), is requesting that inventories be completed and submitted for accounts as described in the following sections.

### **Near-Nonattainment and Affected Counties**

The IEAS is requesting that inventories be completed and submitted for accounts located in the counties listed in Table 1-1 that have emitted at least 10 tons of volatile organic compounds (VOCs) or at least 25 tons of nitrogen oxides (NO<sub>x</sub>). The counties listed in Table 1-1 are either classified as near-nonattainment counties or as affected counties per THSC § 386.001.

If the site meets these thresholds and you have received an IEAS request, then you must complete and submit the emissions inventory.

Of course, if your site is located in a “special inventory” county and meets any of the other applicability requirements of 30 TAC § 101.10, it is your responsibility to submit a routine emissions inventory.

**Table 1-1. Near-Nonattainment and Affected Counties**

Bastrop	Gregg	Henderson	San Patricio	Victoria
Bexar	Guadalupe	Hood	Smith	Williamson
Caldwell	Harrison	Nueces	Travis	Wilson
Comal	Hays	Rusk	Upshur	

### **Former Severe and Serious Nonattainment Counties Under the One-Hour Ozone Standard**

The IEAS is also requesting that inventories be completed and submitted for accounts located in:

- Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, or Waller counties that have the potential to emit either 25 tpy of VOCs or 25 tpy of NO<sub>x</sub>; or
- Collin, Dallas, Denton, Hardin, Jefferson, Orange, or Tarrant counties that have the potential to emit either 50 tpy of VOCs or 50 tpy of NO<sub>x</sub>; or
- El Paso County that have emitted either 10 tpy of VOCs or 25 tpy of NO<sub>x</sub>, or have the potential to emit 50 tpy of VOCs.

If your account meets these thresholds and you have received an IEAS request, then you must complete and submit the emissions inventory.

The map entitled “Special Inventory Areas” will help you identify “special inventory” counties. This map (with its associated table) is intended as guidance and does not supersede or replace any state or federal law, rule, or regulation.

*Note:* Accounts located in a nonattainment county that meet any of the other applicability requirements of 30 TAC § 101.10 are required to submit an annual emissions inventory. It is the owner’s or operator’s responsibility to submit the required EI for such accounts.

## **30 TAC § 101.10. Emissions Inventory Requirements**

(a) **Applicability.** The owner or operator of an account or source in the State of Texas or on waters that extend 25 miles from the shoreline meeting one or more of the following conditions shall submit emissions inventories and/or related data as required in subsection (b) of this section to the commission on forms or other media approved by the commission:

(1) an account which meets the definition of a major facility/stationary source, as defined in §116.12 of this title (relating to Nonattainment Review Definitions), or any account in an ozone nonattainment area emitting a minimum of ten tons per year (tpy) volatile organic compounds (VOC), 25 tpy nitrogen oxides (NO<sub>x</sub>), or 100 tpy or more of any other contaminant subject to national ambient air quality standards (NAAQS);

(2) any account that emits or has the potential to emit 100 tpy or more of any contaminant;

(3) any account which emits or has the potential to emit 10 tons of any single or 25 tons of aggregate hazardous air pollutants as defined in FCAA, §112(a)(1); and

(4) any minor industrial source, area source, non-road mobile source, or mobile source of emissions subject to special inventories under subsection (b)(3) of this section. For purposes of this section, the term “area source” means a group of similar activities that, taken collectively, produce a significant amount of air pollution.

(b) **Types of inventories.**

(1) Initial emissions inventory. Accounts, as identified in subsection (a)(1), (2), or (3) of this section, shall submit an initial emissions inventory (IEI) for any criteria pollutant or hazardous air pollutant (HAP) that has not been identified in a previous inventory. The IEI shall consist of actual emissions of VOC, NO<sub>x</sub>, carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), lead (Pb), particulate matter of less than 10 microns in diameter (PM<sub>10</sub>), any other contaminant subject to NAAQS, emissions of all HAPs identified in FCAA §112(b), or any other contaminant requested by the commission from individual emission units within an account. For purposes of this section, the term “actual emission” is the actual rate of emissions of a pollutant from an emissions unit as it enters the atmosphere. The reporting year will be the calendar year or seasonal period as designated by the commission.

Reported emission activities must include annual routine emissions; excess emissions occurring during maintenance activities, including startups and shutdowns; and emissions resulting from upset conditions. For the ozone nonattainment areas, the inventory shall also include typical weekday emissions that occur during the summer months. For CO nonattainment areas, the inventory shall also include typical weekday emissions that occur during the winter months. Emission calculations must follow methodologies as identified in subsection (c) of this section.

(2) Statewide annual emissions inventory update (AEIU). Accounts meeting the applicability requirements during an inventory reporting period as identified in subsection (a)(1), (2), or (3) of this section shall submit an AEIU which consists of actual emissions as identified in subsection (b)(1) of this section if any of the following criteria are met. If none of the following criteria are met, a letter certifying such shall be submitted instead:

(A) any change in operating conditions, including start-ups, permanent shut-downs of individual units, or process changes at the account, that results in at least a 5.0% or 5 tpy, whichever is greater, increase or reduction in total annual emissions of VOC, NO<sub>x</sub>, CO, SO<sub>2</sub>, Pb, or PM<sub>10</sub> from the most recently submitted emissions data of the account; or

(B) a cessation of all production processes and termination of operations at the account.

(3) Special inventories. Upon request by the executive director or a designated representative of the commission, any person owning or operating a source of air emissions which is or could be affected by any rule or regulation of the commission shall file emissions-related data with the commission as necessary to develop an inventory of emissions. Owners or operators submitting the requested data may make special procedural arrangements with the Industrial Emissions Assessment Section to submit data separate from routine emission inventory submissions or other arrangements as necessary to support claims of confidentiality.

(c) **Calculations.** Actual measurement with continuous emissions monitoring systems (CEMS) is the preferred method of calculating emissions from a source. If CEMS data is not available, other means for instructions of the commission. Sample calculations representative of the processes in the account must be submitted with the inventory.

(d) **Certifying statement.** A certifying statement, required by the FCAA, §182(a)(3)(B), is to be signed by the owner(s) or operator(s) and shall accompany each emissions inventory to attest that the information contained in the inventory is true and accurate to the best knowledge of the certifying official.

(e) **Reporting requirements.** The IEI or subsequent AEIUs shall contain emissions data from the previous calendar year and shall be due on March 31 of each year or as directed by the commission. Owners or operators submitting emissions data may make special procedural arrangements with the Industrial Emissions Assessment Section to submit data separate from routine emission inventory submissions or other arrangements as necessary to support claims of confidentiality. Emissions-related data submitted under a special inventory request made under subsection (b)(3) of this section are due as detailed in the letter of request.

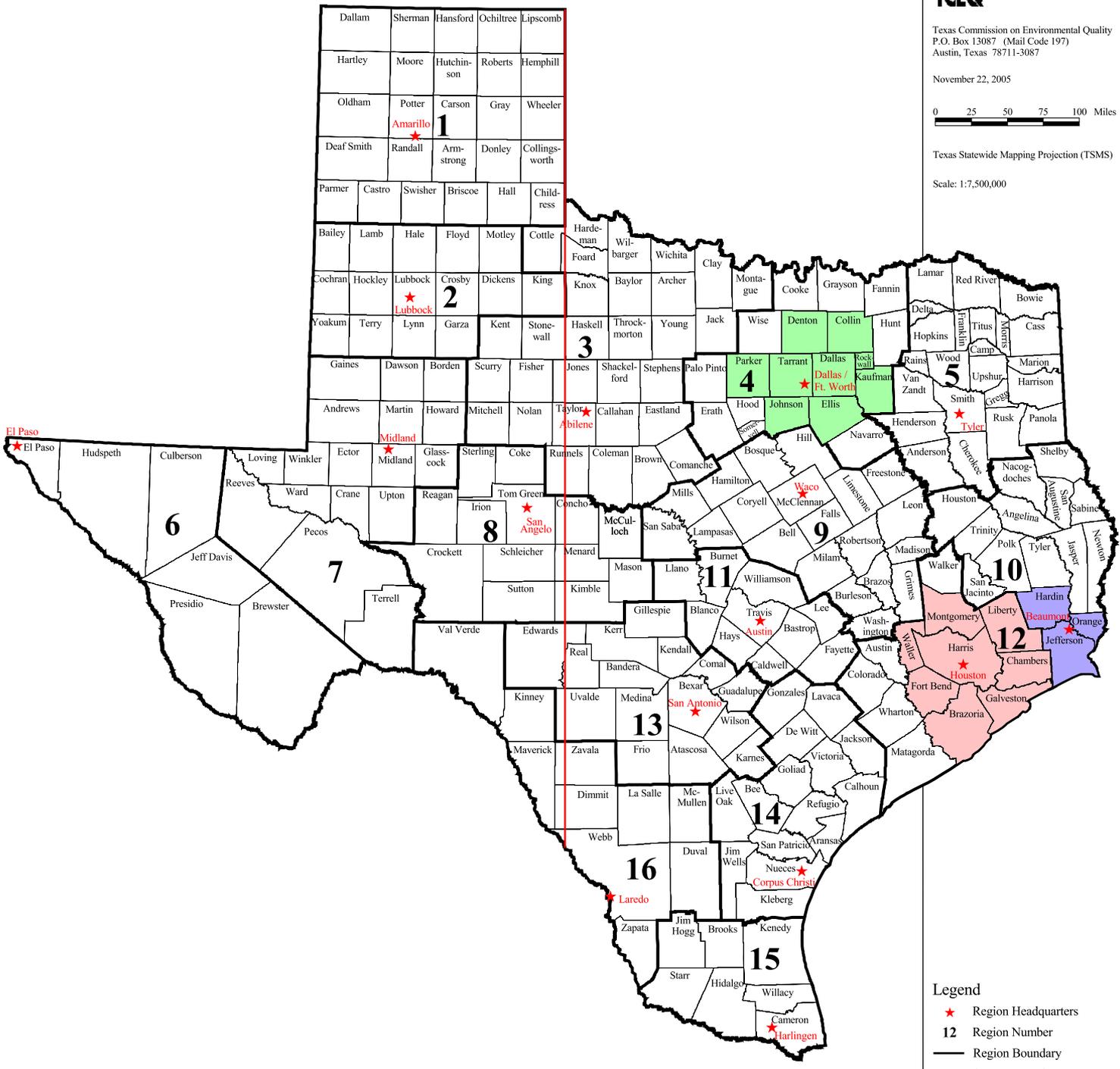
(f) **Enforcement.** Failure to submit emissions inventory data as required in this section shall result in formal enforcement action under the TCAA, §382.082 and §382.088. In addition, the TCAA, §361.2225, provides for criminal penalties for failure to comply with this section.

December 23, 1999

# Eight-Hour Ozone Nonattainment Areas



November 22, 2005  
 0 25 50 75 100 Miles  
 Texas Statewide Mapping Projection (TSM5)  
 Scale: 1:7,500,000



- Legend**
- ★ Region Headquarters
  - 12 Region Number
  - Region Boundary
  - County Boundary
  - Central Meridian

Source: The county boundaries and region headquarters are U.S. Census Bureau 1992 Tiger/Line data (1:100,000). The near non-attainment data is from the TCEQ Office of Policy and Regulator Development.



**Table 1-2. Eight-hour ozone nonattainment areas**

Summary of Reporting Requirements (tpy) for 30 TAC Section 101.10										
County	VOC		NO <sub>x</sub>		Other		Individual HAP		Aggregated HAP	
	Actual	Potential	Actual	Potential	Actual	Potential	Actual	Potential	Actual	Potential
Brazoria, Chambers, Fort Bend Galveston, Harris, Liberty, Montgomery, Waller MODERATE / OZONE	10	100	25	100	100	100	10	10	25	25
Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant MODERATE / OZONE	10	100	25	100	100	100	10	10	25	25
Hardin, Jefferson, Orange MARGINAL / OZONE	10	100	25	100	100	100	10	10	25	25
All Other Counties	100	100	100	100	100	100	10	10	25	25

Note: If an account's emissions meet or exceed the tons per year (tpy) thresholds listed in this table, an emissions inventory questionnaire must be submitted to the TCEQ. This table is provided as a guidance and is not the actual rule. If a discrepancy exists between the table and rule 30 TAC Section 101.10 and 30 TAC Section 116.12 (Major Source Definition), then the rule will take precedence.

This map was generated by the Information Resources Division of the Texas Commission on Environmental Quality. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For information concerning the map, contact the Information Resources Division at (512) 239-0800.

# Special Inventory Areas

Protecting Texas by  
Reducing and  
Preventing Pollution



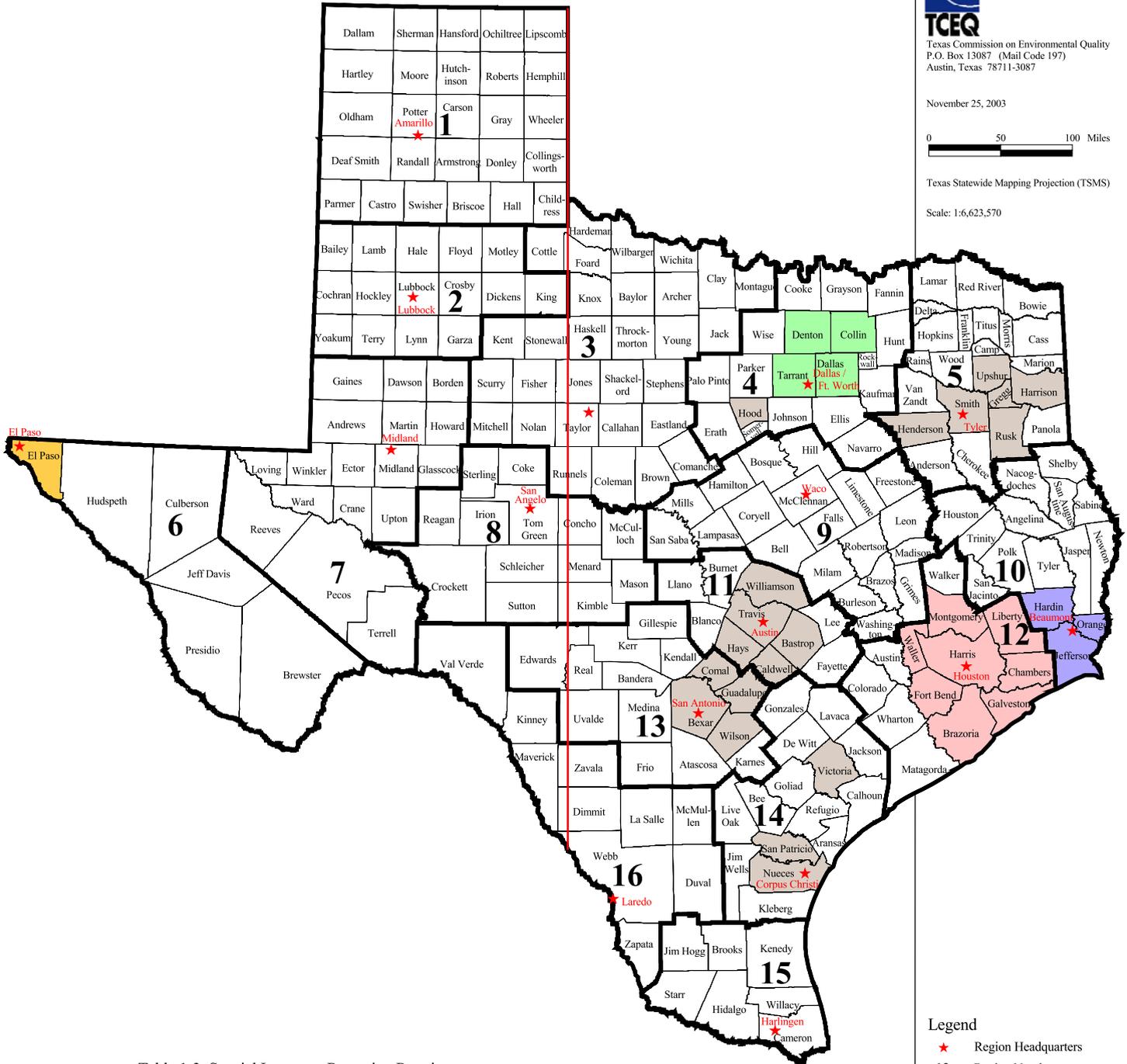
Texas Commission on Environmental Quality  
P.O. Box 13087 (Mail Code 197)  
Austin, Texas 78711-3087

November 25, 2003



Texas Statewide Mapping Projection (TSMS)

Scale: 1:6,623,570



## Legend

- ★ Region Headquarters
- 12 Region Number
- County Boundary
- Central Meridian

Source: The county and region boundaries are U.S. Census Bureau 1992 Tiger/Line data (1:100,000). The Region Headquarters are U.S. Census Bureau 1998 data (1:100,000). The nonattainment and near nonattainment data is from the TCEQ Office of Policy and Regulatory Development.

Table 1-3. Special Inventory Reporting Requirements

Summary of Reporting Requirements (tpy) for 30 TAC Section 101.10										
County	VOC		NO <sub>x</sub>		Other		Individual HAP		Aggregated HAP	
	Actual	Potential	Actual	Potential	Actual	Potential	Actual	Potential	Actual	Potential
Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller SPECIAL INVENTORY REPORTING THRESHOLDS	10	25	25	25	100	100	10	10	25	25
El Paso SPECIAL INVENTORY REPORTING THRESHOLDS	10	50	25	100	100	100	10	10	25	25
Collin, Dallas, Denton, Tarrant SPECIAL INVENTORY REPORTING THRESHOLDS	10	50	25	50	100	100	10	10	25	25
Hardin, Jefferson, Orange SPECIAL INVENTORY REPORTING THRESHOLDS	10	50	25	50	100	100	10	10	25	25
Near Nonattainment and Affected Counties (See Listing Below) SPECIAL INVENTORY REPORTING THRESHOLDS	10	100	25	100	100	100	10	10	25	25

Note: This table is provided as a guidance and is not the actual rule. If a discrepancy exists between the table and rule 30 TAC Section 101.10 and 30 TAC Section 116.12 (Major Source Definition), then the rule will take precedence.

Near Nonattainment and Affected Counties: Bastrop, Bexar, Caldwell, Comal, Gregg, Guadalupe, Harrison, Hays, Henderson, Hood, Nueces, Rusk, San Patricio, Smith, Travis, Upshur, Victoria, Williamson, Wilson

This map was generated by the Information Resources Division of the Texas Commission on Environmental Quality. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For information concerning the map, contact the Information Resources Division at (512) 239-0800.

## What Constitutes a Complete Submission?

The information required for a complete submission depends in part upon a site's circumstances. Has an emissions inventory ever been completed for this account? Does the site still meet the applicability requirements of 30 TAC § 101.10? Have emissions changed significantly, as defined in the rule? Might the rule apply to the account in some future year? The answers to these questions will determine the amount and type of information required by the IEAS.

### Sample Calculations

Per 30 TAC § 101.10(c), sample calculations representative of the processes in the account **must** be submitted with the inventory. Submit sample calculations showing determinations of actual annual emissions for each different type of process present in the account, including enough data so that the determination results may be reasonably reproduced. Generic sample calculations cannot be accepted since they do not contain representative process data and do not demonstrate actual annual emissions determinations. For similar reasons, summary spreadsheets listing emissions quantities are not considered sample calculations. Note that sample calculations are required to be submitted and updated each year.

### Requirements for a New Account

If a site has not previously submitted an emissions inventory and it meets the applicability requirements of 30 TAC § 101.10, then you are required to submit:

- **For a hard copy (paper) EI:** a full set of properly completed forms (see *2006 Emissions Inventory Forms and Instructions*, TCEQ publication RG-360B, or the IEAS web page), including:
  - A completed Account Emissions form with required signatures—
    1. *Emissions events certification.* This statement **must** be signed **if and only if** there were no emissions events and no emissions from emissions events will be reported in the EI.
    2. *Signature of the legally responsible party.* The signature of the individual legally responsible for certifying that the inventory is, to the best of her or his knowledge, accurate and complete. Note that the legally responsible party **may not be a consultant**. See the Account Emissions form instructions for further details.
  - An Account Information form.

- A Contact Information form.
  - A Structural Overview form.
  - The appropriate Facility Information form for each facility listed on the Structural Overview form.
  - An Abatement Device Information form for each abatement device listed on the Structural Overview form.
  - The appropriate Emission Point Information form for each emission point listed on the Structural Overview form.
  - A Path Emissions form for each path listed on the Structural Overview form.
  - Sample calculations representative of the account's processes.
  - Summary test results if stack test data is used to determine emissions; or summary Relative Accuracy Test Audit sheets if CEMS or PEMS data are used to determine emissions.
  - Flare Data, Fugitive Data, and Material Throughput for oil field storage tanks forms, if required by the technical supplements in Appendix A.
- **For an electronic EI:** submit all of the information contained in the forms listed in "For a Hard Copy (Paper) EI" in an approved electronic format, as outlined in the *STARS Electronic Reporting User's Guide*. This document is available online at <[www.tceq.state.tx.us/goto/starsguide](http://www.tceq.state.tx.us/goto/starsguide)>. Additionally, submit a physical (paper) copy of the following forms:
- A completed Account Emissions form with required signatures—
    1. *Emissions Events Certification*. This statement **must** be signed **if and only if** there were no emissions events and no emissions from emissions events will be reported in the EI.
    2. *Signature of the Legally Responsible Party*. The signature of the individual legally responsible for certifying that the inventory is, to the best of her or his knowledge, accurate and complete. Note that the legally responsible party **may not be a consultant**. See the Account Emissions form instructions for further details.
  - An Account Information form.
  - A Contact Information form.
  - A Structural Overview form.
  - Sample calculations representative of the account's processes.
  - Summary test results if stack test data is used to determine emissions, or summary Relative Accuracy Test Audit

sheets if CEMS or PEMS data are used to determine emissions.

- Flare Data, Fugitive Data, and Material Throughput for oil field storage tanks forms, if required by the technical supplements in Appendix A.

## ***Requirements for a Previously Existing Account***

If a previously existing account continues to meet the applicability requirements of 30 TAC § 101.10, then you are required to submit:

- A properly and thoroughly updated paper or electronic EIQ; complete instructions can be found in Chapter 6. **You may not substitute a spreadsheet for the EIQ.**
- The required signatures on a physical (paper) copy of the EIQ:
  - Emissions Events Certification: This statement **must** be signed **if and only if** there were no emissions events and no emissions from emissions events will be reported in the EI.
  - Signature of the Legally Responsible Party: The signature of the individual legally responsible for certifying that the inventory is, to the best of her or his knowledge, accurate and complete. Note that the legally responsible party may not be a consultant. See the sub-heading “Signature of Legally Responsible Party” in Chapter 6, “Updating an EIQ,” for further details.
- Sample calculations representative of the account’s processes.
- Summary test results if stack test data is used to determine emissions; or summary Relative Accuracy Test Audit sheets if CEMS or PEMS data are used to determine emissions.
- Material Throughput forms for flare data, fugitive data, and oil field storage tanks, if required by the technical supplements in Appendix A.
- For paper accounts: any forms necessary to add or change account structure (add forms).
- For electronic accounts: all information necessary to add or change account structure in the approved electronic format, as outlined in the *STARS Electronic Reporting User’s Guide*. This document is available online at <[www.tceq.state.tx.us/goto/starsguide](http://www.tceq.state.tx.us/goto/starsguide)>.

## ***If Your Site Experienced Insignificant Changes in Emissions***

You are not required to submit a full emissions inventory if total actual annual emissions of volatile organic compounds (VOCs), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), lead (Pb), and particulate matter with a diameter of 10 micrometers or less (PM<sub>10</sub>) are all within 5 percent or five tons, whichever is greater, of the most recent total actual annual emissions reported in the STARS database. Instead, you may request that the IEAS copy the most recent annual emissions to the current year.

If the site experienced no emissions due to emissions events (EE) and/or scheduled maintenance, startup, or shutdown activities (SMSS emissions), then you may request that the IEAS copy the most recent annual and ozone season emissions to the current year by submitting:

- a letter similar to the Insignificant Change Notification letter in Appendix B;
- the signed emissions inventory questionnaire cover page; and
- the signed Emissions Events certification statement.

Otherwise, you may still request that the IEAS copy the most recent annual and ozone season emission rates to the current year. However, you will have to submit updated emissions events and/or SMSS emissions as appropriate. Submit:

- a letter similar to the Insignificant Change Notification letter in Appendix B;
- the entire original emissions inventory questionnaire with updated emissions events and/or SMSS emissions; and
- for accounts only reporting SMSS emissions and not reporting emissions events, the signed Emissions Events certification statement.

In either case, you **must** provide sample calculations and other supporting documentation.

## ***If a Site Does Not Meet the Requirements of 30 TAC § 101.10 for the Current Emissions Inventory Year***

If you believe that your site does not meet the applicability requirements of 30 TAC § 101.10 for the current inventory year, but may meet applicability requirements in future years, submit:

- a summary of the site's actual and allowable emission rates and
- a letter similar to the Inapplicability Notification and Request to Remain on Mailing List letter in Appendix B.

*Note:* By signing this letter or a similar letter, the account's owner or operator will remain on the IEAS mailing list and continue to receive annual emissions inventory questionnaires.

Be prepared to supply sample calculations and other supporting documentation if the IEAS requests them.

### ***If a Site Will Not Meet the Requirements of 30 TAC § 101.10 in Future Years***

If you believe that your site does not currently meet the applicability requirements of 30 TAC § 101.10, and if you expect that the site will not meet these requirements in future years, then you may request that the account be removed from the IEAS mailing list. The account owner or operator must sign a letter requesting this action. A sample Inapplicability Notification and Request for Removal from Mailing List letter is included in Appendix B.

Emissions inventory requests are based primarily on an account's most recent emissions inventory as it appears in the STARS database. If the emissions or allowable rates reported in this emissions inventory exceed the rule applicability requirements, then the IEAS cannot remove the account from its mailing list.

If an account that has been removed from the mailing list meets the reporting requirements of 30 TAC § 101.10 at any time in the future, it is the responsibility of the account owner or operator to notify the IEAS that the account now meets the current reporting requirements and to request an emissions inventory questionnaire for that account.

## **A Note About Confidentiality**

The IEAS will respect the confidentiality of certain data unless the Texas Attorney General's Office rules that the data are not protected by state law. If you have any special concerns about confidentiality, contact the IEAS. Such concerns do not justify withholding relevant information from the IEAS.

The following information will be kept confidential if clearly marked:

- material data (as reported on Material Throughput forms)
- process flow diagrams
- process rates
- trade secrets (information that reveals secret processes or methods of manufacture or production)

Information not considered confidential includes:

- emission rates
- emission point data
- type of emissions control equipment
- type of emitting equipment

Under no circumstance should you enter confidential information on the EIQ. Instead, submit confidential information separately, with each page clearly marked *CONFIDENTIAL*.

## **Electronic Reporting**

STARS allows you to receive and submit your EIQ in an approved electronic format. All submitted electronic EIQs must pass a formatting check **and** subsequently be able to be uploaded into STARS; otherwise, the EIQ is considered incomplete. Note that the guidance contained in this document applies to electronic, as well as paper, accounts.

For more information about electronic reporting, consult the *STARS Electronic Reporting Users Guide*, available online at [www.tceq.state.tx.us/goto/starsguide](http://www.tceq.state.tx.us/goto/starsguide).

Contact the IEAS for further assistance with electronic reporting.

# CHAPTER 2—CREATING AN INITIAL EMISSIONS INVENTORY

If you are new to the emissions inventory process, your first question might be, “What is an emissions inventory?” You also might have questions about terms such as *account* and *structure* that are used in Chapter 1. This chapter will answer the above questions, explaining the emissions inventory (EI) process, as well as key terms associated with this process. Additionally, this chapter (in conjunction with other material from this book) will guide you through creating an initial emissions inventory. If at any point you are unfamiliar with a term or concept, please consult the Glossary, or contact the IEAS for assistance.

## The Emissions Inventory Process

The IEAS annually collects statewide data on emissions of air pollutants and stores the data in its database, the State of Texas Air Reporting System (STARS). An *emissions inventory* is the process by which the IEAS collects actual annual air pollution emissions data for a **specific site**, using a standardized set of forms. Since the IEAS collects actual air emissions data statewide, its emissions inventory forms are standardized to ensure consistency among types of data collected, and to facilitate data entry into and retrieval from STARS.

Every site’s emissions inventory is currently identified with and indexed by its site-specific air account number, a unique identification number assigned by the TCEQ. Your site’s air account number will thus also uniquely identify your site’s emissions inventory. “Account” is used as a shorthand term for air account number throughout this document, and the term is synonymous with the particular site that it represents.

## Requirements for Submitting an Emissions Inventory

After familiarizing yourself with the material in Chapter 1, you next need to determine whether your site must submit an emissions inventory. The TCEQ requires emissions inventories from accounts that satisfy certain conditions; these conditions, often referred to as either *applicability requirements* or *reporting requirements*, are defined in 30 TAC § 101.10. Chapter 1 reproduces 30 TAC § 101.10 for your convenience.

The reporting requirements for emissions inventories will vary, depending on both:

- account location and
- the type and quantity of emissions.

The *attainment status* of the county where the account is located will impact the emissions inventory reporting requirements that concern both emissions type and quantity. Specifically, the county's attainment status for a particular pollutant will affect both the **potential** and **actual** emissions level reporting requirements for this pollutant. Thus, an account located in a county designated in nonattainment for ozone will be subject to more stringent potential and actual emissions level reporting requirements for ozone-precursor pollutants than an account located in a county classified as in attainment for ozone.

The term *actual emission* is defined in 30 TAC § 101.10 as the actual rate of emissions of a pollutant from an emissions generating source, or *unit*, as the pollutant enters the atmosphere. Potential emissions from a specific unit are referred to as its *potential to emit*. Potential to emit is defined in the Glossary as well as 30 TAC § 122.10. Note that, while both actual and potential emissions are defined above in relation to an emissions generating source or unit, the emissions inventory reporting requirements concerning actual and potential emissions are **account-wide**.

First, to determine the attainment status of the county where the site is located, consult the maps in Chapter 1. These maps also contain tables that summarize the different actual and potential emissions level reporting requirements for emissions inventory submission. For more information, consult the text of 30 TAC § 101.10 in Chapter 1.

Note that these maps and the associated tables are intended to clarify reporting requirements and do not supersede or replace 30 TAC § 101.10. To determine both the actual and potential emissions level reporting requirements for a specific county, consult 30 TAC § 101.10.

Next, to identify emissions sources present in your account, consult both this chapter and "Identifying Emissions Sources" in Chapter 3. Once you have identified all account emissions sources, you will need to determine each source's actual and potential emissions. To determine the quantity and type of actual and potential emissions, consult Chapter 4. Finally, you will need to sum the actual annual emissions, as well as the potential emissions, from all sources.

Based on the reporting requirements associated with the site's location and both the account's actual and potential emissions, you can determine whether you are required to submit an emissions inventory. If so, you will need to report the actual annual emissions on the standardized EI forms. Representing sources within the emissions inventory is termed *account structure*, which is explained in the following section.

## Understanding Account Structure

Your emissions inventory will report specific quantities of pollutants that are emitted at the site. This information on emissions, which is entered into STARS, is not just associated with a site's air account number, but is specifically tied to individual sources. Associating emissions to a particular emissions source in this manner facilitates data quality assurance, as well as improved statewide emissions modeling.

The way in which the emissions inventory ties emissions data to particular emissions sources is called *structure*. In other words, structure aids in the translation of your emissions-generating equipment and processes, onto paper forms. The key concepts associated with structure are discussed in the following sections.

### ***Facilities and Emission Points***

In emissions inventory terminology, any source capable of generating emissions (for example, an engine or a sandblasting area) is called a *facility*. Thus, *facility* and *emissions source*, or "source" for short, are synonymous.

The actual physical location where the emissions enter the atmosphere (for example, an engine stack or a sandblasting yard) is called an *emission point*. Emission points are currently classified into three different types:

- stack-type emission points, such as boiler stacks or building vents;
- fugitive-type emission points, such as sandblasting yards or marine loading areas;
- and flare-type emission points, which **only** include flares.

Thus, an emission point's type can range from a smaller, more precise location (such as a glycol still vent) to a larger, wider area (such as an outdoor lot where surface-coated metal pieces finish drying).

For emissions inventory purposes, every facility (emissions source) must be linked to at least one emission point, and vice versa; this allows the inventory to capture the maximum amount of data about a source. For example, an internal combustion engine with one stack is represented as

the facility and emission point, respectively. The engine's burn type and design capacity will be captured in the facility data, and the stack height, diameter, exhaust exit velocity, and exhaust temperature will be captured in the emission point data.

## **Paths**

As stated in the previous section, every facility must be linked to at least one emission point. This association of one facility to one emission point is termed a *path*. A path essentially traces an air pollutant's origination, from its creation by the facility to its entrance into the atmosphere via the emission point. If a control device is involved, the path traces an air pollutant's origination, from its creation by the facility, to its abatement by the control device, to its entrance into the atmosphere via the emission point.

It is important to note that a path represents **one** facility linked to **one** emission point; in other words, a path traces **only one** route by which a facility's emissions enter the atmosphere. If one facility is linked to **more than one** emission point, then multiple paths exist. For example, if a paint booth has three exhaust vents, then three different paths exist, since there are three different routes by which the facility's (source's) emissions can enter the atmosphere.

Thus, when actual emissions data are reported in the emissions inventory, the data will be associated with a path—in other words, the emissions data will be associated with the facility (emissions source) that created the emissions, and the point where they entered the atmosphere. If a control device is involved, it will also be associated with the path.

Your site's emissions inventory will consist of a collection of paths that will allow for the submission of detailed emissions data, as well as detailed facility and emission point characteristics. These collective paths, facilities, emission points, and any associated control devices will form your *account structure*.

These key elements of account structure are important because they allow emissions data to be tied to specific sources. Chapter 3 discusses in detail how to establish the account structure.

# CHAPTER 3—ACCOUNT STRUCTURE

Account information must be stored in a standardized manner that accurately represents a site's processes. This chapter aims to help you represent your processes properly. It begins with a section on identifying emission sources and a general discussion of how to represent these sources in the standardized emissions inventory format. The representation of account sources in this standardized format is referred to as account structure. Examples of common industrial processes and their appropriate structural representation are discussed. Finally, the chapter concludes with a section on modifying existing account structure.

## Identifying Emission Sources

To develop an accurate emissions inventory, each emission source at the site must be identified. Using all available tools—including, but not limited to, plot plans, site maps, comprehensive process flow diagrams, and your knowledge of the site's processes, list all equipment and operations that may result in air emissions, such as:

- combustion sources
- storage tanks
- loading operations
- piping component fugitive areas
- wastewater collection and treatment systems
- process areas (for example, building vents, process vents, or reactors)
- evaporative losses (for example, in surface coating, solvent degreasing, railcar or tank truck cleaning, or printing operations)
- plant roads

The emissions from each source have to be determined as recommended in the guidance in Chapter 4 and in the technical supplements (Appendix A). This information is used to determine account structure.

## Guidelines for Including Sources in Account Structure

Depending upon the type of emissions source, you will either need to add the emissions source to the EI as an individual source, group the emissions source with other similar sources, or **possibly** omit the source from the EI.

## **Sources That Must Be Added to the EI and That May Be Grouped as Collective Sources**

Each emissions source at an account must be added to the EI if it meets **any** of the following criteria:

- the source emitted 1 ton or more of **any** regulated pollutant;
- the source emitted 0.1 ton or more of any toxic chemical or hazardous air pollutant; or
- you are required to include the source in your inventory's structure under any TCEQ enforceable document, such as a permit, regulation, or commission order.

If **individual** sources do **not** meet the requirements listed above, these sources may be omitted from the EI, provided that the collective emissions from **all** such unreported sources total less than 5 tons of any regulated pollutant and less than 1 ton of aggregate HAPs. If individual sources do not meet the requirements listed above, but exceed the collective emissions totals outlined above, then these sources must either be:

- individually added to the EI, or
- grouped according to the "Collective Sources" section of this chapter, and added as a collective source to the EI.

The IEAS encourages the grouping of similar small emission sources. When creating a new path for grouped sources (grouped facilities) refer to the guidelines in the "Collective Sources" section. If small sources or small facilities are grouped in a permit, group these sources in a similar manner when adding them to the EIQ.

## **Representing Account Structure in the Emissions Inventory**

For emissions inventory purposes, the term *facility* refers to a source, unit, device, structure, or area capable of generating air contaminants. The point where air contaminants are emitted to the environment is called the *emission point*. Some contaminants that may have an impact on the environment have to be controlled by an abatement device prior to being emitted at the emission point.

### **Facilities and Facility Identification Numbers**

Each facility at the site must be identified. Examples of a facility include:

- a reciprocating engine
- a spray booth

- a chemical storage tank
- a flare

Each facility at your site must be given a unique alphanumeric code called a facility identification number (FIN). The FIN cannot be longer than 10 characters. Examples of possible FINs for the facilities listed above are:

- COMP01
- SPRBTH
- TANK03
- FLR

Every FIN must be linked to at least one emission point.

### ***Emission Points and Emission Point Numbers***

An emission point is the spatial location (point) at which emissions enter the air. Every facility has at least one emission point; therefore, each emission point at the site must be identified. Examples of emission points include:

- an engine exhaust stack
- a spray-booth vent
- a process fugitive area
- a building vent

Each emission point must be given a unique alphanumeric code called an *emission point number*. The EPN cannot be longer than 10 characters. Examples of possible EPNs for the emission points listed above are:

- STK1A
- VENT
- FUG
- BLDGVENT

Every EPN must be linked to at least one facility.

### ***Abatement Devices and Control Identification Numbers***

An *abatement device*, also called a *control device*, is a piece of equipment or a recognized operational procedure that limits, controls, or abates emissions. Each abatement device at the site must be identified. Examples of abatement devices include:

- a flare
- a scrubber
- a condenser
- a vapor recovery unit
- a fugitive leak detection and repair program

Each abatement device must be given a unique alphanumeric code called a control identification number. The CIN cannot be greater than 10 characters. Examples of possible CINs for the abatement devices listed above are:

- FLR
- SCRUB4
- VAPORCOND
- VRU
- LDAR2

Every CIN must be associated with at least one facility (identified by a FIN) that is linked to an emission point (identified by an EPN).

Some control devices, such as thermal oxidizers and flares, also create emissions and must be represented as both facilities and control devices. For more information on this subject, refer to the “Representing Combustive Abatement Devices” later in this chapter.

## ***Emission Paths***

An emission path is the route a contaminant must travel from the facility to the abatement device to the atmosphere via the emission point. Every emission path must include at least one facility and one emission point.

Refer to Figure 3-1 for an example of the emission paths for a site that has all of the following facilities, abatement devices, and emission points:

- a spray booth with a filtered vent
- a two-stack engine without catalytic reduction
- a process fugitive area not subject to an LDAR program

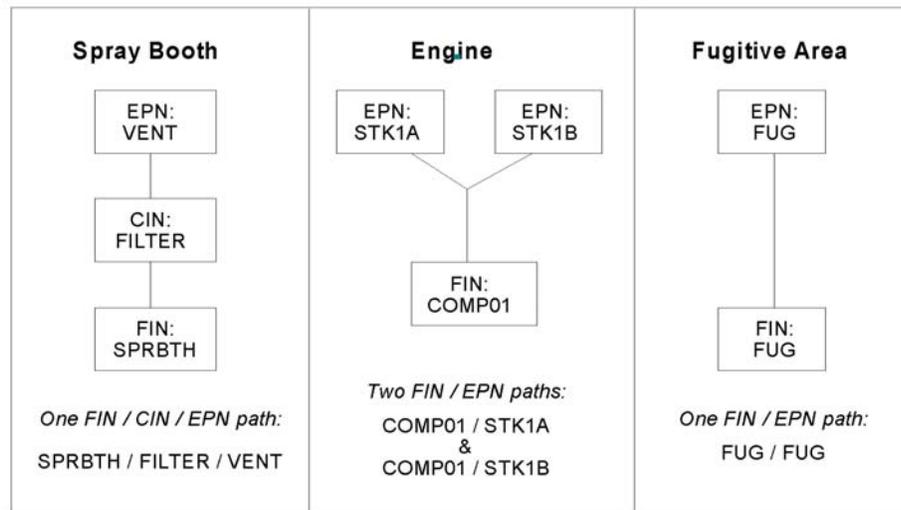


Figure 3-1. Emission Paths

## Collective Sources

Emission sources that emit a small amount of emissions, have similar Source Classification Codes, and emit similar emissions may be grouped as one collective facility. The collective emission source will be given a unique FIN and be added to the EI. A small emission source or a small facility must meet **all** of the following criteria:

- the source emitted less than 1 ton of each regulated pollutant;
- the source emitted less than 0.1 ton of any toxic chemical or hazardous air pollutant; and
- you are not required to include the source in your inventory's structure under any other TCEQ enforceable document, such as a permit or a commission order.

If small sources or small facilities are grouped in the account's air permits, group these sources as collective FINs in a similar manner when adding them to the EIQ. Use the following guidelines when adding collective sources to the EIQ:

### Facility Guidelines

Group only those sources with similar SCC and similar emissions as one collective facility. Create different collective FINs for each distinct type of process and equipment. Examples of different source types that can be grouped in a collective FIN include:

- solvent cleaning areas and equipment
- painting areas and equipment

- piping component fugitive areas
- VOC loading operations
- tanks
- internal combustion sources
- external combustion sources
- other sources as appropriate

### **Emission Point Guidelines**

Unless all of the sources in a collective facility group vent to a common control device, a collective facility group should have a fugitive area emission point.

- Complete the Emission Point Information—Fugitive form for the fugitive area emission point. The length and width of the fugitive area is the length and width of the entire site and the height of the fugitive area is 3 feet.
- If the collective emission point is represented in any air permits for the site, the TCEQ recommends using the same naming convention as the air permit when assigning the EPN; otherwise, the EPN can begin with the character string “GRP” such as EPN: GRPTANKS or EPN: GRPSOURCES.
- When supplying UTM coordinates for the collective emission point, use the UTM coordinates for the plant centroid.

### **Abatement Device Guidelines**

Add abatement devices to collective facilities. If the abatement device only abates certain sources in the grouped facilities, note this in the “Path Comments” portion of the EIQ.

If you need assistance with collective source structure, please contact the IEAS Help Line at 512-239-1773.

## ***Representing Combustive Abatement Devices***

Most abatement devices do not generate their own emissions and should therefore appear only as control devices within account structure. However, a combustive abatement device generates emissions while burning contaminants and must appear in the account structure as an abatement device and as an emissions source.

Emergency flare structure is similar to process flare structure, except that you may not need to link an emergency flare to each individual facility. If an emergency flare controls emissions from a large number of sources, then associating it with each facility would greatly increase the inventory’s size without substantially improving its quality. For

emergency flares, the emissions path will be from the process to the abatement device to the flare. Thus, you would create the path FIN: PROCESS/CIN: FLARE/EPN: FLARE. All undestroyed VOC emissions should be reported in this path. Another emissions path will have to be created to report the emissions generated by the combustion of emissions at the flare. The products of combustion will be reported in the emissions path from the flare to the flare.

If you need assistance with establishing correct flare structure, please contact the IEAS.

## Appropriate Structural Representation of Common Industrial Processes

This section discusses appropriate structural representation of some common emissions sources. If you need assistance with establishing the correct structure for a process, please contact the IEAS.

### ***Cooling Towers***

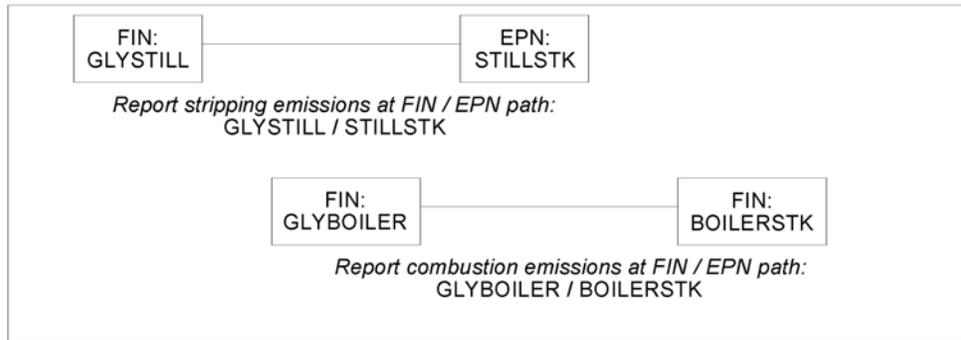
In order to promote data consistency within the STARS database, represent each cooling tower as one facility with one associated **stack** emission point, regardless of whether it is a natural-draft or a mechanical-draft tower. A mechanical-draft tower with multiple cells should also be considered one facility with one stack emission point; the number of cells should be represented as one of the parameters under the FIN group and profile characteristics on the EIQ.

Cooling towers are designed with drift eliminators. A drift eliminator is part of a cooling tower's basic design and is not considered an abatement device from a structural standpoint.

### ***Glycol Units and Amine Units***

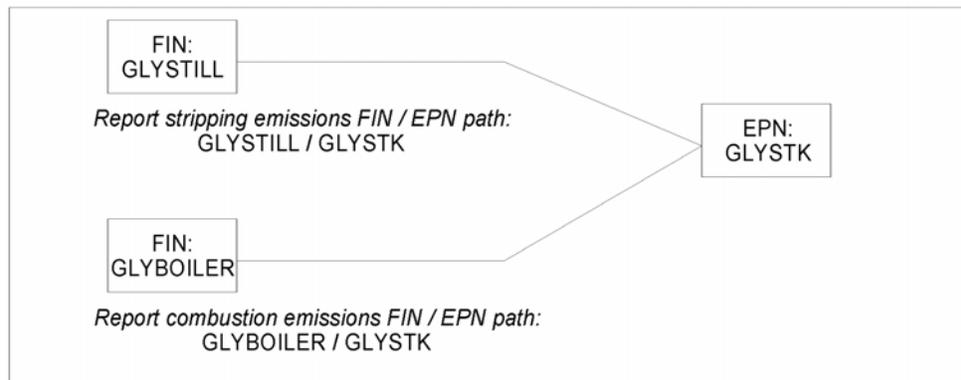
For the purposes of establishing account structure, treat an amine unit as you would a glycol unit, using the following guidance.

Two paths are needed to represent each glycol unit: a still path for reporting emissions from the gas-stripping process, and a reboiler path for reporting combustion emissions. If still and reboiler emissions are vented through different stacks, then you will need to represent the unit by two facilities linked to two different emission points, as in Figure 3-2.



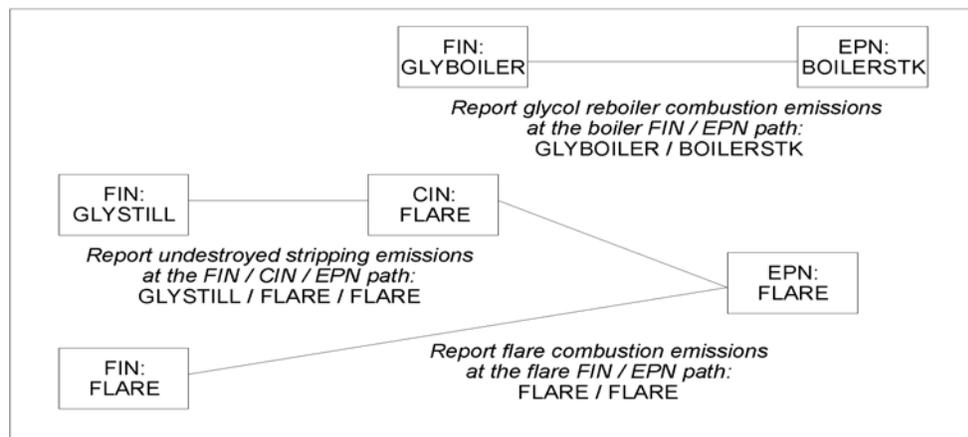
**Figure 3-2. Glycol Unit Structure—Separate Still and Reboiler Vents**

If still emissions and reboiler emissions vent through a common stack, then you will need to represent the glycol still and reboiler by two facilities linked to a single emission point. This structure is demonstrated in Figure 3-3.



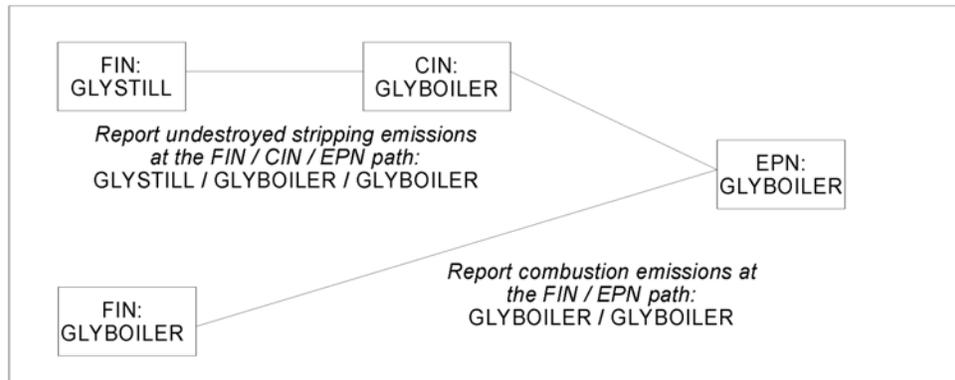
**Figure 3-3. Glycol Unit Structure—Common Still and Reboiler Vents**

If glycol still emissions are routed to a flare, then you should represent the still and reboiler as shown in Figure 3-4.



**Figure 3-4. Glycol Unit Structure—Flared Still Emissions**

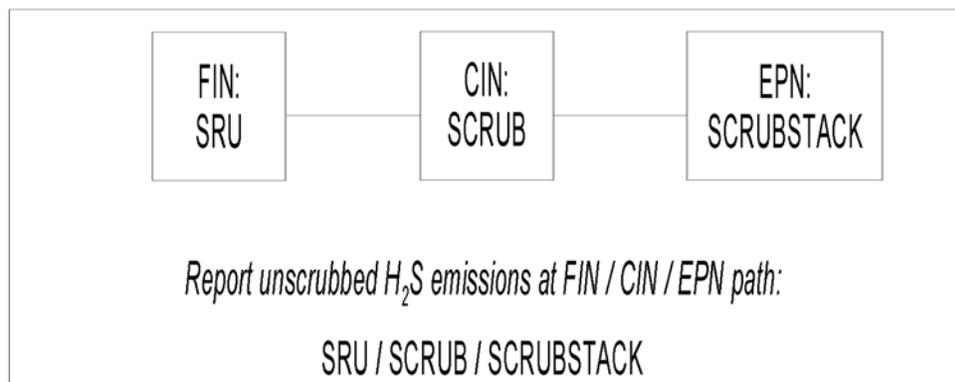
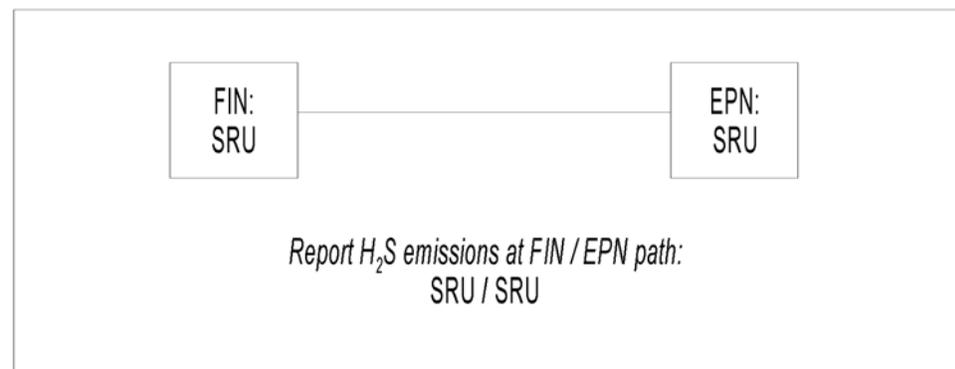
If glycol still emissions are routed through the reboiler and combusted, then you should represent the still and reboiler as shown in Figure 3-5.



**Figure 3-5. Glycol Unit Structure—Still Emissions Routed Through Reboiler**

## Sulfur Recovery Units

An SRU is not an abatement device, but rather a unit generating hydrogen sulfide emissions. Some common SRU structures are shown in Figures 3-6 through 3-9.



**Figure 3-7. Sulfur Recovery Unit with Scrubber**

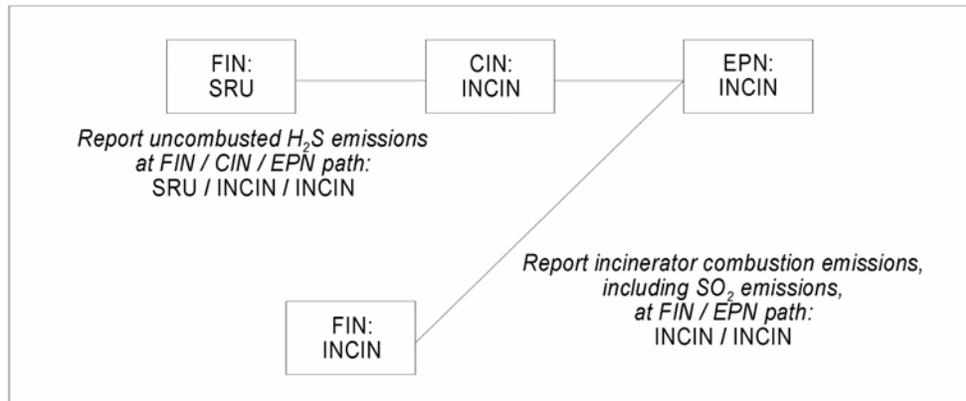


Figure 3-8. Sulfur Recovery Unit with Incinerator

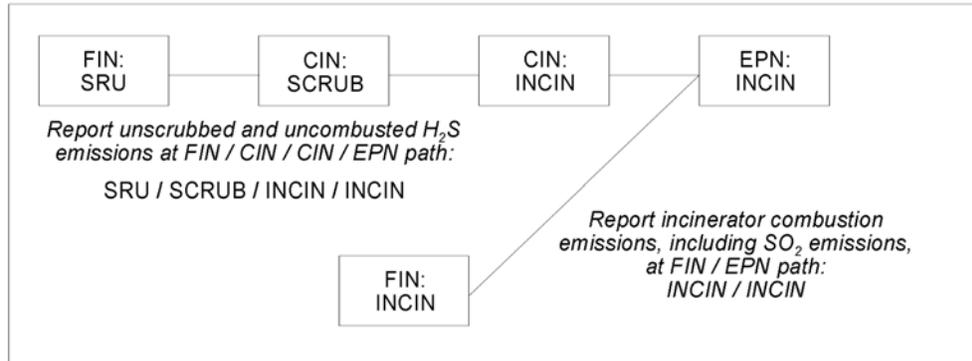


Figure 3-9. Sulfur Recovery Unit with Scrubber Prior to Incinerator

## Loading Operations

If loading emissions are not routed to an abatement device, then represent the emissions path from each separate loading area to a single fugitive-type emission point (Figure 3-10).

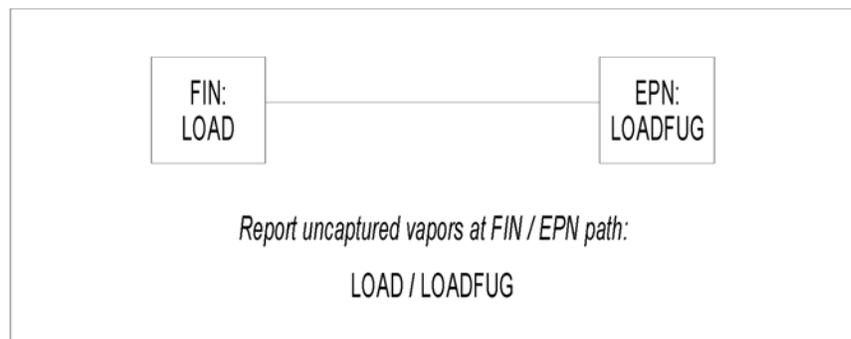
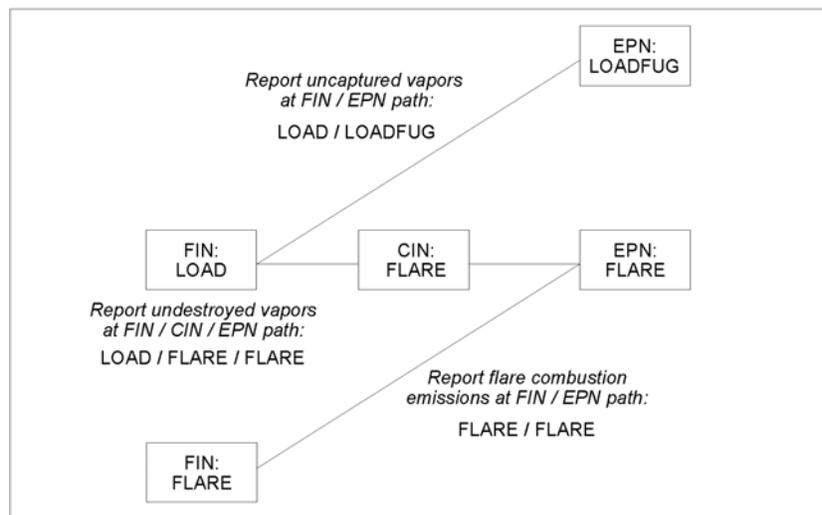


Figure 3-10. Loading Area—Unabated

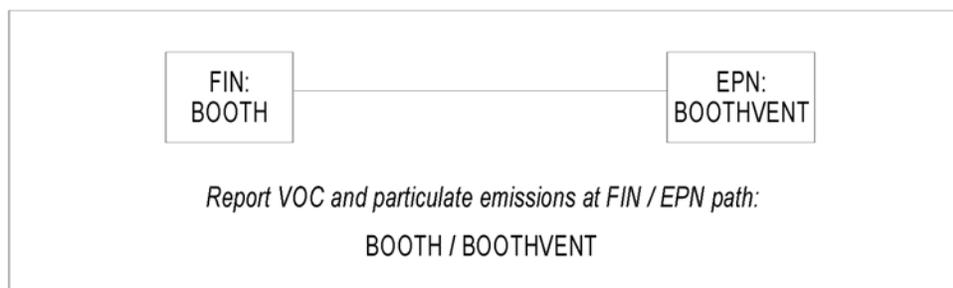
If loading emissions are controlled, the emissions paths will be from the loading operation to the fugitive loading area and the flare emission points. Report the uncaptured vapors that are not routed to the flare at the fugitive loading area emission point. Report the emissions from the captured, undestroyed vapors at the abatement device. Figure 3-11 illustrates proper structure for a loading area controlled by a flare.



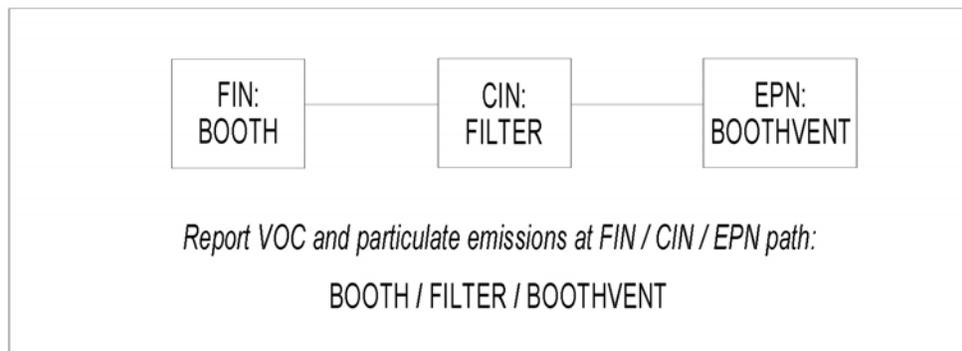
**Figure 3-11. Loading Area Controlled by a Flare**

## Surface Coating Operations

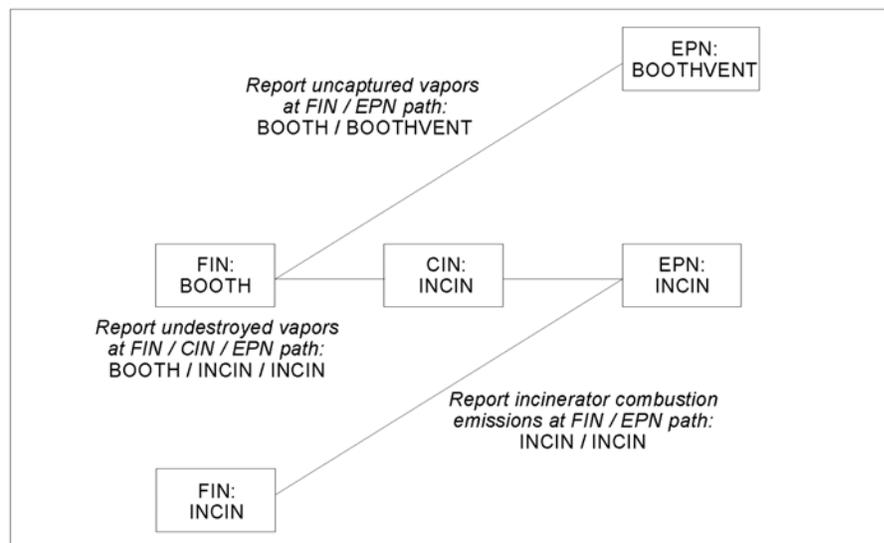
If emissions from a paint booth are completely uncontrolled, then represent the booth by a single facility and emission point path (Figure 3-12). If emissions are filtered to control particulate emissions, then add the filter as the abatement device (Figure 3-13). If paint booth emissions are routed to an incinerator to control VOC emissions, then represent the booth as shown in Figure 3-14.



**Figure 3-12. Paint Booth—Unabated**



**Figure 3-13. Paint Booth—Particulate Emissions Abated by a Filter**



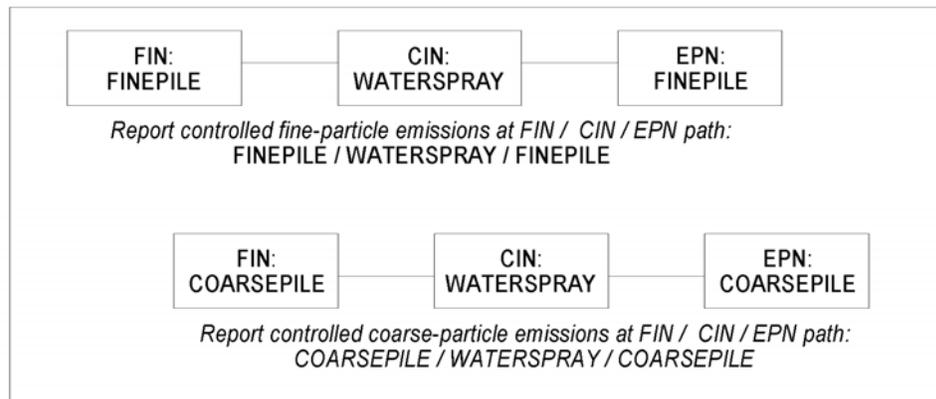
**Figure 3-14. Spray Booth Controlled by an Incinerator**

If coated surfaces are heat-dried, be certain to include the drier in the account structure.

## Aggregate Operations

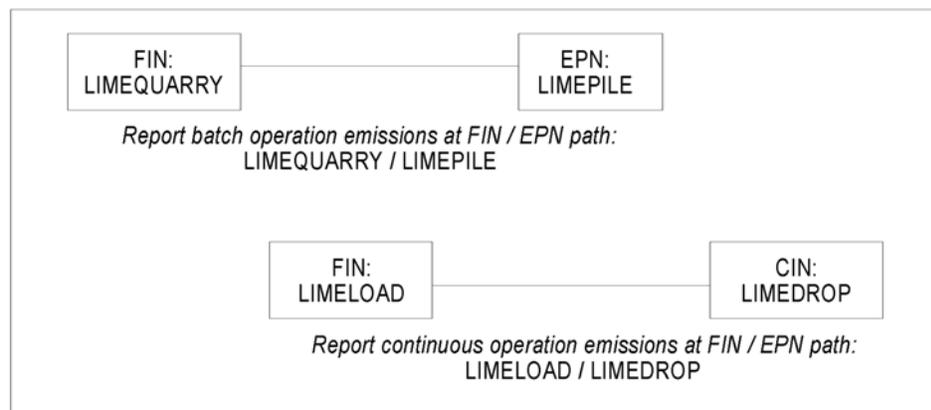
Emission sources from aggregate operations include storage piles and material transport and processing operations, such as crushing, grinding, milling, mixing, calcinating, and kilning. Represent each step in material storage, transport, and processing with a separate path made up of a unique FIN and EPN.

Classify aggregate storage piles by material type and particle size—for example, a site using a water-spray system to control emissions from a fine-particle pile and a coarse-particle pile composed of the same material, as shown in Figure 3-15.



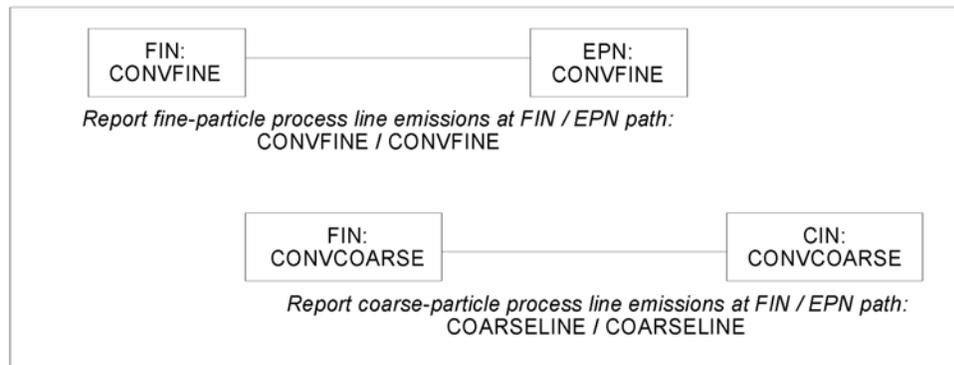
**Figure 3-15. Fine and Coarse Piles—Emissions Controlled by Water Spray**

Separate batch from continuous material-transport operations. For example, an operation moving limestone in batches from a quarry to a storage pile, then continuously feeding the limestone into a process stream, as shown in Figure 3-16.



**Figure 3-16. Continuous and Batch Operations Separated**

Rather than grouping all conveyor transport operations under a single FIN/EPN path, represent each of the conveyor's interdependent operating systems separately. For example, a conveyor system that has both a fine- and a coarse-particle process line should have an emissions path for each line. This structure is shown in Figure 3-17.



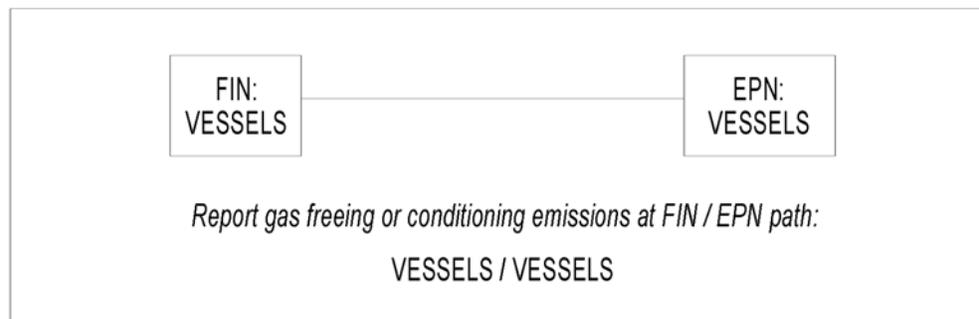
**Figure 3-17. Conveyor Transport—Interdependent Systems**

## Marine Operations

Rather than reporting all marine losses at a single FIN/EPN path, you should uniquely identify each individual equipment or process type in your inventory. This section addresses correct structure for several common marine operations. Please contact the IEAS if you require additional guidance on representing the structure of your marine facility.

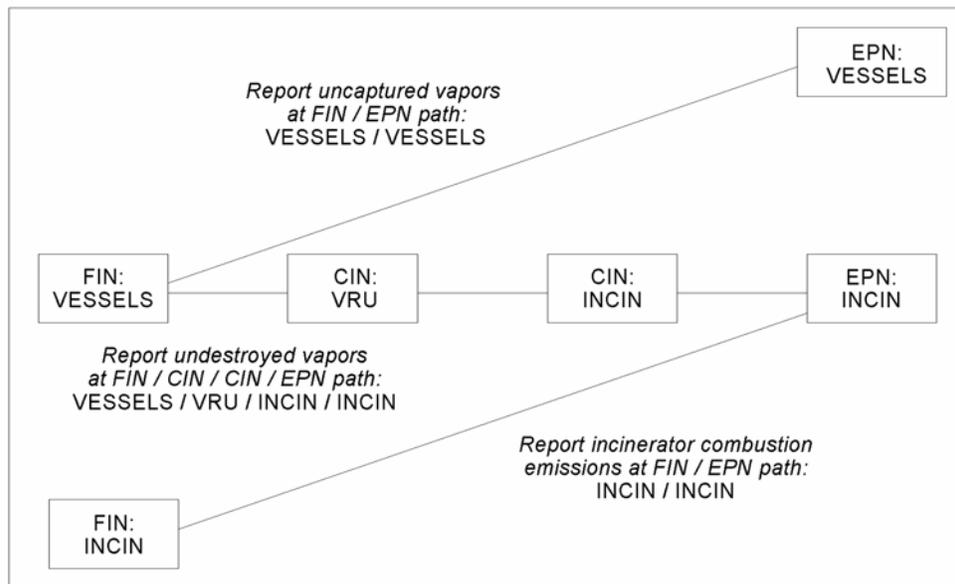
### Loading and Unloading Bulk Liquids

If loading operations are uncontrolled, represent the emissions path from one or more vessels as shown in Figure 3-18.



**Figure 3-18. Uncontrolled Bulk Material Liquid Emissions**

If loading operations use a vacuum-assisted vapor recovery system, any uncollected emissions should be reported at the vessel, with the balance of emissions reported at the onshore equipment serving as a control device. Figure 3-19 shows an example of correct structure.

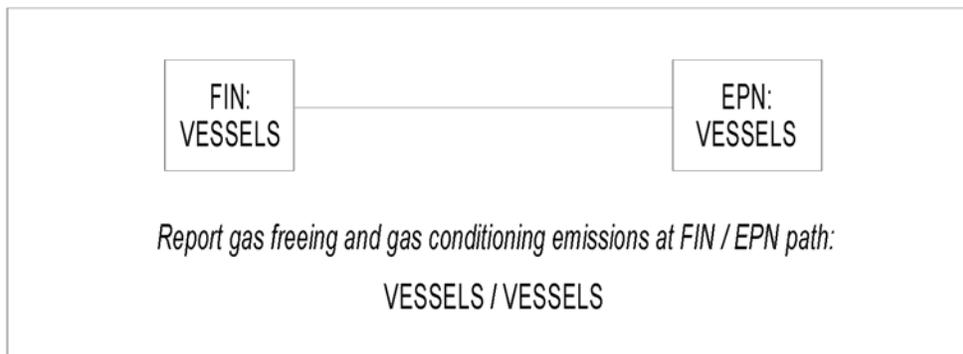


**Figure 3-19. Liquid Loading Controlled by a Vapor Recovery Unit and Routed to an Incinerator**

### Loading and Unloading Bulk Liquefied Gaseous Materials

Since pressurized marine vessel compartments do not normally release to the atmosphere, loading and unloading bulk liquefied gaseous materials may generate fugitive emissions from equipment leaks. These should be reported at the appropriate equipment leak fugitive area on the dock.

If gas freeing or gas conditioning is performed, emissions should be reported at the FIN/EPN path representing the vessel or vessels. See Figure 3-20.



**Figure 3-20. Uncontrolled Degassing and Cleaning Emissions**

### Loading and Unloading Solid Bulk Materials

Although unloading operations are not limited to the use of hoppers or pneumatic systems, those are perhaps the most common methods. Pneumatic systems transfer material to silos or storage tanks, where air is separated from the material and vented to a baghouse or cyclone, the location of which represents the emission point for the operation. An example of this structure appears in Figure 3-21.

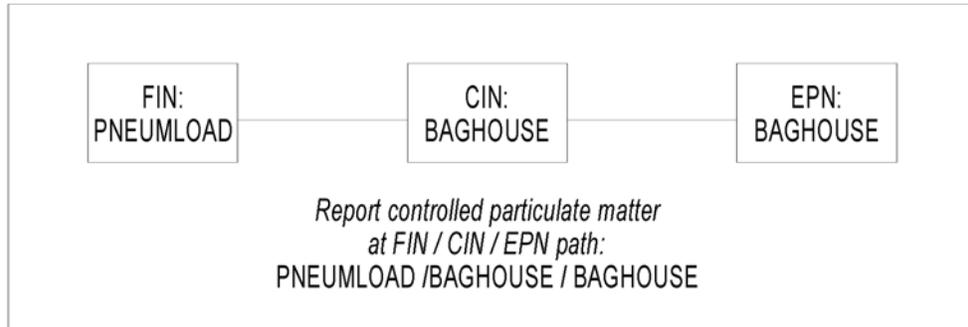


Figure 3-21. Pneumatic Transfer of Solids Controlled by a Baghouse

### Degassing and Cleaning Liquid Vessel Compartments

Emissions from liquid vessel cleaning and degassing will occur either from the vessel itself (if the vessel does not have a vapor recovery system) or from the shore-based control equipment. See Figures 3-22 and 3-23.

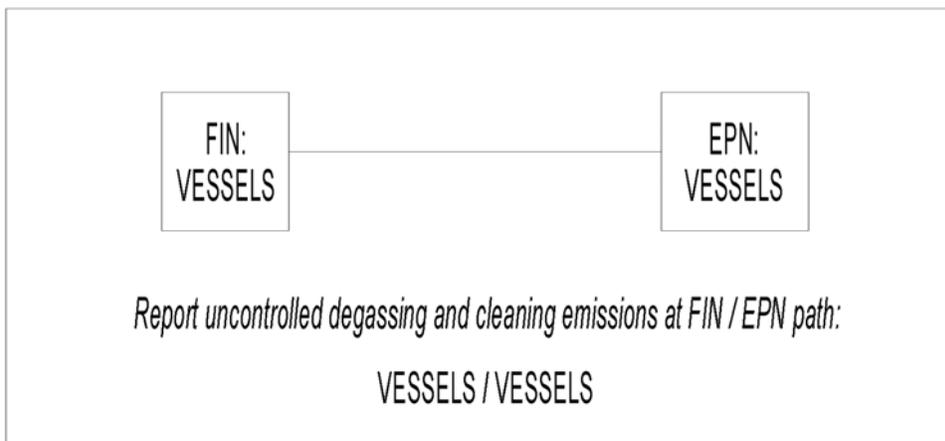
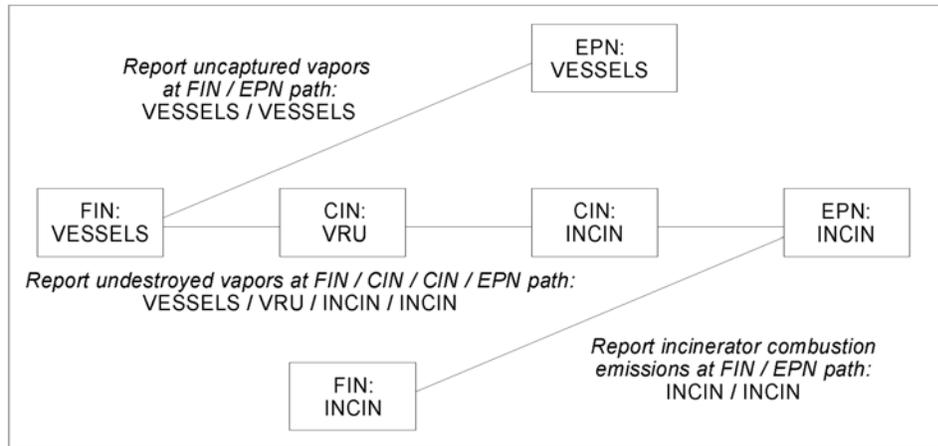


Figure 3-22. Uncontrolled Degassing and Cleaning Emissions



**Figure 3-23. Degassing and Cleaning Emissions Captured by a VRU and Routed to an Incinerator**

## ***Wastewater Collection and Treatment***

Because wastewater collection and treatment involve several different processes, you should not represent an entire wastewater collection and treatment system by a single path. Instead, represent each of the system's processes, including collection, by a unique FIN/EPN path. For assistance with establishing or modifying your wastewater plant's structure, contact the IEAS.

## ***Chemical Production***

Do not represent an entire chemical plant by a single facility linked to multiple emission points. If you wish to group an account's emission sources by plant, you may assign each group a unique plant identification number. You should assign each source within a plant a unique FIN/EPN path.

Chemical plant structures vary widely. For assistance with establishing or modifying your plant's structure, contact the IEAS.

## **Modifying Existing Account Structure**

If the account's structure is incorrect, or if it has changed because new equipment has been added or existing equipment has been newly linked, then you will need to modify the structure by submitting the appropriate forms available in the *2006 Emissions Inventory Forms and Instructions* (RG-360B) or at the IEAS web page, <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>. The remainder of this chapter provides instructions for making common structural modifications.

## **Removing Structure**

For historical reasons, the IEAS does not normally delete structure or emissions records. If a facility has been permanently shut down or removed from an account, simply change its status accordingly and zero all emission rates. If a facility operated at any time during the emissions inventory year, you must list its operating status as “active.”

## **Changing Facility and Emission Point Designations**

The IEAS does not normally allow changes to facility or emission point designations due to the historical nature of emissions data. Exceptions to this policy will be made to correct errors or to align EI nomenclature with permit nomenclature. If you feel revisions to facility or emission point designations are necessary, submit a Revision Request form available in the *2006 Emissions Inventory Forms and Instructions* (RG-360B) or on the IEAS web page, <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>. Be sure to provide a reason for the requested revisions. The IEAS reserves the right to approve or disapprove all such revision requests.

## **Adding a New Emission Point to an Existing Facility**

To add a new emission point to an existing facility:

- list the new path on one line of the Structural Overview form;
- complete an Emission Point Information form; and
- complete a Path Emissions form, noting in the gray area directly above the FIN box that the facility is “EXISTING.”

**Example:** If you wish to link a new flare, EPN: FL, to an existing tank, FIN: TK, you will need to:

- enter the new FIN: TK/CIN: FL/EPN: FL path on the Structural Overview form, since the flare will also act as a control device to control the tank’s emissions;
- complete an Abatement Device Information form for the flare;
- complete an Emission Point Information form for the flare, including the form’s Flare Information section;
- complete a Path Emissions form for the FIN: TK/CIN: FL/EPN: FL path, noting in the gray area directly above the FIN box that the FIN: FL is “EXISTING”;
- enter the new FIN: FL/EPN: FL path on the Structural Overview form because the flare is also an emissions source (a facility) in this case;
- complete the Facility Information for a Flare Combustion Unit form for the flare;

- complete a Path Emissions form for the FIN: FL/EPN: FL path; and
- complete a Material Throughput for Combustion Units form for the flare.

### ***Adding a New Facility to an Existing Emission Point***

To add a new facility to an existing emission point:

- list the new path on one line of the Structural Overview form;
- complete the appropriate Facility Information form as determined by the nature of the facility (combustion unit, storage tank, wastewater facility or other);
- complete a Path Emissions form, noting in the gray area directly above the EPN: FL is “EXISTING”;
- and
- complete the appropriate Material Throughput form.

**Example:** If you wish to add a new tank, FIN: TK, whose emissions are routed to an existing flare, EPN: FL, you will need to:

- enter the new FIN: TK/CIN: FL/EPN: FL path on the Structural Overview form;
- complete the Facility Information for Storage Tanks form for the tank;
- complete a Path Emissions form for the FIN: TK/CIN: FL/EPN: FL path, noting in the gray area directly above the EPN box that the EPN: FL is “EXISTING”; and
- complete a Material Throughput for Storage Tanks form for the tank.

### ***Linking an Existing Facility to an Existing Emission Point***

To connect an existing facility to an existing emission point:

- list the new path on one line of the Structural Overview form and
- complete a Path Emissions form, noting in the gray area directly above the FIN and EPN boxes that the facility and emission point are “EXISTING.”

**Example:** If an existing tank, FIN: TK, is being connected to an existing flare, EPN: FL, you will need to:

- enter the new FIN: TK/CIN: FL/EPN: FL path on the Structural Overview form and
- complete a Path Emissions form for the FIN: TK/CIN: FL/EPN: FL path noting in the gray area directly above the

FIN and EPN boxes that the FIN:TK and EPN:FL are “EXISTING.”

### ***Adding a New Abatement Device to an Existing FIN/EPN Path without Changing the Emission Point***

To add a new abatement device to an existing FIN/EPN path, leaving the emission point unchanged:

- list the new path on one line of the Structural Overview form;
- complete an Abatement Device Information form; and
- complete a Path Emissions form for the new path, noting in the gray area directly above the FIN and EPN boxes that the facility and emission point are “EXISTING.”

**Example:** To add a catalytic converter, CIN: CC, to an existing engine path FIN: COMP/EPN: STK, you need to:

- enter the new FIN: COMP/CIN: CC/EPN: STK path on the Structural Overview form;
- complete an Abatement Device Information form for CIN: CC;
- and complete a Path Emissions form for the new path—noting in the gray area directly above the FIN and EPN boxes that the FIN:COMP and EPN: STK are “EXISTING.”

### ***Adding a New CIN/EPN Path to an Existing Facility, Unlinking the Old Emission Point, and Linking the New CIN/EPN Path***

To add a new abatement device to an existing FIN path, deactivate the old abatement device, and activate the new CIN/EPN path:

- list the new path on one line of the Structural Overview form;
- complete an Abatement Device Information form;
- complete an Emission Point Information form for the new emission point;
- complete a Path Emissions form for the new path, noting in the gray area directly above the FIN box that the facility is “EXISTING;” and
- mark the status of the old path on the EIQ (where the facility is linked to the old emission point) as “DEACTIVATED.”

**Example:** Suppose that all emissions from an existing tank, FIN: TK, are now sent to a new flare, EPN: FL. Then you will need to:

- enter the new FIN: TK/CIN: FL/EPN: FL path on the Structural Overview form;

- complete an Abatement Device Information form for the flare;
- complete an Emission Point Information Flare form for the flare;
- complete a Path Emissions form for the FIN: TK/CIN: FL/EPN: FL path noting in the gray area directly above the FIN box that the FIN:TK is “EXISTING”;
- mark the status of the FIN/old EPN path as appropriate on the EIQ; and
- enter the new FIN: FL/EPN: FL path on the Structural Overview form, because, in this case, the flare is also an emissions source (a facility);
- complete the Facility Information for Flare Combustion Units form for the flare;
- complete a Path Emissions form for the FIN: FL/EPN: FL path; and
- complete a Material Throughput for Combustion Units form for the flare.

### ***Adding an Existing Abatement Device to an Existing FIN/EPN Path without Changing the Emission Point***

To add an existing abatement device to an existing FIN/EPN path, leaving the emission point unchanged:

- list the new path on one line of the Structural Overview form and
- complete a Path Emissions form for the new path, noting in the gray area directly above the FIN, EPN, and CIN boxes that the facility, emission point, and abatement device are “EXISTING.”

### ***Adding an Existing Abatement Device to an Existing Facility, Unlinking the Old Emission Point, and Linking the New CIN/EPN Path***

To add an existing abatement device to an existing facility, deactivate the old emission point, and activate the new CIN/EPN path:

- list the new path on one line of the Structural Overview form;
- complete an Emission Point Information form if the abatement device is not already an emission point elsewhere in the account;

*Emissions Inventory Guidelines*

- complete a Path Emissions form for the new path, noting in the gray area directly above the FIN, EPN, and CIN boxes that the facility, emission point, and abatement device are “EXISTING”; and
- mark the status of the old path on the EIQ (where the old facility is linked to the old emission point) as “DEACTIVATED.”

# CHAPTER 4—DETERMINING AND REPORTING EMISSIONS

This chapter gives general information about required actual emissions data, acceptable emissions determination methodologies, speciating emissions (categorizing emissions by chemical species), and correctly reporting actual annual emissions, ozone season emissions, and emissions due to emissions events and scheduled maintenance, startup, and shutdown. For more detailed information about determining emissions from internal and external combustion sources, cooling towers, equipment leak fugitives, flares, and marine operations, consult the appropriate technical supplement (Appendix A).

## Required Actual Emissions Data

If a site meets the reporting requirements of 30 TAC § 101.10(b)(1) and 40 CFR Part 51, all actual emissions for each regulated pollutant must be reported in the emissions inventory. For the purposes of this document, the term regulated pollutant shall include the following:

- any VOC, as defined in 30 TAC § 101.1;
- any pollutant subject to the Federal Clean Air Act, § 111;
- any pollutant listed as a hazardous air pollutant under FCAA § 112;
- each pollutant for which a national primary ambient air quality standard has been promulgated (including carbon monoxide); and
- any other air pollutant subject to requirements under TCEQ rules, regulations, permits, orders of the commission, or court orders.

Non-criteria, regulated pollutants include—but are not limited to—TSP, ammonia, and H<sub>2</sub>S.

## Acceptable Determination Methodologies

Many different methods exist to determine emissions. In order to promote accuracy and consistency among emissions inventories, the IEAS accepts only a limited number of determination methodologies, and further requires that **all** emissions be determined using the best methodology available. Determination methodologies other than those listed as follows may not be employed without the IEAS's prior approval. Depending on the type of emission source, the methodology preference will often vary. The acceptable methodologies are discussed in alphabetical order and are labeled with a relevant heading (for example, stack testing is discussed under the "Measured Data" heading).

Preceding each heading is a single letter, such as "A" or "V," which represents the **code** entered on the EIQ when using that emissions

determination methodology. These codes should be entered on the “Path Emissions” portion of the EIQ under the heading “Method” for **each** reported contaminant. Each contaminant listed on the EIQ can only have **one** corresponding code entered under “Method,” and this code should represent how the emissions of that contaminant were determined.

## **Source-Specific Determination Methodologies**

For information about the preferred emissions determination methodology or methodologies for a specific source type, consult the appropriate technical supplement (Appendix A), or call the IEAS help line.

If you believe that a preferred method does not apply to a given facility (or source), or that its use would misrepresent the source’s emissions, contact the IEAS for approval of an alternate methodology.

### **D: Continuous Emissions Monitoring Systems**

Continuous emissions monitoring systems (CEMS) generate real-time emissions data 24 hours per day. (Note that portable analyzers are not CEMS.) If CEMS are properly calibrated and operated they offer the best means of determining a source’s emissions. CEMS may be used to determine emissions only if they have been certified according to EPA or TCEQ standards.

Supply a representative set of summary sheets from Relative Accuracy Test Audits performed during the EI calendar year. If NO<sub>x</sub> emissions are determined using CEMS, note the molecular weight used in the data logger. Since the calculation is based on NO<sub>2</sub> by convention, the logger should use a molecular weight of 46.01 to determine NO<sub>x</sub> emissions.

If a CEMS is inoperative for any part of the EI calendar year, other data may be used to determine emissions during CEMS downtime, provided that the data substitution method is well documented in your EI submission.

### **F: Predictive Emissions Monitoring Systems**

Predictive emissions monitoring systems (PEMS) predict real-time emissions data continuously. Since correct calibration and operation are critical to system performance, PEMS may be used to determine emissions only if they have been certified according to EPA or TCEQ standards.

Supply a representative set of summary sheets from relative accuracy test audits performed during the EI calendar year. If NO<sub>x</sub> emissions are determined using PEMS, provide the molecular weight used in the data

logger. As with CEMS, the logger should use a molecular weight of 46.01 to determine NO<sub>x</sub> emissions.

If a PEMS is inoperative for any part of the EI calendar year, other data may be used to determine emissions during PEMS downtime, provided that the data substitution method is well documented in your EI submission.

### **M: Measured Data (Stack Sampling Data)**

Stack testing is a formal, structured event coordinated with the appropriate TCEQ regional office. Testing conducted using a portable analyzer, draeger tube, fuel gas analysis, or fuel flow measurement does not qualify as stack testing because the data obtained from these type of testings produce emission rates that are considered engineering estimates.

While properly performed stack testing can provide valuable information about a facility's operation, improperly performed testing may grossly misrepresent a facility's emissions. For this reason, the IEAS requires that all stack-test data used to determine emissions be collected using methods approved by the EPA or the TCEQ.

Test stacks during conditions that reflect the actual routine operation of the unit. If a unit is modified, or its operating conditions or associated process parameters change significantly, previous stack test results may no longer accurately reflect the unit's emissions and the IEAS may require that a more appropriate method be used to recalculate emissions determinations.

If identical facilities with similar emissions are located at the same account but stack-test data are available for only one of them, the IEAS may approve the use of the tested facility's emission factors to determine emissions from the other identical facilities. The IEAS will also consider, case by case, the validity of using stack-test emission factors generated for one account to determine emissions from identical facilities in another account. In these cases, only the tested facility's emissions may be coded as "M" for "measured." The other related facilities' emissions must be coded as "estimated" because these facilities were not actually tested.

The IEAS prefers that stacks be tested during the EI calendar year. However, the use of historical stack-test data is acceptable, provided that the equipment is operating within the same parameters and under the same conditions that were in place at the time of the test. You may not use stack-test data from a current year to determine emissions for previous years.

By signing the front page of the Emissions Inventory Questionnaire and submitting the document to the IEAS, you are certifying that all test data used accurately represent facility emissions.

If you use stack sampling data to determine NO<sub>x</sub> emissions, use a NO<sub>x</sub> molecular weight of 46.01 when converting from parts per million to a mass emission rate.

### **V: Vendor-Supplied Emissions Factors**

Many industrial equipment manufacturers supply emissions information for their products. These data, based on equipment testing, are developed for a particular piece of equipment and, if applicable, for a particular unit size. Vendor data may be used to determine emissions only if they are based on approved stack testing and if no significant changes have been made to the equipment. A change to a facility or its operation, including a significant change in fuel characteristics, may significantly affect the facility's emissions and therefore invalidate the manufacturer's emissions data.

Include a copy of the manufacturer's data with your supporting documentation. In signing the front page of the EIQ and submitting the document to the IEAS, you are certifying that the facility for which the vendor data were used is and has been operated in the manner under which it was tested.

### **A: AP-42 and Other EPA- or TCEQ-Approved Factors**

One method used to determine emissions is the EPA's *Compilation of Air Pollutant Emission Factors*, Volume I: *Stationary Point and Area Sources* (AP-42), with Supplements (updated continuously)—available at <<http://www.epa.gov/ttn/chief/ap42/index.html>>. AP-42 includes brief discussions of various industrial processes, descriptions of these processes' emissions, and emission factors useful for determining these emissions. Equipment emission factors have generally been determined by testing a representative population varying in size and age. **Since this limits the accuracy of determining emissions of these factors, specific equipment factors are preferable to AP-42 factors.**

The EPA is constantly working to improve the quality and quantity of the AP-42 factors. When factors are revised, the new factors wholly replace the older factors. When using a published factor from the EPA or the TCEQ, use the most recent factor as of the end of the calendar year for which the emissions inventory is being prepared. A factor published after the end of the EI calendar year may not be used.

Emissions determined using tools other than AP-42 factors may still be coded with a determination methodology of “A” if the determinations were based on EPA- or TCEQ-approved programs or factors. Examples include emissions determined using the TANKS and WATER9 software programs, fugitive emissions determined using factors taken from EPA-453/R-95-017, and particulate emissions determined using the abrasive blast cleaning factors from TCEQ’s guide to air permits, *Abrasive Blast Cleaning* (publication no. RG-169).

### **B: Material Balance**

Material balance can only be performed for specific types of facilities whose processes are well understood and relatively simple (for example, surface coating or parts cleaning). Emissions determinations must be based on process rates and material quantity and composition. Guidance on determining emissions from several process types may be found in AP-42 or in various TCEQ guides to air permitting, see Appendix D for a list of helpful EPA and TCEQ resources.

Certain methodologies for determining emissions may be labeled “material balance” even if those methodologies incorporate analytical measurements. A TCEQ-approved program for monitoring cooling towers, or an extended inlet gas analysis from a glycol still for use in GRI GlyCalc, measures the amount of pollutant contained in a process stream and does not measure the amount released to the atmosphere. Therefore, emissions determination methodologies that use such measurements are labeled “B,” since these measurements are input into emissions equations that account for the mass flux entering and leaving a defined area.

### **S: Scientific Calculation**

For emissions inventory, the use of first-order engineering principles (for example, thermodynamic equations or the ideal gas law) constitutes a scientific calculation. Use of process rate data in conjunction with AP-42 or vendor-supplied emission factors, like simple use of a calculator to multiply or add values, does not constitute a “scientifically calculated” emissions determination.

### **E: Estimation**

If the EPA or the TCEQ has not published guidance on determining emissions for a particular process, and if a preferable emissions determination method is not available, you may make an engineering estimate of emissions. Any such estimate must be the best possible, given the available data, and must be accompanied by enough supporting documentation to allow the IEAS to logically understand how the estimation was made. **If the IEAS determines that an estimation is unfounded, then the IEAS may require that emissions determinations be recalculated.**

### **O: Other**

If the EPA or the TCEQ has not published emissions determination guidance for a particular process, and if a preferable emissions determination method is not available, it may be acceptable to use factors developed by an industry group. When using such factors, code the associated emissions with a determination methodology of “other.”

Note that certain industry-published software programs, such as GRI GlyCalc or E&P Tanks, use emissions determination methodologies that are more appropriately coded with methodologies besides “O.” For example, GRI GlyCalc uses site-specific analytical measurements input into material balance equations to determine glycol still emissions. Therefore, GRI GlyCalc emissions determinations should be coded “B.” Similarly, E&P Tanks uses EPA-approved equations (that are also contained in AP-42) to determine tank emissions. Therefore, E&P Tanks emissions determinations should be coded “A.”

When using industry group guidance, carefully check emissions determination methodologies to ensure there is no code more appropriate than “O.” Additionally, **if the IEAS determines that an emissions determination is unfounded, then the IEAS may require that emissions be recalculated.**

**Example:** A turbine has CEMS installed to measure NO<sub>x</sub> and CO. Additionally, formal stack testing, conducted in coordination with the appropriate TCEQ regional office, has measured SO<sub>2</sub> emission rates for this same turbine. CEMS data must be used to determine NO<sub>x</sub> and CO actual annual emissions, and these resulting emissions should be coded on the EIQ with a determination methodology of “D.” Since the turbine has no CEMS or PEMS in place to measure SO<sub>2</sub>, the data from the stack test mentioned previously must be used to determine SO<sub>2</sub> actual annual emissions; those resulting emissions should be coded “M.” For all other expected contaminants—including, but not limited to, TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, and VOC—the best available determination methodologies should be used, and these emissions coded appropriately. For more information on preferred determination methodologies for turbines, please consult “Technical Supplement 1: Select Combustion Sources” in Appendix A.

### **Minimum Detection Limits**

Certain source-specific methods listed in the preceding sections, such as measured data or material balance, use analytical measurements to determine emissions. Analytical test methods can indicate that measurements of a contaminant likely to be present in an emissions stream are below the analytical method’s minimum detection limit. However, such a finding is **not equivalent** to a finding that the contaminant is absent

from the emissions stream. Therefore, if measurements of a contaminant likely to be in an emissions stream are below the minimum detection limit (that is, non-detected), then half of the detection limit must be used to determine the emissions of the contaminant, unless otherwise specified by permit condition, TCEQ or federal rule, or commission order.

## **General Order of Preference**

If a source-specific order of preference for determination methodologies does not exist for a given facility (see technical supplements in Appendix A), then you should follow the general order of preference listed in Table 4-1.

**Table 4-1. General Order of Preference for Emissions Determination Methodologies (to Be Used *Only* in the Absence of Source-Specific Guidance)**

<b>D</b> (Continuous Emissions Monitoring System or CEMS)
<b>F</b> (Predictive Emissions Monitoring System or PEMS)
<b>M</b> (Measured—Stack Test Data)
<b>V</b> (Vendor-Supplied Emissions Factors)
<b>A</b> (AP-42 and other EPA-approved Factors)
<b>B</b> (Material Balance)
<b>S</b> (Scientifically Calculated)
<b>E</b> (Estimated)
<b>O</b> (Other)

## **Using Factors from a Permit**

Do **not** list a permit as a factor's source. If you use the same factor to determine emissions for your inventory as you used to apply for your permit, then tell us where that factor originated (for example, vendor data or AP-42). You may not use the factor from your permit if any of the following applies:

- If your permit factor came from a document such as AP-42, then you must use the most recent version of that factor. If you believe that a previous factor more accurately represents facility emissions, explain your reasoning in the cover letter you submit with your emissions inventory. The IEAS will review your request.
- If you have conducted testing or implemented continuous monitoring since your permit was issued, you must use the resulting data. If you believe that the data used to apply for your permit more accurately represent facility emissions,

explain your reasoning in the cover letter you submit with your emissions inventory. The IEAS will review your request.

- If your permit no longer reflects the conditions under which a facility actually operates.

Rates reported on the EIQ should **represent actual emissions**, rather than maximum potential emissions.

## Speciating Emissions

Once you have determined the emissions from each facility at the site, you may need to specifically identify and quantify the individual chemical substances, or species, within each emission category. This process, known as *speciation*, is particularly important when reporting emissions of volatile organic compounds (VOCs). This section offers only a brief overview of speciation requirements. For more information about emissions speciation for a particular source, consult the appropriate technical supplement (Appendix A), or contact the IEAS.

### Speciating VOCs

VOC speciation requirements depend on an account's geographic location. If the site lies in El Paso County or east of 100° longitude (see map on page 9), then speciate the VOCs from each source emitting at least 5 tons of VOCs annually. If it lies west of 100° longitude (except for El Paso County), then speciate the VOCs from each source emitting at least 25 tons of VOCs annually.

In either case, speciate VOC emissions to at least 90 percent of the total VOC emissions reported for each facility. If any speciated contaminant was emitted at a level below 0.1 ton, you may report that contaminant under *VOC-unclassified* (contaminant code 50001).

Each emitted substance (for example, carbon monoxide or benzene) must be identified by a unique five-digit number known as the contaminant code. It is very important that each emission rate be reported under the most accurate contaminant code available. For example, benzene should be reported under the benzene-specific code (52420) rather than under the general VOC code (50001).

For a complete list of contaminant codes, consult *2006 Emissions Inventory Forms and Instructions* (RG-360B). This document can be found on the IEAS web page at <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>. The IEAS attempts to ensure that the contaminant code list is complete and accurate. If you cannot locate a particular contaminant code, contact the IEAS for assistance. If possible, be prepared to provide the compound's

Chemical Abstracts Service (CAS) number to aid in identification. Note that the contaminant code 50000, unspciated hydrocarbons, **is no longer in use.**

To obtain a VOC-unclassified (contaminant code 50001) total, subtract all speciated VOCs from the total VOC number. Note that the IEAS no longer requires explicit reporting of total VOC emissions under contaminant code 59999. The following example should clarify VOC reporting requirements.

**Example:** A fugitive area located east of 100° longitude emitted 10 tons of VOCs. Based on the VOC weight percentages obtained using a site gas analysis, you determined that the released contaminants were:

- propane (60%)
- butane (8%)
- iso-butane (7%)
- pentane (7%)
- iso-pentane (6%)
- hexane (4%)
- heptane (3%)
- individual VOCs occurring in such small amounts that they cannot reasonably be separated (5%)

You report these emissions as shown in Table 4-2:

**Table 4-2. Example of Speciated VOC Emissions**

Contaminant Code	Contaminant	Actual Emissions (tpy)
50001	VOC-unclassified	0.5
56775	propane	6
56725	butane	0.8
56625	isobutane	0.7
56750	pentane	0.7
56700	isopentane	0.6
56600	hexane	0.4
56575	heptane	0.3

Notice that the total VOC emissions of 10 tons are not explicitly shown in your report. The STARS database will automatically sum the reported VOCs for each source to obtain the total VOC number (previously reported under contaminant code 59999). **Do not** report the total 10 tons of VOC emissions under contaminant code 50001 and then report the

speciated emissions shown in Table 4-2, because STARS will then arrive at a total VOC emission rate of 19.5 tons for this facility, resulting in an overreporting of 9.5 tons of emissions.

## **Speciating Hazardous Air Pollutants and Other Compounds of Interest**

Speciate all hazardous air pollutants (HAPs), particularly if they were emitted from any facility (source) at or above 0.1 ton per year. Give special consideration to determining and reporting mercury emissions. The TCEQ is requesting that all accounts report mercury emissions from any facility (or source), especially those whose emissions exceed 0.001 ton of mercury per year.

In a nonattainment county, speciate each of the following chemicals, particularly if they were emitted from any facility at or above 0.1 ton:

- ethylene;
- propylene;
- isoprene;
- all butenes (butylenes), especially 1,3-butadiene;
- all pentenes;
- all trimethylbenzenes;
- all xylenes; and
- all ethyltoluenes.

For certain chemical mixtures such as condensate or gasoline, quantify and speciate the HAPs, list each HAP under the appropriate contaminant code, and then report the balance of the emissions under the chemical mixture's contaminant code, such as 59090 (for condensate) or 59003 (for gasoline). For speciation guidance on other complex contaminants, contact the IEAS.

## **Speciating Particulate Matter**

### **TSP, PM<sub>10</sub>, and PM<sub>2.5</sub>**

*Particulate matter* is a collective term used for any material, except uncombined water, that exists as a solid or liquid in the atmosphere or in a gas stream at standard conditions. While individual particles cannot be seen with the naked eye, collectively they can appear as black soot, dust clouds, or grey hazes.

Total suspended particulate (TSP) matter refers to all particulate matter except uncombined water. However, particles can range in size from several hundred microns to thousandths of a micron. Since a particle's transport characteristics and its potential health effects may depend on its

size, the EPA has promulgated national primary and secondary air quality standards concerning two subsets of fine (small) particulate matter:  $PM_{10}$  and  $PM_{2.5}$ . Thus, emissions of  $PM_{10}$  and  $PM_{2.5}$  are required to be reported on the emissions inventory. This section will assist you in reporting  $PM_{10}$  and  $PM_{2.5}$  emissions on the EIQ.

$PM_{10}$  is defined as the portion of TSP that has an aerodynamic diameter less than or equal to 10 microns. Therefore,  $PM_{10}$  is a subset of TSP by definition. Most TSP emissions are composed of a certain percentage of  $PM_{10}$ ; that is, a certain percentage of TSP emissions comprises particles less than 10 microns in diameter, while the remaining percentage comprises larger particles. Therefore, when reporting TSP emissions, also report  $PM_{10}$  emissions, unless the facility can document that all TSP emissions are greater than 10 microns in diameter.

$PM_{2.5}$  is defined as the portion of TSP that has an aerodynamic diameter less than or equal to 2.5 microns. Therefore,  $PM_{2.5}$  is a subset of TSP and  $PM_{10}$  by definition. For many sources,  $PM_{2.5}$  constitutes a certain percentage of TSP emissions. For example, sources that combust natural gas emit particulate matter less than 1 micron in diameter. Thus, all particulate matter emitted from natural gas combustion is not only  $PM_{2.5}$  (since it is smaller than 2.5 microns in diameter), but also TSP and  $PM_{10}$ , since  $PM_{2.5}$  is a subset of TSP and  $PM_{10}$  by definition.

### Particle-Size Distribution

The percentages of  $PM_{10}$  and  $PM_{2.5}$  that constitute a source's TSP emissions are often referred to as a *particle-size distribution*. Source-specific, EPA-approved testing is the best method available to determine particle size distribution for a particular emissions source (facility). If test data are not available, process knowledge—including manufacturers' data—may help you determine a source's particle-size distribution. AP-42 also contains particle-size distributions for certain sources.

### Reporting and Speciating Particulate Matter

When reporting particulate matter emissions, report all such emissions, regardless of size, as TSP under the 10000 series of contaminant codes. Since TSP is defined as all particulate matter (that is, there are no size restrictions on TSP), even the portion of TSP that is  $PM_{10}$  and  $PM_{2.5}$  should be reported under the 10000 contaminant code series. Similarly, all particles with an aerodynamic diameter less than or equal to 10 microns should be reported as  $PM_{10}$  under the 20000 contaminant code series, even if a portion of these particles can be considered  $PM_{2.5}$ . Note that, since  $PM_{10}$  and  $PM_{2.5}$  are subsets of TSP, representing particulate matter as TSP,  $PM_{10}$ , and  $PM_{2.5}$  does not result in repeated counting of the emissions.

To speciate particulate matter, follow these guidelines:

- report all speciated particulate emissions under the appropriate 1xxxx contaminant code;
- list the remaining unspeciated particulate emissions under the contaminant code 10000;
- report the portion of the particulate emissions with an aerodynamic diameter of 10 microns or less (PM<sub>10</sub>) under a 2xxxx contaminant code;
- report the portion of the particulate emissions with an aerodynamic diameter of 2.5 microns or less (PM<sub>2.5</sub>) under the contaminant code 39999.

**Example:** A facility in a given account emitted 10 tons of particulate matter. The matter is determined to have been mostly phosphorus (75 percent) and zinc (16 percent), with the remaining 9 percent being of unknown composition. The phosphorus and zinc particles are larger than 2.5 microns in aerodynamic diameter but smaller than 10 microns in aerodynamic diameter. The other 9 percent of particles are believed to be larger than 10 microns in aerodynamic diameter. The emissions in this example should be reported as follows:

**Table 4-3. Example of Speciated Particulate Matter Emissions**

Contaminant Code	Contaminant	Actual Emissions (tpy)
10000	part-unclassified	0.9
14460	phosphorus	7.5
14780	zinc	1.6
20000	PM <sub>10</sub> -unclassified	0
24460	PM <sub>10</sub> phosphorus	7.5
24780	PM <sub>10</sub> zinc	1.6
39999	total PM <sub>2.5</sub>	0

Notice that the total particulate number (10 tons) and the total PM<sub>10</sub> number (9.1 tons) are not explicitly listed in this report. Once again, the STARS database will sum all of the appropriate individual contaminants to obtain these numbers. Verify that the sum of the emission rates reported in the entire 10000 series of contaminants represents the intended total particulate emission rate, and that the sum of the emission rates reported in the entire 20000 series of contaminants represents the intended total PM<sub>10</sub> emission rate.

## Reporting Emissions

Before entering emission rates on the EIQ, you must distinguish annual emissions from those resulting from emissions events or scheduled maintenance, startup, and shutdown activities. Then, depending on the site's location, you may need to determine the daily emission rates for the summer months. Once you have done all of this, you will be ready to report your emissions in your inventory.

### *Annual Emissions*

These include all of a facility's emissions, including authorized emissions from maintenance, startup, and shutdown activities. It does not include emissions which are defined in 30 TAC § 101.1 as emissions events or scheduled maintenance, startup, and shutdown activities. Determine and speciate annual emissions according to the guidance in this chapter and the technical supplements.

### *Ozone Season Emissions*

If the account is located in El Paso County or east of 100° longitude (see Table 4-4 for these counties), then you will need to determine average daily release rates during the ozone season, which encompasses the period from June 1 through August 31, inclusive. Report ozone season emissions, in units of pounds per day (PPD), under the "Ozone" heading on the Path Emissions portion of the EIQ. **The IEAS database can no longer automatically calculate ozone rates.**

For each FIN/EPN path, use actual process and/or emissions data gathered during the summer months to determine total ozone season emission rates. For example, for a combustion source, determine total ozone season emissions contaminant by contaminant from the amount of fuel burned from June 1 through August 31. For sources (facilities) equipped with CEMS, determine total ozone season emissions from CEMS data gathered from June 1 through August 31.

For each FIN/EPN path, quantify every contaminant's total ozone season emissions (in pounds). Do **not** include emissions events or scheduled maintenance, startup, and shutdown emissions in total ozone season emissions. Next, for each FIN/EPN path, determine how many days the facility emitted through this emission point during the ozone season. Then use the following equation to determine the FIN/EPN path's PPD emissions rates:

$$E_{\text{ozone rate}} = \frac{E_{\text{ozone total}}(\text{lbs})}{\text{OperationDays}_{\text{ozone}}}$$

Where:

$E_{\text{ozone rate}}$  = PPD (pounds per day) ozone rate for one contaminant

$E_{\text{ozone total}}$  = total ozone season emissions rate for one contaminant, in **lbs**

$\text{Operation Days}_{\text{ozone}}$  = number of days FIN/EPN path operated during ozone season; **not to exceed 92**

$\text{Operation Days}_{\text{ozone}}$  in the above formula will vary, depending upon a facility's operating schedule. If the associated facility has a consistent weekly operating schedule, then ozone emissions can be calculated using the actual number of days operated during the ozone season. Ensure that the facility's operating schedule on the EIQ has been updated with data for the current year.

However, if a facility does not operate consistently during the summer months, then ozone season emissions data should be averaged over 92 days (that is, enter "92" for  $\text{Operation Days}_{\text{ozone}}$  in the above formula) to avoid unusually large ozone emissions.

For example, an account has an emergency generator or fire pump, that is tested quarterly but otherwise remains idle. During the one day July test, the unit emits 1000 pounds of  $\text{NO}_x$ . However, these emissions should **not** be reported as 1000 pounds per day for one day per week, four weeks per year. Rather, they should be averaged over the 92 days of the ozone season and the operating schedule should remain 24 hours per day, seven days per week, 52 weeks per year (the actual number of number of operating hours can be represented in the field "Annual Operating Hours").

If a facility's inconsistent operating schedule produces unusually large ozone season emissions, or if an EIQ source operated during the summer months, but specific ozone season emissions data are not available to determine PPD rates, please contact the IEAS for assistance.

**Table 4-4. Counties for Which Ozone Season Daily Rates Must Be Reported**

Note: The IEAS database is no longer capable of automatically calculating ozone rates.

Anderson	Duval	Karnes	Red River
Angelina	Eastland	Kaufman	Refugio
Aransas	El Paso	Kendall	Robertson
Archer	Ellis	Kenedy	Rockwall
Atascosa	Erath	Kerr	Runnels
Austin	Falls	Kimble	Rusk
Bandera	Fannin	Kleberg	Sabine
Bastrop	Fayette	Knox	San Augustine
Baylor	Foard	La Salle	San Jacinto
Bee	Fort Bend	Lamar	San Patricio
Bell	Franklin	Lampasas	San Saba
Bexar	Freestone	Lavaca	Shackelford
Blanco	Frio	Lee	Shelby
Bosque	Galveston	Leon	Smith
Bowie	Gillespie	Liberty	Somervell
Brazoria	Goliad	Limestone	Starr
Brazos	Gonzales	Live Oak	Stephens
Brooks	Grayson	Llano	Tarrant
Brown	Gregg	Madison	Taylor
Burleson	Grimes	Marion	Throckmorton
Burnet	Guadalupe	Mason	Titus
Caldwell	Hamilton	Matagorda	Travis
Calhoun	Hardeman	McCulloch	Trinity
Callahan	Hardin	McLennan	Tyler
Cameron	Harris	McMullen	Upshur
Camp	Harrison	Medina	Uvalde
Cass	Haskell	Menard	Van Zandt
Chambers	Hays	Milam	Victoria
Cherokee	Henderson	Mills	Walker
Clay	Hidalgo	Montague	Waller
Coleman	Hill	Montgomery	Washington
Collin	Hood	Morris	Webb
Colorado	Hopkins	Nacogdoches	Wharton
Comal	Houston	Navarro	Wichita
Comanche	Hunt	Newton	Wilbarger
Concho	Jack	Nueces	Willacy
Cooke	Jackson	Orange	Williamson
Coryell	Jasper	Palo Pinto	Wilson
Dallas	Jefferson	Panola	Wise
De Witt	Jim Hogg	Parker	Wood
Delta	Jim Wells	Polk	Young
Denton	Johnson	Rains	Zapata
Dimmit	Jones	Real	Zavala

## **Emissions Events (EE)**

Report emissions events separately under the “EE” column on the “Path Emissions” portion of the EIQ, instead of reporting total annual emissions from all emissions events and scheduled maintenance, startup, and shutdown activities in the “EE/SMSS” column.

In this “EE” column, report the total annual emissions in tons from all releases due to emissions events, regardless of whether those releases represent reportable or nonreportable quantities and regardless of whether the emissions for which an affirmative defense is claimed for those emissions. For more information, consult 30 TAC § 101.1 and § 101.201.

For guidance on interpreting rules concerning emissions events, contact the TCEQ’s air section manager for the region where the account is located.

### **Opacity Events**

Opacity events typically indicate emissions that need to be quantified and reported in the emissions inventory. However, the opacity event itself cannot be reported in terms of percent opacity in the EI. Rather, the emissions associated with the opacity event must be calculated and reported as a mass quantity (in terms of tons), using the best methods available, such as process knowledge, past engineering analysis, or testing.

### **Certification Statement**

Under Texas Health and Safety Code 382.015(f), all emissions inventories include a certification statement that must be signed by a responsible official for the account indicating that no reportable or nonreportable emissions events occurred during the respective calendar year. If an account only experiences opacity events and does not generate unauthorized emissions during a calendar year that need to be reported within the EIQ for that same calendar year, the responsible official must sign the emissions event certification statement for that account’s emissions inventory.

## **Scheduled Maintenance, Startup, and Shutdown (SMSS) Activities**

Report scheduled maintenance, startup, and shutdown emissions separately under the “SMSS” column on the “Path Emissions” portion of the EIQ, instead of reporting total annual emissions from all emissions

events and scheduled maintenance, startup, and shutdown activities in the “EE/SMSS” column.

In this SMSS column, report the total annual emissions in tons from all releases due to scheduled maintenance, startup, and shutdown, regardless of whether those releases represent reportable or nonreportable quantities and regardless of whether the emissions for which an affirmative defense is claimed for those emissions. For more information, consult 30 TAC § 101.1 and § 101.211. This total should not include emissions from maintenance, startup, and shutdown activities which are authorized under a permit or permit by rule.

For guidance on interpreting rules concerning scheduled maintenance, startup, and shutdown activities, contact the TCEQ’s air section manager in the region where the account is located.

### ***Special Note: “EE/SMSS” Column***

As outlined in the previous section, emissions from emissions events and SMSS activities must be reported in either the “EE” or the “SMSS” column, as appropriate. **An account that reports emissions in the “EE/SMSS” (totals) column must also report emissions in the “EE” or SMSS column (or both), as appropriate.**



# CHAPTER 5—EXAMPLE INITIAL EMISSIONS INVENTORY

This chapter presents an example initial emissions inventory for a hypothetical account producing and processing natural gas. Carefully consult the materials in Chapters 3 and 4 in conjunction with this example.

## Identifying Emissions Sources

The following processes occur at an upstream gas field site (hypothetical):

- natural gas production
- separation of natural gas and liquids
- natural gas sweetening
- natural gas dehydration
- natural gas compression and delivery to a pipeline
- storage of condensate and natural gas liquids
- loading of condensate on trucks
- blowdown operations

The following equipment is involved in the above processes:

- lift pump and associated electric motor
- gunbarrel separator (initial gas–liquids separation)
- amine unit, associated reboiler, and diethylamine storage tank
- glycol dehydration still, associated reboiler, and ethylene glycol storage tank
- emergency flare to control glycol unit and amine unit emission events, as well as blowdowns
- refrigerated absorption unit and fractionation columns (further natural gas liquids separation)
- compressor engines:
  - one 2000 hp turbine with dual exhaust stacks
  - one 1200 hp lean-burn, 4-stroke engine
  - one 1000 hp rich-burn, 4-stroke engine with a 70 percent–efficient nonselective catalytic reduction (NSCR) system
- two 1500 gallon condensate fixed-roof storage tanks
- one condensate truck loading rack (uncontrolled)
- high-pressure storage tanks

Analyzing the two above lists, the following emissions sources can be identified. Characteristic source emissions are listed, as appropriate.

**Table 5-1. Identifying Emissions Sources from Equipment and Processes**

<b>Equipment or Process</b>	<b>Emissions Source</b>
Lift pump and associated electric motor	Piping fugitive components (including pump)
Gunbarrel separator	Gunbarrel separator: flash emissions
	Piping fugitive components
Natural gas sweetening	Amine unit: hydrogen sulfide emissions
	Amine reboiler unit: combustion emissions
	Diethylamine storage tank
	Piping fugitive components
Natural gas dehydration	Glycol still: source of VOC and HAP emissions
	Glycol reboiler unit: combustion emissions
	Ethylene glycol storage tank
	Piping fugitive components
Refrigerated absorption unit and fractionation columns	Piping fugitive components
Compressor engines	Turbine
	Lean-burn, 4-stroke engine
	Rich-burn, 4-stroke engine
	Piping fugitive components
Flaring of emissions events	Emergency flare: combustion emissions
	Source that generated emissions events (amine unit, blowdown, etc.)
	Piping fugitive components

**Table 5-1. Identifying Emissions Sources, continued**

<b>Equipment or Process</b>	<b>Emissions Source</b>
Condensate storage	First 1500 gallon condensate fixed-roof storage tank
	Second 1500 gallon condensate fixed-roof storage tank
	Piping fugitive components
Condensate truck loading	Loading rack: loading emissions
	Piping fugitive components
Natural gas liquids storage	Piping fugitive components, especially relief valves
Gas delivery to pipeline	Piping fugitive components
Blowdown operations	Blowdown process

## Translating Emissions Sources to the Emissions Inventory

*Facilities.* After the account's emissions sources have been identified, they need to be transferred to emissions inventory forms. Review the material in Chapter 3, "Account Structure," in conjunction with the guidance in this chapter.

Since facilities are defined as an unique unit, device, structure, or area capable of generating emissions, all of the emissions sources listed in Table 1 are facilities. Now that the account's facilities have been identified, each one needs to be translated to the EI. To do this, we will first need to assign each facility in this account with a unique facility identification number (FIN). Remember that EI naming conventions (for facilities as well as emission points) should follow the naming conventions of any associated account permits. With that in mind, we can draft a list of FINs (and their corresponding emissions sources) to add to the EI (Table 5-2):

**Table 5-2. Assigning FINs to Emissions Sources**

<b>Emissions source</b>	<b>FIN</b>
All natural gas piping fugitive components	FUGAREA1
All condensate piping fugitive components	CONDFUGS
Gunbarrel separator	GUNBARSEP
Amine unit	AMINEUNIT
Amine reboiler unit	AMREBOILER
Diethylamine storage tank	DEA-TANK
Glycol still	GLYCOLSTIL
Glycol reboiler unit	GLREBOILER
Ethylene glycol storage tank	EG-TANK
Turbine	TURBINE1
Lean-burn, 4-stroke engine	COMP1
Rich-burn, 4-stroke engine	COMP2
Emergency flare	UPSETFLARE
First 1500 gallon condensate fixed-roof storage tank	CONDTANK1
Second 1500 gallon condensate fixed-roof storage tank	CONDTANK2
Loading rack: loading emissions	LOADRACK
Blowdown operations	BLOWDOWN

Note that, in Table 5-2, piping fugitive components are grouped together into two facilities: one equipment leak fugitive facility for the natural gas streams, and one equipment leak fugitive facility for the condensate streams. If an emissions source handles similar process streams, uses the same emissions determination methodology, and is monitored under the same monitoring program, all of the components can be grouped under one facility. See Technical Supplement 3 in Appendix A for more details on creating facilities for piping component fugitive areas.

**Emission points.** Once all of the FINs have been assigned for the account's emissions sources, their associated emission points need to be identified. From Tables 5-1 and 5-2, you can identify most of the sources'

emission points. However, you need to list **all possible** emission points through which a facility can emit. Based on this information, identify all of the possible emission points for the sources listed in Table 5-2 as shown in Table 5-3:

**Table 5-3. Identifying Emission Points for FINs**

<b>FIN</b>	<b>Emission Point(s)</b>
FUGAREA1	Fugitive area encompassing piping component fugitives
CONDFUGS	Fugitive area encompassing piping component fugitives
GUNBARSEP	Separator vent
AMINEUNIT	Amine unit vent
	Flare (during emissions events)
AMREBOILER	Reboiler stack
DEA-TANK	Tank vent
GLYCOLSTIL	Glycol still vent
	Flare (during emissions events)
GLREBOILER	Reboiler stack
EG-TANK	Tank vent
TURBINE1	Stack one (dual exhaust stack)
	Stack two (dual exhaust stack)
COMP1	Compressor stack
COMP2	Compressor stack
UPSETFLARE	Flare
CONDTANK1	Tank vent
CONDTANK2	Tank vent
LOADRACK	Area where fugitive loading emissions escape
BLOWDOWN	Emergency flare

In Table 5-3, all facilities that are able to route their emissions from emissions events have the flare as an emission point. Each emission point

must be assigned a unique emission point number. The EI naming conventions for EPNs should follow the same naming conventions as their air permit. Table 5-4 lists the FINs and their corresponding EPNs.

**Table 5-4. Assigning EPNs to Emission Points**

<b>FIN</b>	<b>Emission point(s)</b>	<b>EPN</b>
FUGAREA1	Fugitive area encompassing piping component fugitives	FUGAREA1
CONDFUGS	Fugitive area encompassing piping component fugitives	CONDFUGS
GUNBARSEP	Separator vent	SEPVENT
AMINEUNIT	Amine unit vent	AMINEVENT
AMINEUNIT	Flare (during emissions events)	FLARE
AMREBOILER	Reboiler stack	REBOILSTK1
DEA-TANK	Tank vent	DEA-TANK
GLYCOLSTIL	Glycol still vent	GLYCOLVENT
	Flare (during emissions events)	FLARE
GLREBOILER	Reboiler stack	REBOILSTK2
EG-TANK	Tank vent	EG-TANK
TURBINE1	Stack one (dual exhaust stack)	TURBSTK1
	Stack two (dual exhaust stack)	TURBSTK2
COMP1	Compressor stack	COMP1STK
COMP2	Compressor stack	COMP2STK
UPSETFLARE	Flare	FLARE
CONDTANK1	Tank vent	CONDTANK1
CONDTANK2	Tank vent	CONDTANK2
LOADRACK	Fugitive loading emissions area	LOADFUGS
BLOWDOWN	Emergency flare	FLARE

**Control Devices.** Prior to adding the emissions paths to the EI, the control devices need to be added to the appropriate paths. From the information in Table 5-4, control devices need to be added to the following FIN/EPN paths:

- AMINEUNIT/FLARE
- GLYCOLUNIT/FLARE
- COMP2/COMP2 (remember, this engine has NSCR controls)
- BLOWDOWN/FLARE

Each control device must be assigned a unique control identification number. Table 5-5 lists the FINs, the EPNs, and their associated CINs.

**Table 5-5. Assigning CINs to Paths**

<b>FIN</b>	<b>EPN</b>	<b>CIN (if applicable)</b>
FUGAREA1	FUGAREA1	
CONDFUGS	CONDFUGS	
GUNBARSEP	SEPVENT	
AMINEUNIT	AMINEVENT	
AMINEUNIT	FLARE	FLARE
AMREBOILER	REBOILSTK1	
DEA-TANK	DEA-TANK	
GLYCOLSTIL	GLYCOLVENT	
GLYCOLSTIL	FLARE	FLARE
GLREBOILER	REBOILSTK2	
EG-TANK	EG-TANK	
TURBINE1	TURBSTK1	
TURBINE1	TURBSTK2	
COMP1	COMP1STK	
COMP2	COMP2STK	NSCR
UPSETFLARE	FLARE	
CONDTANK1	CONDTANK1	
CONDTANK2	CONDTANK2	
LOADRACK	LOADFUGS	
BLOWDOWN	FLARE	FLARE

**EI Forms.** The account paths can now be transferred to the appropriate Facility Information, Emission Point Information, and Abatement Device Information forms. These forms are available on the IEAS web page or in the *2006 Emissions Inventory Forms and Instructions* (RG-360B).

Different types of Facility Information and Emission Point Information forms exist to represent different types of processes or units. A Facility Information form exists for each type of processes or units:

- cleaning
- coating or printing
- cooling tower
- flare (combustion unit—flare profile)
- leaking component fugitives
- loading
- non-flare combustion unit
- storage tank
- VOC process
- wastewater system
- wastewater system component
- other facility

There are three different types of Emission Point Information forms for stacks, fugitive areas, and flares. There is only one Abatement Device Information form for control devices.

Table 5-6 lists which forms should be used to add the account’s structure.

**Table 5-6. Appropriate Forms to Add Structure to the EI**

<b>FIN and Appropriate Facility Form</b>	<b>EPN and Appropriate Emission Point Form</b>	<b>CIN</b>
FUGAREA1: Facility Information form for Leaking Component Fugitives	FUGAREA1: Emission point form for a Fugitive-type EPN	
CONDFUGS: Facility Information form for Leaking Component Fugitives	CONDFUGS: Emission point form for a Fugitive-type EPN	
GUNBARSEP: Facility Information form for a VOC Process (under the “Profile” section of the form, check “other”).	SEPVENT: Emission point form for a Stack-type EPN	
AMINEUNIT : Facility Information form for Other Facility	AMINEVENT: Emission point form for a Stack-type EPN	

**Table 5-6. Appropriate Forms to Add Structure to the EI, continued**

<b>FIN and Appropriate Facility Form</b>	<b>EPN and Appropriate Emission Point Form</b>	<b>CIN</b>
AMINEUNIT: Facility Information form for Other Facility	FLARE: Emission point form for a Flare-type EPN	FLARE*
AMREBOILER: Facility Information form for a Combustion Unit	REBOILSTK1: Emission point form for a Stack-type EPN	
DEA-TANK: Facility Information form for a Storage Tank	DEA-TANK: Emission point form for a Stack-type EPN	
GLYCOLSTIL: Facility Information form for a VOC Process (under the “Profile” section of the form, check “glycol still”)	GLYCOLVENT: Emission point form for a Stack-type EPN	
GLYCOLSTIL: Facility Information form for a VOC Process (under the “Profile” section of the form, check “glycol still”)	FLARE: Emission point form for a Flare-type EPN	FLARE*
GLREBOILER: Facility Information form for a Combustion Unit	REBOILSTK2: Emission point form for a Stack-type EPN	
EG-TANK: Facility Information form for a Storage Tank	EG-TANK: Emission point form for a Stack-type EPN	
TURBINE1: Facility Information form for a Combustion Unit (under the “Profile” section of the form, check “turbine”)	TURBSTK1: Emission point form for a Stack-type EPN	
TURBINE1: Facility Information form for a Combustion Unit (under the “Profile” section of the form, check “turbine”)	TURBSTK2: Emission point form for a Stack-type EPN	
COMP1: Facility Information form for a Combustion Unit (under the “Profile” section of the form, check “IC Engine,” and complete the remaining blanks “4-cycle, lean-burn”)	COMP1STK: Emission point form for a Stack-type EPN	
COMP2: Facility Information form for a Combustion Unit (under the “Profile” section of the form, check “IC Engine,” and complete the remaining blanks “4-cycle, rich-burn”)	COMP2STK: Emission point form for a Stack-type EPN	NSCR*
UPSETFLARE: Facility Information form for a Flare (Combustion Unit—Flare Profile)	FLARE: Emission point form for a Flare-type EPN	

\*Since only one abatement device form exists for control devices, complete the Abatement Device Information form for these two CINs.

**Table 5-6. Appropriate Forms to Add Structure to the EI, continued**

<b>FIN and Appropriate Facility Form</b>	<b>EPN and Appropriate Emission Point Form</b>	<b>CIN</b>
CONDTANK1: Facility Information form for a Storage Tank	CONDTANK1: Emission point form for a Stack-type EPN	
CONDTANK2: Facility Information form for a Storage Tank	CONDTANK2: Emission point form for a Stack-type EPN	
LOADRACK: Facility Information form for a Loading facility	LOADFUGS: Emission point form for a Fugitive-type EPN	
BLOWDOWN: Facility Information form for a VOC Process (under the “Profile” section of the form, check “blowdown operations”)	FLARE: Emission point form for a Flare-type EPN	FLARE*

\*Since only one abatement device form exists for control devices, complete the Abatement Device Information form for these two CINs.

For facilities that have multiple paths, only **one** Facility Information form needs to be submitted to add the facility. To link this facility to other emission points simply the facility in the appropriate blank on the Path Emissions form as explained below. These procedures can also be used for emission points and abatement devices that have multiple paths.

**Completing Path Information.** Emissions data needs to be completed for each path on the Path Emissions form. Submit Material Throughput forms as necessary to supply process rate data used in emissions determinations.

**Completing Account Information.** An Account Information form must be completed as well as the Contact Information forms.

Use the information in Table 5-6 to complete the Structural Overview form, which documents account path data.

The sum of each criteria pollutants reported at all account paths must be entered on the Account Emissions form. The legally responsible party must endorse the “Signature of the Legally Responsible Party” statement. If no emissions from emissions events are being reported within the EI, the legally responsible party must sign the Emissions Events certification statement.

Detailed instructions on how to complete each EI form are provided in the companion volume, *2006 Emissions Inventory Forms and Instructions* (publication number RG-360B) or on the IEAS web page.

# CHAPTER 6—UPDATING AN EMISSIONS INVENTORY QUESTIONNAIRE

This chapter tells how to update an emissions inventory questionnaire. Review all of the information in this book before attempting to update these forms.

Be certain to review all data on your EIQ printout for accuracy. Update EIQ items as necessary, using the blank space provided (usually below or to the right of the item). If the EIQ has no blank space is not provided for a specific item on the EIQ, write the updated data next to the item, circling or highlighting it if possible. **Important:** Any items left unchanged, including emission rates, will be assumed to be correct for 2006 and will be entered into the STARS database as part of your 2006 inventory.

Due to space considerations, this year the Emission Inventory (EI) forms and instructions are available in **a separate document**, the *2006 Emissions Inventory Forms and Instructions (RG-360B)*. This document appears online at <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)> or obtain a hard copy by contacting the IEAS. Any EI forms referred to in this chapter can be found in this new document.

## Updating EIQ Data

### *Special Notes*

#### **Sample Calculations**

30 TAC § 101.10(c) requires all accounts to submit sample calculations **representative** of the account processes. Submit sample calculations showing actual annual emissions determination for each different process type present in the account, providing enough data so that the determination results may be reasonably reproduced. Generic sample calculations cannot be accepted since they do not contain representative process data and do not demonstrate actual annual emissions determinations.

#### **Use Permanent Ink**

Please use permanent ink instead of pencil when updating the EIQ. Pencil tends to smudge and can be difficult to read, increasing the chance of data-entry errors or omissions. Permanent ink, especially ink in colors other than black, is clearer and more legible. There are no restrictions on ink color, but colors other than black make EIQ updates more noticeable.

## **Electronic Accounts**

Electronically update and submit all of the information discussed in this chapter in an approved electronic format, as outlined in the *STARS Electronic Reporting User's Guide*. This document is available online at <[www.tceq.state.tx.us/goto/starsguide](http://www.tceq.state.tx.us/goto/starsguide)>. The first three pages of the paper-formatted EIQ that are enclosed with the electronic EIQ must be signed and remitted with an updated electronic EIQ.

## **Account Information**

General account information is printed at the top of the EIQ's first page. For a detailed description of the items in this section, consult *2006 Emissions Inventory Forms and Instructions* (RG-360B) on completing an Account Information form.

To make any significant changes to this information, notify Central Registry of the changes and send the IEAS a copy of the notification.

## **Emissions Inventory and Account Contact Information**

For a detailed description of the requirements concerning emissions inventory contact and account contact information, please consult the *2006 Emissions Inventory Forms and Instructions* (RG-360B).

To update this information, please complete and submit the Contact Information form.

## **Criteria Emissions Totals**

This section contains five columns for emissions reporting: *Annual*, *Ozone*, *EE* (Emissions Events), *SMSS* (scheduled maintenance, startup, and shutdown activities), and *EE/SMSS* (totals from EE and SMSS emissions). There are six rows, each one representing a criteria pollutant. Each column contains two subcolumns: one with a printed number, one with a blank. The printed number reflects the total submitted on the most recent inventory. In the blank to the right of that number, you should enter the total for the current inventory.

**Note that these reported emissions totals are not entered into STARS.** Instead, the reported totals are used for comparison to ensure that STARS correctly sums the emissions reported within the EIQ itself. Emissions totals reported in "Criteria Emissions Totals" section must also be reported at the appropriate paths within the EIQ.

Also note that the “EE/SMSS” column is now used by STARS to automatically calculate total emissions from emissions events and SMSS activities. Therefore, emissions from emissions events and SMSS activities must be reported in either the “EE” or “SMSS” column as appropriate.

For a thorough discussion of the elements of this section, please consult Chapter 4, “Determining and Reporting Emissions,” and *2006 Emissions Inventory Forms and Instructions* (RG-360B) for instructions on completing an Account Emissions form.

## **Site Quantifiable Event Totals**

**New this year**, the total number of reportable and non-reportable emission events and scheduled maintenance, startup, and shutdown events are required to be reported for the inventory year per 30 TAC §§ 101.201 and 101.211. An explanation of each type of event follows.

*Total Number of Reportable Emission Events* is the number of events that meet or exceed a reportable quantity (RQ) and the number of excess opacity events. These events were typically reported to TCEQ as part of the required emissions event reporting.

*Total Number of Non-Reportable Emission Events* is the number of events that did not exceed the RQ.

*Total Number of Reportable Scheduled Maintenance, Startup or Shutdown Activities* is the number of events that meet or exceed the RQ and the number of excess opacity events resulting from unplanned MSS activities.

*Total Number of Non-Reportable Scheduled Maintenance, Startup or Shutdown Events* is the number of events that did not meet or exceed the RQ.

How to complete this section of the Account Emission form is detailed in the *2006 Emissions Inventory Forms and Instructions* (RG-360B). For guidance on interpreting rules concerning EE and SMSS events, contact the TCEQ’s air section manager in the region where the account is located.

## **Emissions Events Certifying Signature**

This must be signed if and only if you experienced and reported **no** emissions from emissions events.

This signature is required by Texas Health and Safety Code § 382.0215(f), which states, in part: “An owner or operator of a facility required by 382.014 to submit an annual emissions inventory report and which has experienced no emissions events during the relevant year must include as part of the inventory a statement that the facility experienced no emissions events during the prior year.”

For more information on emissions events, consult Chapter 4.

### **Signature of Legally Responsible Party**

A complete inventory requires the signature of the individual responsible for certifying that the inventory is, to the best of her or his knowledge, accurate and complete. Fill in all of the blanks on this portion of the EIQ.

If you have questions regarding the definition of the legally responsible party, please consult 30 TAC § 122.165, Certification by a Responsible Official.

Note that the legally responsible party **must not** be a consultant.

### **Facility Information**

Descriptions of most of the items in this section, along with information on accepted values, may be found in the instructions for completing the relevant Facility Information form. The following discussion focuses primarily on common issues about updating facility data.

If you need to make corrections to any of the information in this section, please do so in the blanks provided.

#### **Source Classification Code (SCC)**

A facility’s SCC is an **eight-digit** EPA-developed code that associates emissions determinations with identifiable industrial processes. TCEQ staff use a facility’s SCC for modeling, rulemaking, and SIP-related activities; therefore, a facility’s SCC must be as accurate as possible.

The EPA maintains a current list of SCCs in Excel file format at [www.epa.gov/ttn/chief/codes/index.html](http://www.epa.gov/ttn/chief/codes/index.html). When using this Excel file, only use the codes that have a value of “POINT” in the “Sector” column, as only those codes are appropriate for the point source EI. Please do not enter SIC (Standard Industrial Classification) codes or AMS (area and mobile source) codes for SCCs on the EIQ.

### Status, Status Date

If you wish to change the facility's status, enter the appropriate letter and enter the date on which the status changed. Status options are:

- A (active): If the facility operated the entire reporting year.
- I (idle): If the facility was idle or temporarily shut down for the entire reporting year.
- S (shut down): If the facility has been permanently shut down and will never operate again. **Note that a facility, once shut down, cannot be reactivated.**
- D (demolished): If the facility has been removed from the site.
- N (permitted but never built).
- O (ownership transferred to a new party): If the facility has been sold, or if responsibility for it has been transferred to another owner, during the reporting year. Supply the new owner's TCEQ air account number, if known.

### Operating Schedule and Annual Operating Hours

These fields should reflect a facility's **actual** annual operating schedule and operating hours, **not** maximum potential hours of operation. Update these fields every reporting year with actual annual data for the facility.

If a facility's operating schedule is inconsistent throughout the reporting year, enter the actual number of weeks that the facility operated in the "Weeks per Year" blank, and enter average data for the fields "Days/Week" and "Hours/Day."

### Seasonal Operating Percentages

Seasonal operating percentages represent the percentage of actual annual facility operations that occurs during each season. These percentages are normally based upon process rate data. For EI purposes, "spring" includes March through May; "summer" includes June through August; "fall" includes September through November; and "winter" includes January, February, and December of the same calendar year. Note that the percentages must be reported as whole numbers (no decimals) and must sum to 100.

### FIN Group Type, Profile, and Characteristics

In STARS, every facility has a group type associated with it; a list of current group types is available in Table 11 in this chapter. You will notice that these group types now also appear on the Facility Information forms. Associating each facility with a group type allows the IEAS to collect data on sources of interest, and also facilitates data retrieval.

If the facility's group type or profile appears incorrect, consult Table 6-1. Most of the group types are self-explanatory; for examples of facility types that belong to each group, refer to the associated profiles, which also appear in the table.

If you determine that the facility has an incorrect group type or profile (for example, a flare has a group type of "equipment leak fugitive"), correct the group type and profile on the EIQ itself. Next, complete the appropriate Facility Information form to update the facility information; in our example, you would need to complete a Facility Information for Combustion Unit—Flare Profile Facility Information form. Be sure to write the word "update" at the top of the form to avoid any confusion.

For more information about the characteristics associated with each profile, please identify the facility appropriate group type, and then consult the instructions for completing the relevant facility form in *2006 Emissions Inventory Forms and Instructions* (RG-360B). For example, if you wanted more information about a cooling tower's characteristics, you would consult the instructions for completing a Facility Information for Cooling Towers form.

**Table 6-1. STARS Facility Group Types, Profiles, and Characteristics**

<b>Group</b>	<b>Profile</b>	<b>Characteristics</b>
Cleaning	Dip degreasing Vapor degreasing Barge cleaning Railcar cleaning Tank car cleaning Other	Not applicable
Combustion	Flare	Design capacity in MMBtu per hour Assist type (steam, air, or none) Service type (process, emergency, or both)
	I.C. engine	Number of cycles (two or four) Burn type (rich or lean) Design capacity in MMBtu per hour <i>or</i> engine rating in horsepower
	Boiler, dryer, furnace, heater, incinerator, kiln, oven, turbine, thermal oxidizer, other	Design capacity in MMBtu per hour Firing type
	Fluid catalytic cracking unit (FCCU)	Not applicable
	Boiler—Electric Generation I.C. Engine—Electric Generation Turbine—Electric Generation	Design capacity in MMBtu per hour Firing Type Generation Capacity in MW
Coating or printing	Coating or printing	Not applicable
Cooling tower	Cooling tower	Design flow rate in MMgal per day Draft design type (natural or mechanical) Number of cells Sampling schedule Sample tested for VOCs? Sampling data used to calculate emissions?
Equipment leak fugitives (Leaking component fugitives )	Equipment leak fugitives	Emissions determination methodology* Leak detection and repair program* Component count* *refer to the Facility Information for Leaking Component Fugitives and the Fugitive Data forms
Loading	Railcar Tanker truck Railcar / tanker truck Marine Other	Not applicable
Other	Other	Not applicable

**Table 6-1. STARS Facility Group Types, Profiles and Characteristics, continued**

Group	Profile	Characteristics
Tanks	Horizontal fixed roof Vertical fixed roof Internal floating roof Pressure tank Underground tank External floating roof: double deck, single seal External floating roof: double deck, double seal External floating roof: pontoon, single seal External floating roof: pontoon, double seal Domed external floating roof: double deck Domed external floating roof: pontoon Other	Refer to the Facility Information for Storage Tanks form.
VOC process	Analyzer Blowdown operations Glycol still Polyethylene unit Polypropylene unit Mixing vessel Reactor Other	Not applicable
Wastewater	Wastewater system	Flow model (flowthrough or disposal) Aeration (diffused air, mechanical or none) Biodegradation mechanism (biodegradation, activated sludge, or none) Design type (surface, subsurface, or other) Depth Surface area Flow rate in MMgal per day
Wastewater	Basin Clarifier Closed sump Lift station Open sump Reactor Stripper Separator Other wastewater component	Not applicable

## ***Control Device Information***

Descriptions of the items in this section, along with information on accepted values, appear in the instructions for completing the Abatement Device Information form. If you need to make corrections to any of the information in this section, please do so in the blanks provided.

For each abatement device, verify that:

- the stated abatement efficiencies are accurate;
- the abatement code, number of units, and inspection and maintenance (I/M) schedule are accurate; and that
- the percentage of time offline is reflected in annual emissions determinations.

For abatement devices that can also be considered facilities, such as combustive abatement devices, ensure that these devices are not abating their own emissions. Abatement devices cannot abate themselves.

## ***Parameters for Emission Points***

Descriptions of most of the items in this section, along with information on accepted values, may be found in the instructions for completing the relevant Emission Point Information form. The following discussion focuses primarily on common issues concerning updating emission data for each path.

In STARS, every emission point has a “type” associated with it; currently, these types are as follows: stack, flare, and fugitive. You will notice that these types now also appear on the Emission Point Information forms. Associating each emission point with a type allows the IEAS to collect data on sources of interest and facilitates data retrieval.

If the emission point type is incorrect, please complete and submit the appropriate Emission Point Information form, marking “update” at the top of the form to avoid confusion. Note that you must choose from the available emission point types.

### **UTM Coordinates**

Accurate UTM coordinates for each emission point are essential to urban airshed modeling activities. All account UTM coordinates should be expressed in the North American Datum of 1983 (NAD83) coordinate system.

Verify that each account emission point has accurate NAD83 UTM coordinates; for most nonfugitive emission points, these coordinates should be unique. Also, verify that the account centroid, printed on page 2 of the EIQ, is correct.

### **EPN Parameters**

Accurate emission point parameters are essential to urban airshed modeling activities. Emission point parameters should represent **actual** stack, fugitive, or flare parameter values, not values for permit modeling purposes. Verify that all account emission points have accurate, actual parameter values.

## ***Changing FIN and EPN Designations***

The IEAS does not normally allow changes to FIN or EPN designations due to the historical nature of emissions data. Exceptions to this policy will be made to correct errors or to align EI nomenclature with permit nomenclature. If you feel revisions to FIN or EPN designations are necessary, please submit a Revision Request form; be sure to provide a reason for the requested revisions. Note that the IEAS reserves the right to approve or disapprove all such revision requests.

## ***Total Aggregate Annual Heat Input***

For combustion units, enter the total heat value (in MMBtu) of all fuels that the facility combusted during the year.

To determine the total aggregate annual heat input, first determine the heat input for **each** fuel that the facility combusted during the year by multiplying the fuel's gross heating (calorific) value (in Btu/lb) by the fuel's annual feed rate (in lb/year). Next, sum these individual annual heat inputs for all fuels combusted during the year, and convert from Btu to MMBtu to obtain the total aggregate annual heat input (in MMBtu/year).

## ***Emissions Factors***

In the spaces provided, supply the factors that were used to determine the emissions for this FIN/EPN path. In the far right column, enter the source from which the emissions factor originated.

In particular, providing NO<sub>x</sub> emissions factor data within the EIQ will allow the IEAS to capture this data, which will be used to improve the TCEQ's airshed modeling and rule making activities. To promote consistency among similar emissions sources, the IEAS requests that the

NO<sub>x</sub> emissions factors be based upon the following process rate data. Examples of the preferred process-rate-based NO<sub>x</sub> factors include:

- lb/MMBtu (boilers, furnaces, heater, and turbines)
- g/hp-hr or lb/MMBtu (all engines)
- lb of NO<sub>x</sub> /ton of clinker (cement kilns)
- lb of NO<sub>x</sub> /ton of calcium oxide (lime kilns)
- lb of NO<sub>x</sub> /ton of product (lightweight aggregate)
- lb/Mgal (liquid-fired boilers)
- ppmv @ 0% O<sub>2</sub> (FCCUs)

Ensure that an NO<sub>x</sub> emissions factor has been entered for every NO<sub>x</sub> source on the “Emissions Factor” portion of the EIQ.

## **Updating Reported Emissions**

Detailed discussion of the items in this section may be found in *2006 Emissions Inventory Forms and Instructions* (RG-360B) in the section on completing the Path Emissions form. The following discussion focuses primarily on common issues concerning updating emissions data for each path.

Updated emissions must be reported on the appropriate EIQ forms. **The IEAS does not allow the submission of spreadsheets in lieu of completed EIQ forms.**

### **Annual Emissions**

For annual emissions, report total emissions rates for the year for all contaminants emitted, measured in tons. Actual annual emissions should not include emissions from emissions events or scheduled maintenance, startup or shutdown activities. Annual emissions include authorized emissions from maintenance, startup, and shutdown activities. Ensure that all criteria emissions totals (as updated on the front page of the EIQ) are included as path emissions within the body of the EIQ.

Update annual emissions under the “Path Emissions” portion of the EIQ. The printed numbers in this section reflect the emissions rates submitted on the most recent inventory. Enter the new rates in the space provided; only **one** rate may be entered per blank. If an emissions rate did not change, circle the printed rate.

### **Ozone Season Emissions**

For ozone season emissions, report actual contaminant emissions rates during the ozone season, measured in pounds per day. Recall that the

ozone season is defined as the 92 days from June 1 to August 31, inclusive; see Chapter 4, “Determining and Reporting Emissions,” for more details. Ozone season emissions are mandatory for all accounts in El Paso County and for all accounts in any county east of the Central Meridian. A list of these counties is provided in Table 4-4. The IEAS database can no longer automatically calculate ozone season rates.

The printed numbers in this section reflect the emissions rates submitted for the most recent inventory. Enter the new rates in the space provided; only **one** rate may be entered per blank. If an emissions rate did not change, you may simply circle the printed rate.

### **Emissions Events (EE)**

Report emissions from emissions events in the EE column, using the blanks provided. For more information on emissions events, see Chapter 4, “Determining and Reporting Emissions.”

### **Scheduled Maintenance, Startup, and Shutdown Activities (SMSS)**

Report emissions from scheduled maintenance, startup, and shutdown activities in the “SMSS” column, using the blanks provided. For more information on SMSS emissions, see Chapter 4.

### **EE/SMSS Column: Reporting Guidelines**

As outlined in the previous section, emissions from emissions events and/or SMSS activities must be reported in either the EE or SMSS column, as appropriate. **If an account reports emissions in the EE/SMSS totals column, emissions must also be reported in the EE and/or SMSS columns, as appropriate.**

### **Determination Methodology**

The determination methodology represents the method used to determine the reported emissions. Acceptable methods are described in Chapter 4.

Verify an emissions rate’s determination methodology every year, updating the methodology as needed with the correct code under the “Method” heading (on the Path Emissions portion of the EIQ). To obtain the code for a particular EIQ determination methodology, consult the appropriate heading in Chapter 4.

## Adding Emissions Rates

To add an emissions rate to the EIQ, you will first need a contaminant code. Contaminant codes are unique five-digit codes associated with individual contaminants. An updated list of contaminant codes is available in *2006 Emissions Inventory Forms and Instructions (RG-360B)*.

To report emissions of a contaminant not printed on the form, simply add the following below the last printed entry:

- the contaminant code;
- the associated annual, ozone, EE, and SMSS emissions rates (as applicable); and
- the determination methodology.

If you wish to add numerous contaminants that will not fit on the EIQ page itself, you may submit a Path Emissions form with the appropriate information. On the form, note that both the FIN and EPN are “existing” in the gray box directly above the FIN and EPN blanks.

If a contaminant does not appear to have a contaminant code, try electronically searching for the contaminant’s Chemical Abstracts Service (CAS) number in *2006 Emissions Inventory Forms and Instructions (RG-360B)*. If a search by CAS number fails, contact the IEAS for assistance; be sure to have the chemical’s name and CAS number when you call.

## Emissions Rates: Numeric Format

STARS cannot accept emissions rates beyond four decimal places. Emissions rates that extend beyond four decimal places should be rounded as appropriate. Under no circumstances may scientific notation be used when reporting emissions rates, as data in this numeric format cannot be entered into STARS.

Only one emissions rate can be entered per blank. STARS does not support the routine reporting of emissions rates for time periods of less than one year, such as quarterly emissions rates.



# APPENDIX A—TECHNICAL SUPPLEMENTS

## Disclaimer

The Industrial Emissions Assessment Section (IEAS) has developed technical supplements for several common emission sources. The supplements are intended to help you accurately determine and correctly report emissions from specific types of sources, and may not cover every source in your account. You are responsible for reporting emissions from every source required to be included in your emissions inventory. See Chapter 1 for information on reporting requirements.

These supplements reflect our current understanding of how certain processes work and how they generate emissions. The supplements may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding.

The methods discussed in this appendix are intended as an aid in calculating emissions. Certain process or operational conditions may make alternate calculation methods equally acceptable if they are based upon, and adequately demonstrate, sound engineering principles or data. You are responsible for using the best available method to determine and report the emissions that accurately reflect the conditions at your site. If you have a question regarding the acceptability of a given emissions determination method, contact the IEAS at 512-239-1773.

## Miscellaneous VOC Sources

One of the goals of the IEAS is to identify sources that are unreporting or underreporting their VOC emissions. The TCEQ is not aware of any specific guidance that is readily available to estimate the emissions from these type of sources. However, these sources are present and the emissions should be represented in the emissions inventory using the best available emission estimation methodologies. These sources include, but are not limited to, casing head gas releases, coking units, confined entry ventilation, and Merox units.

### *Casing Head Gas Releases*

Casing head gas is unprocessed natural gas and other hydrocarbon vapors that emerge at the casing head fitting when crude oil is pumped to the surface in a well. During normal operating conditions, the casing head fitting is tight and no vapors leak into the atmosphere. When the casing head gas is vented, the emissions should be accounted for in the emissions inventory.

## **Coking Units**

*Coking* is a severe method of thermal cracking used to break heavy, long-chained hydrocarbons into lighter products. The residual product of the coking process is a solid carbon substance called *petroleum coke*.

Petroleum coke is removed from the walls of a coke drum by *decoking* or *coke cutting*. During the decoking or coke cutting process, VOC gases trapped in the coke will be released, creating hot spots and steam eruptions. Hydrocarbons may also be emitted during the associated cooling and venting of the coke drum prior to decoking.

## **Confined Entry Ventilation**

Confined entry usually occurs during inspection, repair, or maintenance. Before entry, gas hazards are controlled by purging, inerting, flushing, or ventilating the space as necessary. Examples of confined spaces include, but are not limited to, tanks, manholes, boilers, furnaces, vaults, pipes, trenches, tunnels, ducts, and bins.

If the seal of a confined space is broken and uncontrolled, the contaminants within the confined space may be released into the atmosphere. These emissions should be accounted for in the EI. Consult Chapter 3 for information on Collective Sources to determine if these ventilation emission sources can be grouped in your account.

## **Merox Units**

After mercaptan-rich hydrocarbon liquids are treated in a Merox unit, they are often placed in a storage tank. Inert gases may become trapped in this hydrocarbon liquid and can strip VOCs while escaping during storage. These additional emissions may not be accounted for by the EPA TANKS program.

If the liquid streams are warmer than ambient temperature, see Technical Supplement 6 for information on hot-product storage to determine the tank's routine emissions. Additional emissions from inert gas stripping should be calculated using sound engineering principles and data.

## Technical Supplements

The following technical supplements are included in this appendix.

***Technical Supplement 1: Select Combustion Sources*** addresses common problems and concerns regarding internal combustion engines (turbines, reciprocating engines, and gasoline and diesel industrial engines); external combustion sources burning natural gas; and combined cycle turbines with heat recovery steam generators.

***Technical Supplement 2: Cooling Towers*** will help you to determine the nature of the emissions from your cooling tower system, to identify some of the methods that may be used to quantify those emissions, and to correctly report the emissions on the annual emissions inventory.

***Technical Supplement 3: Equipment Leak Fugitives*** discusses emissions from piping components at industrial facilities resulting from leaking seals or connections.

***Technical Supplement 4: Flares*** clarifies how elevated flare emissions should be estimated and reported.

***Technical Supplement 5: Marine Facilities*** discusses stationary emissions from vessel cleaning, material transfer, and dockside sources such as particulate stockpiles, silos, VOC collection units, loading racks, and abatement devices. All of these emissions sources must be reported in the dock owner's emissions inventory.

***Technical Supplement 6: Aboveground Liquid Storage Tanks*** explores stationary emissions from storage tank breathing and working losses, flashing losses, and landing losses. The supplement identifies some of the methods used to quantify those emissions.



# TECHNICAL SUPPLEMENT 1: SELECTED COMBUSTION SOURCES

## Technical Disclaimer

This technical supplement is intended to help you accurately determine and correctly report emissions from combustion sources. It does not supersede or replace any state or federal law, rule, or regulation.

This guidance, which reflects our current understanding of how combustion sources work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of combustion emissions and thereby further improve emissions reported within the emissions inventory.

The calculation methods represented are intended as an aid; alternate methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Industrial Emissions Assessment Section at 512-239-1773.

## Introduction

This technical supplement addresses common problems and concerns with internal combustion engines (turbines, reciprocating engines, and gasoline and diesel industrial engines); external combustion sources burning natural gas; and combined cycle turbines with heat recovery steam generators. For more information about these sources, or for information about combustion sources not covered in this supplement, consult the appropriate TCEQ new source review guides and the EPA's compilation of *Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (AP-42), continuously updated.

## Internal Combustion Engines

### ***Expected Contaminants***

Reported engine emissions should include all of the following:

- TSPs (contaminant code 10000)
- PM<sub>10</sub> (contaminant code 20000)
- PM<sub>2.5</sub> (contaminant code 39999)
- VOCs (contaminant codes 50001 through 59998)
- NO<sub>x</sub> (contaminant code 70400)
- SO<sub>2</sub> (contaminant code 70510)
- CO (contaminant code 90300)

### ***Emissions Determination Methodologies***

The appropriate emissions determination methodologies for internal combustion engines are accepted in the following order of preference:

- D (continuous emissions monitoring system or CEMs)
- F (predictive emissions monitoring system or PEMS)
- M (measured—stack test data)
- V (vendor-supplied emissions factors)
- A (AP-42 factors)
- S (scientifically calculated)
- E (estimated)

Testing conducted with a portable analyzer does not qualify as stack testing, and using this data would be considered an estimated (“E”) methodology. Using stack test results from an identical unit also falls under the estimated (“E”) methodology.

Note that material balance (“B”) is not explicitly mentioned in the list because of its limited applicability in determining emissions from combustion sources. If you feel that none of these methodologies will accurately represent a source’s emissions, contact the IEAS for further assistance.

### ***SO<sub>2</sub> Emissions***

If any sulfur is present in a source’s inlet gas, then the source will emit sulfur dioxide as a product of combustion. When selecting a methodology for determining SO<sub>2</sub> emissions, CEMS, PEMS, and stack test data are, in that order, the preferred emissions determination methods. However, material balance emissions determinations based upon the combusted fuel’s sulfur content are preferred to both vendor and AP-42 determinations.

## **Particulate Emissions**

Determining and reporting particulate emissions has caused some confusion in previous years. Please read the following information carefully.

Combustion sources emit particulate matter. Furthermore, particulate matter emitted from internal combustion engines has an aerodynamic diameter smaller than 2.5 microns. Thus, all particulate emissions from these sources should be reported as  $PM_{2.5}$ , total suspended particulate (TSP) matter, and  $PM_{10}$ . See Chapter 4, "Particulate Emissions," for more details.

In the past, some confusion has arisen from AP-42's representation of three particulate emission factors:  $PM_{10}$  (filterable),  $PM_{2.5}$  (filterable), and PM (condensable). Since the condensable and filterable fractions represent two different halves of cumulative particulate emissions, these factors must be used together to accurately represent cumulative particulate emissions.

However, the manner in which you sum these emission factors is not straightforward. Since all particulate matter emitted from internal combustion engines is  $PM_{2.5}$  or smaller, the  $PM_{10}$  (filterable) and  $PM_{2.5}$  (filterable) factors are equivalent; those two factors represent the same set of particulate emissions. In calculating emissions, then, you only need to use one of these factors when attempting to obtain the cumulative emissions factor.

To calculate particulate emissions, sum the condensable factor and one of the two filterable factors to obtain the cumulative emissions factor. Use this cumulative emissions factor to determine all particulate emissions. Report the emission rate thus obtained as follows:

- total suspended particulate (contaminant code 10000);
- $PM_{10}$  (contaminant code 20000); and
- $PM_{2.5}$  (contaminant code 39999).

**Example:** Suppose that AP-42 shows the following emission factors for particulate matter from a certain type of engine:

$PM_{10}$  (filterable) = 0.0095 lb/MMBtu

$PM_{2.5}$  (filterable) = 0.0095 lb/MMBtu

PM (condensable) = 0.00991 lb/MMBtu

Then the correct particulate emission factor for this engine type would be the sum of the  $PM_{2.5}$  (filterable) and the PM (condensable) factors, or

0.01941 lb/MMBtu. If the engine consumed 35,000 MMBtu of fuel during the year, then its particulate emissions would be:

$$\frac{0.0194 \text{ lb}}{\text{MMBtu}} \times \frac{35,000 \text{ MMBtu}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 0.3395 \text{ tons}$$

The correct way to report these emissions is shown in the following table:

**Table A-1. Reporting Particulate Emissions**

Contaminant Code	Contaminant	Annual Emissions
10000	part-unclassified	0.3395 tons
20000	PM <sub>10</sub> -unclassified	0.3395 tons
39999	total PM <sub>2.5</sub>	0.3395 tons

## VOC Emissions

Determining, speciating, and reporting VOC emissions have caused some confusion in previous years. Please read the information in this section carefully. VOC emissions may be determined using a combination of stack test data, vendor data, and AP-42 factors. Each methodology is discussed separately in the following sections; each section contains methodology-specific speciation instructions.

### Stack Test Data

When using stack test data to determine VOC emissions, verify that the test measured VOCs rather than total hydrocarbons. If it did measure VOCs, then use the test data to determine emissions; code the emissions with a determination methodology of “M.”

If the test instead measured total hydrocarbons, then you will need to adjust for this by multiplying the hydrocarbon factor by the following ratio: AP-42 VOC factor / AP-42 total organic carbon (TOC) factor. Code the emissions with a determination methodology of “S.”

Because complex oxidation reactions in the combustion chamber significantly alter the emissions composition, it is unacceptable to apply the inlet gas stream’s VOC percentage to the stack test TOC factor to obtain a VOC emission factor.

### Vendor Data

When using vendor data to determine VOC emissions, verify that the factor refers to VOCs rather than total hydrocarbons. If it does, then use it to determine emissions; code the emissions with a determination methodology of “V.”

If the factor refers instead to total hydrocarbons, then you will need to adjust for this by multiplying the hydrocarbon factor by the following ratio: AP-42 VOC factor / AP-42 TOC factor. Code the emissions with a determination methodology of “S.”

Because complex oxidation reactions in the combustion chamber significantly alter the emissions composition, it is unacceptable to apply the inlet gas stream’s VOC percentage to the vendor’s TOC factor to obtain a VOC emission factor.

### **AP-42 Factors**

AP-42 provides both VOC and TOC factors. Because complex oxidation reactions in the combustion chamber significantly alter the composition of emissions, it is unacceptable to apply the inlet gas stream’s VOC percentage to the AP-42 TOC factor to obtain a VOC emission factor.

When using an AP-42 factor to determine emissions, use the most recent VOC factor. Code emissions with a determination methodology of “A.”

### **Speciation**

To determine whether or not you need to speciate VOC emissions from an internal combustion engine, see Chapter 4.

If you have any source-specific information about the VOC emissions composition for a source, then you should use it to speciate the emissions. Supply the data and related information with your emissions inventory.

If you do not have any source-specific information about the VOC emissions’ composition, then you should speciate the emissions using those AP-42 “trace organic compounds” factors that are graded “C” or better. Divide each trace organic factor by AP-42’s VOC factor to obtain the contaminant’s speciation ratio. Multiply the source’s total VOC emissions by each ratio to obtain that compound’s emission rate. You need only report speciated emissions of at least 0.1 ton; smaller rates may be reported under VOC-u (contaminant code 50001).

If you used stack test data or vendor data to determine total VOC emissions, then code the speciated emissions with a determination methodology of “S” for “scientifically calculated”; the VOC-u emissions will be coded as “M” or “V.” If you used an AP-42 factor to determine total VOC emissions, then code all VOC emissions with a determination methodology of “A.”

**Example:** Using a vendor-supplied VOC factor, you have determined VOC emissions from a four-cycle lean burn compressor at 11.2 tons. You have no information about the composition of the exhaust VOCs. You do have an inlet gas analysis, but because complex oxidation reactions in the combustion chamber alter the emissions composition significantly, you know that you cannot use those data to speciate the VOC emissions. You therefore turn to AP-42.

In AP-42, you find that one of the Trace Organic Compounds factors graded C or better is for formaldehyde: 0.0528 lb/MMBtu. The total VOC emission factor in AP-42 is 0.118 lb/MMBtu. To obtain formaldehyde's speciation ratio, you divide the formaldehyde factor by the total VOC factor:

$$0.0528 \text{ lb/MMBtu} \div 0.118 \text{ lb/MMBtu} = 0.44746$$

Now you multiply the engine's total VOC emissions by this ratio to determine the formaldehyde emissions:

$$11.2 \text{ tons VOC} \times 0.44746 = 5.0115 \text{ tons formaldehyde}$$

If you perform a similar calculation for each Trace Organic Compound with a factor graded C or better, you will obtain 27 speciated emission rates. However, only eight of these exceed the 0.1 ton threshold. You should report the speciated emissions for these eight compounds and report the balance of VOC emissions under "VOC-unclassified," as shown in Table A-2.

**Table A-2. Reporting Internal Combustion VOC Emissions**

<b>Contaminant Code</b>	<b>Contaminant</b>	<b>Annual Emissions</b>	<b>Determination Methodology</b>
50001	VOC-unclassified	0.2240 ton	V
51620	acetaldehyde	0.7935 ton	S
51640	acrolein	0.4879 ton	S
51680	formaldehyde	5.0115 tons	S
51530	methanol	0.2373 ton	S
56150	methylcyclohexane	0.1167 ton	S
56600	<i>n</i> -hexane	0.1054 ton	S
56750	<i>n</i> -pentane	0.2468 ton	S
56775	propane	3.9769 ton	S

## ***Ozone Season Emissions***

Ozone season emissions should reflect an average daily emission rate. Do not report maximum daily emissions based on a design capacity and the assumption that the facility operated 24 hours each day. For sources that run regularly throughout the ozone season, divide the total emissions from June, July, and August by the number of days the facility is operated. For sources that run intermittently during the ozone season (e.g., emergency generators which operate a few hours every couple of weeks), use a straight conversion of the annual tons per year to pounds per day.

## **External Combustion Sources Burning Natural Gas**

### ***Expected Contaminants***

Reported boiler emissions should include all of the following:

- TSP (contaminant code 10000)
- PM<sub>10</sub> (contaminant code 20000)
- PM<sub>2.5</sub> (contaminant code 39999)
- VOCs (contaminant codes 50001 through 59998)
- NO<sub>x</sub> (contaminant code 70400)
- SO<sub>2</sub> (contaminant code 70510)
- CO (contaminant code 90300)

### ***Emissions Determination Methodologies***

The appropriate emission determination methodologies for boilers are, in order of preference:

- D (continuous monitoring system)
- F (predictive monitoring system)
- M (measured—stack test data)
- V (vendor-supplied emissions factors)
- A (AP-42 factors)
- S (scientifically calculated)
- E (estimated)

Testing conducted the use of these data would be considered an estimated (“E”) methodology. Using stack test results from an identical unit also falls under the estimated (“E”) methodology.

If you feel that none of these methodologies will accurately represent a source's emissions, contact the IEAS for further assistance.

## ***SO<sub>2</sub> Emissions***

Note that if any sulfur is present in a source's inlet gas, then the source will emit sulfur dioxide as a product of combustion.

## ***Particulate Emissions***

Determining and reporting particulate emissions has caused some confusion in previous years. Please read the following information carefully.

Combustion sources emit particulate matter. Furthermore, all of the particulate matter emitted from boilers as a result of combustion has an aerodynamic diameter smaller than 2.5. Hence, all particulate emissions from these sources should be reported as TSP, PM<sub>10</sub>, and PM<sub>2.5</sub>.

Note that AP-42 provides three particulate emission factors: PM (total), PM (condensable), and PM (filterable). Use the PM (total) factor (which can also be obtained by summing the PM (condensable) and PM (filterable) factors) to determine boiler particulate emissions. Report these emissions as TSP (contaminant code 10000), as PM<sub>10</sub> (contaminant code 20000), and as PM<sub>2.5</sub> (contaminant code 39999).

## ***VOC Emissions***

The practice of determining, speciating and reporting VOC emissions has caused some confusion in previous years. Please read the information in this section carefully. Emissions may be determined using stack test data, AP-42 factors, or both. Each methodology is discussed separately in the following sections, and is followed by instructions on speciation.

### **Stack Test Data**

When using stack test data to determine VOC emissions, verify that the test measured VOCs rather than total hydrocarbons. If it did measure VOCs, then use the test data to determine emissions; code the emissions with a determination methodology of "M."

If the test instead measured total hydrocarbons, then you will need to adjust for this by multiplying the hydrocarbon factor by the following ratio: AP-42 VOC factor / AP-42 TOC factor. Code the emissions with a determination methodology of "S." Because complex oxidation reactions in the combustion chamber significantly alter the composition of

emissions, it is unacceptable to apply the inlet gas stream's VOC percentage to the stack test TOC factor to obtain a VOC emission factor.

### **Vendor Data**

When using vendor data to determine VOC emissions, verify that the factor refers to VOCs rather than total hydrocarbons. If it does, then use it to determine emissions; code the emissions with a determination methodology of "V."

If the factor refers instead to total hydrocarbons, then you will need to adjust for this by multiplying the hydrocarbon factor by the ratio: AP-42 VOC factor / AP-42 TOC factor. Code the emissions with a determination methodology of "S."

Because complex oxidation reactions in the combustion chamber significantly alter the emissions composition, it is unacceptable to apply the inlet gas stream's VOC percentage to the vendor's TOC factor to obtain a VOC emission factor.

### **AP-42 Factors**

AP-42 provides both VOC and TOC factors. Because complex oxidation reactions in the combustion chamber significantly alter the emissions composition, it is unacceptable to apply the inlet gas stream's VOC percentage to the AP-42 TOC factor to obtain a VOC emission factor.

When using an AP-42 factor to determine emissions, use the most recent factor. Code all emissions with a determination methodology of "A."

### **Speciation**

To determine whether or not you need to speciate VOC emissions from a source, consult Chapter 4.

If you have any source-specific information about the composition of VOC emissions for a source, then you should use it to speciate the emissions. Supply the data and related information with your emissions inventory.

If you do not have any source-specific information about the composition of VOC emissions, then you should speciate the emissions using the AP-42 speciated organic compounds factors for formaldehyde, toluene, and benzene. Divide each of these factors by the AP-42 VOC factor to obtain the contaminant's speciation ratio. Then multiply the source's total VOC emissions by each contaminant's ratio to obtain that contaminant's

emission rate. Report the emissions balance as “VOC-unclassified” (contaminant code 50001).

If you used stack test data to determine total VOC emissions, then code the speciated emissions with a determination methodology of “S” for “scientifically calculated”; the VOC-u emissions will be coded as “M.” If you used an AP-42 factor to determine total VOC emissions, then code all VOC emissions with a determination methodology of “A.”

**Example:** Using stack test data, you have determined VOC emissions from a boiler at 43 tons. You have no information about the composition of the exhaust VOCs. You do have an inlet gas analysis, but because complex oxidation reactions in the combustion chamber alter the emissions composition significantly, you know that you cannot use these data to speciate the VOC emissions. You therefore turn to AP-42.

In AP-42, you find that one of the speciated organic compounds factors graded C or better is for formaldehyde: 0.075 lb/MMscf. The total VOC emission factor in AP-42 is 5.5 lb/MMscf. To obtain formaldehyde’s speciation ratio, you divide the formaldehyde factor by the total VOC factor:

$$0.075 \text{ lb/MMscf} \div 5.5 \text{ lb/MMscf} = 0.0136$$

Now you multiply the boiler’s total VOC emissions by this ratio to determine the formaldehyde emissions:

$$43 \text{ tons VOC} \times 0.0136 = 0.5864 \text{ ton formaldehyde}$$

Perform similar calculations for benzene and toluene. Report the boiler’s VOC emissions as shown in Table A-3.

**Table A-3. Reporting External Combustion VOC Emissions**

Contaminant Code	Contaminant	Annual Emissions	Determination Methodology
50001	VOC-unclassified	42.3706 tons	M
51680	formaldehyde	0.5864 ton	S
52420	benzene	0.0164 ton	S
52490	toluene	0.0266 ton	S

# Combined Cycle Turbines with Heat Recovery Steam Generators

## *Structure*

Structural representation of cogeneration turbines with an associated duct burner, heat recovery steam generator (HRSG), or boiler will vary, depending upon the operation of the units in question.

If the unit associated with the cogeneration turbine cannot operate independently from the turbine, represent the units as one facility–emission point path, noting in the path or facility comments that a duct burner or HRSG operates in conjunction with the turbine.

If the unit associated with the cogeneration turbine can operate independently from the turbine, as is the case for most boilers, then represent the turbine as one facility and the associated unit as a separate facility. If both the turbine and the associated unit vent to the same emission point, create a common emission point for both facilities.

If the turbine can vent to a separate emission point (that is **not** the emission point shared with the associated unit) when it operates independently, that emission point also needs to be represented in the EI. Create two paths for the turbine, using one facility and two emission points: one for the separate turbine stack, and one for the stack shared with the associated unit. Remember also to include the path for the associated unit that vents to the shared stack in the EI.

## *Expected Contaminants*

These facilities' reported emissions should include all of the following:

- TSP (contaminant code 10000)
- PM<sub>10</sub> (contaminant code 20000)
- PM<sub>2.5</sub> (contaminant code 39999) (continued on next page)
- VOCs (contaminant codes 50001 through 59998)
- NO<sub>x</sub> (contaminant code 70400)
- SO<sub>2</sub> (contaminant code 70510)
- CO (contaminant code 90300)
- NH<sub>3</sub> (contaminant code 70050)

## **Emissions Determination Methodologies**

The appropriate emission determination methodologies for combined cycle turbines are, in order of preference:

- D (continuous monitoring system)
- F (predictive monitoring system)
- M (measured—stack test data)
- V (vendor-supplied emissions factors)
- A (AP-42 factors)
- S (scientifically calculated)
- E (estimated)

Quarterly testing with a portable instrument falls under the scientifically calculated (“S”) methodology. Using stack test results from an identical unit falls under the estimated (“E”) methodology.

If you feel that none of these methodologies will accurately represent a source’s emissions, contact the IEAS for further assistance.

## ***NO<sub>x</sub> and CO Emissions***

NO<sub>x</sub> and CO emissions from these sources are typically continuously monitored. In this case, emissions reporting is straightforward.

If, however, you use stack test data to determine emissions from a combined cycle turbine equipped with a duct burner, you should use two data sets: one representing emissions with the duct burner on, the other representing emissions with the duct burner off. If you do not have two separate data sets, or if you are using another method to determine emissions, then contact the IEAS for guidance.

## ***Particulate, VOC, and SO<sub>2</sub> Emissions***

For guidance on determining and speciating these emissions, see “Internal Combustion Engines” earlier in this supplement.

# TECHNICAL SUPPLEMENT 2: COOLING TOWERS

## Technical Disclaimer

This technical supplement is intended to help you accurately determine and correctly report cooling tower emissions. It does not supersede or replace any state or federal law, rule, or regulation.

This guidance, which reflects our current understanding of how cooling towers work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of cooling tower emissions and thereby further improve determinations within the emissions inventory.

The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question about the acceptability of a given emissions determination method, contact the Industrial Emissions Assessment Section at 512-239-1773.

## Introduction

This technical supplement offers guidance on identifying, quantifying, and correctly reporting cooling tower emissions on the annual emissions inventory. It does not address devices such as fin-fan coolers and the cooling towers used exclusively in HVAC systems.

## Definitions

In this document, “cooling tower” refers to the equipment that, through the process of direct contact with atmospheric air, reduces the temperature of water used to cool either process equipment or process fluid streams. “Cooling tower heat exchange system” refers to the cooling tower and all associated heat exchangers, pumps, and ancillary equipment where water is used as a cooling medium to which the heat from process fluids is transferred.

## Cooling Tower Structure

Each cooling tower in VOC service must be represented as a facility in the EI. For a multicell tower, represent the entire tower as a single facility.

To add a cooling tower in VOC service to the EI, use the Facility Information for Cooling Tower form. For cooling towers already in the EI, ensure that the appropriate facilities have a “cooling tower” group and

profile, and that all facility profile characteristics are complete. If a cooling tower facility has the incorrect group type, strike through the incorrect group type on the EI and write “cooling tower,” and then update the facility by attaching a completed Facility Information for Cooling Tower form to the EI; be sure to write “UPDATE FACILITY” across the top of the form.

Each cooling tower facility must have a **stack** type emission point. This stack type emission point should have:

- a stack diameter equal to the diameter
  - of the tower top for natural draft towers; or
  - of the fan for mechanical draft towers; or
  - of an average fan for multicell towers;
- a stack velocity of 10–20 feet per second;
- a temperature ranging from ambient to 15 degrees Fahrenheit above ambient;
- a nonzero moisture content (generally between 5 to 10 percent); and
- no horizontal discharge, except for crossflow towers (possibly).

When a permit lists multiple fans in a multicell tower, use multiple stack type emission points attached to a single cooling tower facility.

## Cooling Tower Source Classification Codes

Use either SCC 38500101 (for mechanical-draft cooling towers) or SCC 38500102 (for natural-draft cooling towers).

## Expected Emissions

Cooling towers operate in such a manner that they may emit particulate matter, dissolved solids, or chemicals entrained in the cooling water. Cooling tower emissions fall into three categories: particulate matter, inorganic compounds, and volatile organic compounds (VOCs). Any tower has the potential to emit all three of these emissions types in varying amounts, depending on the its service.

### ***Particulate Matter***

Particulate emissions result from the presence of minerals or any dissolved or suspended solids in the cooling water. Air flowing through the tower can entrain water droplets and carry them out of the cooling tower in a process referred to as drift. Once these drift droplets leave the tower and

evaporate, they deposit dissolved or suspended solids as fine particulate matter (PM<sub>10</sub> or smaller).

Cooling towers are generally designed with drift eliminators—typically mesh or a series of angled slates placed above the water inlet. Note that, despite its name, a drift eliminator will reduce, but not eliminate, drift.

### ***Inorganic Compounds***

Inorganic emissions may result from inorganic process fluids leaking into the cooling water or from water treatment chemicals or other additives used in the cooling water system. The air flowing through the tower may strip these inorganic compounds from the water, resulting in their emission. Typical inorganic emissions may consist of chlorinated compounds, brominated compounds, or any other inorganic substance present in the cooling water.

### ***Volatile Organic Compounds***

Although some VOC emissions may result from the stripping of organic water treatment chemicals, the primary sources of VOC emissions are hydrocarbon-containing process fluids leaked into the cooling water by components of the cooling tower heat exchange system. Once the hydrocarbon-contaminated cooling water reaches the tower, the VOCs either flash out of the water or are stripped out by the tower's air flow. This may result in many tons of VOC emissions.

## **Emissions Determination**

The process serviced by the cooling tower will largely determine how emissions should be determined and reported. For each contaminant type, determination methods and special concerns are discussed in the following sections.

### ***Particulate Matter***

Some manufacturers provide drift factors that may help you to determine particulate emissions. If you use a vendor-supplied drift factor, code the associated emissions with a determination methodology of "V" for 'vendor data.'

If no drift data are available from the manufacturer, determine particulate emissions using the appropriate factor from AP-42, Chapter 13. Code the associated emissions with a determination methodology of "A."

## **Inorganic Compounds**

Very little research has focused on inorganic compound emissions from cooling towers. Emissions resulting from water additives may be determined based on the additive's chemical characteristics, the amount of additive used, the volume of cooling water, and a scientifically based assumption about the percentage of additive stripped from the cooling water at the tower. Code the associated emissions with a determination methodology of "E" for 'estimated.'

## **Volatile Organic Compounds**

### **Emissions Determination Methodologies: Order of Preference**

The appropriate VOC emissions determination methodologies for cooling towers are, in order of preference:

- emissions data from an approved monitoring and control program plan on file with the TCEQ (code as "B");
- emissions data from an unapproved monitoring and control program (code as "E");
- the AP-42 **uncontrolled** factor.

The use of the AP-42 controlled factor is not allowed. Detailed explanations of these emissions determination methodologies appear in the following sections.

### **Emissions Determination Methodologies**

If cooling water is used to cool VOC process streams, emissions will result from process fluid leaks into the cooling water, with one exception. If the cooling water is maintained at a pressure at least 5 psi greater than the process fluid pressure throughout the entire cooling tower heat exchange system, then any leak in the heat exchanger will result in water leaking into the process fluid. For such systems, heat exchanger leaks do not generate VOC emissions from the cooling tower. For all other cooling tower heat exchange systems, where the cooling water is not maintained at a pressure at least 5 psi greater than the process fluid pressure throughout the entire cooling tower heat exchange system, use the following guidelines to determine emissions.

If VOC emissions are determined using a factor from Section 5.1 of AP-42, the uncontrolled emission factor (6 lb/MMgal) must be used. According to AP-42, use of the controlled factor (0.7 lb/MMgal) is contingent upon the use of applicable control technology to minimize hydrocarbon leaks into the cooling water system and the monitoring of cooling water for hydrocarbons. If a monitoring system allows for such control, then the associated data should be sufficiently detailed to allow for the derivation of an emission rate, either through a measurement of total VOC or through testing for all VOC species present in the cooling

water. If the monitoring system is insufficient in monitoring hydrocarbons, the “uncontrolled” VOC emission factor should be used. If you determine emissions in this manner, code them with a determination methodology of “A.”

Emissions determinations based on actual measured cooling water VOC concentrations and flow rate data are preferred. When using such data to determine emissions, assume that VOCs were present at the measured concentration for the entire period between samples. If analytical test methods indicate that VOC measurements are below the minimum detection limit, half of the detection limit must be used to calculate VOC emissions unless otherwise specified by a permit condition, TCEQ or federal rule, or commission order. This method applies to situations where monitoring is done such that a total VOC emission rate can be determined, either from a total VOC measurement or a summation of measurements of all of the VOC species in the cooling water. For cases where only a select few of the possible VOCs present in the cooling water are measured, the AP-42 uncontrolled factor should be used to determine the total VOC emission rate from the cooling tower, and the measurements of the select VOC species (such as HRVOCs) should be speciated in the emissions reporting and subtracted from the AP-42 derived total VOC emission rate.

Because these methods measure the amount of pollutant contained in the cooling water rather than the amount of pollutant released to the atmosphere, the emissions are not to be coded with a determination methodology of “M” (for ‘measured.’) The appropriate determination methodology will depend upon whether data are gathered following an approved monitoring and control program plan on file with the TCEQ. If so, code the associated emissions with a determination methodology of “B” for ‘material balance.’ If not, code them with a determination methodology of “E,” for ‘estimated.’ Please note that, in the case of cooling towers, such estimates are still preferred to AP-42 factors.

If cooling water VOC concentration is measured, but a large leak occurs between times of sampling events and no monitoring data are available for the period of the leak, then use the AP-42 uncontrolled emission factor to determine emissions for the leak period. If you do not know when the leak began, assume that it began immediately after the previous sample was taken. If the majority of annual emissions are determined using the measured data, then code them as described in the preceding paragraph.

Note that the information from devices such as lower explosive limit detectors, chlorine residual measurements, and total carbon measurements do not qualify as adequate monitoring or control technology and therefore do not allow use of the controlled VOC emission factor from AP-42.

## Annual and Ozone Season Rates

If measured data are available for a cooling tower, then calculate the reported emissions should be calculated using actual, rather than average, test data. Use test data from each sampling event to determine emissions released since the prior sampling. Sum the different sampling periods' emissions to obtain the annual total. If analytical test methods indicate that VOC measurements are below the minimum detection limit (that is, undetected), then half of the detection limit must be used to calculate VOC emissions, unless otherwise specified by permit condition, TCEQ or federal rule, or Commission order.

For example, suppose that tests are performed weekly to determine a cooling tower's VOC emission rate. Using the test results from each week and the associated water flow for the seven days preceding the sample time, one would calculate the total emissions for each seven-day period during the year, then sum those weekly emissions to arrive at the annual total.

To obtain ozone season emission rates, average over 92 days the total emissions during the months of June, July, and August.

## Speciation

If samples were tested for VOCs, then use the measured data to speciate emissions. For more information on speciation requirements, see Chapter 4. For guidance regarding method detection limits and speciated compounds, follow the general guidance outlined in "Minimum Detection Limits," Chapter 4.

## Supporting Documentation

Include documentation with your emissions inventory that supports and validates the emissions reported in the inventory. The relevant supporting documentation for cooling towers includes, but may not be limited to, representative samples of the following types of data:

- VOC test results, especially from times when leaks were discovered;
- cooling water and process fluid pressure readings for systems that maintain cooling water at a pressure at least 5 psi greater than the process fluid pressure throughout the entire cooling tower heat exchange system;
- annual water treatment chemical usage data for all chlorinated or brominated chemicals;
- annual and daily flow rate for cooling water; and
- emission rates calculated from measured data.

## Issues of Special Concern

### **What if I share a cooling tower with another company?**

Emissions should be reported by the regulated entity who owns the cooling tower. Please call the IEAS for additional guidance if you have questions about your particular situation.

### **Are there any circumstances under which I may use the AP-42 controlled VOC factor?**

No. According to AP-42, use of the “controlled” factor (0.7 lb/MMgal) is contingent upon the use of applicable control technology to minimize hydrocarbon leaks into the cooling water system and the monitoring of cooling water for hydrocarbons. If a monitoring system is sufficient to provide such “control,” then the associated data should be sufficiently detailed to allow for the derivation of an emission rate. If the monitoring system is insufficient to provide data for determining emissions, then the system is insufficient to provide reliable “control” and so the “uncontrolled” VOC emission factor is appropriate.

### **Must I report particulate matter emissions?**

Yes. While drift eliminators greatly reduce cooling tower drift, the drift droplets that do escape are so small and of such little mass that they can remain airborne for some time and travel a significant distance.

### **My cooling tower’s emission point is currently shown as a fugitive area. Must I change this?**

Yes. Your cooling tower’s emission point should be shown as a stack. For more information, see “Cooling Tower Structure” earlier in this supplement, as well as instructions for completing the Emission Point Information: Stack Profile form in *2006 Emissions Inventory Forms and Instructions* (TCEQ publication RG-360B).

## References

*Compilation of Air Pollutant Emission Factors*. 1995. Vol. I: *Stationary Point and Area Sources*. 5th ed. AP-42. Research Triangle Park, NC: U.S. Environmental Protection Agency. Available online at: <[www.epa.gov/ttn/chief/ap42/index.html](http://www.epa.gov/ttn/chief/ap42/index.html)>

Perry, Robert H., et al. 1997. *Perry's Chemical Engineers' Handbook*. 7th ed. New York: McGraw-Hill.

Texas Commission on Environmental Quality. 2001. *Air Quality Permit Technical Guidance for Chemical Sources: Cooling Towers*. Air Permits Division draft document. Available online at: <[http://www.tceq.state.tx.us/permitting/air/nav/air\\_guidenewsourc.html](http://www.tceq.state.tx.us/permitting/air/nav/air_guidenewsourc.html)>.

# TECHNICAL SUPPLEMENT 3: EQUIPMENT LEAK FUGITIVES

## Technical Disclaimer

This technical supplement is intended to help you accurately determine and correctly report equipment leak fugitive emissions. It does not supersede or replace any state or federal law, rule, or regulation.

This guidance, which reflects our current understanding of how piping components work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of equipment leak fugitive emissions and thereby further improve determinations within the emissions inventory.

The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Industrial Emissions Assessment Section at 512-239-1773.

## Introduction

This technical supplement provides guidance for identifying, determining, and correctly reporting equipment leak fugitive emissions from piping components and associated equipment at industrial facilities. It does not address emissions from cooling towers, oil/water separators, material stockpiles, loading operations, or other sources not related to piping components.

Please note that structural representation of equipment leak fugitive areas in the emissions inventory is specifically addressed under “Issues of Special Concern” later in this supplement. For general guidance on this topic, consult Chapter 3, “Account Structure.”

## Definitions

In this document, the phrase “traditional component types” refers to those component types traditionally considered and reported as sources of equipment leak fugitive emissions: valves, connectors, pumps, compressor seals, relief valves, sampling connections, process drains, and open-ended lines. “Nontraditional component types” refers to component types traditionally not treated as sources of equipment leak fugitive emissions, but which recent scientific studies have identified as such. Examples include screwed fittings, liquid relief valves, agitators, heat exchanger

heads, site glasses, bolted manways and hatches, blind flanges, caps and plugs, connectors, compression fittings, and metal-to-metal seals.

## Expected Emissions

Equipment leak fugitive emissions may include organic or inorganic compounds in gaseous or liquid state, depending upon the composition of streams flowing through the associated piping components.

## Quantifying Equipment Leak Fugitive Emissions

### *Introduction*

Equipment leak fugitive emissions are determined using emission factors or equations statistically developed from component- and industry-specific sampling data. Methodologies will differ, depending upon whether a source is monitored using a VOC instrument detector or is not monitored. For monitored sources, base determinations on correlation equations and the individual screening values obtained with the instrument. For unmonitored sources, base determinations on average emission factors.

For detailed information on available emission factors and determination methods, see the EPA documents *Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017) and *Preferred and Alternative Methods for Estimating Fugitive Emissions from Equipment Leaks* (Emissions Inventory Improvement Program Document Series, Volume II, Chapter 4, November 1996), as well as the TCEQ document *Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives* available at <[http://www.tceq.state.tx.us/permitting/air/nav/air\\_guidenewsourc.html](http://www.tceq.state.tx.us/permitting/air/nav/air_guidenewsourc.html)> and the guidance available at the IEAS web page, <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>.

### **Requirements for Determining Equipment Leak Fugitive Emissions**

Emissions from monitored equipment leak fugitive components must be determined using the actual monitoring data gathered at a site. Most LDAR program permit conditions require the retention of screening value data for all monitored components. Therefore, most accounts with a monitoring program will have the necessary data to use correlation equations to determine equipment leak fugitive emissions.

Specifically, if an account is required by permit condition, TCEQ rule, or commission order to retain screening value data for its monitored components, correlation equations must be used to determine emissions.

The IEAS has previously allowed the use of LDAR reduction credits applied to EPA’s average factors for annual emissions determinations. However, using actual leaking component data, which reflect a site’s actual leak fraction and LDAR program effectiveness, will provide more accurate emission determinations than use of average emission factors with LDAR reduction credits.

Since all monitored equipment leak fugitive sources should have individual screening values for monitored components, the use of average emission factors with LDAR reduction credits to determine emissions from monitored components will no longer be allowed. One exception is detailed under “Quantifying Emissions from Components Monitored by an Audio/Visual/Olfactory Inspection” later in this supplement.

### ***Emissions Determination Methodologies: Order of Preference***

The appropriate methodologies for determining VOC emissions for equipment leak fugitive components are, in order of preference:

- Unit-specific correlation equations developed in accordance with EPA guidelines (code as “M”)
- EPA correlation equations (code as “A”)
- EPA industry-appropriate average factors (code as “A”)

**The use of reduction credits (from a LDAR program) applied to EPA’s average factors for emissions inventory purposes is no longer allowed, with few exceptions.** One exception is detailed under “Quantifying Emissions from Components Monitored by an Audio/Visual/Olfactory Inspection” later in this supplement.

### ***Emissions Factors***

All emissions factors discussed in this supplement are available in the PDF document titled *Emissions Factors for Equipment Leak Fugitive Components* on the IEAS’ web page at <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>.

## **Determining Emissions from Monitored Components**

### ***Quantifying Emissions Using Correlation Equations***

Emissions determinations for monitored equipment leak fugitive emissions sources must be determined using site-specific monitoring data. Specifically, correlation equations must be used to determine emissions when a permit condition, TCEQ rule, or commission order requires the retention of screening value data.

Correlation equations use an instrument-measured VOC concentration screening value to determine a component-specific emission rate. Screening value data are collected using a portable monitoring instrument to sample air from potential leak interfaces on individual pieces of equipment. Screening data must be collected in accordance with EPA Reference Method 21, as detailed in 40 CFR 60 Appendix A and *Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017), available at the EPA's web site at <<http://www.epa.gov/ttnchie1/publications.html>>.

To determine emissions, the screening value data are used either in industry-specific correlation equations developed by the EPA or in correlation equations developed by a company for a specific process unit. The EPA correlation equations are available in *Protocol for Equipment Leak Emission Estimates* and in the PDF document titled *Emissions Factors for Equipment Leak Fugitive Components* on the IEAS' web site at <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>. The EPA has approved separate correlation equation sets for synthetic organic chemical manufacturing industry (SOCMI) components and petroleum industry components (which includes refineries, marketing terminals, and oil and gas production facilities).

The TCEQ accepts the use of correlation equations for screening values between zero and 100,000 parts per million. To determine emissions using correlation equations, you must consider each component's screening value (adjusted for the background concentration) as follows:

- Before using the screening value in the appropriate correlation equation, determine the screened stream's response factor and, if necessary, adjust the screening value according to the guidance in *Protocol for Equipment Leak Emission Estimates*.
- For each component with a nonzero screening value, enter the value into the applicable correlation equation to determine a mass emission rate. Sum the individual mass emission rates for each component to determine a total leak rate. Note that each individual screening value must be entered into the correlation equation to predict a component's leak rate. Averaged screening values should not be used to determine emissions.
- For each component with a screening value of zero, note that although the correlations predict a leak rate of zero for screening values of zero, the EPA data suggest that this prediction is incorrect. To account for screening values of zero, the EPA has established a default zero leak rate which should be applied to each component whose screening value was zero.

- For each component with a screening value above 100,000 ppm, use an EPA-developed default 100,000 ppm pegged leak rate. Note that if a pegged value of 10,000 ppm is indicated (i.e., the instrument was not calibrated to quantify the screening value between 10,000 ppm and 100,000 ppm), then the default 100,000 ppm pegged leak rate—**not** the default 10,000 ppm rate—should be used.

Since a component's screening concentration may vary from one monitoring period to another, emissions for each period should be based upon each component's screening concentration for that period. These period-specific emission rates should then be summed to obtain an annual emissions rate. For example, if components are monitored quarterly, each component's quarterly screening value should be used to determine quarterly emissions, and then the quarterly emission rates summed to obtain the component's total annual emissions.

When determining a component's leak duration, it would be most conservative to assume that the component was leaking at the measured concentration for the entire period since last monitored. An acceptable engineering estimate would be that the component was leaking at the measured concentration for half the monitoring period, plus the time needed to repair the component. The IEAS must approve any other method of determining leak durations before you use it.

When using the correlation equations to calculate emissions, the components must be monitored at least once during the year. Using monitoring data from a previous year to estimate future emissions is a difficult process. If this is done, sound engineering assumptions to support the calculations must be provided with the emissions inventory.

Detailed information about correlation equations can be found in *Protocol for Equipment Leak Emission Estimates*.

### **Unit-Specific Correlation Equations**

If an account has developed its own set of unit-specific correlation equations for its equipment leak fugitive components, those equations may be used to determine emissions only if the equations, sampling procedures, and all related procedures and data comply with EPA Reference Method 21 and the guidance in *Protocol for Equipment Leak Emission Estimates*.

When using company-developed correlation equations, supply supporting documentation indicating the basis for these equations. Also, if the account-specific equations do not account for components with screening

values of zero, the IEAS may require the use of EPA's default zero leak rates. Likewise, if the account-specific equations do not account for components with pegged screening values, the IEAS may require the use of EPA's pegged leak rates.

## **Quantifying Emissions from Components Monitored by an Audio/Visual/Olfactory Inspection**

For odorous or toxic inorganic compounds, an AVO inspection may be required by TCEQ rule, commission order, or permit condition. Generally, an AVO inspection program may only be applied to inorganic compounds that cannot be monitored by instrument. In limited instances, the AVO inspection program may be applied to extremely odorous organic compounds such as mercaptans.

If no monitoring or screening data exists for AVO-monitored components, then average emissions factors with AVO reduction credits applied can be used to determine emissions. To claim credit for this program, you must be able to produce, upon request, documentation that all elements of the program are in place and were followed.

AVO factors can be found in the PDF document titled *Emissions Factors for Equipment Leak Fugitive Components* on the IEAS' web site at <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>.

## **Determining Emissions from Unmonitored Components**

### ***Emissions Determination Requirements***

Emissions for monitored equipment leak fugitive emissions sources must be determined using actual monitoring data. However, for unmonitored components, average emissions factors may still be used to quantify emissions.

### ***Quantifying Emissions Using Average Factors***

Average emission factors are divided into four categories:

- SOCFI factors,
- oil and gas production factors,
- refinery factors, and
- factors for petroleum marketing terminals.

Within each category, factors vary depending upon specific component type (connectors, valves, pumps, etc.) and material in service (light liquid, heavy liquid, gas–vapor, or water–light liquid). For components in liquid

service, you may need to choose between a “heavy liquid” factor and a “light liquid” factor. Use the “heavy liquid” factor if the stream’s vapor pressure is less than or equal to 0.044 psia at 68°F. If the stream’s vapor pressure is greater than 0.044 psia at 68°F, use the appropriate “light liquid” factor.

Note that the average factors generally determine total hydrocarbon emissions. Therefore, you may need to multiply the calculated emission rates by the stream’s weight percentage of VOC compounds to determine total VOC emissions.

The EPA average emissions factors for the industry types described in the following sections can be found in *Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017), available at the EPA web site at <http://www.epa.gov/ttnchie1/publications.html>.

### **SOCMI Factors**

Use the SOCMI factors to determine equipment leak emissions from chemical plants or chemical processes within refineries. SOCMI factors are divided into three categories: SOCMI average factors, “SOCMI with ethylene” factors, and “SOCMI without ethylene” factors.

Use the SOCMI average factors, which were developed to represent fugitive emission rates from all chemical plants, for streams containing between 11 percent and 85 percent ethylene. For streams containing more than 85 percent ethylene, use the “SOCMI with ethylene” factors. For streams containing less than 11 percent ethylene, use the “SOCMI without ethylene” factors.

### **Oil and Gas Production Factors**

The oil and gas production factors are based on oil and gas production equipment leak emissions data gathered by the American Petroleum Institute and evaluated by the EPA. The oil and gas production factors include four different equipment service categories: gas, heavy oil (less than 20° API gravity), light oil (greater than 20° API gravity), and water/light oil (water streams in light oil service with a water content between 50 percent and 99 percent).

### **Refinery Factors**

Use refinery factors to determine equipment leak fugitive emissions from a refinery process. For a chemical process located within a refinery that is not specifically considered a refinery process (for example, an MTBE production unit), use the SOCMI factors rather than the refinery factors to calculate emissions.

### **Petroleum Marketing Terminal Factors**

Use the factors for petroleum marketing terminals to determine equipment leak fugitive emissions at gasoline-distribution facilities that are one step removed from local gasoline stations and other end users. Do not use these factors to determine equipment leak fugitive emissions from loading racks at chemical plants and refineries; instead, use the appropriate SOCFI or refinery factors.

The use of these factors must be accompanied by an AVO program performed monthly. To claim credit for this program, you must be able to produce, upon request, documentation that all elements of the program are in place and were followed. Because the petroleum marketing terminal factors include the appropriate reduction credit for the AVO inspection, no additional reductions may be taken.

If a monthly AVO inspection was not performed, use the refinery factors to determine emissions.

### ***Quantifying Emissions from Components Exempt from Monitoring***

Some components may be exempt from monitoring requirements based on size, physical location at a facility, or low vapor pressure. Exempt components' emissions, like those from unmonitored components, **must** be calculated and reported. Since these components are not monitored, calculate their associated emissions based on average factors with no reduction credit applied. When calculating emission rates, inaccessible components and other unmonitored components must be clearly identified and separated from monitored components.

### ***Quantifying Emissions Using Average Factors with Emissions Reduction Credits***

Quantifying emissions using average factors with emissions reduction credits applied implies the use of a monitoring (LDAR) program. Most instrument-based LDAR program permit conditions will require the retention of screening value data. Since the use of such data in correlation equations provides more accurate emissions determinations, the use of average factors with applied emissions reduction credits to determine actual annual emissions rates is no longer allowed.

### **Reduction Credit for Connector Monitoring**

Because connector monitoring is not usually required, emission reductions are not typically claimed for these components. However, if a weekly physical inspection program is in place, a 30 percent emissions reduction credit applied to average factors is allowed. To claim credit for any such program, you must be able to produce, upon request, documentation that all elements of the program are in place and were followed.

If connectors are instrument-monitored, then you should use correlation equations to determine emissions according to the guidance in this supplement. In these cases, no additional reduction credit for connector monitoring may be applied to the correlation equation.

### ***Quantifying Emissions of Odorous or Toxic Inorganic Compounds***

The best method to determine equipment leak emissions of odorous or toxic inorganic compounds like chlorine ( $\text{Cl}_2$ ), ammonia ( $\text{NH}_3$ ), hydrogen sulfide ( $\text{H}_2\text{S}$ ), hydrogen fluoride ( $\text{HF}$ ), and hydrogen cyanide ( $\text{HCN}$ ) would be to develop unit-specific correlation equations, as described in Section 2.3.4 of *Protocol for Equipment Leak Emission Estimates*. To develop these equations, it is necessary to use a monitoring instrument that could detect the inorganic compounds in question.

Note that it also would be necessary to use a monitoring instrument that could detect the inorganic compounds in question to apply either EPA-developed correlation equations or screening range emissions factors. If monitoring data are not available, calculate uncontrolled equipment leak fugitive emissions using the industry-specific factors discussed previously. Although these VOC emission factors were not developed specifically for use with inorganic compounds, they are presently the best data available for determining inorganic equipment leak fugitive emissions.

### ***Quantifying Emissions for Nontraditional Components***

Emissions from nontraditional piping sources should be calculated and included in all emissions inventories. While these sources have not historically been included, recent scientific studies and equipment monitoring have indicated that these components are a source of emissions.

Although component-specific factors do not exist for most nontraditional components, the TCEQ has identified appropriate substitute factors based on component, leak potential, and leak mechanism similarity. These factors are listed in Table A-4.

The component-specific emission factors for pressurized railcar loading operations threaded connections and quick-connect couplers are listed in Table A-4 and should be applied when a pressurized railcar is connected to the loading system using a loading arm. The loading arm may consist of a combination of threaded and quick-connect components and each component should be accounted for in the inventory.

**Table A-4. Appropriate Substitute Factors for Nontraditional Components**

To determine this nontraditional component's emissions ...	... use this factor.
Agitator	Light liquid pump
Blind flange	Flange
Bolted manway or hatch	Flange
Cap or plug	Flange
Compression fitting	Flange
Connector	Flange
Heat exchanger head: unmonitored monitored	Open-ended line Flange correlation equation
Liquid relief valve	Light liquid valve
Metal-to-metal seal	Flange
Screwed fitting	Flange
Site glass	Flange times two
Pressurized railcar loading arm: threaded connection quick connect coupler	0.0214 lb/hr/component 0.0055 lb/hr/component

### ***Special Considerations when Quantifying Emissions***

When determining fugitive emissions, note the following special considerations.

#### **Hours of Operation**

Equipment leak fugitive emission factors are independent of process unit throughput. Because emissions occur whenever material is in the line, regardless of process activity or downtime, all streams should be in service for 8,760 hours annually. Any exception to this service time would require that the lines be purged during process downtime.

### **Equipment Design Specifications**

Certain facility design specifications may eliminate or minimize equipment leak fugitive emissions. If components are designed as described in the following sections, you may apply the stated emissions reduction credit.

**Relief Valves:** 100 percent control may be assumed if either of the following conditions is met:

- relief valve vents are routed to a properly operating control device; or
- relief valves are equipped with a rupture disc and pressure sensing device (between the valve and disc) to monitor for disc integrity.

It is important to verify proper relief valve operation if one of these design specifications is not used. If a relief valve does not reseat properly, the resulting emissions must be determined and reported. Possible sources of emissions include storage tanks, pressure tanks, loading operations, reactors, and mixing vessels controlled by relief valves.

**Pumps:** The following pump types are designed to be “leakless” and are eligible for a 100 percent control credit:

- canned pumps
- magnetic drive pumps
- diaphragm-type pumps
- pumps with double mechanical seals that use a barrier fluid at a higher pressure than the process fluid pressure
- pumps with double mechanical seals that vent the barrier fluid seal pot to a control device

**Valves:** You may take a 100 percent control credit for the following:

- bellows valves with bellows welded to both the bonnet and stem
- diaphragm-type valves
- seal-welded, magnetically actuated, packless, hermetically sealed control valves.

**Connectors:** You may take a 100 percent control credit if the connections are welded together around their circumference so that the flanges cannot be unbolted.

**Compressors:** You may take a 100 percent control credit if a compressor is designed with enclosed distance pieces and if the crankcase vents to a control device.

**Double Mechanical Seals:** You may tank a 75 percent control credit for any component employing double mechanical seals.

## Speciation

Use current gas or liquid process stream analysis (or both) to speciate equipment leak fugitive emissions. For more information about speciation requirements for the emissions inventory, see Chapter 4.

## Supporting Documentation

Include representative sample calculations for each equipment leak fugitive area, including a list of the components to which a 100 percent control credit has been applied with a footnote describing the specific control method. If screening range emissions factors are used, the IEAS may require that supporting documentation be submitted to verify that a permitted monitoring program is not required to retain screening value data.

In addition, if an equipment leak fugitive area emitted more than 5 tons during the year, complete and submit the Fugitive Data Form found at the end of this supplement.

## Issues of Special Concern

### **May I put the whole plant's equipment leak fugitives under one facility and emission point?**

In a relatively small plant, such as a natural gas compressor station or a petroleum marketing terminal, the entire plant's equipment leak fugitive emissions may be represented by one facility/emission point path. For larger plants, however, it is generally more appropriate to report fugitive emissions under more than one facility.

There are two main items to consider when breaking fugitive areas into multiple facilities. First, if different process areas within a plant follow different leak detection and repair programs, each area should be represented by a separate path to avoid confusion. Second, since stream composition may differ greatly between processes and may necessitate the use of different calculation methodologies, fugitive emissions from separate processes should be reported under separate facilities. Consider,

for instance, a refinery with a process area for MTBE production. Emissions determinations for the MTBE process area should use correlation equations or the SOCOMI average emission factors, as they are more appropriate than the refinery factors. Separate facility–emission point paths should represent the MTBE process area fugitives and the refinery fugitives.

**Do I have to report emissions from components that are exempt from monitoring (such as components less than 2 inches in diameter)?**

Yes. All components' emissions must be determined and reported, regardless of monitoring exemptions based on size, physical location, or low vapor pressure. Since these components are exempt from monitoring, an approach based on determining average factors will typically be used and no reduction credits from monitoring may be applied.

**I have a unit that was shut down part of the year. Must I determine equipment leak fugitives for the entire year or just for the part of the year when the unit was operating?**

Equipment leak fugitive emissions should be determined for the entire year (8,760 hours) unless the unit's lines were purged during the downtime.

**I want to use correlation equations to determine equipment leak fugitive emissions. May I get screening values for a certain percentage of components and use the average value to represent all other components?**

No. Correlation equations may only be used to determine emissions for those components with individual screening values. If screening values are not determined for certain components, you must use a different calculation methodology for these unmonitored components.

**I have a crude oil storage and loading facility. May I use the emission factors for bulk terminals?**

No. If you have monitoring data for the fugitive components, then monitoring data must be used to determine emissions in accordance with the guidance in this supplement.

In the absence of monitoring data, use the oil and gas production average factors to determine component emissions. The bulk terminal average factors were developed specifically for gasoline and gasoline product

loading operations. For crude oil storage and loading, the Oil and Gas Production factors would be more appropriate.

**I have an LDAR program. Is there any way to represent this on my emissions inventory?**

You may represent an LDAR program as part of an account's structure. For fugitive facilities with an LDAR program, add a CIN with abatement code 800. Since the LDAR reduction credits can no longer be applied to average factors for emissions determinations, you do not need to give a control efficiency for this type of CIN.

**How do I find out if any new equipment leak fugitive factors have been developed or approved by the TCEQ?**

To find out if new factors have been approved by the TCEQ, review the PDF document titled *Emissions Factors for Equipment Leak Fugitive Components*. This document is available on the IEAS' web page at <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>.

**Do I have to report emissions of nonreactive compounds?**

Nonreactive compounds like methylene chloride and acetone are still considered air contaminants and should be reported. This is particularly important if a nonreactive compound has an associated allowable emission rate. Nonreactive equipment leak fugitive emissions should be calculated in the same way as VOC fugitive emissions.

**For my permit, I used the EPA's average emissions factors with LDAR reduction credits to determine my equipment leak fugitive emissions. Can I use this approach to report these emissions in the emissions inventory?**

No. All monitored equipment leak fugitive components should either have limited data for leaking components or, preferably, have individual screening values. Since using this monitoring data with correlation equations or screening range emissions factors will provide a more accurate determination of a site's emissions, the use of LDAR reduction credits applied to average emission factors for emissions determinations will not be allowed.

**I monitor my connectors only once every four years based on "skip period" provisions in my permit. For years where the connectors are not monitored, should I use the average factors with no reductions**

**applied to estimate my emissions? Or can I apply the correlation equations using the data from the last monitoring period?**

Normally, the IEAS would require components to be monitored at least once during the current inventory year to use the correlation equations. Using monitoring data from previous years to predict future emissions requires the assumption that component leaks will not grow in the future—a questionable engineering assumption that will likely result in underestimation of emissions.

In the case of “skip period” provisions in a permit, it is permissible to use data from the last monitoring period in the correlation equations. To account for future leaking components, you should use leaking component screening values **before** any repairs are done. Since there is a history of monitoring and monitoring will occur in the future, the snapshot (as it were) taken before repairs should reasonably mirror any future monitoring.

Because there is no way to estimate the amount of time a component will leak in the future, the most conservative estimate would be to assume any leaking component will do so for an entire year. If you elect to use a different method to estimate your emissions, you must provide valid engineering assumptions to support your calculations.

**In the past, I used screening range (leak/no-leak) emissions factors to determine emissions from my fugitive area. May I continue to use this method?**

The correlation equations should be used to determine emissions from your fugitive area if you have screening value data from a monitoring program.

If your monitoring program does not retain screening value data, emissions must be determined using the best available method. If you elect to use the screening range emissions factors to estimate your emissions, you must supply valid engineering assumptions to support your calculations.

## References

Texas Commission on Environmental Quality. 2000. *Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives*. TCEQ Air Permits Division draft document: Available online at: <[http://www.tceq.state.tx.us/permitting/air/nav/air\\_chemdocs.html](http://www.tceq.state.tx.us/permitting/air/nav/air_chemdocs.html)>. Accessed December 28, 2006.

Texas Commission on Environmental Quality. 2005. *Emissions Factors for Equipment Leak Fugitive Components*. TCEQ Industrial Emissions Assessment Section draft

*Emissions Inventory Guidelines*

document: Available online at: <[www.tceq.state.tx.us/goto/ieas](http://www.tceq.state.tx.us/goto/ieas)>. Accessed December 28, 2006.

U.S. Environmental Protection Agency. 1996. *Preferred and Alternative Methods for Estimating Fugitive Emissions from Equipment Leaks*. Vol. 2, Emissions Inventory Improvement Program Document Series, chapter 4: Available online at: <[www.epa.gov/ttn/chief/eiip/techreport/volume02/index.html](http://www.epa.gov/ttn/chief/eiip/techreport/volume02/index.html)>.

U.S. Environmental Protection Agency. 1995. *Protocol for Equipment Leak Emission Estimates*. EPA-453/R-95-017. Available online at: <[www.epa.gov/ttnchie1/publications.html](http://www.epa.gov/ttnchie1/publications.html)>. Accessed December 28, 2006.

# Fugitive Data Form

TCEQ Emissions Inventory Year \_\_\_\_\_

TCEQ Air Account Number: \_\_\_\_\_

FIN: \_\_\_\_\_

## COMPONENT COUNTS

	Service	Unmonitored	Monitored				
		Number of components	Number of components	Leak definition (ppm)	Number of leakers	Number pegged	Monitoring frequency
Valves	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						
Pumps	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						
Flanges	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						
Open-Ended Lines	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						
Connectors	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						
Relief Valves	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						
Compressor Seals	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						
Other	Gas/Vapor						
	Light liquid						
	Heavy liquid						
	H <sub>2</sub> O/Light oil						

### VOC PERCENTAGES

### MONITORING EQUIPMENT DATA

Gas/vapor stream: \_\_\_\_\_ %  
 Light liquid stream: \_\_\_\_\_ %

Pegged Component Screening Value: \_\_\_\_\_ ppm  
 Calibration Range: \_\_\_\_\_ min \_\_\_\_\_ max

### EMISSIONS DETERMINATION METHODOLOGY OR LDAR PROGRAM USED

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> Oil and Gas Factors                  | <input type="checkbox"/> SOCM1 Average Factors       | <input type="checkbox"/> SOCM1 without Ethylene Factors |
| <input type="checkbox"/> Refinery Factors                     | <input type="checkbox"/> SOCM1 with Ethylene Factors | <input type="checkbox"/> Correlation Equations          |
| <input type="checkbox"/> Petroleum Marketing Terminal Factors | <input type="checkbox"/> Other (explain): _____      |   |

**LDAR PROGRAM:**    None    28M    28RCT    28VHP    28MID    28LAER  
 AVO    28CNTA    28CNTQ    HRVOC    Other: \_\_\_\_\_

# Instructions for Completing the Fugitive Data Form

## Component Counts

Enter the number of each component type (valves, flanges, etc.) in each service (gas/vapor, light liquid, etc.). Note that *water/light liquid service* applies only to the oil and gas industry. Be certain to fill in all columns.

### Unmonitored: Number of Components

For each component type, enter the number of unmonitored components in the fugitive area. If an LDAR program is in place, include components exempt from monitoring in this column.

### Monitored: Number of Components

For each component type, enter the number of instrument-monitored components in the fugitive area.

### Leak Definition

For each monitored component type, enter the leak definition level measured in parts per million.

### Number of Leakers

For each monitored component type, enter the number of components that leaked at or above the leak definition threshold. Count each component once for each period during which it leaked. For example, if a valve monitored quarterly was found to be leaking each quarter in a year, it should be counted as four leakers.

### Number Pegged

For each monitored component type, enter the number of components that leaked at or above the “pegged” screening value. Count each component once for each period during which it leaked at or above the pegged rate. For example, if a valve monitored quarterly was found to be leaking above the pegged rate each time, it should be counted as four pegged valves.

### Monitoring Frequency

For each monitored component type, enter how frequently the components are monitored (annually, semiannually, quarterly, monthly, biweekly, etc.).

## VOC Percentages

Enter the average VOC percentages for the gas/vapor stream and the light liquid stream. Heavy liquid streams are assumed to be 100 percent VOC.

### ***Monitoring Equipment Data***

Enter the equipment's calibration value range and the "pegged" components' screening value.

### ***Emissions Determination Methodology***

Select the industry type and methodology that you use to determine fugitive emissions. Please note that if more than one method is used for a single facility, you should create separate facilities for each factor group used.

### ***LDAR Program Used***

Select the leak detection and repair program followed by your account for this facility. Please note that if more than one LDAR program is followed for a single facility, you should create separate facilities for each such program.



# TECHNICAL SUPPLEMENT 4: FLARES

## Technical Disclaimer

This technical supplement is intended to help you accurately determine and correctly report flare emissions. It does not supersede or replace any state or federal law, rule, or regulation.

This guidance, which reflects our current understanding of how flares work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of flare emissions and thereby further improve determinations within the emissions inventory.

The calculation methods represented are intended as an aid; alternate methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Industrial Emissions Assessment Section at 512-239-1773.

## Introduction

This technical supplement offers guidance on identifying, quantifying, and correctly reporting elevated flare emissions on the annual emissions inventory.

This document does not address flare structural representation in the inventory. For guidance on this topic, consult Chapter 3.

## Definitions

In this supplement, the term “waste gas” refers to gas streams produced in the process unit and routed to the flare for destruction.

“Supplemental fuel” refers to the gas that mixes with waste gas prior to its arrival at the flare tip, ensuring the combustibility of the total gas stream.

“Flared gas” refers to the combination of waste gas and supplemental fuel.

“Pilot gas” refers to the gas routed to the flare tip to ensure flared gas ignition.

## Expected Emissions

Flare emissions will include, at a minimum, nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and uncombusted flared gas compounds. In addition, if the flared gas contains sulfur-bearing compounds, emissions will also include hydrogen sulfide (H<sub>2</sub>S) and sulfur dioxide (SO<sub>2</sub>).

### **Products of Combustion**

Products of combustion include NO<sub>x</sub>, CO, and SO<sub>2</sub>. Flared and pilot gas heat outputs impact emission rates of NO<sub>x</sub> and CO. The sulfur content of both flared and pilot gases determines SO<sub>2</sub> emissions.

### **Compounds from Uncombusted Flared Gas**

The flare's destruction efficiency determines what fraction of the flared gas remains uncombusted. The uncombusted flared gas compounds are generally volatile organic compounds, but may also include H<sub>2</sub>S, CO, ammonia, and other organic and inorganic compounds present in the flared gas.

## Emissions Determination

Generally, flare emissions determinations should be consistent with *Air Permit Technical Guidance for Chemical Sources: Flares and Vapor Oxidizers* available at [http://www.tceq.state.tx.us/permitting/air/nav/air\\_chemdocs.html](http://www.tceq.state.tx.us/permitting/air/nav/air_chemdocs.html). However, if actual flare operation deviates from the specific operating conditions assumed in permit guidance, then it may not be appropriate to use the guidance in RG-109 to determine emissions. Exceptions for actual operation are identified in the following sections.

All flare emissions determinations depend upon the flared gas flow rate and composition. Therefore, before specific emission calculations are discussed, the preferred methods for obtaining the actual flared gas flow rate and composition data will be addressed.

### **Flared Gas Flow Rate and Composition**

To obtain the most accurate emissions determination, base your calculations on the actual flow rate and the specific composition of the gas routed to the flare. The generally preferred methods of obtaining data on flared gas flow rate and composition are, in order of preference:

1. continuous monitoring with quality assured instruments
2. continuous monitoring with instruments that may not meet all quality assurance tests
3. periodic testing with instruments and laboratory analytical methods

- 4a. engineering determinations based on detailed process evaluation
- 4b. a one-time performance test conducted during the inventory year

For flares subject to Chapter 115, Subchapter H, relating to highly reactive volatile organic compounds, flow rate and composition data required by 30 TAC §§ 115.725 and 115.726 should be used to determine emissions for any portions of 2006 during which HRVOC monitors were installed and operational.

In the absence of monitoring data, selection of the most accurate method may sometimes require exercising scientific judgment. For example, when using the results of a one-time performance test, the test conditions should be compared to the flare's actual operating conditions during the inventory year to determine whether the test accurately represents the flare's performance. If test conditions do not accurately model flare operation, then engineering determinations based on detailed process evaluation may provide the best data.

## ***NO<sub>x</sub> and CO Emissions***

To calculate NO<sub>x</sub> and CO emissions, you must first know the net heating value of the flared gas. Using the actual short-term flared gas composition and flow rate data for the inventory year, calculate the net heating value of the flared gas and the total heat release for each short time period. Use these total heat release data, in conjunction with the appropriate emission *Flares and Vapor Oxidizers*, to determine NO<sub>x</sub> and CO emissions for each time segment. Since the calculated net heating value of the gas and the assist gas type will determine the appropriate NO<sub>x</sub> and CO emission factors from *Flares and Vapor Oxidizers*, you must carefully select the correct factors for each flare.

Calculate emissions using the most accurate data on gas flow rate and composition available. (See “Flared Gas Flow Rate and Composition” earlier in this supplement for more information on preferred data.) Regardless of the data's source, code NO<sub>x</sub> and CO emissions with a determination methodology of “A” for “TCEQ-approved factor.”

For flares subject to the HRVOC regulations in Chapter 115, Subchapter H, use the net heating value data required by 30 TAC §§ 115.725–26 to determine NO<sub>x</sub> and CO emissions for any portions of 2006 during which HRVOC monitors were installed and operational.

## ***Uncombusted Flared Gas Emissions***

Uncombusted flared gas emissions usually include VOCs, H<sub>2</sub>S, or both. Emissions calculations for these contaminants are based on the flared gas flow rate and composition and the appropriate destruction efficiency,

which depends upon the actual flare operation. Flare destruction efficiency varies with flame stability, operating conditions, flare tip size and design, the specific compounds being combusted, and gas composition. The EPA has determined operating limits (see 40 CFR 60.18), that result in stable operation of flare flames. Therefore, emission determinations may vary depending on whether the criteria of 40 CFR 60.18 are satisfied.

Chapter 115 HRVOC regulations address flare operational requirements in regard to 40 CFR 60.18. For flares subject to HRVOC regulations, use the appropriate destruction efficiencies specified in 30 TAC § 115.725. Additionally, for flares subject to Chapter 115 HRVOC regulations, use the required HRVOC monitoring data to determine emissions of uncombusted flared gases for any portions of 2006 during which HRVOC monitors were installed and operational.

Otherwise, if the flare's operation is consistent with 40 CFR 60.18, then use the appropriate destruction efficiencies provided in *Flares and Vapor Oxidizers*. Note that, for flare operation to be considered consistent with 40 CFR 60.18, it should:

- meet the flared gas heating value and flare exit tip velocity limitations;
- be equipped with proper liquid knockout and ignition systems; and
- operate smokelessly.

If the flare's operation is not consistent with 40 CFR 60.18, then the flare is likely to be operating at or near unstable flame mode. If specific data on destruction efficiency are available for the flare tip and design, compounds being combusted, gas composition, and operating conditions of the flare in question, these may be used to determine emissions in such cases. Otherwise, it will be necessary to use the destruction efficiency described in the following paragraph.

Although only limited test data are available for flares operating with an unstable flame, EPA test data indicate that destruction efficiencies generally range from 85 to 97 percent in such cases. The median destruction efficiency for the EPA data set appears to be approximately 93 percent. Although other data suggest that efficiencies may be even lower during unstable flame operations, you may assume a 93 percent destruction efficiency for flare operating conditions that do not satisfy 40 CFR 60.18.

On steam assisted flares, there is the potential for over-steaming of the gas stream and the destruction efficiency may be lower than the appropriate destruction efficiencies given in *Flares and Vapor Oxidizers*. You may

assume a 93 percent destruction efficiency for flare operating conditions that do not satisfy 40 CFR 60.18.

Of course, if the flare flame is ever extinguished, one should assume no destruction for the period during which the flame was out.

Code uncombusted flared gas emissions with a determination methodology of “B” for ‘material balance.’

## ***SO<sub>2</sub> Emissions***

Calculations of SO<sub>2</sub> emissions are based on the amount of sulfur-bearing compounds in the flared gas and on the appropriate destruction efficiency, as discussed previously.

For example, assume that 100 pounds per hour of flared gas, composed of 80 percent butane and 20 percent H<sub>2</sub>S, is burned in a flare that satisfies 40 CFR 60.18. The hourly uncombusted flared gas emissions would be 1.6 pounds of butane and 0.4 pounds of H<sub>2</sub>S. In addition, the flare creates SO<sub>2</sub> from the H<sub>2</sub>S. Determine the SO<sub>2</sub> emissions as follows:

$$\frac{20 \text{ lbH}_2\text{S}}{\text{hour}} \times 0.98 \times \frac{\text{lb-mole}}{34 \text{ lb H}_2\text{S}} \times \frac{64 \text{ lb SO}_2}{\text{lb-mole}} = 36.9 \text{ lb/hr SO}_2$$

Note that, as the criteria of 40 CFR 60.18 were met, a 98 percent destruction efficiency was assumed.

Code SO<sub>2</sub> emissions with a determination methodology of “B” for ‘material balance.’

## **Annual and Ozone Season Rates**

Typically, flared gas flow rate and composition are highly variable; therefore, calculations of flare emissions need to take this variability into consideration. In general, emission determinations should not be based on annual average conditions. Instead, calculate emissions for short time segments during which flare flow rate and composition are relatively constant, and then sum those short-term emissions to obtain the actual annual total. For example, if hourly flow rates and composition data are available, then calculate hourly emissions (lb/hr) and sum all hourly rates to obtain the annual total. If only weekly data are available, then calculate weekly average emissions and sum those to obtain the annual total.

These principles are especially important for ozone season emission calculations. The actual short-term emissions calculated for the months of

June, July, and August should be used to develop the daily average ozone season emissions.

If no flow rate or composition data are available, then engineering estimates should account for annual process variations that might affect flared gas.

## **Speciation of Uncombusted Flared Gas Compounds**

Depending on the flare service, emissions of uncombusted flared gas could include carbon, nitrogen, and sulfur compounds.

At this time, the composition of the uncombusted flared gas is assumed to remain unchanged. Although complex oxidation reactions in the flare flame may alter the emissions composition, no definitive method exists to identify those new compounds. Thus, emission determinations should assume no change in the composition of the uncombusted gas.

For example, consider a flared gas flow rate of 100 pounds per hour of VOC with a composition by weight of:

- 20 percent toluene,
- 60 percent xylene,
- and 20 percent butane.

If the flare satisfies 40 CFR 60.18 performance criteria with this flow rate and composition, then a 98 percent destruction efficiency may be used. Based on the flow rate, composition, and destruction efficiency, **total** VOC emissions would be 2 pounds per hour.

Since these emissions are assumed to be 20 percent toluene, 60 percent xylene and 20 percent butane by weight, speciated VOCs would be reported as:

- 0.4 pound per hour toluene,
- 1.2 pounds per hour xylene, and
- 0.4 pound per hour butane.

For flares subject to HRVOC regulations, determine speciated uncombusted flare gas emissions according to the requirements (including destruction efficiencies) outlined in 30 TAC § 115.725.

## Supporting Documentation

Flare emissions depend heavily on a flare's destruction efficiency. Provide the following supporting documentation with your inventory:

- sample calculations showing the basis of flare emission determination; and
- a completed Flare Data form (see end of supplement)

For each flare in HRVOC service, indicate "Yes" on the "HRVOC Service?" characteristic.

In addition, IEAS staff may request data for those times during which the flare did not satisfy 40 CFR 60.18 criteria. These data include, but are not limited to:

- the date and time of the period;
- the flare emission point;
- waste gas and supplemental fuel flow rate in scfm;
- waste gas and supplemental fuel composition in volumetric percentages
- the Btu/scf value for each component of the waste gas and supplemental fuel
- the flare tip diameter; and
- the steam/air assist gas rate.

## References

Engineering Science, preparer. 1983. *A Report on Flare Efficiency Study*. Vol. 1. Chemical Manufacturers' Association.

Energy and Environmental Research Corporation, preparer. 1984. *Evaluation of the Efficiency of Industrial Flares: Test Results*. EPA report 600/2-84-095. Industrial and Environmental Research Lab.

Texas Commission on Environmental Quality. 2000. *Air Permit Technical Guidance for Chemical Sources: Flares and Vapor Oxidizers*. TCEQ Air Permits Division draft document. Available online at: <[http://www.tceq.state.tx.us/permitting/air/nav/air\\_chemdocs.html](http://www.tceq.state.tx.us/permitting/air/nav/air_chemdocs.html)>. Accessed December 27, 2006.

U.S. Environmental Protection Agency. 1985. *Evaluation of the Efficiency of Industrial Flares: Flare Head Design and Gas Composition*. EPA report 600/2-85-106. Washington, DC: Environmental Protection Agency.

<b>Flare Data Form</b> TCEQ Emissions Inventory Year _____
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TCEQ Air Account Number:
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Flare FIN:	Flare EPN:
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For the path(s) that the flare abates, flare CIN:
---

<b>Minimal Flow Data</b> <i>For the period during which flow rate to the flare was lowest</i>	
Minimal Flow Rate: _____ Mscf/minute	Gross Heating Value: _____ Btu/scf
Tip Velocity: _____ feet/second	Net Heating Value: _____ Btu/scf

<b>Maximal Flow Data</b> <i>For the period during which flow rate to the flare was highest</i>	
Maximal Flow Rate: _____ Mscf/minute	Gross Heating Value: _____ Btu/scf
Tip Velocity: _____ feet/second	Net Heating Value: _____ Btu/scf

TCEQ-20349 (1-03-07)

# TECHNICAL SUPPLEMENT 5: MARINE FACILITIES

## Technical Disclaimer

This technical supplement is intended to help you accurately determine and correctly report marine facility emissions. It does not supersede or replace any state or federal law, rule, or regulation.

This guidance, which reflects our current understanding of how marine facilities work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of marine facility emissions and thereby further improve determinations within the emissions inventory.

The calculation methods represented are intended as an aid; alternate methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, please contact the Industrial Emissions Assessment Section at 512-239-1773.

## Introduction

This technical supplement offers guidance on identifying, quantifying, and correctly reporting marine facility emissions on the annual emissions inventory. Marine facility emissions must be reported as part of the annual routine emissions inventory. The onshore facilities' owner or operator does not own or operate the marine vessel itself, but does operate most of the activities resulting in vessel emissions while the vessel is docked. Therefore, the onshore facilities' owner or operator is responsible for reporting dock and dockside marine vessel emissions in the annual emission inventory. This is consistent with the longstanding approach of reporting truck loading and cleaning emissions in the truck terminal or cleaning facility owner's inventory.

There are several categories of facilities associated with marine operations, including:

- onshore process units or equipment performing a function associated with dockside marine vessels (e.g., solid material stockpiles, silos, tanks, and abatement devices)
- the dock and all of its associated equipment (e.g., conveying lines, piping, valves, pumps, hoses, and blowers); and
- dockside marine vessel loading and unloading, cleaning and degassing, and abrasive blasting and painting. A marine vessel is considered dockside if it is in any way connected to

the shore. This includes vessels connected to the dock, connected to a vessel that is connected to the dock, or connected directly to the land.

Because onshore process units and equipment are addressed elsewhere in *2006 Emissions Inventory Guidelines*, this technical supplement addresses only dock and dockside marine vessel emissions.

This supplement does not address the structural representation of marine operations in the inventory. For guidance, consult Chapter 3.

There are multiple Air Permit's draft guidance documents that are referred to in this supplement. They can be found on the Air Permits New Source Review's web page available at [http://www.tceq.state.tx.us/permitting/air/nav/air\\_guidenewsource.html](http://www.tceq.state.tx.us/permitting/air/nav/air_guidenewsource.html).

## Expected Emissions

Emissions associated with the dock and the dockside marine vessels, except for emissions from marine vessel engines, should be determined and reported in the annual emission inventory. This includes any emissions from marine vessel-to-marine vessel transfers (i.e., lightering or barging).

A marine facility's emissions depend on the activity performed and the materials handled or used.

Dock emissions may include:

- fugitive particulate matter from conveying lines; and
- fugitive VOCs from equipment leak fugitives.

Dockside marine vessel emissions may include:

- VOCs from loading or unloading liquid bulk materials,
- VOCs from loading or unloading liquefied gaseous materials,
- particulate matter from loading or unloading solid bulk materials (including lightering or barging at the dock),
- VOCs from degassing and cleaning liquid vessel compartments, and
- particulate matter and VOCs from abrasive blasting and surface coating.

## Determining Emissions

For primary guidance on determining marine emissions, consult the air permit draft guidance document *Dockside Vessel Emissions*. In particular,

Section 2 of that document addresses each dockside activity discussed in the following section, giving background information, specific guidance on calculations, and references to other specific documents relating to air permits that may also be helpful. The following sections address the key points related to the emissions inventory.

### ***Loading and Unloading Bulk Liquid Materials***

Loading and unloading emissions bulk liquid materials may result in emissions at the dock and at the vessel. Dock emissions result from equipment leak fugitives, while vessel emissions result from vapor displacement during liquid loading.

Determine dock emissions from equipment leak fugitives following the guidance in Technical Supplement 3: Equipment Leak Fugitive Emissions. Code the emissions with a determination methodology of “A.” Equipment leak fugitives should be determined for the entire period when VOCs are present in the dock piping.

Determine vessel emissions from liquid material loading and unloading using the techniques in the TCEQ air permits draft guide *Loading Operations*. Code the associated emissions with a determination methodology of “A.”

If loading emissions are collected and abated, some emissions will escape collection and, additionally, some collected emissions will escape destruction. The air permits document *Loading Operations* gives guidance on determining uncollected emissions, which should be coded with a determination methodology of “A.” The collected emissions that escape destruction at the abatement device should be determined using an appropriate destruction efficiency. Code these emissions with a determination methodology of “B.”

During unloading operations, vapor in the receiving storage tank’s vapor space is displaced, resulting in emissions that should be reported at the storage tank using storage tank emission calculations and following the general guidance.

After unloading operations, the liquid left in sumps can evaporate over time, which will result in emissions. Those emissions should be reported with the equipment leak fugitives using a material balance approach.

## **Loading and Unloading Bulk Liquefied Gaseous Materials**

Loading and unloading liquefied gases will result in VOC emissions from dock equipment leak fugitives, and may also result in vessel emissions from gas freeing and vessel conditioning.

When liquefied gaseous materials are transferred to or from a pressurized marine vessel compartment, emissions usually come only from dock piping components. For guidance on determining these emissions, consult Technical Supplement 3. Code the associated emissions with a determination methodology of “A.” Equipment leak fugitive emissions should be determined for the entire period when VOCs are present in the dock piping.

Emissions from a pressurized marine vessel compartment may result from two processes used to ensure safety and product quality: gas freeing and gas conditioning. Gas freeing is the evacuation of residual liquid (“heel”) and vapor after unloading and prior to loading a new material. Gas conditioning displaces the residual nitrogen pad from the marine vessel compartment and saturates the vapor space with product vapor prior to loading. Calculate gas freeing or gas conditioning emissions using the ideal gas law and the actual pressure, concentration and vessel volume data. Since the ideal gas law is a first-order scientific principle, code the associated emissions with a determination methodology of “S” for ‘scientifically calculated.’

## **Loading and Unloading Solid Bulk Materials**

Emissions from solid bulk material loading and unloading result from dock fugitives and from entrainment of solids during displacement of the vessel compartment air space during loading.

Material transfer methods determine where and how particulate matter is emitted. Emissions from such transfer methods as pneumatic systems, clamshell buckets, drag chains, belt conveyors, manual operations, or a combination of these methods should be determined following the detailed guidance in the air permits document *Dockside Vessel Emissions*.

If a material type is explicitly addressed in air permits guidance, then code the associated emissions with a determination methodology of “A.” If the material type is not explicitly addressed, use the method for the most closely related material and code the emissions with a determination methodology of “E” for ‘estimated.’

## ***Degassing and Cleaning Vessel Compartments***

Cleaning operations remove residual material from vessel compartments prior to change of service, maintenance, or repair. Depending on the vessel compartment's condition, as many as three steps in the process may result in emissions: degassing, deheeling, and cleaning. *Dockside Vessel Emissions* explains the emission calculation method for degassing, deheeling, and cleaning. It also references the TCEQ document for determining uncontrolled vessel degassing and cleaning emissions, *Tank Truck and Rail Car Cleaning*. Since these techniques use the ideal gas law, code the associated emissions with a determination methodology of "S" for 'scientifically calculated.'

If saturation test results are used to calculate degassing, deheeling, and cleaning emissions, then the ambient temperature during the test should correspond to or be greater than the average ambient temperature for that year's ozone season. Similarly, the chemical vapor pressure(s) used to calculate emissions should be the vapor pressure(s) of the chemical(s) at the average ozone season temperature. Additionally, the test results can only be applied to chemicals that have an equivalent or lower vapor pressure than the tested chemical's vapor pressure.

If emissions are determined using saturation test results, code the associated emissions with a determination methodology of "B" for "material balance." Submit summary test results with each year's EIQ, and include information such as the ambient temperature during testing and vapor pressures of the tested chemicals.

## ***Abrasive Blasting and Surface Coating***

Building or repairing marine vessels and offshore platforms may involve abrasive blasting and painting operations. Abrasive blasting results in particulate matter emissions of the abrasive material and the old paint. Painting results in emissions of the VOCs that volatilize from the paint as it cures and particulate matter resulting from paint overspray. Determine these emissions using the TCEQ draft documents *Abrasive Blast Cleaning and Surface Coating Operations*.

Since particulate emissions from abrasive blasting are calculated based on the abrasive material usage and the emission factors in the abrasive blast cleaning guidance, code the emissions with a determination methodology of "A."

Since VOC and particulate emissions from coatings are determined based on the coating composition and the application equipment's transfer

efficiency, code the emissions with a determination methodology of “B” for ‘material balance.’

## Annual and Ozone Season Emission Rates

Determine actual annual emissions following the guidance in this supplement. If the same material is handled throughout the year, then use annual material throughput and the guidance in this supplement to determine emissions. If materials vary, determine emissions from each individual operation using the guidance in this supplement and the following information:

- the amount and type of material processed;
- speciation of any VOC or particulate emissions;
- temperature, vapor pressure, molecular weight, and any other data necessary to determine emissions.

Report the resulting emission rates at the appropriate facility–emission point paths as the annual emissions rates. Do not use average or typical operations data to determine actual annual emissions.

To obtain ozone season emission rates for each facility–emission point path, first determine emissions (in pounds) that the facility generated and emitted during the months of June, July, and August. Next, divide the resulting emissions rates by the number of days that the facility operated during the months of June, July, and August. Report the resulting rates as the ozone season pound per day emissions rates for that facility–emission point path. Note that the number of days that a facility can operate during the ozone season cannot exceed 92. For more information, consult “Reported Emissions”: “Ozone Season Emissions” in Chapter 4.

## VOC and Particulate Speciation

Speciation should follow the guidance in *2006 Emissions Inventory Guidelines*. In general:

- Emissions from bulk liquids and liquefied gaseous materials loading and unloading will be VOC, with a composition corresponding to that of the material loaded or unloaded.
- Vessel gas freeing and conditioning emissions will be VOCs with a composition corresponding to that of the previously loaded material or the material now being loaded.
- Emissions from loading solid bulk material will be particles of the material loaded.
- Degassing and cleaning emissions will be VOCs with a composition corresponding to that of the material previously held in the vessel compartment.

- Abrasive blasting results in particulate matter emissions of the abrasive material and the old paint. Painting results in emissions of the VOCs that volatilize from the paint as it cures and particulate matter resulting from paint overspray.

## Supporting Documentation

So that QA staff may verify reported emissions, include representative sample calculations with your emissions inventory submission. Supply the data used in these sample calculations, including:

- the amount and type of material processed during each operation, including the type and amount of material transferred between vessels at the docks;
- the date and time of the activity;
- temperature, vapor pressure, molecular weight, and other factors upon which emission determinations depend;
- material composition data, if the associated emissions (total or speciated) depend upon them; and
- all other information necessary to determine emissions.

## Issues of Special Concern

**May I omit my marine emissions from the annual inventory? Aren't these emissions accounted for in the area source inventory?**

No. The area source inventory only includes emissions from ships in transit. Once a ship is docked, it is considered a stationary source. All engine emissions from a docked vessel should be reported in the point source inventory.

**Since I don't own the marine vessel, why am I required to report its emissions in my inventory?**

Because the marine vessel is at your site supporting your business, the associated emissions should be reported in your inventory. This is similar to the situation for truck loading or unloading inside a plant.

**What if I share a marine loading facility with another company?**

Emissions should be reported by the regulated entity who owns the marine loading facility. Please call the IEAS for additional guidance if you have questions about your particular situation.

**Should I report emissions generated when materials are transferred from one marine vessel to another while docked? (This is sometimes also called lightering or barging.)**

Yes. All emissions from vessels at the dock should be reported by the dock owner or operator.

## References

Texas Commission on Environmental Quality. 2000. *Air Permit Technical Guidance for Chemical Sources: Loading Operations*. TCEQ Air Permits Division draft document. Available online at: <[http://www.tceq.state.tx.us/permitting/air/nav/air\\_chemdocs.html](http://www.tceq.state.tx.us/permitting/air/nav/air_chemdocs.html)>. Accessed December 28, 2006.

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# TECHNICAL SUPPLEMENT 6: ABOVEGROUND LIQUID STORAGE TANKS

## Technical Disclaimer

This technical supplement is intended to help you accurately determine and correctly report aboveground liquid storage tank emissions. It does not supersede or replace any state or federal law, rule, or regulation.

This guidance, which reflects our current understanding of how storage tanks work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of tank emissions and thereby further improve determinations within the emissions inventory.

The calculation methods represented are intended as an aid; alternate methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Industrial Emissions Assessment Section at 512-239-1773.

## Introduction

This technical supplement provides guidance on identifying, quantifying, and correctly reporting aboveground storage tank emissions on the annual emissions inventory. This document does not address underground storage tanks or devices such as separators, reactors, mixing vessels, or blend tanks. For more information on the common tank designs covered in this technical supplement, consult the current edition of Chapter 7 of *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources* (AP-42).

This document does not discuss tank structural representation in the emissions inventory. For guidance on this topic, consult *2006 Emissions Inventory Guidelines*, Chapter 3.

## Guidance Available in This Supplement

This supplement provides guidance on appropriate methodologies for determining emissions from storage tanks, emissions inventory reporting, and special considerations to be made when determining emissions. Specifically, the topics addressed are:

- expected emissions from aboveground liquid storage tanks; quantifying emissions for breathing, working, flash, degassing, cleaning, and landing losses; and special emissions determination considerations for certain storage tank situations.

## Definitions

In this document, the term “breathing losses,” also known as “standing losses,” will refer to the emissions that occur when vapors are expelled from the tank due to changes in temperature, barometric pressure, or both.

“Cleaning” refers to the process of removing vapor, sludge, or rinsing liquid from a storage tank.

“Degassing” is the process of removing organic gases or vapors from a storage tank.

“Equation of state” refers to an equation relating the temperature, pressure, and volume of a system in thermodynamic equilibrium.

“Flash gas” refers to the gas or vapor that is generated when a gas or liquid stream experiences a decrease in pressure or an increase in temperature.

“Gas-to-oil ratio” (GOR) means the number of standard cubic meters of gas produced per liter of crude oil or other hydrocarbon liquid.

“Landing losses” refers to emissions that occur from floating-roof tanks whenever the tank is drained to a level where its roof rests on its deck legs (or other supports).

“Pigging” (and its variants) refers to deploying a mobile plug (known as a *pig*) through a pipeline to perform various activities such as pipeline cleaning, inspection, or product removal.

“Working losses” are emissions related to the movement of the liquid level in the tank. Working losses from fixed-roof tanks occur as vapors are displaced from the tank during tank filling and emptying. Working losses from floating-roof tanks occur as the liquid level (and therefore the floating roof) is lowered, causing the liquid on the exposed tank walls and fittings to evaporate.

## Expected Emissions

Storage tank emissions can include VOC, HAP, toxic, and inorganic emissions from flashing, landing, breathing, and working losses. Storage tank emissions may also include emissions from degassing, cleaning, and defective tank seals and fittings. All storage tank emissions, whether

routine or not, should be quantified and reported in the emissions inventory.

### ***Associated Emissions***

Equipment leak fugitive emissions and loading loss emissions from trucks, railcars, tank cars, etc., are two other emissions sources generally associated with liquid storage operations.

Do not report equipment leak fugitive emissions at the same facility–emission point path where storage tank breathing and working loss emissions are reported. Instead, report equipment leak fugitive emissions at a separate path according to the guidance in Technical Supplement 3. To determine emissions from equipment leak fugitive components, consult Technical Supplement 3.

Similarly, do not report truck, railcar, tank car, etc., loading operations associated with storage tanks at the same facility–emission point path where you report emissions from storage tank breathing and working losses. Instead, report the loading rack and its related emissions at a unique facility–emission point path. For further guidance on structural representation, consult “Loading Operations” in Chapter 3. For guidance on determining emissions from loading operations, consult the current version of the TCEQ’s *Air Permits Technical Guidance for Loading Operations* and the current version of AP-42, Chapter 5.2.

## **Quantifying Storage Tank Emissions**

### ***Determining Emissions from Breathing and Working Losses***

Emissions from storage tanks occur because of evaporative losses of the liquid during storage (breathing losses) and as a result of changes in liquid level (working losses). Determining breathing and working loss emissions from liquid storage tanks should be consistent with the current edition of AP-42, Chapter 7.

Using the current version of TANKS, the EPA’s free software program that calculates fixed-roof and floating-roof storage tank emissions, will help to ensure that emissions determinations are consistent with the current edition of AP-42. The current version of TANKS is available at <[www.epa.gov/ttn/chief/software/tanks/index.html](http://www.epa.gov/ttn/chief/software/tanks/index.html)>.

### **Annual and Ozone Season Emissions**

Annual and ozone season breathing and working loss emissions can be determined by using the current TANKS program or by following the guidance outlined in AP-42, Chapter 7.

Due to higher average ambient temperatures during the ozone season, the vapor pressure of an organic liquid will increase; therefore, storage tank emissions rates will be greater in the summer than in the winter. Ozone season emissions will need to be determined using the increased vapor pressure data in the appropriate equations. Ozone season emissions should be determined by generating a TANKS report for the months of June, July, and August. To obtain the ozone season emissions rate in pounds per day, divide the total emissions (in pounds) for the three-month summer period by 92 days (the total number of days during the ozone season).

### **Obtaining Accurate Emissions Determinations from TANKS**

Accurate data input is essential to obtaining valid emissions determinations from the TANKS program. TANKS has programmed default settings for many input variables, including floating-roof tank fittings, and speciation profiles for chemical mixtures. If the TANKS default settings are used, it can result in inaccurate or invalid emissions determinations. Therefore, the user should use site-specific data to obtain the most accurate emissions determinations.

Specifically, for compounds whose physical properties can vary widely, such as condensate, or for site-specific or proprietary compounds or chemical mixtures, enter specific chemical or mixture data into the TANKS chemical database; use these new chemical data to generate emissions reports.

Similarly, detailed information on the number and physical characteristics of the tank fittings should be used in the “detailed” fittings selection should be used in the “Physical Characteristics” portion of TANKS.

The TANKS user’s manual, available at:

<[www.epa.gov/ttn/chief/software/tanks/index.html](http://www.epa.gov/ttn/chief/software/tanks/index.html)>, contains detailed instructions for adding or modifying chemicals, chemical mixtures, and tank fittings, as well as general information on how to use the software.

### **Determining Emissions from Flashing Losses**

Flashing losses occur when a liquid with entrained gases experiences a pressure drop or a temperature increase. As the liquid equalizes to a new steady state, some of the lighter compounds dissolved in the liquid are released or “flashed” from the liquid. Additionally, some of the compounds that are liquids at the initial pressure and temperature transform into a gas or vapor and are also released or “flashed” from the liquid. As these gases are released, some of the other non-flashing compounds in the liquids may become entrained in these gases and will be emitted with them. Flashing loss emissions (*flash emissions*) are greater as the pressure drop increases and as the amount of lighter hydrocarbons in

the liquid increases. The temperature of both the liquids and the storage tank will also influence the amount of flash emissions.

From a process perspective, flash emissions from storage tanks generally occur when pressurized liquids are sent to storage at a lower pressure. Specifically, flash emissions from storage tanks can occur at wellhead sites, tank batteries, compressor stations, gas plants, and “pigged” gas lines when pressurized gas and liquids are sent to atmospheric storage vessels. These flash emissions are vented to the atmosphere through a tank’s pressure relief valve, hatch, or other openings, or alternatively may be routed to a control device. Additionally, flash emissions can also be associated with high-, intermediate-, and low-pressure separators, heater treaters, surge tanks, and accumulator operations, although emissions determinations for these sources are not addressed in this supplement.

While the composition of flash emissions varies, flash gas emissions include VOCs, HAPs, and toxics.

### **Emissions Determination Methodologies: Order of Preference**

Several different methods of determining flash emissions exist; however, there are specific constraints associated with each method. The most appropriate method for determining flash emissions will depend upon the site-specific process. Acceptable determination methods for a given process should be evaluated upon whether the process parameters are consistent with the method’s development and underlying assumptions.

General orders of preference for black oil and gas condensate systems are listed below. However, for a given system, a more preferred method may not necessarily be applicable to a process based upon its specific parameters. Specific constraints for each method are explained in detail in the following sections. If the IEAS determines that a determination method for a site-specific process is unfounded, then the IEAS may require that the emissions determinations be recalculated using a more appropriate method.

Note that TANKS does **not** determine flash loss emissions, and cannot be used to determine losses from unstable or boiling stocks, or from mixtures of hydrocarbons or petrochemicals for which the vapor pressure is not known or cannot be readily predicted.

#### ***Black Oil Systems***

The appropriate methodologies for determining flash emissions for black oil systems are, in general order of preference:

- direct measurement of emissions (code as “M”);
- process simulator models (code as “S”);

- the E&P TANK program (code as “O”);
- Vasquez-Beggs or Rollins, McCain, and Creeger correlations, or software that uses these correlation equations (such as GRI-HAPCalc) (code as “O”);
- the gas/oil ratio (GOR) method (code as “B”).

### ***Gas Condensate Systems***

The appropriate methodologies for determining flash emissions for gas condensate systems are, in general order of preference:

- direct measurement of emissions (code as “M”);
- process simulator models (code as “S”);
- the E&P TANK program (code as “O”);
- the Environmental Consultants and Research, Inc. (EC/R) Equation (code as “O”); the gas/oil ratio method (code as “B”).

### **Direct Measurement of Emissions**

Direct measurement provides the most accurate results for evaluating flash gas flow rates and the composition of flash emissions; however, this method can be more costly than others discussed below.

### **Process Simulator Models**

Process simulators are computer models that use equations of state in conjunction with mass and energy balances to simulate petroleum processes for a variety of engineering purposes. Process simulator determinations generally are consistent with laboratory values, and therefore are expected to be more accurate when estimating flash emissions than most other determination methods (except measurements). However, process simulators are costly, and can be complicated to use.

There are several different process simulators (HYSIM, HYSIS, WINSIM, PROSIM, etc.), each utilizing similar basic principles. While process simulators are primarily used in process design, these models can also determine and speciate flash emissions using the Peng-Robinson equation of state option. Although other equations of state are available in the model, the Peng-Robinson equation best suits flash emissions determinations.

Required inputs may include an extended pressurized condensate analysis as well as other parameters (for example, temperature, pressure, and flow) for the process being simulated. Unlike other flash determination methods, process simulators are not constrained by American Petroleum Institute (API) gravity. Process simulators are appropriate for either black oil or gas condensate systems if detailed, accurate input data are available.

## **E&P TANK Program**

API and the Gas Research Institute developed the E&P TANK model, which predicts VOC and HAP emissions (flashing, working, and standing losses) from petroleum production field storage tanks. The E&P TANK program bases flash emissions determinations on the Peng-Robinson equation of state, and requires site-specific information to determine emissions rates. E&P TANK is best suited for upstream operations, such as stock tanks at wellheads and tank batteries common to several wellheads, although it will handle a broad range of API gravities (15°–68°).

The E&P TANK model allows the user to input compositional analyses from pressurized oil and gas samples to simulate flash generation in storage tanks. Specifically, the minimum inputs needed for the model are:

- separator oil composition;
- separator temperature and pressure;
- sales oil API gravity and Reid Vapor Pressure (RVP);
- sales oil production rate; and
- ambient temperature and pressure.

Since separator oil composition is a key input in the model, E&P TANK includes a detailed sampling-and-analysis protocol for separator oil.

E&P TANK also allows users to input detailed information about tank size, shape, internal temperatures, and ambient temperatures, and therefore the software can produce more precise emissions determinations. This flexibility in model design allows users to employ the model to match site-specific information.

## **Vasquez-Beggs Correlation Equation**

The Vasquez-Beggs correlation equation was developed in 1980 as part of a University of Tulsa research project. More than 6,000 samples from oil fields worldwide were used in developing correlations to predict oil properties.

The Vasquez-Beggs correlation equation determines the gas/oil ratio of a hydrocarbon solution from user-inputted variables; this GOR can then be used in conjunction with product and process parameters to determine flash emissions. This method was designed for gases dissolved in crude oils, and is most appropriate for use on upstream operations, such as stock tanks at wellheads, oil- and gas-production batteries, and for “black oil” (a heavy, low-volatility oil approximated by a GOR of less than 1,750 cubic feet per barrel and an API gravity less than 40°).

The method requires eight input variables:

- stock-tank API gravity,
- separator pressure,
- separator temperature,
- gas specific gravity,
- volume of produced hydrocarbons,
- molecular weight of the stock-tank gas,
- the VOC fraction of the tank emissions, and
- atmospheric pressure.

The Vasquez-Beggs correlation equation determines the dissolved GOR of a hydrocarbon solution as a function of the separator temperature, pressure, gas specific gravity, and liquid API gravity. Flash emissions from the VOC storage tank are then determined by multiplying the GOR by the tank throughput, the molecular weight of the stock-tank gas, and the weight fraction of VOC in the gases.

These equations to determine flash emissions are available in a Microsoft Excel spreadsheet originally developed by the Oklahoma Department of Environmental Quality, and can be downloaded at [www.deq.state.ok.us/AQDnew/resources/Calculations11.xls](http://www.deq.state.ok.us/AQDnew/resources/Calculations11.xls).

Programs such as GRI's HAPCalc model use the Vasquez-Beggs correlation equation to determine flash emissions; emissions-determinations methods using such programs should be coded accordingly.

### **EC/R Equation**

The EC/R equation calculates flash emissions based on the pressure drop of the process stream from the previous process vessel, the tank throughput, the density of the hydrocarbon liquids, and the mass fraction of each component in the liquid.

This method assumes that the liquid and vapor streams reach equilibrium at standard temperature and pressure and that the storage tank is at standard temperature and pressure. The EC/R algorithm is valid for vapor pressure of liquid streams entering the storage tank between 1.6 atmospheres and 5.1 atm. At vapor pressures less than 1.6 atm or greater than 5.1 atm, another method should be selected.

The EC/R equation is best suited to gas condensate systems operating in the pressure ranges described above. This equation is available in the Oklahoma DEQ's spreadsheet mentioned in the previous subsection.

### **Gas/Oil Ratio (GOR) Method**

The hydrocarbon liquid GOR can be determined by laboratory analysis of a pressurized sample collected upstream of the storage tank from the separator dump line (or from a similar apparatus). For more information, refer to the Gas Processors Association Standard 2174-93, which provides details on sampling procedures for collecting a pressurized oil sample.

The flash emissions are then determined by multiplying the GOR by the throughput of the tank. An extended hydrocarbon analysis of the flash gas from the sample should also be conducted to identify the concentrations of the individual components of the tank's flash emissions. When such sampling is conducted, the GOR method is appropriate for either black oil or gas condensate systems.

## ***Determining Emissions from Landing Losses***

### **Introduction**

Landing losses occur from floating-roof tanks whenever a tank is drained to a level where its roof lands on its deck legs or other supports (including roof suspension cables). When a floating roof lands on its supports or legs, it creates a vapor space underneath the roof. Liquid remaining in the bottom of the tank provides a continuous source of vapors to replace those expelled by breathing (in the case of internal floating-roof tanks) or wind action (in the case of external floating-roof tanks). These emissions, referred to as standing idle losses, occur daily as long as the tank roof remains landed.

Additional emissions occur when incoming stock liquid fills a tank with a landed roof; the incoming liquid not only displaces those vapors remaining under the floating roof, but also generates its own set of vapors that are displaced during the filling process. These two types of emissions are collectively referred to as filling losses.

For a given roof landing event, total landing loss emissions are therefore the sum of the filling losses and the daily standing idle losses over the entire period that the roof remained landed. Landing losses are inherently episodic in nature, and must be determined each time a tank's floating roof is landed.

Neither the EPA's TANKS program nor any other storage-tank emissions software currently determines landing loss emissions as part of routine program operation. However, landing loss emissions may be determined using the guidance outlined in American Petroleum Institute Technical Report 2567, "Evaporative Loss from Storage Tank Floating Roof Landings" (API TR 2567). EPA has also incorporated this API guidance

into a new version of Chapter 7, “Organic Liquid Storage Tanks,” available at: <[www.epa.gov/ttn/chief/ap42/index.html](http://www.epa.gov/ttn/chief/ap42/index.html)>.

The emissions determination method detailed in AP-42, Chapter 7 is the preferred method for determining landing loss emissions.

### **Floating-Roof Tank Designs**

Tank design considerations will impact both standing idle and filling loss emissions. Therefore, AP-42, Chapter 7 separates floating-roof tanks into the following three categories for emissions determination purposes:

- internal floating-roof tanks (IFRTs) with a full or partial liquid heel,
- external floating-roof tanks (EFRTs) with a full or partial liquid heel, and
- IFRTs and EFRTs that drain dry.

AP-42, Chapter 7 contains standing idle and filling loss equations for each different tank category listed above. To accurately use these equations, you must first classify the storage tank in question into one of the above categories. Care must be taken when classifying a tank as drain-dry. Both AP-42, Chapter 7 and API TR 2567 state that a tank is only a drain-dry tank if all of its free-standing liquid has been removed. The following tank configurations qualify as tanks with a partial liquid heel, according to API TR 2567:

- tanks that drain to a sump that retains a liquid heel,
- tanks whose sumps have baffles or similar fittings that retain liquid, or
- flat-bottom tanks whose contents have been removed by a vacuum truck, since liquid typically will still remain in irregular surfaces along the tank bottom.

For each tank category listed above, AP-42, Chapter 7 publishes different saturation factors that have been validated through API field studies to use in the landing loss equations. These saturation factors represent the stratification of vapors in the vapor space underneath the floating roof; therefore, no modification to these saturation factors based upon tank shell height is necessary.

### **Required Data for Determining Landing Loss Emissions**

After you have correctly determined your tank type, you must collect the following information about the tank and its contents for each episode when the roof is landed:

- tank diameter
- tank color
- height of the vapor space under the floating roof
- height of the stock liquid
- atmospheric pressure at the tank’s location

- average temperature of the vapor and liquid below the floating roof
- physical and chemical properties of the stored liquid (such as density, molecular weight, and vapor pressure)
- physical and chemical properties of the liquid that the tank is refilled with, if different from the previously stored liquid
- number of days that the tank stands idle while its floating roof is landed

For a given tank, you can then use this information in conjunction with the appropriate standing idle and filling loss equations to determine the emissions for each roof landing episode. The annual landing loss emissions can then be determined by summing the emissions from each episode occurring within a given calendar year. Emissions from each roof landing episode must be individually determined using accurate temperature data and stored liquid properties for the time of year when the roof landing occurred.

When using API TR 2567, care must be taken to avoid using certain default parameters that may not accurately reflect a given storage tank. For example, the daily vapor temperature range should be calculated from the appropriate equation presented within the document, instead of the default range being used.

Similarly, care must be taken using the “B” coefficient from Antoine’s equation to calculate the  $K_E$  term for certain chemical species. The form of Antoine’s equation used within API TR 2567 and AP-42, Chapter 7 closely resembles the Clausius-Clapeyron equation, and “B” values for many chemical species are not readily available in the prescribed units of temperature and pressure. In certain cases, the  $K_E$  term may have to be calculated using the original equation(s) as presented in AP-42, Chapter 7.

### **Reporting Landing Loss Emissions within the Inventory**

Report landing losses for each storage tank on the appropriate path within the emissions inventory questionnaire (EIQ). If your site determines that landing loss emissions occurred due to normal, routine operation, revise annual and ozone season emissions accordingly. For specific procedural guidance on reporting emissions on the EIQ, please consult Chapter 4 of *2006 Emissions Inventory Guidelines*.

## ***Determining Emissions from Degassing and Cleaning***

Emissions from tank degassing and cleaning operations can be determined using site-specific knowledge and material balance equations.

Alternatively, the following methods developed by the EPA can be used to determine emissions.

### **Degassing (Emptying) a Storage Tank**

For a fixed roof tank, degassing emissions can be determined by a two-part process. First, use TANKS to determine emissions from one turnover to account for vapors displaced during filling. Next, to account for clingage, determine the emissions from one turnover calculated as if the tank had an internal floating roof. Sum these two emission rates to determine degassing emissions.

For a floating-roof tank, degassing emissions can be determined by a two-part process. First, use TANKS to determine emissions for one turnover. Next, to approximate the vapor displaced from the space under the floating roof, determine the emissions from the tank modeled as a fixed roof tank with a tank height equal to the height of the deck legs. Sum these two emission rates to determine degassing emissions.

### **Cleaning (Sludge Handling)**

Most aqueous sludges are about 80 percent to 90 percent water by weight. A conservative approach for determining emissions from sludge cleaning is to assume the sludge is 80 percent water; the remainder is assumed to be VOCs and emitted. As an alternative, the actual sludge moisture content can be determined.

## ***Special Considerations when Quantifying Emissions***

When determining storage tank emissions, note the following special considerations.

### **Pressure Tanks**

Pressure tanks are designed to handle pressures significantly higher than atmospheric pressure. Two classifications of pressure tanks exist: low pressure and high pressure tanks. API defines *low pressure tanks* as those operating in the range of just above atmospheric pressure to 15 psig; high pressure tanks are those operating at pressures above 15 psig.

*High pressure tanks* are considered to be closed systems that prevent routine breathing and working loss emissions. However, routine emissions from equipment leak fugitive components associated with high pressure tanks, as well as any non-routine emissions, should be reported in the EI.

Low pressure tanks can experience breathing and working losses. While these emissions are usually less than those a similar atmospheric tank would experience, these emissions should be quantified and reported within the EI according to the guidance outlined in Chapters 3 and 4.

Since the TANKS model uses equations developed under atmospheric conditions, it does not accurately model emissions from low pressure tanks. Instead, you may use API Bulletin 2516, *Evaporation Loss From Low-Pressure Tanks*, to determine breathing and working losses from low pressure tanks.

### **Nitrogen-Blanketed Tanks**

Typically, storage tanks are blanketed with nitrogen (or other inert materials) to reduce the risk of fire, to reduce water acquisition by hygroscopic materials, or to prevent corrosion. However, nitrogen blanketing of an atmospheric storage tank does not reduce the tank's breathing or working loss emissions (*note*: air is approximately 78 percent nitrogen by volume).

Therefore, when determining emissions from nitrogen-blanketed atmospheric storage tanks (whether the tank is of fixed roof or internal floating-roof design), no modifications to the AP-42 equations (or software programs using these equations) are required. The gas blanket will not affect emissions if the tank is operated near atmospheric pressure.

### **Heated Tanks**

If a tank is heated, the vapor space can be assumed to be at a constant temperature and no breathing losses will occur. The tank must be heated to a uniform temperature and well-insulated, thus isolating it from heat gains and losses due to insolation and variations in ambient temperature. Changes in atmospheric pressure are assumed to have only negligible contributions to breathing losses and are not considered.

When using the TANK program, answer "yes" to the menu selection "Is Tank Heated?" on the Physical Characteristics screen to determine emissions from vertical and horizontal fixed-roof tanks. This will allow you to enter the temperature data directly on the Tank Contents screen. Temperature data input fields exist for Average, Minimum and Maximum Liquid Surface Temperature and for Bulk Liquid Temperature (degrees Fahrenheit). The temperature at which the tank is heated should be entered in all four data fields. If the tank is not well insulated, daily variations in liquid surface temperatures may be observed. The Minimum and Maximum Liquid Surface Temperatures, if available, should be input to estimate breathing losses.

You should also ensure that TANKS has the appropriate information for estimating vapor pressure at the desired temperature in its chemical database. For example, if TANKS uses Option 1 in the chemical database for estimating vapor pressure (which is valid for temperatures from 40 to 100 °F) and the desired temperature is over 100 °F, the program will **not** extrapolate the vapor pressure to the higher temperature, but will instead

calculate a vapor pressure at 100 °F. Options 2, 3, or 4 in the chemical database should be used for estimating vapor pressures at temperatures greater than 100 °F.

### **Tanks Storing Hot Products**

If hot products (materials with a temperature above the ambient temperature) are stored in a tank, using ambient meteorological data will not properly model the tank's true emissions. If the TANKS program is used, the tank should be treated as a heated tank, as detailed in the section above. To account for material cooling, the Minimum and Maximum Liquid Surface Temperatures should be entered to estimate breathing losses.

### **Tanks Storing Inorganic Liquids**

Currently, methods developed exclusively for determining inorganic compound emissions from storage tanks do not exist. However, it is possible to use the TANKS model to determine storage tank emissions from inorganic liquids if the inorganic liquid has a measurable vapor pressure and if data are available for one of the vapor pressure options in the TANKS chemical database.

Although the equations used in TANKS were developed to estimate evaporative losses from storage of organic liquids, they currently present the best available method for determining inorganic emissions from storage tanks.

### **Tanks With a Liquid Heel**

Care must be taken when classifying a tank as "drain dry." If the tank drains to a sump that retains a liquid heel, the API publishes saturation factors to use in the landing loss equations in order to determine the resulting emissions, which cannot be assumed to be negligible.

Operations where potential emissions are generated and released include: degassing operations, tank cleaning, steam cleaning, and the use of vacuum trucks.

### **Oil Field Wellhead Tank Battery Emissions**

A recent Houston Advanced Research Center (HARC) study, HARC 51C: *Evaluation of VOC Emissions from Flash and Condensate Tanks*, has shown significant emissions from wellhead crude and condensate storage tanks in the upstream oil and gas industry. According to this study, many wellhead storage tank batteries meet or exceed emission inventory reporting thresholds. A copy of the HARC study can be found at: <<http://www.harc.edu/Projects/AirQuality/Projects/Projects/H051C>>.

That study has identified these storage tank batteries as potentially underreported VOC emissions sources. Companies that own or operate sites in the upstream oil and gas industry should determine VOC emissions from all wellhead tank batteries to determine if these sites meet emissions inventory reporting requirements. Each storage tank in the wellhead battery will generate working, breathing, and flashing emissions. Please see Technical Supplement 6: Aboveground Storage Tanks, for guidance on determining storage tank emissions.

The IEAS has developed a new Material Throughput form specifically for oil field storage tanks and the form should be completed and include the production information for each tank.

## Speciation

If you have any source-specific information about storage tank VOC composition, you should use it to speciate the emissions. Supply the composition data and any related information (such as test results, etc.) with your emissions inventory. If you do not have any source-specific information about speciation of storage tank VOCs, then use the default speciation profiles in the current TANKS program.

For more information on speciation requirements, see Chapter 4.

## Supporting Documentation

Include documentation with your emissions inventory that supports and validates the emissions reported therein—including, but possibly not limited to, representative samples of:

- calculations detailing the tank parameters (diameter, height, shell color, roof color, paint condition, shell construction, capacity, primary and secondary seals, fittings, and throughput rate);
- if TANKS is used, a report generated using the “detailed” report option;
- physical properties of each product, including liquid density, liquid molecular weight, vapor molecular weight, and vapor pressure;
- sampling analysis;
- all supporting data used to calculate the flash losses, including identification of the determination method, sample analysis, API gravity, density of liquid petroleum, gas/oil ratio, gas gravity, molecular weight of stock, and

- VOC percentage by weight of both the stored liquid and flash gas; and
- all other information necessary to determine emissions.

## For More Information

Answers to questions about storage tanks are available at the EPA's web site: <[www.epa.gov/ttn/chief/faq/tanksfaq.html](http://www.epa.gov/ttn/chief/faq/tanksfaq.html)>.

While those questions are not reproduced here due to space considerations, they address such topics as underground storage tanks, vapor-balanced tanks, tanks with roof geometries other than a cone or a dome, indoor storage tanks, and tanks storing a two-phase liquid.

## References

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## APPENDIX B—SAMPLE LETTERS

The following sample letters, offered for guidance and general reference only, demonstrate the information required for prompt handling of accounts that:

- do not meet the applicability requirements of Title 30, Texas Administrative Code, Section 101.10 for the current inventory year, but that wish to remain on the IEAS mailing list to continue to receive future inventories;
- have experienced an insignificant emissions change; or
- are not expected to meet the applicability requirements of 30 TAC Section 101.10 in future years and therefore wish to be removed from the mailing list.

# Inapplicability Notification and Request to Remain on Mailing List

Kevin Cauble, Manager  
 Industrial Emissions Assessment Section, MC 166  
 Texas Commission on Environmental Quality  
 P.O. Box 13087  
 Austin, TX 78711-3087

Re: Emissions Inventory for the 2006 Texas Commission on Environmental Quality Air  
 Program Account Number \_\_\_\_\_

Dear Mr. Cauble:

Pursuant to Section 382.014 of the Texas Clean Air Act and Title 30, Texas Administrative Code, Section 101.10, the TCEQ has requested that a 2006 Air Emission Inventory be submitted for my plant site. Upon reviewing the applicability requirements as presented in 30 TAC § 101.10, I do not believe that the requirements apply to my account for the current inventory year.

The following table lists the total actual emissions and the potential to emit (PTE), both in tons per year, for all criteria and hazardous air pollutants (HAPs). The values in the table are representative of the operations during calendar year 2006 at this plant site.

**Plant-wide Emissions Totals (TPY)**

Pollutant	VOC	NO <sub>x</sub>	CO	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	Any Individual HAP	Aggregate HAPs
PTE								
Actual								

Upon request from the IEAS, I am prepared to submit supporting documentation. This may include, but may not be limited to, representative sample calculations; stack test results; copies of continuous emissions monitoring system reports; and copies of applicable permit maximum allowable emission rate tables (MAERTs) or, for sources not listed on any MAERT, the calculations used in determining potential to emit.

If you have questions concerning the determination of this account's status or the calculation methodologies employed to make this determination, please contact me via telephone at \_\_\_\_\_ or via e-mail at \_\_\_\_\_.

Sincerely,

# Insignificant Change Notification

Kevin Cauble, Manager  
Industrial Emissions Assessment Section, MC 166  
Texas Commission on Environmental Quality  
P.O. Box 13087  
Austin, TX 78711-3087

Re: 2006 Emissions Inventory TCEQ Air Program Account Number \_\_\_\_\_

Dear Mr. Cauble:

Pursuant to Section 382.014 of the Texas Clean Air Act and Title 30, Texas Administrative Code, Section 101.10, the TCEQ has requested that a 2006 Air Emission Inventory be submitted for my account. The purpose of this letter is to inform the TCEQ that this account has not undergone operational or process changes to produce a significant change in actual emission rates for any one of the criteria pollutants. Annual emission totals for VOCs, NO<sub>x</sub>, CO, SO<sub>2</sub>, Pb, PM<sub>10</sub>, and PM<sub>2.5</sub> are each within 5 percent or five tons of the most recently reported annual total, as detailed in 30 TAC § 101.10(b)(2)(A).

Please note that (*check one*):

- because my account experienced no emissions due to emissions events (EE) or scheduled maintenance, startup and shutdown (SMSS) activities, I am submitting:
  - the signed emissions inventory questionnaire cover page and
  - the signed Emissions Events statement.
  
- because my account did experience emissions due to emissions events (EE) or scheduled maintenance, startup and shutdown (SMSS) activities, I am submitting:
  - the signed emissions inventory questionnaire cover page, and
  - the signed Emissions Events statement, if applicable.

Upon request from the IEAS, I am prepared to submit supporting documentation. This may include, but may not be limited to, representative sample calculations, stack test results, and copies of continuous emissions monitoring system reports.

If you have questions concerning the determination of this account's status or the calculation methodologies employed to make this determination, please contact me via telephone at \_\_\_\_\_ or via e-mail at \_\_\_\_\_.

Sincerely,

# Inapplicability Notification and Request for Removal from Mailing List

Kevin Cauble, Manager  
Industrial Emissions Assessment Section, MC 166  
Texas Commission on Environmental Quality  
P.O. Box 13087  
Austin, TX 78711-3087

Re: TCEQ Air Program Account Number  
Emissions Inventory Calendar Year 2006  
Company Name \_\_\_\_\_  
Site Name \_\_\_\_\_

Dear Mr. Cauble:

The referenced account's actual and potential emissions fell below the reporting threshold of Title 30, Texas Administrative Code, Section 101.10 for the referenced emissions inventory reporting calendar year. Furthermore, my company believes that this account will fail to meet current rule applicability requirements in future years. I therefore request that this account be removed from the Industrial Emissions Assessment Section's annual emissions inventory mailing list.

I understand that:

- if the referenced account meets the reporting requirements of 30 TAC § 101.10 in the future, then it is my company's responsibility to submit an annual emissions inventory update; and
- if emission fees apply to the referenced account, then the TCEQ may assess future fees based on the account's most recently submitted emissions data on file with the Industrial Emissions Assessment Section.

Owner or Owner's Authorized

Representative (print) \_\_\_\_\_ Title (print) \_\_\_\_\_

Signature \_\_\_\_\_ Date Signed \_\_\_\_\_

*Note: If your account's current emissions as shown in the State of Texas Air Reporting System database exceed rule applicability requirements, you must submit a current emissions inventory showing a reduction in emissions to below the thresholds defined in 30 TAC § 101.10. The IEAS will review the submitted information and update the emissions data in STARS. If, after review, the referenced account no longer exceeds the thresholds, then the IEAS will remove the account from the annual emissions inventory mailing list.*

# APPENDIX C—EPA AND TCEQ RESOURCES

This appendix includes information about some helpful EPA and TCEQ resources.

## EPA Resources

### Air CHIEF

The EPA's Clearing House for Inventories and Emission Factors contains the most up-to-date emissions information and factors, including most of the tools listed below. CHIEF is accessible online at [www.epa.gov/ttn/chief/index.html](http://www.epa.gov/ttn/chief/index.html). A CD-ROM (Version 10) is available by calling the Info CHIEF Help Desk at 919-541-1000, or by e-mail to [info.chief@epa.gov](mailto:info.chief@epa.gov).

To learn more about CHIEF, you can also write to:

Info CHIEF  
Emission Factor and Inventory Group (MD-14)  
U.S. Environmental Protection Agency  
Research Triangle Park, NC 27711

### AP-42 (5th Ed., Vol. 1, January 1995, Supplements A–F)

AP-42 is discussed in Chapter 4 (“Determining and Reporting Emissions”) of this document. It is included in Air CHIEF.

### FIRE (Factor Information REtrieval Data System, Version 6.23)

FIRE is a database containing the EPA's recommended emission estimation factors for criteria and hazardous air pollutants. FIRE is available online at [www.epa.gov/ttn/chief/software/fire/index.html](http://www.epa.gov/ttn/chief/software/fire/index.html).

### TANKS 4.x

TANKS is a Windows-based computer software program that estimates emissions of volatile organic compounds and hazardous air pollutants from storage tanks. The current version of TANKS, which is based on the emission estimation procedures from Chapter 7 of AP-42, is available online at [www.epa.gov/ttn/chief/software/tanks/index.html](http://www.epa.gov/ttn/chief/software/tanks/index.html).

### Green Book

The EPA's “Green Book” (*Nonattainment Areas for Criteria Pollutants*) provides up-to-date information on nonattainment status. The Green Book is available online at [www.epa.gov/oar/oaqps/greenbk/](http://www.epa.gov/oar/oaqps/greenbk/).

### **Protocol for Equipment Leak Emission Estimates (EPA-453/R-95-017)**

*Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017) may be downloaded from the EPA web site at <[www.epa.gov/ttn/chief/efdocs/equiplks.pdf](http://www.epa.gov/ttn/chief/efdocs/equiplks.pdf)>.

If you cannot navigate directly to the PDF, navigate to <[www.epa.gov/ttn/chief/publications.html#factor](http://www.epa.gov/ttn/chief/publications.html#factor)>, right-click (Windows) or CTRL-click (Mac) on the link *Protocol for Equipment Leak Emission Estimates*, and then select the appropriate option from the pop-up menu to save the PDF file to your desktop.

## **TCEQ Resources**

### **2006 Forms and Instructions**

<[www.tceq.state.tx.us/implementation/air/industei/psei/psei.html#tools](http://www.tceq.state.tx.us/implementation/air/industei/psei/psei.html#tools)>

### **Tools for Completing the EI**

<[www.tceq.state.tx.us/implementation/air/industei/psei/psei.html#tools](http://www.tceq.state.tx.us/implementation/air/industei/psei/psei.html#tools)>

### **Information about Electronic Reporting**

<[www.tceq.state.tx.us/assets/public/implementation/air/ie/pseiforms/stars.pdf](http://www.tceq.state.tx.us/assets/public/implementation/air/ie/pseiforms/stars.pdf)>

### **EI Account Mailing Status**

<[www.tceq.state.tx.us/implementation/air/industei/psei/psei.html](http://www.tceq.state.tx.us/implementation/air/industei/psei/psei.html)>

### **Air Permits Guidance Documents (may be helpful for determining emissions)**

<[www.tceq.state.tx.us/permitting/air/nav/air\\_guidenewsource.html](http://www.tceq.state.tx.us/permitting/air/nav/air_guidenewsource.html)>

**IEAS Help Line: 512-239-1773**

# APPENDIX D—SMALL BUSINESS INFORMATION

Agency policy encourages small businesses to comply with TCEQ. This appendix contains information that will help you determine whether your business qualifies for small business emissions inventory assistance. It also includes a form that small businesses may use to request help to understand how 30 TAC § 101.10 applies to their account and to estimate emissions.

## Application for Small Business Emissions Inventory Assistance

*Please print or type*

If your business:

- has 100 or fewer full-time employees,
- is independently owned and operated,
- is a first-time reporter of emissions inventory or has completed past inventories in good faith, and
- owns or operates the account for which the EI is due,

then you may request help with your emissions inventory by completing this form.

Company Name: \_\_\_\_\_

TCEQ Air Account Number: \_\_\_\_\_

Business Type: \_\_\_\_\_

Site Location: \_\_\_\_\_

Contact Person and Title : \_\_\_\_\_

Telephone Number : ( \_\_\_\_\_ ) \_\_\_\_\_ - \_\_\_\_\_ Number of Employees at Site: \_\_\_\_\_

An independently owned and operated company is self-operated, -managed, and -owned, and is not a subsidiary or controlled by a corporation with multiple holdings. Is this business independently owned and operated?   yes   no

Please describe, as accurately as possible, the type of assistance that you require.

*Notes:* If emissions at your account meet or exceed the reporting thresholds described in Chapter 1 of this book, you must submit an emissions inventory. You will be required to supply emission rates and other required data in the approved format. You must meet all applicable deadlines for emissions reporting.

If you do not have the data necessary to determine whether emissions at your account meet or exceed the reporting thresholds, or if you need clarification of the requirements or information about the reporting format, contact the IEAS at 512-239-1773.

Return this form to:   Emissions Inventory Data, MC 166  
                                  Texas Commission on Environmental Quality  
                                  P.O. Box 13087  
                                  Austin, TX 78711-3087

# APPENDIX E—POLLUTION PREVENTION INFORMATION

## Introduction

The TCEQ encourages businesses to implement policies that are beneficial while complying with state and federal rules. This appendix contains Best Management Practices (BMPs) devised by the TCEQ's Pollution Prevention and Industry Assistance Section in order to help businesses improve performance and reduce air pollution from various sources. The purpose of these BMPs is to encourage businesses to move above and beyond regulatory requirements.

## Marine Terminals

Steps that can improve marine terminals:

- Institute a hose–connector management system to ensure consistent transfer of liquid that results in fewer leaks. Responsibilities are defined by a responsible care management system (RCMS) and procedures.
- Improve corporate policy on docked barges and make sure they meet terminal emission and operating standards. Ensure vessel operators conform to maintenance standards for terminal relief valves and terminal “closed dome” loading and unloading procedures.
- Improve VOC containment where vapor balance is not completely effective when loading barges, tankers, railcars, and trucks. Use a VOC detector to ensure tight connections.
- Use combined heat and power (CHP) technology for energy recovery rather than using a flare or vapor incineration
- Supply the electricity in a CHP configuration, with the exhaust gases providing waste heat for steam or refrigeration.
- Use CHP chillers to deliver refrigeration for tanks requiring condensers to reduce product loss. CHP technology can provide electricity, steam, and refrigeration from any fuel source with 80–90 percent efficiencies.
- Use pipe purge fluids as solvents, or as fuel for CHP, rather than sending them offsite for disposal.

## **Storage Tanks**

### ***Breathing Losses***

*Breathing losses* are the escape of vapor from a tank vapor space that has expanded due to daily variation in temperature and pressure. Reduce breathing losses by reducing vapor space in the tank. In fixed-roof tanks, breathing losses can account for 10 to 95 percent of total annual emissions. Much of the breathing losses result from thermal expansion of the VOC-saturated vapor in the tank head space. To prevent these losses, reduce the tank head space by operating at a full level and constant rate (fill rate = withdrawal rate). Keep the tank at a more constant temperature by painting it white to reflect more sunlight and by insulating it to reduce heat transfer between the tank liquids and the surrounding air. Supplemental cooling or heating from a CHP system can be used to keep the tank at constant temperature. Raise the vent temperature and consider raising the pressure at which the conservation vent opens to reduce emissions caused by thermal expansion of the tank vapor space. However, do not exceed the tank design pressure. Tanks that operate conservation vents at 2.5 psig or higher will often have low breathing losses, or none.

### ***Working Losses***

Working losses result from filling and emptying tanks and can be reduced significantly by implementing BMPs. Install vapor-return lines to send the displaced vapor from the tank being filled back to the liquid source (tank truck, railcar, barge). Equalize vapor space between tanks in a tank farm using a common vent header. This would apply to tanks containing the same solvent or where cross-contamination is acceptable. The displaced vapor space of a tank being filled will fill the resulting vapor space of a tank being emptied. Equalize the fill rate and withdrawal rate to eliminate working losses.

Reducing the number of tank turnovers per year will reduce working loss emissions. Vapors displaced during filling and thermal outbreathing can be contained by installing a vapor holder (giving the tank a variable vapor space). The vapors from the holder can then be returned to the liquid storage tank during emptying and inbreathing.

### ***Floating-Roof Landing Losses***

In a floating-roof tank, the roof floats on the surface of the liquid inside the tank to reduce evaporative losses during normal operation. However, when the tank is drained to a level where its roof lands on its deck legs or other support mechanism, a vacuum breaker opens to prevent collapse of the roof and a vapor space underneath the roof is created. Liquid remaining in the bottom of the tank continuously emits vapors to replace those expelled by breathing (in the case of internal floating-roof tanks) or

wind action (in the case of external floating-roof tanks). These emissions, referred to as *standing-idle losses*, occur daily as long as the tank roof remains landed. Significant air emissions and loss of product can occur during landing of floating roofs. Floating-roof tanks should be operated in a manner that minimizes the amount and length of time of roof landings.

## **Other Tank Options**

Other options to consider:

- Using insulating paint on the roofs of floating-roof tanks
- Installing vapor-recovery systems
- Using tank emissions for energy recovery in a CHP system

## **Cooling Towers**

Ways to improve cooling tower performance:

- Replace old, leaking heat exchangers
- Install back-up heat exchangers to avoid plant shutdowns
- Monitor cooling tower exhausts to provide real time notification of heat exchanger leaks
- Utilize heat recovery systems to replace cooling towers. This would reduce water evaporation rates, nuisance fog, and mist discharges to plant roads and vehicles

## **Glycol Units**

Things to consider when dealing with glycol units:

- Replace gas pneumatics with air system instruments
- Install flash tank separators on glycol dehydrators
- Implement directed inspection and maintenance at gas plants and booster stations
- Join the EPA's Natural Gas STAR Program
- Install vapor recovery units on natural gas liquid transfer lines from storage tanks to rail and truck transportation vehicles

## **General BMPs for VOC Emissions Control**

Tips on controlling miscellaneous VOC sources:

- Process waste products for resource recovery, or as salable by-products. Recover VOCs via non-destructive methods (e.g., membrane recovery, biofilter, or cryogenic recovery) at or near the point of generation.
- Implement product substitution, product conservation, and changes in product composition. Use alternative products that

would do the same job but with less harmful environmental impact (e.g., low-VOC or water-based products).

- Modify process chemistry or equipment design, improve operational procedures, increased automation, and improve process controls.
- Recover potential emissions for use as feed to the original process or in another process within the facility.
- Practice good housekeeping, implement an effective preventive maintenance or leak detection and repair program (or both), institute training and awareness programs, have effective supervision, encourage employee participation, review production scheduling and planning, and implement accounting and allocation practices that reflect the true cost of wasted products.
- Recycle wash solvents elsewhere in the process, use less volatile cleaning agents, and design equipment and procedures to minimize the need for cleaning.
- Employ parts washers that use steam instead of conventional ones that use solvents.
- Prevent the losses of volatile materials to wastewater streams where they may reappear as VOCs and evaporate.
- Keep paint and paint thinner away from high-traffic areas to avoid spills. Recycle paint, paint thinner, and solvents.
- Train employees on proper painting and spraying techniques, and use effective spray equipment that delivers more paint to the target and less overspray (high volume, low pressure spray guns).
- Replace existing atmospheric blowdown stacks with vapor recovery systems for energy recovery.
- Estimate the cost to install a marine vapor loss control system. Consider both vapor recovery and a CHP configuration.
- Reduce refinery odor from sour water.
- Replace solvent-based paints with low-VOC or water-based paints.
- Improve material handling, storage, and management practices, which may result in substantial reductions in spills, fugitive emissions, and leaks.
- Mix paints and solvents in designated areas, preferably indoors or under a shed.
- Have absorbent and other cleanup items readily available for immediate cleanup of spills.
- Keep VOC saturated pads, rags, and gloves in closed and vapor tight containers.
- Do not transfer or convert pollution from one medium to another.

- Modify the underground drainage system and process water treatment system to improve water treatment and reduce air emissions.
- Burn hydrocarbons for energy recovery in a CHP system.
- Enclose, cover, or contain painting and related activities to the maximum extent practical.

## Sandblasting

Enclose, cover, or contain blasting and sanding areas completely. Use shrouded or vacuum-assisted tools that can prevent abrasives, dust, and paint chips from leaving the area being worked on (e.g., dustless sanders and vacuum blasting robots).

## Boilers and Process Heaters

Ways to improve boiler and heater operations:

- Measure the gas temperature of stacks. If it is too high, install heat-recovery equipment such as an economizer or absorption chiller to chill water.
- Measure flue gas hydrocarbon concentration to ensure complete combustion.
- Clean the water and fire sides of the boiler to enhance heat transfer.
- Reduce excess air. It can lower boiler temperature.
- Install automatic combustion controls.
- Implement an environmental management system (EMS) that calls for continuous improvement of energy efficiency. Involve every employee in source reduction and minimizing waste.
- Improve water quality in the boiler tubes to decrease blowdowns.
- Harvest rainwater and use it in your boiler. Rainwater contains very few impurities and needs less demineralization and dealkalization.
- Reduce radiation and convection losses (*shell losses*) by improving insulation. Periodically measure shell temperatures.
- Steam leaks are very expensive, so repair steam leaks as soon as possible.
- Recover condensate and feed it back to the boiler.

For questions about these best management practices, or for additional technical assistance, please contact the TCEQ's Pollution Prevention and Industry Assistance staff at:

*Emissions Inventory Guidelines*

- 512-239-3100 (Austin)
- 713-767-3763 or 713-767-3693 (Houston)
- 817-588-5827 (Dallas)



# APPENDIX F—CHECKLIST

This list is intended to assist you in ensuring that you have supplied the information required for the IEAS to adequately review your emissions inventory.

You are not required to submit this form to the IEAS.

## 2006 Emissions Inventory Completeness Checklist

Account \_\_\_\_\_ Company: \_\_\_\_\_

- |    |       |  |
|----|-------|--|
| 1  | _____ | Are all required signatures provided? Have you entered the number of reportable and non-reportable emission events and SMSS activities?  |
| 2  | _____ | Are you returning all EIQ pages?   |
| 3  | _____ | Did the contact information change? If so, are you submitting a completed Contact Information form?  |
| 4  | _____ | If the file includes additions, did you submit complete information using the appropriate add forms?   |
| 5  | _____ | Did you review all SCCs? Did you correct any erroneous SCCs?   |
| 6  | _____ | Did you review the operating schedule? Did you correct any incorrect data on the EIQ?  |
| 7  | _____ | Did you identify zero UTM coordinates and non-zero UTM outliers? Did you correct all incorrect coordinates on the EIQ?   |
| 8  | _____ | Did you review all EPN parameters? Did you correct any incorrect parameters on the EIQ?  |
| 9  | _____ | <i>Cooling Towers:</i> Are you submitting all data requested in Technical Supplement 2: Cooling Towers? Have you indicated whether the cooling tower is in HRVOC service?                                      |
| 10 | _____ | <i>Flares:</i> Are you submitting all data requested in Technical Supplement 4: Flares? Have you indicated whether the flare is in HRVOC service?  |
| 11 | _____ | <i>Equipment Leak Fugitive Areas:</i> Are you submitting a Fugitive Data form for each fugitive area emitting more than five tons? This form may be found in Technical Supplement 3: Equipment Leak Fugitives. |
| 12 | _____ | Have you met speciation requirements? (See Chapter 4.)   |
| 13 | _____ | Are tank emissions speciated?  |
| 14 | _____ | Have you included thorough supporting documentation for all NO <sub>x</sub> sources emitting more than 100 tons, and for all VOC sources emitting more than 25 tons?   |
| 15 | _____ | Do the front page totals indicate any large increases or decreases? Did you explain these in your cover letter?  |
| 16 | _____ | Are front page seasonal percentages reported in whole numbers that total 100 percent?  |
| 17 | _____ | Are the seasonal operating percentages for each FIN reported in whole numbers that total 100%?   |
| 18 | _____ | Is all Facility Status information correct? Has the status date for each "S," "D," or "O" status change been accurately updated?   |
| 19 | _____ | Is all Facility Parameter Information accurate and correct?  |
| 20 | _____ | Did you supply all necessary sample calculations and supporting documentation?   |
| 21 | _____ | Did you supply representative material data for tanks, loading, and material balance calculations?   |
| 22 | _____ | Did you use acceptable and current emissions factors?  |
| 23 | _____ | Are you submitting vendor data, stack test results, and/or CEMS data if those determination methods are employed in the current EI?  |
| 24 | _____ | For control devices, are abatement efficiencies accurate? Are all relevant data present, including the Inspection and Maintenance schedule?  |
| 25 | _____ | Were all emissions reported at the appropriate FIN/EPN path?   |
| 26 | _____ | Are all determination methodologies correct?   |
| 27 | _____ | Is the overall account structure representative of actual operations?  |
| 28 | _____ | Have you included Plot Plans and/or Process Flow Diagrams?   |

# ABBREVIATIONS

AEIU	annual emissions inventory update
AMS	area and mobile source
API	American Petroleum Institute
AVO	Audio/visual/olfactory
Btu	British thermal unit(s)
CAS	Chemical Abstracts Service
CEMS	continuous emissions monitoring system(s)
CIN	control identification number
Cl <sub>2</sub>	chlorine
CEO	Chief Engineer's Office
CO	carbon monoxide
CFR	Code of Federal Regulations
EE	emissions events
EI	emissions inventory
EQ	emissions inventory questionnaire
EPA	United States Environmental Protection Agency
EPN	emission point number
FCAA	federal Clean Air Act
FCCU	fluid catalytic cracking unit
H <sub>2</sub> S	hydrogen sulfide
HAP	hazardous air pollutant
HCN	hydrogen cyanide
HF	hydrogen fluoride
HRSG	heat recovery steam generator
HRVOC	highly reactive volatile organic compound
HVAC	heating, ventilation, and air conditioning
IEAS	Industrial Emissions Assessment Section
IEI	initial emissions inventory
LDAR	leak detection and repair
M	thousand
MM	million
NAAQS	national ambient air quality standards
NAD83	North American Datum of 1983
NH <sub>3</sub>	ammonia
NSCR	nonselective catalytic reduction NO <sub>x</sub> oxides of nitrogen
Pb	lead
PEMS	predictive emissions monitoring system(s)
PM	particulate matter
PM <sub>2.5</sub>	particulate matter no larger than 2.5 microns in diameter
PM <sub>10</sub>	particulate matter no larger than 10 microns in diameter
ppm	parts per million
psi	pounds per square inch
psia	pounds per square inch, absolute
psig	pounds per square inch, gauge
RATA	relative accuracy test audit
RN	(regulated entity) reference number
SIC	Standard Industrial Classification

SCC	source classification code
scf	standard cubic feet
SO <sub>2</sub>	sulfur dioxide
SOCMI	synthetic organic chemical manufacturing industry
SMSS	scheduled maintenance, startup, and shutdown
SRU	sulfur recovery unit
STARS	State of Texas Air Reporting System
TAC	Texas Administrative Code
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality
THSC	Texas Health and Safety Code
TOC	total organic carbon
TSP	total solid particulate(s)
tpy	tons per year
-u	unclassified
UTM	Universal Transverse Mercator
VOC	volatile organic compound
VRU	vapor recovery unit

# GLOSSARY

The definitions in this glossary are intended to assist you in understanding matters related to the annual emissions inventory. **Nothing** in this glossary supersedes **any** information in any state or federal law, rule, or regulation. In the case of any discrepancy between information herein vs. information in a state or federal law, rule, or regulation, the law, rule, or regulation takes precedence.

**abatement device**—A piece of equipment or recognized operation that limits, controls, or abates emissions of certain contaminants associated with certain processes. Examples include baghouses, flares, scrubbers, condensers, vapor recovery units, and component fugitive Inspection and Maintenance programs. Synonymous with *control device*.

**abatement code**—A numeric code that identifies an abatement device. A list of abatement codes is available in *2006 Emissions Inventory Forms and Instructions* (TCEQ publication RG-360B).

**account**—See Title 30, Texas Administrative Code (TAC), Section 101.1. *For sources for which a permit is required under 30 TAC Chapter 122 (Federal Operating Permits)*, all sources aggregated as a site. *For all other sources*, any combination of sources under common ownership or control and located on one or more properties that are contiguous, or contiguous except for intervening roads, railroads, rights-of-way, waterways, or similar divisions.

**account centroid**—The physical center of an account, represented in coordinate form (latitude and longitude or UTM).

**account structure**—The way that an account's equipment is represented in the emissions inventory.

**affected county**— Any county designed as an affected county under Texas Health and Safety Code § 386.001.

**API gravity**— The weight per unit volume of hydrocarbon liquids as measured by a system recommended by the American Petroleum Institute:

$$API\ gravity = \frac{141.5}{Specific\ gravity} - 131.5$$

**attainment county**—A county in which levels of criteria air pollutants meet the national ambient air quality standards for the pollutants. Attainment areas are defined using federal pollutant limits set by the EPA. Refer to FCAA § 107(d) for further explanations of “nonattainment” and “attainment” designations. Compare *nonattainment county*.

**Chemical Abstract Service number**—A unique number assigned to a substance. Although the IEAS identifies each substance with a *contaminant code* rather than with its CAS number, you should include the CAS number when adding a new contaminant to your emissions inventory. This additional information will be used for quality assurance.

**condensate**—A liquid hydrocarbon with an API gravity greater than 40° API at 60° F (and a specific gravity less than 0.8251).

**contaminant**—A substance emitted into the air.

**contaminant code**—A contaminant’s five-digit identifying code. A list is available in *2006 Emissions Inventory Forms and Instructions* (TCEQ publication RG-360B).

**control device**—See *abatement device*.

**control identification number (CIN)**—A label that uniquely identifies an abatement device; limited to 10 alphanumeric characters. Please note that no two separate abatement devices within an account may share the same CIN.

**emissions**—Air contaminants generated by a facility. See also *ontaminant*.

**emissions event**—Any upset event or unscheduled maintenance, startup, or shutdown activity from a common cause that results in unauthorized emissions of air contaminants from one or more points at a regulated entity.

**emissions inventory forms**—The forms used to add new structural information to an account or to supply material usage data. Blank forms are available in *2006 Emissions Inventory Forms and Instructions* (TCEQ publication RG-360B) as well as the instructions for completing the forms.

**emissions inventory questionnaire (EIQ)** —A computer printout that shows an account’s self-reported data, including, but not limited to, account information, contact information, process structural data, facility identification data, control device data, emission point data, and path emissions for a given calendar year.

**emission point**—The geographical location (point) where emissions enter the air. An emission point is described by its group, profile and characteristics. Each emission point in the emissions inventory is uniquely identified by an *emission point number*.

**emission point number (EPN)**—A label that uniquely identifies a given emission point; limited to 10 characters. Please note that no two distinct emission points in an account may share the same EPN. If your account is subject to permit, the EPNs on your EIQ must match those on your permit.

**expected maximum capacity**—The projected greatest capacity of a facility based on its physical and operational design or configuration and planned operation.

**facility**—A unit, device, structure or area capable of generating air contaminants. Each facility in the emission inventory is uniquely named by a facility identification number (FIN). For purposes of Texas' emissions inventory, "facility" does not refer to the entire account, but rather to an individual process unit in the account.

**facility identification number (FIN)**—A label that uniquely identifies a given facility; limited to 10 alphanumeric characters. Please note that no two distinct facilities may share the same FIN. If your account is subject to permit, the FINs on your EIQ must match those on your permit.

**gas/oil ratio (GOR)**—The relation of gas in cubic feet to the production of oil in barrels.

**hazardous air pollutant**—An air pollutant designated as hazardous by the EPA. All HAPs should be listed individually (speciated) in your emissions inventory. HAPs are identified in federal Clean Air Act § 115(b); the 1990 Act allows the EPA to modify the list as necessary. A current list can be found on the EPA's website.

**highly reactive volatile organic compounds (HRVOCs)**—For emissions inventory purposes, the compounds ethylene, propylene, all isomers of butene, and 1,3-butadiene.

**IEAS**—Abbreviation for *Industrial Emissions Assessment Section*, the section of TCEQ's Chief Engineer's Office responsible for the emissions inventory process.

**micron**—One-millionth of a meter. Also called *micrometer*.

**near-nonattainment county**—Any county included in the following list: Bastrop, Bexar, Caldwell, Comal, Gregg, Guadalupe, Harrison, Hays, Nueces, Rusk, San Patricio, Smith, Travis, Upshur, Victoria, Williamson, and Wilson.

**nonattainment county**—A defined region within the state designated by the EPA as failing to meet the national ambient air quality standard for a pollutant for which a standard exists. The EPA will designate the area as nonattainment under the provisions of FCAA § 107(d). For the official list and boundaries of nonattainment areas, see 40 CFR Part 81 and pertinent *Federal Register* notices.

**nonreactive organic compounds**—A group of organic compounds that do not significantly contribute to ozone formation.

**non-reportable emissions event**—Any emissions event that in any 24-hour period does not result in an unauthorized emission from any emission point equal to or in excess of the reportable quantity as defined in 30 TAC § 101.1.

**non-reportable scheduled maintenance, startup, shutdown activity**—A SMSS event that is recorded as required by 30 TAC § 101.211.

**path**—Formerly known as a *link*, a path consists of a facility (tracked by its FIN) that generates emissions; an associated emission point where emissions enter the atmosphere; and any abatement devices (tracked by CINs) that control emissions. All paths must consist of at least a FIN and an EPN. If emissions produced at a FIN are not abated before entering the atmosphere at the associated EPN, then the path consists only of a FIN and an EPN. If, however, an abatement device controls emissions between the FIN and the EPN, then the associated path consists of a FIN, a CIN, and an EPN.

**percent max capacity**—The ratio of a facility's annual operating capacity to the facility's maximum capacity:

$$\text{Percent max capacity} = \frac{\text{Capacity}_{\text{annual}}}{\text{Capacity}_{\text{maximum}}} \times 100$$

For a definition of  $\text{Capacity}_{\text{maximum}}$ , see *expected maximum capacity*.

**percent time offline (PTO)**—The ratio of the device's downtime to the annual operating time.

$$\text{PTO} = \frac{\text{Hours offline}}{\text{Annual operating hours}} \times 100$$

**PM<sub>2.5</sub>**—Portion of total suspended particulates with an aerodynamic diameter less than or equal to 2.5 microns. PM<sub>2.5</sub> is a subset of TSP and PM<sub>10</sub>.

**PM<sub>10</sub>**—Portion of total suspended particulates with an aerodynamic diameter less than or equal to 10 microns. PM<sub>10</sub> is a subset of TSP.

**potential to emit (PTE)**—The maximum capacity of a facility or stationary source to emit a pollutant under its physical and operational design. Any physical or enforceable operational limitation on the capacity of the facility or stationary source to emit a pollutant, including the use of air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, should be treated as part of its design only if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions, as defined in 40 CFR 51.165(a)(1)(viii), do not count in determining a stationary source's potential to emit.

**regulated entity reference number**—A number that the Central Registry assigns to a location where a TCEQ-regulated activity occurs.

**regulated pollutant**—Includes any VOC; any pollutant subject to the federal Clean Air Act § 111; any pollutant listed as a hazardous air pollutant under FCAA § 112; each pollutant for which a national primary ambient air quality standard has been promulgated (including carbon monoxide); and any other air pollutant subject to requirements under TCEQ rules, regulations, permits, orders of the Commission, or court orders.

**reportable emissions event**—Any emissions event that in any 24-hour period, results in an unauthorized emission from any emission point equal to or in excess of the reportable quantity as defined in 30 TAC § 101.1.

**reportable scheduled maintenance, startup, shutdown activity**—A SMSS activity as defined in 30 TAC § 101.1, where prior notice and a final report is submitted as required by 30 TAC § 101.211.

**source classification code**—An eight-digit EPA-developed code that identifies a specific industrial process.

**scheduled maintenance, startup, shutdown (SMSS) activity**—An event as defined in 30 TAC § 101.1 which is used in reporting required by § 101.211.

**speciation**—Categorization of the individual chemical substances, or species, within an emission.

**State of Texas Air Reporting System (STARS)**—The database where emissions inventory data are stored.

**structure**—The representation, in the TCEQ database, of the paths (formerly “links”) in an account. Correct account structure, which should reflect the account processes as shown on the site’s process flow diagram, is essential. For more information on proper account structure, consult the appropriate sections of this book.

**total suspended particulate (TSP)**—Any particulate material that exists as a solid or liquid in the atmosphere or in a gas stream at standard conditions except uncombined water.

**volatile organic compounds (VOCs)**—A group of compounds that photochemically react in the atmosphere to form ozone. The official definition is found in 40 CFR 51.100(s), except 51.100(s)(2–4), as amended on November 29, 2004 (*69 Federal Register* 69290).