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Prevention and Toxics
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EPCRA Section 313
Industry Guidance

ELECTRICITY GENERATING FACILITIES

TRI

Section 313 of the Emergency Planning and Community Right-to-Know Act

Toxic Chemical Release Inventory

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OVERVIEW

On May 1, 1997, the U.S. Environmental Protection Agency (EPA) promulgated a final rule (62 FR 23834) adding several new industrial sectors to the list of facilities subject to the Emergency Planning and Community Right-to-Know-Act (EPCRA) Section 313 reporting requirements. Facilities affected by this rule are subject to the annual reporting requirements beginning with activities conducted during the 1998 calendar year, with their first reports due by July 1, 1999.

This document supersedes the document entitled *Section 313 Emergency Planning and Community Right-to-Know Act, Guidance for Electricity Generating Facilities,* dated October 1997. It is intended to assist establishments and facilities designated by Standard Industrial Classification (SIC) codes 4911 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), and 4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce) in making compliance determinations under the EPCRA Section 313 reporting requirements and preparing Form R(s) or the Form A certification statement(s) as required. The EPCRA Section 313 program is commonly referred to as the Toxic Chemical Release Inventory (TRI) program.

The principal differences in the new document include the following:

- More detailed examples;
- Additional interpretive guidance prepared by EPA on various issues specific to electricity generating facilities;
- Industry process issues not discussed in the earlier document; and
- General format changes for program consistency.

This document is designed to be a supplement to the *Toxic Chemical Release Inventory Reporting Forms and Instructions* (*TRI Forms and Instructions)*, issued annually. It is organized to provide a step-by-step guide to compliance with EPCRA Section 313, starting with how you determine if your facility must report through completion of the Form R or Form A. While certain information provided in this document may be used as a reference, specific information available to facilities, such as amounts of chemicals in mixtures and other trade name products used at the facility, may be more accurate and more appropriate for use in developing threshold determinations and estimating releases and other waste management amounts. Under EPCRA Section 313, facilities are instructed to use the best "readily available data", or when such data are not available, use "reasonable estimates," in fulfilling their reporting requirements. This document is organized in the following manner.

Chapter 1 serves as an introduction to TRI reporting and provides a brief background on the Emergency Planning and Community Right-to-Know Act and information on where to obtain additional compliance assistance.

Chapter 2 begins with how to determine if your facility must report. This determination is based on your answers to a series of four questions:

1. Is your facility's primary SIC code on the EPCRA Section 313 list?

2. Does your facility employ ten or more full time equivalent employees?

3. Does your facility manufacture, process, or otherwise use any EPCRA Section 313 chemicals?

4. Does your facility exceed any of the activity thresholds for an EPCRA Section 313 chemical?

If the answer to ANY ONE of the four questions above is "No" you are not required to submit an EPCRA Section 313 report. If you answer "Yes" to ALL four questions, the next step is determining which form(s), Form R or Form A, your facility should file. Chapter 2 provides detailed information on the requirements for each kind of submission.

Chapter 2 concludes with a discussion on how you address trade secrets in your reporting and the kinds of records you should be keeping to support your reporting.

Chapter 3 discusses how you calculate the activity thresholds (manufacture, process, and otherwise use) for the EPCRA Section 313 chemicals. Information is provided on how you determine which EPCRA Section 313 chemicals your facility manufactures, processes, or otherwise uses and how you calculate the quantities of each. Detailed information is also provided on the various exemptions.

Chapter 3 concludes with a discussion of how to determine which EPCRA Section 313 chemicals exceed a reporting threshold, including focused discussions on issues specific to electricity generating facilities.

Chapter 4 discusses how you calculate the release and other waste management amounts for those EPCRA Section 313 chemicals for which you must prepare a report. This chapter provides a step-by-step approach designed to minimize the risk of overlooking an activity involving an EPCRA Section 313 chemical and any potential sources or types of releases and other waste management activities that your facility may conduct. This procedure consists of the following steps:

- Identification of potential **sources** of EPCRA Section 313 chemicals released and otherwise managed as wastes;
- Preparation of a detailed **process flow diagram**;
- Identification of the potential **types** of releases and other waste management activities from each source; and

- Determination of the most appropriate methods for **estimating the quantities** of listed EPCRA Section 313 chemical releases and other waste management activities.

The main part of Chapter 4 is organized around activities common to electricity generating facilities where EPCRA Section 313 chemicals are manufactured, processed, or otherwise used. A list of EPCRA Section 313 chemicals likely to be managed by electricity generating facilities; process descriptions; guidance on thresholds determinations; release and other waste management estimation techniques; and problems these types of facilities are likely to face in complying with EPCRA Section 313 are also presented in this chapter.

This document includes examples of chemical management activities that electricity generating facilities may conduct, illustrating how these activities should be considered for EPCRA Section 313 reporting purposes. This chapter also notes areas where potential errors in reporting might be encountered generally by electricity generating facilities, which are based on information from written comments received from industry representatives as well as from comments made by participants in EPA-sponsored EPCRA workshops.

ACKNOWLEDGMENT

EPA would like to recognize the valuable contributions made by members on the Electricity Generating Committee (EGC) made up of staff from Allegheny Power, Duquesne Light Company, FirstEnergy Corp., GPU Generation, PECO Energy Company, and PP&L, Inc., as well as the Edison Electric Institute (EEI) whose industry insight and understanding of EPCRA Section 313 requirements have greatly assisted in increasing the utility of this document. Special thanks go to Michelle Duncan of EGC for coordinating their review.

Chapter 1 - Introduction

1.0 PURPOSE

The purpose of this guidance document is to assist facilities in SIC codes 4911 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), 4931 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce), and 4939 (limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce) in complying with the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and of Section 6607 of the Pollution Prevention Act of 1990 (PPA), commonly referred to as the Toxic Release Inventory (TRI). On May 1, 1997, EPA promulgated a rule (62 FR 23834) including electricity generating facilities, along with other industry groups, on the list of facilities subject to the EPCRA Section 313 reporting requirements. The new facilities are subject to annual reporting requirements beginning with activities occurring in the 1998 calendar year, with the first reports due by July 1, 1999.

This document explains the EPCRA Section 313 and PPA Section 6607 reporting requirements (collectively referred to as the EPCRA Section 313 reporting requirements) and discusses specific release and other waste management activities encountered at many facilities in this industry. Because each facility is unique, the recommendations presented may have to be adjusted to the specific nature of operations at your facility.

This document supersedes the document entitled *Section 313 Emergency Planning and Community Right-to-Know Act, Guidance for Electricity Generating Facilities*, dated October 1997.

The document is intended to supplement the *Toxic Chemical Release Inventory Reporting Forms and Instructions (TRI Forms and Instructions)* document which is updated and published annually by the U.S. Environmental Protection Agency (EPA). It is essential that you use the most current version of the *TRI Forms and Instructions* to determine whether (and how) you should report. Changes or modifications to TRI reporting requirements are reflected in the annual *TRI Forms and Instructions* and should be reviewed before compiling information for the report.

The objectives of this manual are to:

- Clarify EPCRA Section 313 requirements for industry;
- Increase the accuracy and completeness of the data being reported by electricity generating facilities; and
- Reduce the level of effort expended by those facilities that prepare an EPCRA Section 313 report.

While it is not possible to anticipate every potential issue or question that may apply to your facility, this document attempts to address those issues most prevalent or common to electricity generating facilities. Facilities should also rely on EPA's *Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form* document to assist in providing complete and accurate information for EPCRA Section 313 reporting. Additional discussion addressing specific issues can be found in the *1998 EPCRA Section 313 Questions and Answers* document. All of these documents are available on EPA's TRI website (http://www.epa.gov/tri) or by contacting the EPCRA Hotline at 1-800-424-9346. In the Washington, DC metropolitan area, call 703-412-9810. The EPCRA Hotline TDD number is 1-800-553-7672, or in the Washington, DC metropolitan area, call 703-412-3323.

1.1 Background on EPCRA

One of EPCRA's primary goals is to increase the public's knowledge of, and access to, information on both the presence and release and other waste management activities of EPCRA Section 313 chemicals in their communities. Under EPCRA Section 313, certain facilities (see SIC code discussion, Chapter 2.3) exceeding certain thresholds (see Chapter 2.5) are required to submit reports (commonly referred to as Form Rs or Form A certification statements) annually for over 600 EPCRA Section 313 chemicals and chemical categories and the amounts that enter an environmental medium or are otherwise managed as waste, even if there are no releases and other waste management quantities associated with these chemicals. Chemicals are considered by EPA for inclusion on the EPCRA Section 313 list based on their potential for acute health effects, chronic health effects, and environmental effects. Chemicals may be added or deleted from the list. Therefore, before completing your annual report, be sure to check the most current list included with the *TRI Forms and Instructions* when evaluating the chemicals managed at your facility. Copies of the reporting package can be requested from the EPCRA Hotline as indicated above, or from the Internet at http://www.epa.gov/tri/report.htm.

All facilities meeting the EPCRA Section 313 reporting criteria must submit either a Form R or Form A. A separate submission is required for each EPCRA Section 313 chemical or chemical category that is manufactured (including imported), processed, or otherwise used above the reporting threshold. Reports must be submitted to EPA and State or Tribal governments, on or before July 1, for activities in the previous calendar year. The owner/operator of the facility on July 1 of the reporting deadline is primarily responsible for the report, even if the owner/operator did not own the facility during the reporting year. However, property owners with no business interest in the operation of the facility, for example, owners of an industrial park who only have a real estate interest, are not responsible for any reporting requirements.

EPCRA also mandates that EPA establish and maintain a publicly available database consisting of the information reported under Section 313, and applicable PPA information. This database, known

as the Toxic Chemical Release Inventory (TRI), can be accessed through the following sources:

- National Library of Medicine (NLM) TOXNET on-line system;
- EPA's Internet site, http://www.epa.gov/tri;
- Envirofacts Warehouse Internet site, http://www.epa.gov/enviro/html/tris/tris_overview.html;
- CD-ROM from the Government Printing Office (GPO);
- Microfiche in public libraries;
- Magnetic tape and diskettes from the National Technical Information Service; and
- EPA's annual TRI data release materials (summary information).

In addition to being a resource for the public, TRI is also used in the research and development of regulations related to EPCRA Section 313 chemicals.

Alternative Submission (Form A)

To reduce the burden for facilities that must comply with EPCRA Section 313, EPA has established an alternate threshold of one million pounds manufactured, processed, or otherwise used for facilities with total annual reportable amounts of 500 pounds or less of the EPCRA Section 313 chemical. Provided the facility does not exceed either the reportable amount or the alternate threshold, the facility may file a certification form (Form A) rather than a Form R. By filing the Form A, the facility certifies that it did not exceed the reportable amount or exceed the alternate threshold (see Chapter 2.9 for more detail).

Note that the annual reportable amount includes the quantity of EPCRA Section 313 chemicals in all production-related waste management activities, not just releases (see the waste management discussion in Chapter 4 for more detail). Also, a covered facility must submit either a Form A or a Form R for each EPCRA Section 313 chemical exceeding an applicable reporting threshold, even if there are no releases and other waste management quantities.

Enforcement

Violation of Section 313 reporting provisions may result in federal civil penalties of up to $27,500 per day. State enforcement provisions may also be applicable depending on the state's adoption of any "EPCRA Section 313-like" reporting regulations.

Regulatory Assistance Resources

The *TRI Forms and Instructions* also contain a discussion of common problems in completing the Form R. You are encouraged to read this section before filling out the Form R (or Form A) for your facility. If, after reading both the *TRI Forms and Instructions* and this guidance document, you still have questions about EPCRA Section 313 reporting, please contact the EPCRA Hotline at 1-800-424-9346, or 703-412-9810 in the Washington, DC metropolitan area. The EPCRA Hotline TDD number is 1-800-553-7672, or in the Washington, DC metropolitan area, 703-412-3323. Assistance

is also available from the designated EPCRA Section 313 Coordinator in the EPA regional office and the EPCRA contact in your state (see the *TRI Forms and Instructions* for a current list of these contacts). Appendix A contains a list of additional reference sources.

Chapter 2 - Reporting Requirements

2.0 PURPOSE

The purpose of this chapter is to help you determine whether you must prepare an EPCRA Section 313 submission(s) and, if so, what kind of a submission(s) you should prepare (Form R or Form A). This chapter presents the EPCRA Section 313 reporting requirements to help you determine whether these requirements apply to your facility. It also discusses the records that you must keep. The following terms and concepts are described in this chapter to help you understand the scope of Section 313 reporting and determine whether you need to report, including:

- Definition of facility;
- SIC code determination;
- Employee determination;
- Definitions of manufacture, process, and otherwise use; and
- Determination of whether you exceed one of the thresholds.

2.1 Must You Report?

How do you determine if your facility must prepare an EPCRA Section 313 report? This is decided by your answers to the following four questions (illustrated by Figure 2-1):

1) Is the primary SIC code(s) for your facility with the necessary qualifiers included in the list covered by EPCRA Section 313 reporting (see Chapter 2.3)?

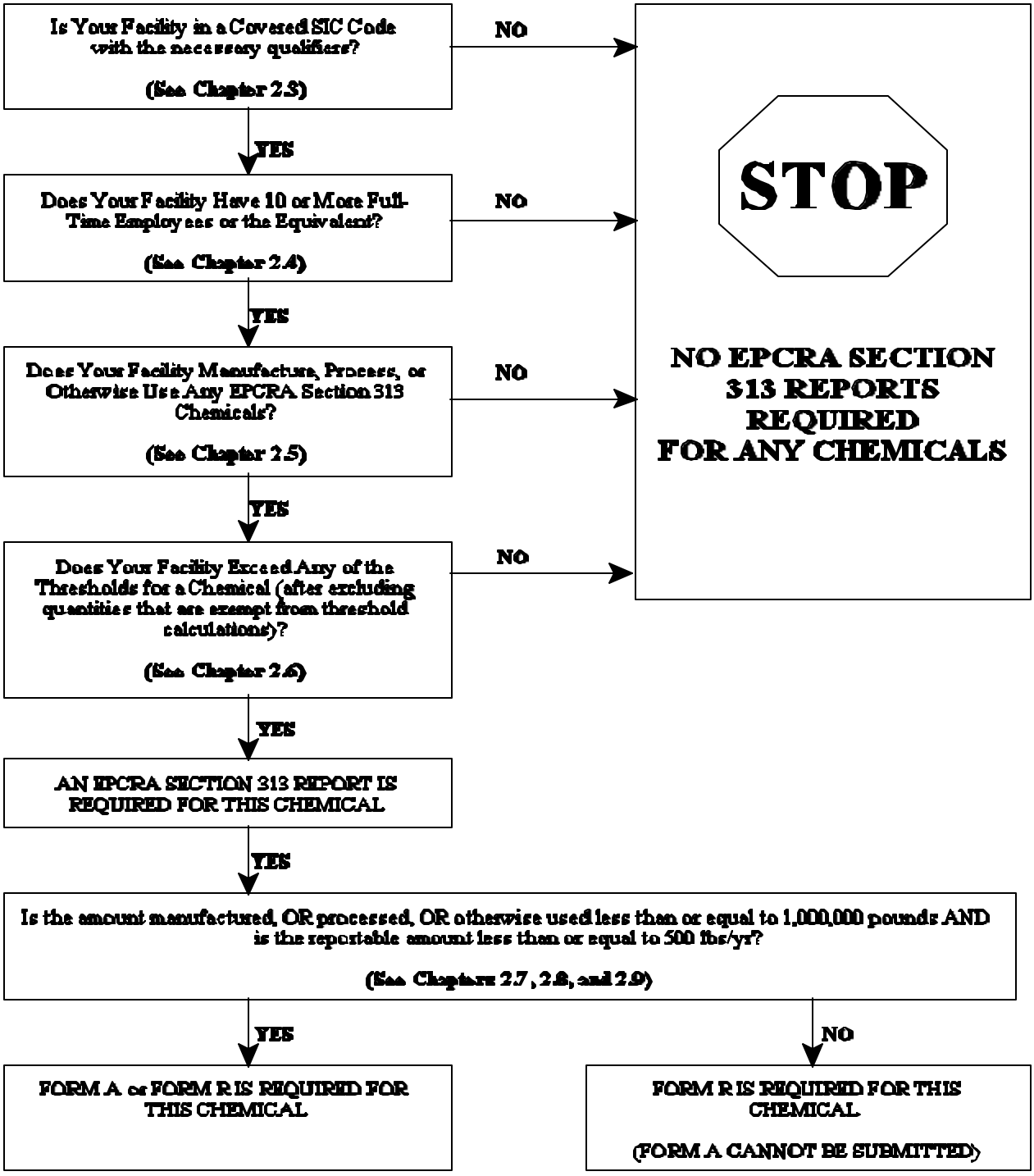
2) Does your facility employ 10 or more full time employees or the equivalent (see Chapter 2.4)?

3) Does your facility manufacture (which includes importation), process, or otherwise use EPCRA Section 313 chemicals (see Chapter 2.5)?

4) Does your facility exceed any applicable thresholds of EPCRA Section 313 chemicals (25,000 pounds per year for manufacturing; 25,000 pounds per year for processing; or 10,000 pounds per year for otherwise use - see Chapter 2.6)?

If you answered "No" to any of the four questions above, you are not required to prepare any submissions under EPCRA Section 313. If you answered "Yes" to ALL of the first three questions, you must perform a threshold determination for each EPCRA Section 313 chemical at the facility, and submit a Form R **or** Form A for each chemical exceeding a threshold.

Figure 2-1: TRI Reporting Determination Diagram



2.2 Definition of "Facility"

To understand the applicability of EPCRA Section 313, you must first understand how EPCRA defines a facility. The term "facility" is defined as "all buildings, equipment, structures, and other stationary items which are located on a single site or on contiguous or adjacent sites and which are owned or operated by the same person (or by any person which controls, is controlled by, or is under common control, with such person). A facility may contain more than one establishment" (40 CFR 372.3). An "establishment" is defined as "an economic unit, generally at a single physical location, where business is conducted, or services or industrial operations are performed" (40 CFR 372.3). For a facility to be made up of more than one establishment, in part requires that there are activities taking place that are recognized as uniquely different at the facility. For example, at an electricity generating facility there may also exist a large parts and maintenance shop which services haul trucks used to transport ash to off-site locations along with other equipment. The haul truck maintenance shop is uniquely different from the electricity generating portion of the facility and may be properly classified by SIC code 7699 Miscellaneous repair shops and related services. The electricity generating portion of the facility would obviously be the primary economic activity in this scenario; thus, the facility as a whole would likely be classified as SIC code 4911 Electric services, that is made up of two establishments SIC codes 4911 and 7699.

Conversely, in the case where an electricity generating facility has more than one type of electricity generating unit, such as a coal fired unit located on the same property as a hydroelectric generating unit, the facility would not be considered a multi-establishment facility because the two types of units provide the same function (i.e., generating electricity) and are both classified as SIC code 4911.

EPA recognizes that some facilities have unique and separate activities ("establishments") taking place at the same facility, and for some of these facilities it may be easier and more appropriate for individual establishments to manage their chemical usage and management information separately. EPA provides for these cases and allows individual establishments at the same facility to report separately. However, for threshold determinations, quantities of EPCRA Section 313 chemicals manufactured, processed, or otherwise used in all establishments in that facility must be combined and considered together. Also, the combined releases and other waste management activities reported separately for each establishment must equal those for the facility as a whole.

Example - Multiple Establishments

Your facility is comprised of two different establishments with SIC codes covered by EPCRA Section 313, a power plant and substation. The power plant used 8,000 pounds of an EPCRA Section 313 chemical for boiler cleaning during the year. The substation used 3,000 pounds of the same chemical for equipment maintenance during the same year. Both activities constitute an "otherwise use" of the listed EPCRA Section 313 chemical (as presented in Section 2.5 and described in detail in Chapter 3) and together, the total quantity otherwise used at the facility exceeded the 10,000 pound otherwise use threshold for the year. If your facility meets the employee threshold, you must file a Form R for that chemical. EPA allows multi-establishment facilities to submit Form Rs from each establishment for an EPCRA Section 313 chemical when thresholds have been exceeded at the facility level. Please note that Form A eligibility is also made at the facility-level, but only one Form A can be submitted per chemical for the entire facility.

Contiguous and/or Adjacent Facilities. In defining the parameters of your facility, you must consider all buildings and other stationary items located on multiple contiguous or adjacent sites that are owned or operated by the same person for EPCRA reporting purposes. For example, an industrial park could contain a manufacturing company and a solvent recovery operation, both operated independently, but owned by the same parent company. Since the two establishments are contiguous or adjacent to each other, they are considered one "facility." The amount of each EPCRA Section 313 chemical manufactured, processed, or otherwise used and the number of employees must be aggregated for all of these contiguous or adjacent sites to determine whether the entire facility meets reporting thresholds. If a company's operations are carried out at two distinctly separate, physical sites that are not contiguous or adjacent, that company is operating two separate facilities for the purposes of EPCRA reporting. The company, therefore, must make SIC code, employee, threshold determinations, and if appropriate, release and other waste management estimates individually for each facility.

If two establishments owned or operated by the same company are connected to each other by a piece of property that is owned by one of the establishments or the same parent corporation, or if they are separated by an easement (e.g., railroad tracks, public road, public catchment basin), they are still considered to be contiguous or adjacent and are therefore part of the same facility. Both "establishments" may report together as the same facility or they may report separately provided threshold determinations are based on activities at the entire facility and that the sum of the releases of the establishments reflects the total releases of the whole facility. Facility operations that are not connected to each other by a piece of property, that is commonly owned, controlled, or operated by the same person(s), are not considered contiguous and may be considered two separate facilities. However, if these operations are relatively near each other, they may be considered adjacent; in which case, they would be part of the same facility.

2.3 SIC Code Determination

Facilities with the SIC codes presented in Table 2-1 are covered by the EPCRA Section 313 reporting requirements. For assistance in determining which SIC code best suits your facility, refer to *Standard Industrial Classification Manual, 1987,* published by the Office of Management and Budget.

Table 2-1
SIC Codes Covered by EPCRA Section 313 Reporting

SIC Code Industry Sectors		
SIC Codes	**Industry**	**Qualifiers**
10	Metal Mining	Except SIC codes 1011, 1081, and 1094
12	Coal Mining	Except SIC code 1241
20 through 39	Manufacturing	None
4911, 4931, and 4939	**Electric and Other Services and Combination Utilities**	**Limited to facilities that combust coal and/or oil for the purpose of generating electricity for distribution in commerce**
4953	Refuse Systems	Limited to facilities regulated under RCRA Subtitle C
5169	Chemicals and Allied Products	None
5171	Petroleum Bulk Stations and Terminals	None
7389	Business Services	Limited to facilities primarily engaged in solvent recovery services on a contract or fee basis

Facilities in SIC codes 4911, 4931, and 4939, that combust coal and/or oil for the purpose of generating power for distribution in commerce must prepare Form R and/or Form A submissions if they exceed the employee and chemical activity thresholds. There may be facilities within SIC codes 4911, 4931, and 4939 that will not have to report because they do not meet the "limiting" criteria. For example, facilities that only combust natural gas are not subject to EPCRA Section 313 reporting requirements. However, facilities in SIC codes 4911, 4931, or 4939 may combust coal or oil on-site for such limited uses as providing heat or electricity on-site, and start-up activities provided such combustion of coal or oil is not for the purposes of generating power for distribution in commerce, even if excess power is unavoidably generated during testing and ultimately distributed in commerce. For example, existing regulations governing nuclear facilities, such as those defined in 10 CFR §50 Appendix A, require nuclear reactors to maintain safety equipment to ensure that certain protective measures are operable in the event that equipment may fail. These regulations specify that an on-site backup power source must be provided in such a way as to be

independent of normal system power in order for safety equipment to continue to function in the event that the nuclear portion fails or malfunctions. This type of use of coal and/or oil is not sufficient to bring a facility under the coverage of EPCRA Section 313. However, if a facility intentionally generates excess power during testing operations for the purpose of distributing power in commerce, the facility would be "covered."

Example - SIC Code

An electricity generating facility produces power using coal and/or oil. All of the power generated at the facility is used to support a single facility within the same company that operates off-site from the electricity generating facility. Is the electricity produced by the electricity generating facility considered to be distributed in commerce for purposes of determining if the facility is "covered"?

Yes. The electricity generating facility is classified within the SIC codes of 4911, 4931, or 4939 and combusts coal and/or oil for purposes of generating power for distribution in commerce. Supplying electricity to a facility off-site is considered generating power for distribution in commerce even if the facility is within the company. For purposes of EPCRA Section 313 reporting, it does not matter that the sole user of the electricity produced by the electricity generating facility is part of the same company.

If a facility within SIC codes 4911, 4931, or 4939 combusts *any* amount of coal and/or oil during the year for purposes of generating power for distribution into commerce, and the facility meets or exceeds the employee and chemical activity threshold, they must prepare a Form R or Form A. Because SIC codes 4911, 4931, and 4939 include all types of electricity generating facilities and other utilities, any generation of power for purposes of distribution into commerce using coal and/or oil will subject the entire facility to TRI reporting, including combustion operations for on-site support and testing purposes and non-coal and/or oil combustion operations. For instance, if your facility is primarily a natural gas combustion facility but, because of fluctuations in natural gas supplies, was required to supplement natural gas combustion with fuel oil combustion for several days during the reporting year, the entire facility would meet the SIC code requirement. In this situation, the facility would need to assess all activities, including the natural gas combustion operations, in conducting threshold determinations and release and other waste management calculations. Even though your primary power generation source may not be coal and/or oil, any use of coal and/or oil for purposes of generating power for distribution into commerce, is sufficient for meeting the facility's SIC code classification for EPCRA Section 313 purposes.

Example - Coal/Oil

Electricity generating facilities in SIC codes 4911, 4931, or 4939 may combust a number of fuels for the purpose of generating power. For purposes of EPCRA Section 313:

- Kerosene and petroleum coke are considered oils. Facilities in SIC codes 4911, 4931, or 4939, that combust kerosene and petroleum coke for the purpose of generating power for distribution in commerce are subject to EPCRA Section 313.

- Non-hazardous oil-contaminated debris is not considered an oil. Facilities in SIC codes 4911, 4931, or 4939, that combust non-hazardous oil-contaminated debris, and do not combust coal or oil, are not subject to EPCRA Section 313.

While you are currently required to determine your facility's reporting eligibility based on the SIC code system described above, it is important to be aware that the SIC code system will be replaced by a new system in the future. On April 9, 1997 (62 FR 17287), the Office of Management and Budget promulgated the North American Industrial Classification System (NAICS). NAICS is a new economic classification system that replaces the SIC code system as a means of classifying economic activities for economic forecasting and statistical purposes. The transition to the new NAICS may require statutory and/or regulatory actions. As a result, the SIC code system is still required to be used as the mechanism to determine your facility's reporting eligibility. EPA will issue notice in the *Federal Register* to inform you and other EPCRA Section 313 facilities of its plans to adopt the NAICS and how facilities should make their NAICS code determination.

Primary SIC Code Determination. Assuming your facility has several establishments with different SIC codes that are owned or operated by the same entity, you will need to determine if your facility has a primary SIC code that is subject to EPCRA Section 313. Your facility is subject to EPCRA Section 313 reporting requirements if:

- All the establishments have SIC codes covered by EPCRA Section 313; OR

- The total value of the products shipped or services provided at establishments with covered SIC codes is greater than 50% of the value of the entire facility's products and services; OR

- Any one of the establishments with a covered SIC code ships and/or produces products or provides services whose value exceeds the value of services provided or products produced and/or shipped by all of the other establishments within the facility on an individual basis.

To determine the value of production or service attributable to a particular establishment, you can subtract the product or service value obtained from other establishments from the total product or

service value of the facility. This procedure eliminates the potential for "double counting" production or service in situations where establishments are engaged in sequential production activities at a single facility.

Auxiliary Facilities. Some companies may own and/or operate a non-contiguous and non-adjacent facility that primarily supports a covered EPCRA Section 313 facility. These auxiliary facilities assume the SIC code of a covered facility that it directly supports. For example, an off-site warehouse that directly supports a covered electricity generating facility (SIC code 4911) must assume the SIC code 4911 itself. For the purposes of EPCRA Section 313, auxiliary facilities must be engaged in performing support services for another facility or establishment within a covered facility. Therefore, if an auxiliary facility's primary function is to support/service a covered electricity generating facility, the auxiliary facility may assume the SIC code of the main facility and may then be covered by the EPCRA Section 313 reporting requirements for purposes of the facility's SIC code determination. Importantly, even if a facility supports one of the covered facilities, it would STILL need to meet the SIC code qualifier of combusting coal and/or oil for the purpose of generating power for distribution in commerce. For example, an ash landfill which directly supports a non-contiguous or non-adjacent electricity generating facility would be classified as an auxiliary facility and assume the SIC code of the electricity generating facility, but the landfill would not be covered because no combustion of coal and/or oil for purposes of generating electricity for distribution into commerce occurred at the landfill.

2.4 Number of Employees

Facilities must also meet or exceed the 10 or more full-time employees or equivalent criterion to be subject to EPCRA Section 313 reporting requirements. A full-time employee equivalent is defined as a work year of 2,000 hours. If your facility's staff (including contractors and certain other non-company personnel) work 20,000 or more hours in a calendar year, you meet the 10 or more full-time employee criterion. While many facilities may easily exceed this criterion, your facility may be small or highly automated and your on-site staff may be small. In these cases, in particular, you should carefully consider all personnel supporting your operations to determine if you meet the 10 or more full-time employee criterion.

The following personnel and time should be included in your employee calculations:

- Owners working at the facility;
- Operations staff;
- Clerical staff;
- Temporary employees;
- Sales personnel;
- Truck drivers (employed by the facility);
- Other off-site facility employees directly supporting the facility;
- Paid vacation and sick leave; and

- Contractor employees (excluding contract truck drivers).

In general, if an individual is employed or hired to work at the facility, all the hours worked by that individual must be counted in determining if the 20,000 hour criterion has been met.

Example - Calculating Employees

Your facility has 7 full-time employees working 2,000 hours/year in the coal-fired power plant. There is also one full-time sales person and a delivery truck driver (employed by the facility) assigned to the plant, each working 2,000 hours/year but predominantly on the road. Two part-time employees, based at the facility, work 1,000 hours/year each to maintain the off-site electricity distribution system. The wastewater treatment plant (on-site and owned by the facility) is operated by a contractor who spends an average of two hours per day and five days per week at the plant. Finally, you built an addition to the plant warehouse during the year, using four contractor personnel who were on site full time for six months (working on average of 1,000 hours each). You would calculate the number of full-time employee equivalents as follows:

- Hours for your nine full-time employees (seven plant personnel, one salesperson, and one delivery truck driver) for the year are:
  9 employees x 2,000 hours/year = 18,000 hours;

- Hours for the electricity distribution maintenance crew are:
  2 employees x 1,000 hours/year = 2,000 hours; and

- Hours for the wastewater treatment plant operator are:
  2 hours/day x 5 days/week x 52 weeks/year = 520 hours; and

- Hours for the construction crew are:
  4 contractors x 1,000 hours = 4,000 hours.

This is a total of 24,520 hours for the year, which is above the 20,000 hours/year threshold; therefore, you meet the employee criterion.

POSSIBLE ERROR - Off-site Maintenance Crew

Remember to include all employees based at your facility even if their primary activities are to maintain your power distribution system, both on- and off-site.

2.5 Manufacturing, Processing, and Otherwise Use of EPCRA Section 313 Chemicals

If you have determined that your facility meets the SIC code and employee threshold determinations, you must determine what EPCRA Section 313 chemicals are manufactured, processed, or otherwise used at your facility during the reporting year and whether an activity threshold was exceeded. This section of the chapter will introduce the terms and concepts behind this determination; whereas, Chapter 3 will take you through a detailed step-by-step process to determine whether you need to report for any EPCRA Section 313 chemicals.

Identifying Chemicals. If you are in a covered SIC code and have 10 or more full-time employee equivalents, you must determine which EPCRA Section 313 chemicals are manufactured, processed, or otherwise used at your facility in excess of threshold quantities. To assist in doing this, you should prepare a list of all chemicals manufactured, processed, or otherwise used by all establishments at the facility, including the chemicals present in mixtures and other trade name products and managed in wastes received from off-site. This list should then be compared to the CURRENT list of EPCRA Section 313 chemicals found in the *TRI Forms and Instructions* document for that reporting year (available from the EPCRA Hotline, 1-800-424-9346 or at the website: http://www.epa.gov/tri). In addition to the individually listed chemicals, the list of EPCRA Section 313 chemicals includes several chemical categories (discussed in detail in Chapter 3). You must include chemical compounds that are members included in any of these categories when evaluating activities at the facility for threshold determinations and release and waste management calculations. Once you identify the EPCRA Section 313 chemicals at your facility, you must evaluate the activities involving each chemical and determine whether any activity thresholds have been met.

Note that chemicals are periodically added, delisted, or modified. Therefore, it is imperative that you refer to the appropriate reporting year's list. Also, note that a list of synonyms for EPCRA Section 313 chemicals can be found in the EPA publication, *Common Synonyms for Chemicals Listed Under Section 313 of the Emergency Planning and Community Right-to-Know Act* (updated March 1995).

2.6 Activity Thresholds

There are three activity thresholds for the EPCRA Section 313 chemicals defined in EPCRA Section 313: manufacturing (which includes importing), processing, and otherwise use. The activity thresholds are 25,000 pounds per year for manufacturing, 25,000 pounds per year for processing, and 10,000 pounds per year for otherwise use. These thresholds apply to each chemical individually. The determination is based solely on the quantity actually manufactured (including imported), processed, or otherwise used. Only the amounts of the listed EPCRA Section 313 chemical that meet activity definitions are considered towards threshold determinations. Any other amounts not considered to be manufactured, processed, or otherwise used are not considered toward threshold determinations. For example, EPCRA Section 313 chemicals that are brought on-site (excluding amounts imported) and

stored for future use or disposal, but are not incorporated into a product for distribution or are not otherwise used on-site during the reporting year, are NOT considered towards any activity threshold for that reporting year.

More detailed explanations of threshold activities (manufactured, processed, or otherwise used), with examples of each are found in Chapter 3, Tables 3-3, 3-15, and 3-16. These terms are briefly defined in Table 2-2, with a detailed discussion to follow.

There are some activities which do not meet the definitions of manufacture, process, or otherwise use. For instance, storage, relabeling, or redistribution of an EPCRA Section 313 chemical where no repackaging occurs does not constitute manufacturing, processing, or otherwise use of that chemical. This type of activity should not be included in threshold calculations. In addition, transfers of EPCRA Section 313 chemicals in wastes for energy recovery, treatment, or disposal are not considered "distribution into commerce." For example, if you receive an EPCRA Section 313 chemical in waste from off-site and repackage the waste and send it to a landfill off-site, that activity should not be included in threshold determinations.

Also, note that the threshold determinations for the three activities (manufacturing, processing, and otherwise use) are mutually exclusive. That is, you must conduct a separate threshold determination for each activity and if you exceed any threshold, all releases and other waste management activities of EPCRA Section 313 chemicals at the facility must be considered for reporting.

Table 2-2
Activity Thresholds

Activity	Definition	Threshold (lbs/yr)
Manufacture	To produce, prepare, import, or compound an EPCRA Section 313 chemical. "Manufacture" applies to an EPCRA Section 313 chemical that is produced coincidentally during the manufacture, processing, otherwise use, or disposal of another chemical or mixture of chemicals as a byproduct or impurity. Examples would be the production of ammonia or nitrate compounds in a wastewater treatment system or the creation of metal compounds during combustion of coal.	25,000

Activity	Definition	Threshold (lbs/yr)
Process	The preparation of an EPCRA Section 313 chemical, after its manufacture, for distribution in commerce: (1) In the same form or physical state as, or in a different form or physical state from, that in which it was received by the person so preparing such chemical; or (2) As part of an article containing the EPCRA Section 313 chemical. For example, if you receive a mixture containing an EPCRA Section 313 chemical and package it, including transferring material from a storage tank to a tank truck and then distribute it into commerce, this chemical has been processed by your facility.	25,000
Otherwise Use	Generally, use of an EPCRA Section 313 chemical that does not fall under the manufacture or process definitions is classified as otherwise use. An EPCRA Section 313 chemical that is otherwise used is not intentionally incorporated into a product that is distributed in commerce, but may be used instead as a manufacturing or processing aid (e.g., catalyst), in waste processing, or as a fuel (including waste fuel). For example, the components of fuel are classified as otherwise used when the fuel is combusted on-site. Otherwise use means "any use of a toxic chemical contained in a mixture or other trade name product or waste, that is not covered by the terms "manufacture" or "process." Otherwise use of an EPCRA Section 313 chemical does not include disposal, stabilization (without subsequent distribution in commerce), or treatment for destruction unless the: 1) EPCRA Section 313 chemical that was disposed, stabilized, or treated for destruction was received from off-site for the purposes of further waste management; or 2) EPCRA Section 313 chemical that was disposed, stabilized, or treated for destruction was manufactured as a result of waste management activities on materials received from off-site for the purposes of further waste management activities."	10,000

2.7 How Do You Report?

You must file a report (Form R) for each EPCRA Section 313 chemical that exceeds a threshold for manufacturing, OR processing, OR otherwise use (providing you meet the employee and SIC code criteria). As an alternative, you may file a Form A certification statement rather than a Form R if you meet certain criteria as explained in Chapter 2.9. The *TRI Forms and Instructions* contain detailed directions for the preparation and submittal of Form R and Form A for each EPCRA Section 313 chemical for the reporting year. The *TRI Forms and Instructions* are sent to all facilities which submitted Form Rs or Form As the preceding year. However, if you do not receive a courtesy copy or

did not report in the preceding year, then copies of the *TRI Forms and Instructions* can be requested from the EPCRA Hotline (1-800-424-9346) or obtained from EPA's TRI website (http://www.epa.gov/tri).

2.8 Form R

If you are submitting a Form R, it is essential that you use the *TRI Forms and Instructions* for the appropriate reporting year. EPA encourages the electronic submittal of the Form R, via the Automated TRI Reporting System (ATRS). Use of the ATRS saves time in data entry and photocopying and reduces errors by means of automated validation procedures. The ATRS produces a certification letter with each validated submission (set of EPCRA Section 313 reports) which provides for an original signature to certify that the submission is accurate and correct. The ATRS is available free of charge from EPA's TRI website at http://www.epa.gov/opptintr/afr.

The ATRS is available in both DOS and Windows versions. More information can be found in the *TRI Forms and Instructions*, EPA's TRI website, or by calling the ATRS User Support Hotline at (703) 816-4434.

Each Form R must consist of two parts:

Part I, Facility Identification Information. This part of the form provides general information to identify the facility, including the name and address of the facility, parent company information, and identification numbers used under reporting regulations. When submitting hard copies of Form R, this part may be photocopied and re-used for each Form R you submit, except for the signature which must be original for each Form R; and

Part II, Chemical Specific Information. This part of the form provides chemical-specific information on the reportable activities, releases, other waste management estimates, and source reduction activities for the reporting year. This must be completed separately for each EPCRA Section 313 chemical or chemical category and not reused year to year even if reporting has not changed.

Submission of incomplete Form Rs may result in an issuance of a Notice of Technical Error (NOTE), Notice of Significant Error (NOSE), or Notice of Non-compliance (NON). See the current *TRI Forms and Instructions* for more detailed information on completing and submitting the Form R. The ATRS has a validation program which helps to identify and eliminate many potential data entry errors.

2.9 Form A

EPA developed the Form A, also referred to as the "Certification Statement," to reduce the

annual burden for facilities with lesser amounts of EPCRA Section 313 chemicals released and/or otherwise managed as a waste, applicable beginning reporting year 1995 and beyond (59 FR 61488; November 30, 1994). A facility must meet the following two criteria in order to use a Form A:

- First, the amount of the chemical manufactured, processed, OR otherwise used cannot exceed 1,000,000 pounds. It is important to note that the quantities for each activity are mutually exclusive and must be evaluated independently. If the quantity for any one of the activities exceeds 1,000,000 pounds, a Form A cannot be submitted.

- Second, the total annual reportable amount of the EPCRA Section 313 chemical cannot exceed 500 pounds per year. The "reportable amount" is defined as the sum of the on-site amounts released (including disposal), treated, recycled, and combusted for energy recovery, combined with the sum of the amounts transferred off-site for recycling, energy recovery, treatment, and/or release (including disposal). This total corresponds to the total of data elements, 8.1 through 8.7 in Part II of the Form R (explained in Chapter 4).

Example - Form A Threshold

A covered electricity generating facility manufactures 800,000 pounds of copper compounds from combustion of coal, during the reporting year. Because the facility distributes all of its ash into commerce for direct reuse, the total annual reportable amount of copper (the sum of Sections 8.1 through 8.7 of the Form R) is less than 500 pounds. Because the facility did not exceed the one million pound threshold for manufacturing, processing or otherwise use and the facility's total reportable quantity of copper does not exceed 500 pounds, the facility has the option of submitting either a Form R or a Form A.

The Form A Certification Statement must be submitted for each eligible EPCRA Section 313 chemical. The information on the Form A is included in the publicly accessible TRI database, however these data are marked to indicate that they represent certification statements rather than Form Rs. Note that separate establishments at a facility cannot submit separate Form As for the same chemical; rather, only one Form A per EPCRA Section 313 chemical can be submitted per facility.

Like the Form R, Form A includes facility identification information. However, no release and other waste management estimations to any media are provided. You must simply certify that the total annual reportable quantity of the chemical or chemicals addressed in the Form A did not exceed 500 pounds and that amounts manufactured, or processed, or otherwise used did not exceed one million pounds. Once a facility has completed estimates to justify the submission of a Form A, there is a considerable time savings in using the Form A especially in subsequent years provided activities related with the chemical do not change significantly. It is strongly recommended that you document your initial

rationale and reconfirm it every year to verify that you have not made any modifications to the process that would invalidate the initial rationale supporting submission of a Form A.

2.10 Trade Secrets

EPCRA's trade secrets provision only applies to the EPCRA Section 313 chemical identity. If you submit trade secret information, you must prepare two versions of the substantiation form as prescribed in 40 CFR Part 350, published in the Federal Register on July 29, 1988, (53 FR 28801) as well as two versions of the Form R. One set of forms should be "sanitized" (i.e., it should provide a generic name for the EPCRA Section 313 chemical identity). This version will be made available to the public. The second version, the "unsanitized" version, should provide the actual identity of the EPCRA Section 313 chemical and have the trade secret claim clearly marked in Part I, Section 2.1 of the Form R or Form A. All other parts of the Form R or Form A must be filled out accordingly.

Individual states may have additional criteria for confidential business information and the submittal of both sanitized and unsanitized reports for EPCRA Section 313 chemicals. Facilities may jeopardize the trade secret status of an EPCRA Section 313 chemical by submitting an unsanitized version to a state agency or Indian tribe that does not require an unsanitized version.

More information on trade secret claims, including contacts for individual state's submission requirements, can be found in the most current version of the *TRI Forms and Instructions*.

2.11 Recordkeeping

Complete and accurate records are absolutely essential to meaningful compliance with EPCRA Section 313 reporting requirements. Compiling and maintaining good records will help you to reduce the effort and cost in preparing future reports and to document how you arrived at the reported data in the event of an EPA compliance audit. EPA requires you to maintain records substantiating the Form R or Form A submission for a minimum of three years from the date of submission. Each facility must keep copies of the Form R or Form A along with all supporting documents, calculations, work sheets, and other forms that you use to prepare the Form R or Form A. EPA may request this supporting documentation during a regulatory audit.

Specifically, EPA requires that the following records be maintained for a period of three years from the date of the submission of a report (summarized from 40 CFR 372.10):

1) A copy of each report that is submitted;

2) All supporting materials and documentation used by the person to make the compliance determination that the facility or establishment is a covered facility;

3) Documentation supporting the report that is submitted, including documentation supporting:

- Threshold determinations;
- Employee threshold determinations (including time sheets);
- Claimed allowable exemptions;
- Calculations for each quantity reported as being released, either on or off site, or otherwise managed as waste;
- Activity use determinations, including dates of manufacturing, processing, or otherwise use;
- Basis of all estimates;
- Receipts or manifests associated with transfers of waste to off-site locations; and
- Waste treatment methods, estimates of treatment efficiencies, ranges of influent concentrations to treatment, sequential nature of treatment steps, and operating data to support efficiency claims.

4) All supporting materials used to make the compliance determination that the facility or establishment is eligible to submit a Form A;

5) Documentation supporting the Form A, including:

- Data supporting the determination that the alternate threshold applies;
- Calculations of annual reporting amounts; and
- Receipts or manifests associated with the transfer of each chemical in waste to off-site locations.

Because EPCRA Section 313 reporting does not require additional testing or monitoring, you must determine the best readily available source of information to make reporting determinations. Alternatively, you may use reasonable estimates to make reporting determinations. The amount and type of data and records will vary from facility to facility. Examples of records that you should keep, if applicable, include the following:

- Each Form R or Form A submitted;
- Section 313 Reporting Threshold Worksheets (sample worksheets can be found in Chapter 3 of this document as well as in the *TRI Forms and Instructions)*;
- Engineering calculations and other notes;
- Purchase records and MSDSs from suppliers;
- Inventory and receipt data;
- Analytical results and profiles for wastes received from off site;
- NPDES/SPDES permits and monitoring reports;

- EPCRA Section 312, Tier II reports;
- Monitoring records;
- Air permits;
- Flow measurement data;
- RCRA hazardous waste generator's reports;
- Pretreatment reports filed with local governments;
- Invoices from waste management firms;
- Manufacturer's estimates of treatment efficiencies;
- CERCLA Reportable Quantity (RQ) reports;
- EPCRA Section 304 follow-up release notifications;
- RCRA manifests; and
- Process flow diagrams (including emissions, releases and other waste management activities).

Chapter 3 - EPCRA Section 313 Threshold Determinations

3.0 PURPOSE

This chapter provides a step-by-step procedure for determining if any EPCRA Section 313 chemicals or chemical categories exceed a reporting threshold at your facility.

Step 1) Determine if you manufacture (including import), process, or otherwise use any EPCRA Section 313 chemicals.

Step 2) Determine the quantity of each EPCRA Section 313 chemical you manufacture (including import), process, or otherwise use.

Step 3) Determine which EPCRA Section 313 chemicals exceed a threshold.

3.1 Step 1 - Determining which EPCRA Section 313 chemicals are manufactured (including imported), processed, or otherwise used

Compiling Chemical Lists. Compile lists of all chemicals, mixtures, or other trade name products, and wastes at your facility. Electricity generating facilities may find it helpful to create two lists: one of purchased chemicals otherwise used at the facility or received from off-site for further waste management, and one of chemicals manufactured during combustion. When developing the list of chemicals manufactured, refer to information your facility may have or have access to regarding specific chemical constituents and their concentrations, in combination with information found later in this chapter. For the otherwise use list, identify the name of each mixture or other trade name product, or waste name or waste code (e.g., chemicals in ash received from off-site for on-site disposal) and write the names of all chemicals contained in each mixture or other trade name product, or waste. Next, compare the individual chemicals on both lists to the current EPCRA Section 313 chemical list found in the *TRI Forms and Instructions* (remember that chemicals may be periodically added and deleted and you should always use the most current instructions). Highlight the EPCRA Section 313 chemicals that are on your list. You must perform threshold determinations for these chemicals.

Review the list to be sure each chemical is shown by its correct EPCRA Section 313 name. For example, a common EPCRA Section 313 chemical created during combustion at an electricity generating facility is sulfuric acid (acid aerosols). Sulfuric acid (CAS No. 7664-93-9) has several synonyms, including dihydrogen sulfate and sulphuric acid. It must be reported on Form R (or Form A), Item 1.2, by its EPCRA Section 313 chemical name, sulfuric acid (acid aerosols). Synonyms can be found in EPA's document *Common Synonyms for Chemicals Listed Under Section 313 of the EPCRA* (EPA 745-R-95-008) (updated March 1995). EPA's Automated TRI Reporting System (ATRS) has a pick list containing a complete list of EPCRA Section 313 chemical and chemical category names and the corresponding CAS numbers and category codes.

While every chemical and chemical category on the EPCRA Section 313 chemical list must be considered, certain chemicals are more likely than others to be encountered at electricity generating facilities. As a guide, certain chemicals that electricity generating facilities may manufacture during combustion, process, and/or otherwise use are provided in Table 3-1. This is not a comprehensive list of all chemicals that may be manufactured, processed, and/or otherwise used at electricity generating facilities, but is merely a starting point for identifying chemicals for threshold determinations. Facilities that distribute ash into commerce for direct reuse should also consider any chemicals in ash that are above *de minimis* levels when making threshold determinations.

Information that is useful in performing threshold determinations and preparing your reports includes the following:

- Mixtures and other trade name products containing EPCRA Section 313 chemicals;
- Associated CAS numbers;
- Throughput quantities; and
- Whether the chemical is manufactured, processed, or otherwise used at the facility (be sure to include quantities that are coincidentally manufactured and imported, as appropriate).

Use of Spreadsheets or Databases. A computerized spreadsheet or database may be helpful in developing your facility's chemical list and performing threshold calculations. The type of information useful as input in a spreadsheet or database includes the chemical name, mixture or other trade name product, or waste name with corresponding chemical component, concentrations, the CAS number, and the yearly quantity manufactured, processed, or otherwise used. The spreadsheet or database could also be designed to identify the total quantity by activity threshold (amounts manufactured, processed, and otherwise used) for each EPCRA Section 313 chemical in every waste, mixture, and other trade name product.

Smaller facilities that do not have an established electronic method of tracking their chemical usage and waste managed should consider developing a spreadsheet to assist them in their chemical management activities. Developing a spreadsheet will require an initial investment of time; however, the time and effort saved in threshold calculations in subsequent years can be significant. Such a system will also reduce the potential of inadvertently overlooking EPCRA Section 313 chemicals that are present in wastes received or mixtures purchased from off-site sources.

Table 3-1
Chemicals Commonly Manufactured, Processed, and Otherwise Used at Electricity Generating Facilities

EPCRA Section 313 Chemicals that Electricity Generating Facilities May Manufacture During Combustion	EPCRA Section 313 Chemicals that Electricity Generating Facilities May Process (in Ash for Direct Reuse)	EPCRA Section 313 Chemicals that Electricity Generating Facilities May Otherwise Use
Antimony compounds	Antimony compounds	Ammonia
Arsenic compounds	Arsenic compounds	Bromine
Barium compounds	Barium compounds	Chlorine
Cadmium compounds	Cadmium compounds	Chlorine dioxide
Chromium compounds	Chromium compounds	Copper compounds
Copper compounds	Copper compounds	Ethylene glycol
Formaldehyde	Lead compounds	Formic acid
Hydrochloric acid (acid aerosols)	Manganese compounds	Hydrazine
Hydrogen fluoride	Mercury	Hydrochloric acid (acid aerosols)
Lead compounds	Nickel compounds	PAC compounds
Manganese compounds	Selenium compounds	Thiourea
Mercury/Mercury compounds	Silver compounds	1,2,4 Trimethylbenzene
Nickel compounds	Vanadium fume or dust	Zinc compounds
Selenium compounds	Zinc compounds	
Silver compounds		
Sulfuric acid (acid aerosols)		
Vanadium fume or dust		
Zinc compounds		

Chemicals Manufactured During Combustion

Electricity generating facilities may manufacture several EPCRA Section 313 chemicals during combustion. To identify the chemicals manufactured, you should use your best readily available information. This information could include analytical data on fuel sources used and combustion processes (e.g., fuel analyses, coal quality database, stack emission testing, combustion tests, etc.), process knowledge, other facility derived data, information from industry associations and EPA sources, and information on chemicals releases or other wastes leaving the facility. This chapter will discuss many of the metals and metal compounds, acids, and organics that are likely to be manufactured during combustion.

EPCRA Section 313 Chemicals in Purchased Chemicals

To develop the chemical list and identify the associated threshold activities for purchased chemicals you may want to consult the following:

- Material Safety Data Sheets (MSDS);
- Facility purchasing records;
- Inventory records;
- Individual manufacturing/operating functions; and
- Operation and process knowledge.

For purchased chemicals, MSDSs are generally considered to be good sources of information for the type and composition of chemicals in mixtures and other trade name products. Electricity generating facilities may receive MSDSs for any mixture or other trade name product purchased for use as fuel, equipment cleaning and maintenance, water treatment, or other operations. As of 1989, chemical suppliers of facilities in SIC codes 2000 through 3999 are required to notify customers of any EPCRA Section 313 chemicals present in mixtures or other trade name products that are distributed to facilities. The notice must be provided to the receiving facility and may be attached or incorporated into that product's MSDS. If no MSDS is required, the notification must be in a letter that accompanies the first shipment of the product to your facility. This letter must contain the chemical name, CAS number, and the weight or volume percent of the chemical (or a range) in the mixture or other trade name product. Beginning with the 1998 reporting year, seven new industries will be covered by most of the EPCRA Section 313 reporting requirements and, therefore, facilities in SIC codes 2000 through 3999 will be required to provide these new industries with this supplier notification information. While the new industries are not required to prepare supplier notifications for materials that they distribute, they are encouraged to pass along the notification to customers receiving these materials who may be subject to EPCRA Section 313. For more information on supplier notification requirements, see *TRI Forms and Instructions, 1998 EPCRA Section 313 Question and Answers,* Appendix A, Directive 9 (EPA-745-B-98-004) or *Supplier Notification Requirements* brochure, (EPA-560/4-91-006).

Carefully review the entire MSDS for your purchased chemicals. Although MSDSs must list whether EPCRA Section 313 chemicals are present, the language and location of this notification is not currently standardized. Depending on the supplier, this information can be found in different sections of the MSDS. The most likely sections of an MSDS to provide information on identity and concentration of EPCRA Section 313 chemicals in purchased chemicals are:

- Hazardous components section;
- Regulatory section;
- Physical properties/chemical composition section;
- Labeling section; and
- Additional information section.

EPCRA Section 313 Chemical List

In order to identify which chemicals are EPCRA Section 313 chemicals, and (in some cases) the form in which they are reportable, you need to compare your list of chemicals managed at your facility to the current Section 313 list of chemicals. The most current list of EPCRA Section 313 chemicals can be found in the *TRI Forms and Instructions* document for the current reporting year. The following discussion is a brief overview of the EPCRA Section 313 list of chemicals, including a description of possible chemical qualifiers.

The original list of EPCRA Section 313 chemicals and chemical categories was comprised from two lists developed by New Jersey and Maryland. EPA refined the list and anticipates changes to continue. The list can be modified by an EPA initiative or through a petition process. When evaluating a chemical for addition or deletion, EPA must consider potential acute and chronic human health effects and adverse environmental effects. The Agency publishes its findings and any regulatory action through the *Federal Register*.

The EPCRA Section 313 chemical list includes individually listed chemicals and several chemical categories. If you meet the SIC code criterion and exceed the employee threshold, you must file a Form R or Form A for each EPCRA Section 313 chemical or chemical category manufactured, processed, or otherwise used above threshold quantities. When conducting threshold determinations for individually listed chemicals, simply compare the amount of that chemical manufactured, processed, or otherwise used, to each threshold quantity. If you exceed the threshold, you must file a Form R or Form A for that chemical. When determining thresholds for chemical categories, you must total the weights of all members of the category, and compare this sum to each activity threshold. It is important that you compare the amount of compounds in a category separately to each individual activity threshold (manufacturing, processing, or otherwise use). If you exceed any of the three activity thresholds for a chemical category, you must file a Form R or Form A for that chemical category.

Many of the EPCRA Section 313 chemical categories are metal compound categories (e.g., chromium compounds). Metal compound categories include any unique chemical substance that contains the metal as part of that chemical's infrastructure. When calculating thresholds for metal compound categories, you must consider the entire weight of the metal compound, not just the weight of the parent metal. However, if you exceed an activity threshold for a metal compound category and you are filing a Form R for that metal compound category, you need only use the weight of the parent metal when calculating quantities released or otherwise managed as waste. Elemental forms of metals (e.g., chromium) are also individually listed on the EPCRA Section 313 chemical list. You must make separate threshold determinations for the elemental metal and the metal compound category (e.g., chromium and chromium compounds). If you exceed thresholds for both the metal and metal compound category, you may submit separate Form Rs, or one Form R for both the metal and metal compound category. However, if both the metal and the metal compound qualify for Form A reporting, you must submit separate Form A certifications for the metal and metal compound category.

Example - Chemical Categories

Example 1 A facility otherwise uses 6,000 pounds of copper compound in equipment painting operation, manufactures 20,000 pounds of copper oxide as a combustion by-product, and processes 18,000 pounds of copper oxide in ash for reuse. All three compounds are members of the copper compounds category, an EPCRA Section 313 chemical category. Because the facility does not exceed the otherwise use, manufacturing, or processing thresholds, the facility is not required to file a Form R or Form A for the copper compound category.

Several chemicals on the EPCRA Section 313 chemical list include qualifiers related to use or form. A few chemicals are reportable ONLY if manufactured by a specified process or in a specified threshold activity. For example, isopropyl alcohol is only reportable if it is manufactured using the strong acid process and saccharin is reportable only if it is manufactured. Some other chemicals are only reportable if present in certain forms. For example, only yellow or white phosphorus are reportable, while black or red phosphorus are not.

The qualifiers associated with these chemicals which may be applicable to the electricity generating industry are presented below. A detailed discussion of the qualifier criteria can be found in the *TRI Forms and Instructions*.

- **Fume or dust** - Three metals (aluminum, vanadium, and zinc) are qualified as "fume or dust forms only." This definition excludes "wet" forms such as solutions or slurries, but includes powder, particulate, or gaseous forms of these metals. For example, on-site disposal of a waste received from off-site containing elemental zinc metal needs to be considered in threshold determinations if the zinc is in the form of a fume or dust. However, if zinc (fume or dust) are found during treatment of a zinc-containing waste

Example - Lead and Lead Compounds

A facility has determined that it needs to report under EPCRA Section 313 for both elemental lead and lead compounds. Can this facility file one Form R that takes into account both the releases and other waste management activities of lead and lead compounds, or is it required to report separately?

If a covered facility exceeds thresholds for both the parent metal and compounds of that same metal, it is allowed to file one joint report (e.g., one report for lead compounds and elemental lead). However, the report filed will indicate amounts of the metal compound. EPA allows this because the release and other waste management information reported in connection with metal compounds will be the total pounds of the parent metal released and otherwise managed as a waste. For data management purposes, EPA requires that the chemical category name and code be placed on the Form R (Sections 1.1 and 1.2).

stream, then these amounts would need to be considered toward the facility's manufacturing threshold. Additionally, the entire weight of all zinc compounds should be

included in the threshold determination for zinc compounds. Keep in mind that most metals in most wastes are expected to be in the compound form.

- **Ammonia** has the following qualifier: "ammonia (includes anhydrous ammonia and aqueous ammonia from water dissociable salts and other sources; 10% of total aqueous ammonia is reportable under this listing)." Aqueous ammonia is formed from the dissociation of ammonium salts (including ammonium sulfate, ammonium nitrate, and ammonium chloride) in water and is an EPCRA Section 313 chemical. You must determine the amount of aqueous ammonia generated from solubilizing these chemicals in water and apply it toward the threshold for ammonia. EPA has published guidance on reporting for ammonia, and ammonium salts in *1998 EPCRA Section 313 Question and Answers*, - Appendix A, Directive 8. Additionally, ammonium nitrate in aqueous solutions must be included in threshold determinations and release and other waste management calculations for the nitrate compounds category. (See below)

- **Nitrate Compounds (water dissociable; reportable only in aqueous solution)** - A nitrate compound is covered by this listing only when in water and if dissociated. Although the complete weight of the nitrate compound must be used for threshold determinations for the nitrate compounds category, only the nitrate ion portion of the compound must be considered for release and other waste management determinations. Nitrate compounds are manufactured during the neutralization of nitric acid and in biological treatment of wastewater. EPA has published guidance for these chemicals in *Water Dissociable Nitrate Compounds Category and Guidance for Reporting* (see Appendix A for more information).

- **Phosphorus (yellow or white)** - Only manufacturing, processing, or otherwise use of phosphorus in the yellow or white chemical forms require reporting. Black and red phosphorus are not subject to EPCRA Section 313 reporting.

- **Asbestos (friable)** - Asbestos only need be considered when it is handled in the friable form. Friable refers to the physical characteristic of being able to crumble, pulverize, or reduce to a powder with hand pressure.

- **Aluminum oxide (fibrous)** - Beginning with reports for calendar year 1989, aluminum oxide is only subject to threshold determination when it is handled in fibrous forms. EPA has characterized fibrous aluminum oxide for purposes of EPCRA Section 313 reporting as a man-made fiber that is commonly used in high-temperature insulation applications such as furnace linings, filtration, gaskets, joints, and seals.

- **Sulfuric acid (acid aerosols) and hydrochloric acid (acid aerosols)** - EPA delisted

non-aerosol forms of sulfuric acid (CAS No. 7664-93-9) and hydrochloric acid (CAS No. 7647-01-0) from the EPCRA Section 313 chemical list beginning in the 1994 and 1995 reporting years, respectively. Threshold determinations and release and other waste management estimates now only apply to the aerosol forms. EPA considers the term aerosol to cover any generation of airborne acid (including mists, vapors, gas, or fog) without any particle size limitation. Sulfuric acid (acid aerosols) and hydrochloric acid (acid aerosols) are manufactured during the combustion of sulfur containing wastes (for sulfuric acid) and chlorine containing wastes (for hydrochloric acid). EPA has published guidance for sulfuric acid (acid aerosols) in *Guidance for Reporting Sulfuric Acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)* (see Appendix A for more information).

3.2 Step 2. Determining the quantity of each EPCRA Section 313 chemical manufactured (including imported), processed, or otherwise used

The next step is to determine the quantities manufactured (including imported), processed, and otherwise used for each EPCRA Section 313 chemical on your list (developed in Step 1). Table 3-2 lists the annual reporting thresholds for each of these activities (Tables 3-3, 3-14 and 3-15 provide detailed definitions of subcategories for each Threshold Activity).

Table 3-2
Reporting Thresholds

Activity	Threshold
Manufacturing (including importing)	More than 25,000 pounds per EPCRA Section 313 chemical
Processing	More than 25,000 pounds per EPCRA Section 313 chemical
Otherwise used	More than 10,000 pounds per EPCRA Section 313 chemical

For each EPCRA Section 313 chemical or chemical category during the reporting year, each threshold must be individually calculated; they are mutually exclusive and are not additive.

Example -Threshold Determination

If your facility manufacturers 22,000 pounds of an EPCRA Section 313 chemical and you also otherwise use 8,000 pounds of the same chemical, you have not exceeded either activity threshold and an EPCRA Section 313 report for that chemical is not required. However, if your facility manufactures 28,000 pounds per year of an EPCRA Section 313 chemical and otherwise uses 8,000 pounds of the same chemical, you have exceeded the manufacturing threshold and all non-exempt releases and other waste management activities of that chemical must be reported on the Form R, including those from the "otherwise use" activity. Additionally, you must also indicate on the Form R in Part II, Section(s) 3.1, 3.2, and 3.3, all non-exempt activities involving the reportable EPCRA Section 313 chemical.

COMMON ERROR - Threshold Determination

The amount of the EPCRA Section 313 chemical that is actually manufactured (including the quantity imported), processed, or otherwise used, not the amount that may be in storage, is the amount applied to the threshold determination. For example, your electricity generating facility uses a recirculating cooling system containing 15,000 pounds of anhydrous ammonia. To replace fugitive releases and small losses that occur during use, you add 5,000 pounds of anhydrous ammonia to the cooling system. In this example, only the 5,000 pounds that were added to the system count toward the "otherwise use" threshold. Therefore, unless you "otherwise use" more than 5,000 pounds elsewhere at the facility, the "otherwise use" threshold of 10,000 pounds has not been exceeded and you would not have to report for ammonia.

Each of the threshold activities is divided into subcategories. As discussed in the *TRI Forms and Instructions*, you are required to designate EACH activity and subcategory that applies to your facility not only those for which a threshold was exceeded.

Manufacturing

Manufacturing means producing, preparing, importing, or compounding an EPCRA Section 313 chemical. While electricity generating facilities may not intend to manufacture EPCRA Section 313 chemicals during operations, combustion of various fuels will produce certain EPCRA Section 313 chemicals that must be considered towards the manufacturing threshold. You will also need to consider if EPCRA Section 313 chemicals are produced coincidentally during combustion (or any of your other operations), even if the chemical exists for only a short period of time, and later is destroyed by air control equipment. Most commonly, electricity generating facilities manufacture new metal compounds (usually as a result of oxidation), acid aerosols, formaldehyde, and other organic compounds, or convert metal compounds to the parent metal (e.g., mercury compounds in coal may reduce to elemental mercury). The following discussion describes the various activities included under manufacturing (see Table 3-3), and other manufacturing threshold issues that are relevant to electricity generating facilities.

Table 3-3
Definitions and Examples of Manufactured Chemicals

Manufacturing Activity Subcategory	Examples
Imported for on-site use/processing	Fuels, maintenance chemicals, or limestone that may contain EPCRA Section 313 chemicals imported into the customs territory of the United States.
Produced or imported for sale/distribution	EPCRA Section 313 chemicals in fuel imported by a facility and sent to other facilities, such as intra-company transfers.
Produced as a by-product	Hydrogen fluoride, hydrochloric acid (acid aerosols) and/or sulfuric acid (acid aerosols) formed during the combustion of coal, oil, or other fuels. The coincidental manufacturing of metal compounds during the combustion of coal and oil.
Produced as an impurity	May not occur in the electricity generating industry.

* More complete discussions of the industry-specific examples can be found in Chapter 4 of this guidance manual.

Manufacture of Metals and Metal Compounds During Combustion. During combustion, if a metal compound is converted to an elemental metal, or if one metal compound is converted to another metal compound (even if it is within the same EPCRA Section 313 metal compound category) then manufacturing has occurred, and the quantity of the EPCRA Section 313 metal or metal compound manufactured must be counted towards the 25,000 pound threshold. The same is true if an elemental metal is converted to a metal compound, although this is not known to be an issue in the combustion of coal, oil, or other fuel types common to electricity generating facilities. You must apply the entire weight of a metal compound manufactured during combustion toward the 25,000 pound threshold, not just the weight of the parent metal. There may be cases in which a metal compound is not changed at all during combustion. For example, beryllium oxide in coal remains as beryllium oxide during combustion. In this case, a beryllium compound has not been manufactured and no amounts of beryllium compounds would need to be

How Do I Calculate Amounts of Metal Compounds Manufactured During Combustion?

In the absence of better facility-specific data, use Tables 3-4 and 3-5 to calculate amounts of metal compounds manufactured during coal and oil combustion.

To use the tables, simply look under the column titled "Approximate Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide." For each metal compound, compare this value to the amount of fuel combusted at your facility during the reporting year. If the amount combusted exceeds the value in the table, you have exceeded the threshold for that metal compound, and you must prepare a Form R or Form A for that metal compound category. For example, if you combust more than 1,800 tons of coal during the reporting year, you must prepare a Form R or Form A for zinc compounds.

considered toward the manufacturing threshold.

To calculate the amount of Section 313 metal compounds manufactured during combustion, facilities must first estimate the concentration of each metal present in the coal, oil, or other fuel. These metals are likely to exist as metal compounds in the fuel. The best available information should be used to estimate the approximate concentration of the metal in the fuel. If a facility has data regarding chemical concentrations in the fuels used by the facility, and the facility believes that this is the best readily available information, then the facility should use this information. If specific concentration data of EPCRA Section 313 chemicals in fuel does not exist at your facility, there are several sources where the facility can find this concentration data. Examples include specifications of product content and concentrations from the supplier, as well as nationally assembled data such as the U.S. Geological Survey's (USGS) coal quality data base (http://energy.er.usgs.gov/products/databases/CoalQual/) or Electrical Power Research Institute's (EPRI) PISCES data base on coal constituents.

As an alternative, if no other information is available, facilities can assume that most of these metal compounds convert to the lowest weight metal oxide possible. You may use the default values provided in Tables 3-4 and 3-5 provided in this chapter. Table 3-4 lists concentrations of EPCRA Section 313 metals and organics typically found in crude oil and petroleum products otherwise used by electricity generating facilities. Only the metals in Table 3-4 would be considered in manufacturing threshold determinations. To support the facility's threshold calculations, the facility should document the type of fuel it uses. Table 3-5 also uses the concentrations associated with coal type (by originating state) to show the estimated pounds of metal oxide manufactured per ton of coal combusted and as a quick reference, the estimated tons of coal needed to be consumed to manufacture 25,000 pounds of the corresponding metal oxide for each coal type (Table 3-5 was derived from data in Appendix D of the *Study of Hazardous Air Pollutant Emissions From Utility Steam Generating Units*).

Table 3-4
Estimated Concentration Values of EPCRA Section 313 Constituents in Crude Oil and Petroleum Products (Weight Percent)

EPCRA Section 313 Chemical	*De Minimis* Level*	Crude Oil	Gasoline (Various Grades)	No.2 Fuel Oil/ Diesel Fuel	Jet Fuel (JP-4)	Kerosene	Lubri-cating Oil	No. 6 Fuel Oil	Aviation Gasoline
Benzene	0.1	0.446 R	1.608 R	8.0E-04 A	1.0 A	0.004 A	N/A	0.001	0.515 R
Biphenyl	1.0	0.060 R	0.010 R	0.100	0.120 R	0.120 R	N/A	N/A	N/A
Bromine	1.0	N/A	N/A	N/A	N/A	N/A	N/A	3.0E-06	N/A
Chlorine	1.0	N/A	N/A	N/A	N/A	N/A	N/A	0.0131 D	N/A
Cyclohexane	1.0	0.700	0.240	N/A	1.240	N/A	N/A	N/A	N/A
Ethylbenzene	1.0	0.346 R	1.605 R	0.013 A	0.50 A	0.127 A	N/A	0.0022	0.432 R
n-Hexane	1.0	2.463 R	1.0 T	1.0 A	1.5 T	0.005 A	N/A	N/A	0.126 R

EPCRA Section 313 Chemical	*De Minimis* Level*	Crude Oil	Gasoline (Various Grades)	No.2 Fuel Oil/ Diesel Fuel	Jet Fuel (JP-4)	Kerosene	Lubri-cating Oil	No. 6 Fuel Oil	Aviation Gasoline
MTBE[b]	1.0	N/A	15.00	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	1.0	0.219 [R]	0.444 [R]	0.550	0.468 [R]	0.733 [R]	N/A	0.10	0.10 [R]
Phenanthrene	1.0	N/A	N/A	0.125	N/A	N/A	N/A	N/A	N/A
Phenol	1.0	0.323	0.055	0.064	N/A	0.770	N/A	N/A	N/A
PACs[e]	0.1	0.0004	N/A	N/A	N/A	N/A	N/A	1.13	N/A
Styrene	0.1	N/A	N/A[@]	0.032 [R]	N/A	N/A	N/A	N/A	N/A
Toluene	1.0	0.878 [R]	7.212 [R]	0.032 [A]	3.20 [A]	.13 [T]	N/A	0.006	7.327
1,2,4-Trimethyl-benzene	1.0	0.326	2.50[‡]	1.0 [‡]	N/A	N/A	N/A	N/A	N/A
Xylene	1.0	1.420 [R]	7.170 [R]	0.290 [A]	3.20 [A]	0.31 [A]	N/A	0.013	2.204
Antimony[a]	0.1	1.0E-05	N/A	N/A	N/A	N/A	N/A	1.0E-06	N/A
Arsenic[a]	0.1/1.0 [c]	2.0E-05	N/A	8.5 [E-06]	N/A	N/A	N/A	3.06E-05 [D]	N/A
Beryllium[a]	0.1/1.0 [c]	2.0E-07	N/A	5.0 [E-06]	N/A	N/A	N/A	2.7E-06 [D]	N/A
Cadmium[a]	0.1/1.0 [c]	4.0E-07	N/A	2.1 [E-05]	N/A	N/A	N/A	2.0E-06 [D]	N/A
Chromium[a]	0.1/1.0 [d]	4.0E-05	N/A	9.5 [E-05]	N/A	N/A	N/A	3.1E-05 [D]	N/A
Cobalt[a]	1.0	0.0003	N/A	N/A	N/A	N/A	N/A	1.63E-04 [D]	N/A
Copper[a]	1.0	4.0E-05		5.6E-04	N/A	N/A	N/A	3.0E-05	N/A
Lead Compounds	1.0 (organic) 0.1 (inorg.)	N/A	N/A	N/A	N/A	N/A	N/A	1.41E-04 [D]	0.14[~] (organic)
Manganese[a]	1.0	N/A	N/A	2.1E-05	N/A	N/A	N/A	3.5E-05 [D]	N/A
Mercury[a]	1.0	0.0006	N/A	4.0E-05	N/A	N/A	N/A	9.2E-07 [D]	N/A
Nickel[a]	0.1	0.0055	N/A	3.38E-04	N/A	N/A	N/A	2.6E-03 [D]	N/A
Selenium[a]	1.0	4.0E-05	N/A	N/A	N/A	N/A	N/A	9.5E-06 [D]	N/A
Silver[a]	1.0	N/A	N/A	N/A	N/A	N/A	N/A	2.0E-08	N/A
Zinc Compounds	1.0	N/A	N/A	N/A	N/A	N/A	1.0	N/A	N/A

Unless otherwise noted, Source: *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313*, Appendix B "Composition of Crude Oil and Petroleum Products."

[A] American Petroleum Institute report prepared for Mr. Jim Durham, EPA (December 23, 1993), regarding revised estimates of heavy petroleum product liquid constituents that are listed as hazardous air pollutants (HAPs) under section 112 of the Clean Air Act Amendments (CAAA).

[R] Radian Corporation report prepared for Mr. James Durham, EPA (August 10, 1993), regarding liquid HAP concentrations of various petroleum products.

[D] Appendix D, Study of Hazardous Air Pollution Emissions from Electric Utility Steam Generating Units--Final Report to Congress, USEPA, OAQPS (February 1998) 453/R-98-004b.

[T] These values have been revised to be consistent with the current version of EPA's emission estimation program TANKS 4.0.
* The *de minimis* concentration values for the metals is for the metal compound.
[~] Lead compounds for Aviation Gasoline 100 (Exxon-MSDS).
[‡] Concentrations updated with comments received from API.
[a] Constituents are most likely metal compounds rather than the elements. Elements are listed in this table because concentration data are for only the metals occurring in the fuel. Concentrations for metal compounds would be somewhat higher depending on the metal compound. For threshold determination, if the weight of the compound is not known, facilities may use the weight of the lowest metal compound likely to be present.
[@] Data from EPA report prepared by Radian Co. for this constituent are considered suspect and are not recommended for use, based on discussion with Jim Durham of EPA on November 30, 1998.
[b] MTBE may be present to enhance octane in concentrations from 0-15% (industry practice, not sampling results).
[c] The *de minimis* level for inorganic compounds is 0.1; for organic compounds is 1.0.
[d] The *de minimis* level for chromium VI compounds is 0.1; for chromium III compounds is 1.0.
[e] The petroleum products may contain one or more of the following chemicals under the polycyclic aromatic compounds (PACs) category: benz(a)anthracene, benzo (b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(rst)pentaphene, benzo(a)phenanthrene, benzo(a)pyrene, dibenz(a,h)acridine, dibenz(a,j)acridine, dibenzo(a,h)anthracene, 7H-Dibenzo(c,g)carbazole, dibenzo(a,e)fluoranthene, dibenzo(a,e)pyrene, dibenzo(a,h)pyrene, dibenzo(a,l)pyrene, 7,12-dimethylbenz(a)anthracene, indeno[1,2,3-cd]pyrene, 5-methylchrysene, 1-nitropyrene. For No. 6 fuel oil, the value given is for benzo(a)anthracene.

Table 3-5
Concentrations of EPCRA Section 313 Metals and their Compounds in Coal and Pounds of Metal Oxide Manufactured per Ton of Coal Combusted, by State and Coal Rank

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Alaska (Subbituminous)			
Antimony/Sb_2O_3	1.9	4.6E-03	5.48
Arsenic/As_2O_3	3	7.92E-03	3.16
Beryllium/BeO	0.5	2.78E-03	8.99
Cadmium/CdO	0.15	3.42E-04	73.10
Chromium/CrO	20	5.24E-02	0.48
Cobalt/CoO	5	1.27E-02	1.97
Chlorine/Cl_2O	53.93[b]	NA	NA
Fluorine/F_2O	95[b]	NA	NA
Lead/PbO	5.4	1.17E-02	2.14
Manganese/MnO	88	2.27E-01	0.11
Mercury/Hg_2O	0.07	1.46E-04	171
Nickel/NiO	10	2.56E-02	0.98
Selenium/SeO_2	1.6	4.51E-03	5.54
Alabama (Bituminous)			
Antimony/Sb_2O_3	1.82	4.37E-03	5.72
Arsenic/As_2O_3	53	1.40E-01	0.18
Beryllium/BeO	1.88	1.05E-02	2.39
Cadmium/CdO	0.06	1.37E-04	182.75
Chromium/CrO	22.8	5.97E-02	0.42
Cobalt/CoO	8.2	2.08E-02	1.20
Chlorine/Cl_2O	380[b]	NA	NA
Fluorine/F_2O	127[b]	NA	NA
Lead/PbO	7	1.51E-02	1.65
Manganese/MnO	41	1.06E-01	0.24
Mercury/Hg_2O	0.19	3.95E-04	63.26
Nickel/NiO	17.5	4.48E-02	0.56

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Selenium/SeO_2	1.88	5.30E-03	4.72
Arkansas (Lignite)			
Antimony/Sb_2O_3	1.17	2.80E-03	8.90
Arsenic/As_2O_3	4.3	1.12E-02	2.20
Beryllium/BeO	2.4	1.33E-02	1.87
Cadmium/CdO	0.29	6.61E-04	37.81
Chromium/CrO	16.9	4.43E-02	0.56
Cobalt/CoO	6	1.52E-02	1.64
Chlorine/Cl_2O	142[b]	NA	NA
Fluorine/F_2O	63[b]	NA	NA
Lead/PbO	9.8	2.12E-02	1.18
Manganese/MnO	119	3.07E-01	0.08
Mercury/Hg_2O	0.25	5.20E-04	48.08
Nickel/NiO	11.8	3.02E-02	0.83
Selenium/SeO_2	5	1.41E-02	1.77
Arizona (Subbituminous)			
Antimony/Sb_2O_3	0.47	1.13E-03	22.22
Arsenic/As_2O_3	2.1	5.55E-03	4.5
Beryllium/BeO	1.1	6.12E-03	4.09
Cadmium/CdO	0.1	2.28E-04	109.65
Chromium/CrO	4.6	1.21E-02	2.07
Cobalt/CoO	2.1	5.33E-03	4.69
Chlorine/Cl_2O	200[b]	NA	NA
Fluorine/F_2O	79[b]	NA	NA
Lead/PbO	9	1.94E-02	1.29
Manganese/MnO	27	6.97E-02	0.36
Mercury/Hg_2O	0.07	1.46E-04	172
Nickel/NiO	4.8	1.23E-02	2.03
Selenium/SeO_2	1.5	4.23E-03	5.91

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Colorado (Bituminous)			
Antimony/Sb_2O_3	0.91	2.18E-03	11.5
Arsenic/As_2O_3	1.34	3.54E-03	7.07
Beryllium/BeO	0.36	2.00E-03	12.49
Cadmium/CdO	0.18	4.10E-04	60.92
Chromium/CrO	1.89	4.95E-03	5.05
Cobalt/CoO	10.3	2.62E-02	0.96
Chlorine/Cl_2O	92.97[b]	NA	NA
Fluorine/F_2O	98.78[b]	NA	NA
Lead/PbO	5.44	1.18E-02	2.13
Manganese/MnO	10.83	2.79E-02	0.89
Mercury/Hg_2O	0.07	1.46E-04	172
Nickel/NiO	1.25	3.20E-03	7.81
Selenium/SeO_2	0.87	2.45E-03	10.19
Colorado (Subbituminous)			
Antimony/Sb_2O_3	0.35	8.35E-04	30
Arsenic/As_2O_3	1.03	2.72E-03	9.2
Beryllium/BeO	0.84	4.67E-03	5.35
Cadmium/CdO	0.08	1.82E-04	137.06
Chromium/CrO	4.1	1.07E-02	2.33
Cobalt/CoO	1.6	4.06E-03	6.15
Chlorine/Cl_2O	118[b]	NA	NA
Fluorine/F_2O	99[b]	NA	NA
Lead/PbO	3.5	7.56E-03	3.31
Manganese/MnO	32	8.26E-02	0.30
Mercury/Hg_2O	0.14	2.91E-04	86
Nickel/NiO	7.9	2.02E-02	1.24
Selenium/SeO_2	0.89	2.51E-03	9.96
Iowa (Bituminous)			
Antimony/SbO	2.3	5.50E-03	4.55

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Arsenic/As_2O_3	12.0	3.17E-02	0.79
Beryllium/BeO	1.88	1.05E-02	2.39
Cadmium/CdO	14.0	3.19E-02	0.78
Chromium/CrO	12.10	3.17E-02	0.79
Cobalt/CoO	10.00	2.54E-02	0.98
Chlorine/Cl_2O	1498.36	NA	NA
Fluorine/F_2O	77.0	NA	NA
Lead/PbO	68.0	1.47E-01	0.17
Manganese/MnO	259.0	6.68E-01	0.04
Mercury/Hg_2O	0.19	3.95E-04	63.26
Nickel/NiO	31.0	7.94E-02	0.32
Selenium/SeO_2	3.60	1.02E-02	2.46

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Illinois (Bituminous)			
Antimony/Sb_2O_3	0.82	1.96E-03	12.76
Arsenic/As_2O_3	6.78	1.79E-02	1.4
Beryllium/BeO	1.31	7.28E-03	3.43
Cadmium/CdO	0.98	2.23E-03	11.19
Chromium/CrO	12.66	3.32E-02	0.75
Cobalt/CoO	3.19	8.10E-03	3.09
Chlorine/Cl_2O	1136.07[b]	NA	NA
Fluorine/F_2O	84.14[b]	NA	NA
Lead/PbO	24.51	5.29E-02	0.47
Manganese/MnO	33.74	8.70E-02	0.29
Mercury/Hg_2O	0.08	1.66E-04	150
Nickel/NiO	12.74	3.26E-02	0.77
Selenium/SeO_2	1.72	4.85E-03	5.15
Indiana (Bituminous)			
Antimony/Sb_2O_3	1.4	3.35E-03	7.47
Arsenic/As_2O_3	10.1	2.67E-02	0.84
Beryllium/BeO	2.82	1.57E-02	1.59
Cadmium/CdO	0.49	1.12E-03	22.38
Chromium/CrO	15.4	4.03E-02	0.62
Cobalt/CoO	5.2	1.32E-02	1.89
Chlorine/Cl_2O	1032.79[b]	NA	NA
Fluorine/F_2O	65[b]	NA	NA
Lead/PbO	10.9	2.35E-02	1.06
Manganese/MnO	38	9.80E-02	0.25
Mercury/Hg_2O	0.11	2.29E-04	109
Nickel/NiO	17.9	4.58E-02	0.55
Selenium/SeO_2	2.17	6.12E-03	4.09

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Kansas (Bituminous)			
Antimony/Sb_2O_3	0.85	2.03E-03	12.3
Arsenic/As_2O_3	25	6.6E-02	0.38
Beryllium/BeO	1.47	8.17E-03	3.06
Cadmium/CdO	10	2.28E-02	1.10
Chromium/CrO	10.1	2.65E-02	0.94
Cobalt/CoO	15	3.81E-02	0.66
Chlorine/Cl_2O	2500[b]	NA	NA
Fluorine/F_2O	64[b]	NA	NA
Lead/PbO	111	2.40E-01	0.10
Manganese/MnO	160	4.13E-01	0.06
Mercury/Hg_2O	0.19	3.95E-04	63.3
Nickel/NiO	41	1.05E-01	0.24
Selenium/SeO_2	2.7	7.61E-03	3.28
Kentucky (Bituminous)			
Antimony/Sb_2O_3	1.13	2.7E-03	9.26
Arsenic/As_2O_3	19.1	5.05E-02	0.50
Beryllium/BeO	3.17	1.76E-02	1.42
Cadmium/CdO	0.16	3.65E-04	68.53
Chromium/CrO	16.3	4.27E-02	0.59
Cobalt/CoO	6.6	1.68E-02	1.49
Chlorine/Cl_2O	1139	NA	NA
Fluorine/F_2O	86	NA	NA
Lead/PbO	10.6	2.29E-02	1.09
Manganese/MnO	32	8.26E-02	0.30
Mercury/Hg_2O	0.15	3.12E-04	80
Nickel/NiO	17.5	4.48E-02	0.56
Selenium/SeO_2	3.83	1.08E-02	2.31

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Louisiana (Lignite)			
Antimony/Sb_2O_3	0.82	1.96E-03	12.76
Arsenic/As_2O_3	3.7	9.75E-03	2.56
Beryllium/BeO	1.9	1.06E-02	2.37
Cadmium/CdO	0.15	3.42E-04	73.10
Chromium/CrO	11.4	2.99E-02	0.84
Cobalt/CoO	3.3	8.38E-03	2.98
Chlorine/Cl_2O	115[b]	NA	NA
Fluorine/F_2O	83[b]	NA	NA
Lead/PbO	5.5	1.19E-02	2.10
Manganese/MnO	141	3.64E-01	0.07
Mercury/Hg_2O	0.19	3.95E-04	63.25
Nickel/NiO	7.8	2.00E-02	1.25
Selenium/SeO_2	6	1.69E-02	1.48
Maryland (Bituminous)			
Antimony/Sb_2O_3	0.81	1.95E-03	12.92
Arsenic/As_2O_3	26	6.85E-02	0.36
Beryllium/BeO	2.01	1.12E-02	2.24
Cadmium/CdO	0.14	3.19E-04	78.32
Chromium/CrO	26.7	7.00E-02	0.36
Cobalt/CoO	11	2.79E-02	0.89
Chlorine/Cl_2O	914[b]	NA	NA
Fluorine/F_2O	107[b]	NA	NA
Lead/PbO	10	2.16E-02	1.16
Manganese/MnO	13	3.35E-02	0.75
Mercury/Hg_2O	0.42	8.74E-04	28.62
Nickel/NiO	22	5.63E-02	0.44
Selenium/SeO_2	3.8	1.07E-02	2.33

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Missouri (Bituminous)			
Antimony/Sb_2O_3	1.6	3.83E-03	6.54
Arsenic/As_2O_3	10	2.64E-02	0.94
Beryllium/BeO	2.01	1.12E-02	2.24
Cadmium/CdO	0.8	1.82E-03	13.71
Chromium/CrO	12.2	3.20E-02	0.78
Cobalt/CoO	6.7	1.70E-02	1.47
Chlorine/Cl_2O	1701.64[b]	NA	NA
Fluorine/F_2O	60[b]	NA	NA
Lead/PbO	67	1.45E-01	0.17
Manganese/MnO	99	2.55E-01	0.10
Mercury/Hg_2O	0.17	3.54E-04	70.07
Nickel/NiO	23	5.89E-02	0.42
Selenium/SeO_2	4.2	1.18E-02	2.11
Montana (Bituminous)			
Antimony/Sb_2O_3	0.69	1.65E-03	15.15
Arsenic/As_2O_3	7	1.85E-02	1.36
Beryllium/BeO	0.52	2.89E-03	8.65
Cadmium/CdO	0.08	1.82E-04	137.06
Chromium/CrO	3.1	8.12E-03	3.08
Cobalt/CoO	1.5	3.81E-03	6.56
Chlorine/Cl_2O	80[b]	NA	NA
Fluorine/F_2O	104[b]	NA	NA
Lead/PbO	3	6.48E-03	3.86
Manganese/MnO	37	9.55E-02	0.26
Mercury/Hg_2O	0.09	1.87E-04	133.55
Nickel/NiO	3.9	9.98E-03	2.50
Selenium/SeO_2	0.7	1.97E-03	12.66

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Montana (Lignite)			
Antimony/Sb_2O_3	0.92	2.20E-03	11.36
Arsenic/As_2O_3	18	4.75E-02	0.52
Beryllium/BeO	1.04	5.78E-03	4.32
Cadmium/CdO	0.11	2.51E-04	99.68
Chromium/CrO	0.94	2.46E-03	10.15
Cobalt/CoO	0.8	2.03E-03	12.30
Chlorine/Cl_2O	67[b]	NA	NA
Fluorine/F_2O	159[b]	NA	NA
Lead/PbO	4.8	1.04E-02	2.41
Manganese/MnO	68	1.75E-01	0.14
Mercury/Hg_2O	0.12	2.50E-04	100.2
Nickel/NiO	4	1.02E-02	2.44
Selenium/SeO_2	0.72	2.03E-03	12.31
Montana (Subbituminous)			
Antimony/Sb_2O_3	0.69	1.65E-03	15.16
Arsenic/As_2O_3	7	1.85E-02	1.36
Beryllium/BeO	0.52	2.89E-03	8.65
Cadmium/CdO	0.08	1.82E-04	137.06
Chromium/CrO	3.1	8.12E-03	3.08
Cobalt/CoO	1.5	3.81E-03	6.56
Chlorine/Cl_2O	80[b]	NA	NA
Fluorine/F_2O	104[b]	NA	NA
Lead/PbO	3	6.48E-03	3.86
Manganese/MnO	37	9.55E-02	0.26
Mercury/Hg_2O	0.09	1.87E-04	133.55
Nickel/NiO	3.9	9.98E-03	2.50
Selenium/SeO_2	0.7	1.97E-03	12.66

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
North Dakota (Lignite)			
Antimony/Sb_2O_3	0.58	1.39E-03	18.04
Arsenic/As_2O_3	8.4	2.22E-02	1.12
Beryllium/BeO	0.82	4.56E-03	5.48
Cadmium/CdO	0.11	2.51E-04	99.68
Chromium/CrO	7	1.83E-02	1.36
Cobalt/CoO	2.7	6.86E-03	3.65
Chlorine/Cl_2O	110[b]	NA	NA
Fluorine/F_2O	34[b]	NA	NA
Lead/PbO	3.73	8.06E-03	3.10
Manganese/MnO	86	2.22E-01	0.11
Mercury/Hg_2O	0.13	2.70E-04	92.46
Nickel/NiO	4.1	1.05E-02	2.38
Selenium/SeO_2	0.79	2.23E-03	11.22
New Mexico (Subbituminous)			
Antimony/Sb_2O_3	1.07	2.56E-03	9.78
Arsenic/As_2O_3	1.8	4.75E-03	5.26
Beryllium/BeO	2.7	1.50E-02	1.67
Cadmium/CdO	0.16	3.65E-04	68.53
Chromium/CrO	6	1.57E-02	1.59
Cobalt/CoO	2.65	6.73E-03	3.71
Chlorine/Cl_2O	95[b]	NA	NA
Fluorine/F_2O	87[b]	NA	NA
Lead/PbO	31	6.70E-02	0.37
Manganese/MnO	45	1.16E-01	0.22
Mercury/Hg_2O	0.06	6.5E-05	384.62
Nickel/NiO	4.6	1.18E-02	2.12
Selenium/SeO_2	1.94	5.47E-03	4.57

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Ohio (Bituminous)			
Antimony/Sb_2O_3	0.81	1.94E-03	12.92
Arsenic/As_2O_3	23.2	6.1E-02	0.40
Beryllium/BeO	2.39	1.33E-02	1.88
Cadmium/CdO	0.12	2.74E-04	91.37
Chromium/CrO	14.3	3.75E-02	0.67
Cobalt/CoO	0.9	2.29E-03	10.94
Chlorine/Cl_2O	719[b]	NA	NA
Fluorine/F_2O	92[b]	NA	NA
Lead/PbO	7.3	1.58E-02	1.59
Manganese/MnO	28.3	7.30E-02	0.34
Mercury/Hg_2O	0.22	4.58E-04	54.63
Nickel/NiO	14.9	3.81E-02	0.66
Selenium/SeO_2	3.8	1.07E-02	2.33
Oklahoma (Bituminous)			
Antimony/Sb_2O_3	0.69	1.65E-03	15.16
Arsenic/As_2O_3	24	6.35E-02	0.40
Beryllium/BeO	0.86	4.78E-03	5.23
Cadmium/CdO	0.1	2.28E-04	109.65
Chromium/CrO	15	3.93E-02	0.64
Cobalt/CoO	6.2	1.57E-02	1.59
Chlorine/Cl_2O	267[b]	NA	NA
Fluorine/F_2O	77[b]	NA	NA
Lead/PbO	10	2.16E-02	1.16
Manganese/MnO	74	1.91E-01	0.13
Mercury/Hg_2O	0.17	1.84E-04	136.16
Nickel/NiO	17	4.35E-02	0.57
Selenium/SeO_2	1.8	5.08E-03	4.93

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Pennsylvania (Bituminous)			
Antimony/Sb_2O_3	1.23	2.94E-03	8.50
Arsenic/As_2O_3	32.1	8.45E-02	0.30
Beryllium/BeO	2.45	1.36E-02	1.84
Cadmium/CdO	0.1	2.28E-04	109.65
Chromium/CrO	20.1	5.27E-02	0.47
Cobalt/CoO	7.9	2.01E-02	1.25
Chlorine/Cl_2O	1096[b]	NA	NA
Fluorine/F_2O	78[b]	NA	NA
Lead/PbO	10.8	2.33E-02	1.07
Manganese/MnO	23.5	6.06E-02	0.41
Mercury/Hg_2O	0.29	6.03E-04	41.43
Nickel/NiO	20.4	5.22E-02	0.48
Selenium/SeO_2	3.55	1.00E-02	2.50
Texas (Lignite)			
Antimony/Sb_2O_3	0.82	1.96E-03	12.76
Arsenic/As_2O_3	3.7	9.75E-03	2.56
Beryllium/BeO	1.9	1.06E-02	2.37
Cadmium/CdO	0.15	3.42E-04	73.10
Chromium/CrO	11.4	2.99E-02	0.84
Cobalt/CoO	3.3	8.38E-03	2.98
Chlorine/Cl_2O	115[b]	NA	NA
Fluorine/F_2O	83[b]	NA	NA
Lead/PbO	5.5	1.19E-02	2.10
Manganese/MnO	141	3.64E-01	0.07
Mercury/Hg_2O	0.19	3.95E-04	63.26
Nickel/NiO	7.8	2.00E-02	1.25
Selenium/SeO_2	6	1.69E-02	1.48

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Utah (Bituminous)			
Antimony/Sb_2O_3	0.23	5.50E-04	45.50
Arsenic/As_2O_3	0.89	2.35E-03	10.64
Beryllium/BeO	0.61	3.39E-03	7.37
Cadmium/CdO	0.08	1.82E-04	137.06
Chromium/CrO	7.7	2.02E-02	1.24
Cobalt/CoO	2.7	6.86E-03	3.65
Chlorine/Cl_2O	219.67[b]	NA	NA
Fluorine/F_2O	57[b]	NA	NA
Lead/PbO	3.9	8.42E-03	2.97
Manganese/MnO	8	2.06E-02	1.21
Mercury/Hg_2O	0.04	8.32E-05	300.48
Nickel/NiO	4.1	1.05E-02	2.38
Selenium/SeO_2	2	5.64E-03	4.43
Virginia (Bituminous)			
Antimony/Sb_2O_3	0.93	2.23E-03	11.24
Arsenic/As_2O_3	11	2.91E-02	0.86
Beryllium/BeO	1.66	9.23E-03	2.71
Cadmium/CdO	0.05	1.14E-04	219.30
Chromium/CrO	12.5	3.28E-02	0.76
Cobalt/CoO	6.3	1.60E-02	1.56
Chlorine/Cl_2O	930[b]	NA	NA
Fluorine/F_2O	74[b]	NA	NA
Lead/PbO	5.8	1.25E-02	2.00
Manganese/MnO	19	4.90E-02	0.51
Mercury/Hg_2O	0.14	2.91E-04	85.91
Nickel/NiO	11.2	2.87E-02	0.87
Selenium/SeO_2	2.7	7.61E-03	3.28

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Washington (Subbituminous)			
Antimony/Sb_2O_3	0.3	7.15E-03	34.86
Arsenic/As_2O_3	1.5	3.96E-03	6.32
Beryllium/BeO	1.1	6.12E-03	4.09
Cadmium/CdO	0.11	2.51E-04	99.68
Chromium/CrO	0.7	1.83E-03	13.63
Cobalt/CoO	4.7	1.19E-02	2.09
Chlorine/Cl_2O	103.28[b]	NA	NA
Fluorine/F_2O	14[b]	NA	NA
Lead/PbO	2.8	6.05E-03	4.13
Manganese/MnO	41	1.06E-01	0.24
Mercury/Hg_2O	0.06	1.25E-04	200.32
Nickel/NiO	7.9	2.02E-02	1.24
Selenium/SeO_2	0.4	1.13E-03	22.16
West Virginia (Bituminous)			
Antimony/Sb_2O_3	0.93	2.23E-03	11.24
Arsenic/As_2O_3	10.6	2.8E-02	0.90
Beryllium/BeO	2.78	1.55E-02	1.62
Cadmium/CdO	0.1	2.28E-04	109.65
Chromium/CrO	15.3	4.01E-02	0.62
Cobalt/CoO	7.2	1.83E-02	1.37
Chlorine/Cl_2O	1216[b]	NA	NA
Fluorine/F_2O	58[b]	NA	NA
Lead/PbO	7.2	1.56E-02	1.61
Manganese/MnO	19.1	4.93E-02	0.51
Mercury/Hg_2O	0.16	3.33E-04	75.12
Nickel/NiO	14.2	3.64E-02	0.69
Selenium/SeO_2	3.97	1.12E-02	2.23

Section 313 Metal/ Lowest Weight Metal Oxide[a] That May Be Manufactured from the Metal	Metal Concentration in Coal in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Ton of Coal Combusted	Approximate Million Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Wyoming (Subbituminous)			
Antimony/Sb_2O_3	0.73	1.75E-03	14.32
Arsenic/As_2O_3	0.69	1.82E-03	13.72
Beryllium/BeO	0.18	1.00E-03	24.98
Cadmium/CdO	0.13	2.96E-04	84.35
Chromium/CrO	2.82	7.39E-03	3.38
Cobalt/CoO	0.87	2.21E-03	11.31
Chlorine/Cl_2O	118.3[b]	NA	NA
Fluorine/F_2O	43.7[b]	NA	NA
Lead/PbO	2.07	4.47E-03	5.59
Manganese/MnO	5.65	1.46E-02	1.72
Mercury/Hg_2O	0.08	1.66E-04	150.24
Nickel/NiO	2.17	5.56E-03	4.50
Selenium/SeO_2	0.51	1.44E-03	17.38

a. As discussed above, mercury compounds in coal may not convert to the lowest weight oxide, but may reduce to the elemental mercury. At this time, EPA does not require facilities to make threshold determinations based on the weight of mercury compounds, but instead allows facilities to use the lower weight of elemental mercury.
b. These elements are not metals and subsequently do not produce metal oxides. They will produce hydrochloric acid (acid aerosols) and hydrofluoric acid, respectively. This is addressed elsewhere in the document.

A significant percentage of bituminous coal from most Eastern and Midwestern locations undergo a "cleaning process" to meet customer specifications for heat, ash, and sulfur content. Based on findings in EPA's OAQPS study (*Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units - Final Report to Congress, February 1998*), this cleaning process can affect the concentrations of some of the constituents in coal. In order to account for this, Table 3-6 has been included to provide "cleaning factors" to be used to adjust for this coal type taken from these locations that are subjected to a cleaning process. An example of how these cleaning factors may be used is provided immediately after Table 3-6. Note, based on the analysis used to develop information in Tables 3-5 and 3-6, it was identified that bituminous coal from Illinois and Colorado was not subject to cleaning processes; therefore, the factors in Table 3-6 should not be used for bituminous coal from these two states.

Table 3-6
Coal Cleaning Factors for Bituminous Coals

Constituent	Cleaning Factor
Antimony	0.715
Arsenic	0.554
Beryllium	0.711
Cadmium	0.624
Chromium	0.512
Cobalt	0.537
Chlorine	0.496
Fluorine	0.496
Lead	0.449
Manganese	0.382
Mercury	0.790
Nickel	0.568
Selenium	0.745

Example--Use of Coal Cleaning Factor

An electricity generating facility burns bituminous coal from Alabama and Kentucky. The facility estimates that it has exceeded the manufacturing threshold for elemental mercury. Based on information obtained by the facility from the USGS Coal Quality Database, along with information provided in Table 3-5 in this document, the facility estimates that it manufactured approximately 32,000 pounds of elemental mercury from coal combustion. Based on the knowledge that the coal combusted had been cleaned prior to combustion, the facility recalculated the amount elemental mercury manufactured to be:

32,000 lbs Hg x 0.790 (Coal Cleaning Factor for Hg) = 25,280 lbs Hg manufactured.

Information on a few metals and metal compounds believed to be present in coal, and included in EPA's previous versions of the Coal Mining and Electricity Generating Facilities guidance documents, was not provided for coal types analyzed in the *Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units*. Facilities should consider the specific information they have for the coal they use to determine whether or not these chemicals are present and at what concentrations. If the facility does not have additional information, they should consider information on those metals and metal compounds provided in Table 3-7 for purposes of threshold determinations and release and other waste management calculations. As discussed above, there are several sources of information, such as the U.S. Geological Survey's Coal Quality database or EPRI's Pisces database, that provide amounts of constituents in coal types from various locations that may represent better information than that provided in Table 3-7 and facilities are instructed to use their best "readily available" information when developing these estimates. However, if the facility does not have better information, then Table 3-7 should be considered.

Table 3-7
Concentrations of Additional EPCRA Section 313 Metals and their Compounds in Coal and Pounds of Metal Oxide Manufactured per Ton of Coal Combusted

EPCRA Section 313 Metal Constituents of Coal and the Estimates of the Corresponding Metal Oxide for Metals Not Present in Table 3-5				
EPCRA Section 313 Metal/ Lowest Weight Metal Oxide That May Be Manufactured from the Metal	**Metal Concentration in Coal in Units of Micrograms/ Gram**	**Oxide Factor**	**Pounds of Metal Oxide Manufactured per Ton of Coal Combusted**	**Tons of Coal Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide**
Zinc/ZnO	5,600	1.24	13.88	1,800
Barium/BaO	250	1.12	0.56	44,643
Copper/Cu_2O	185	1.125	0.42	60,060
Silver/Ag_2O	0.08	1.07	1.7E-04	1.46E08

Note: The table consists of the lowest weight oxide per metal possible for the particular metal. The metal concentration for amounts in coal were adapted from *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313,* Appendix D, Table D-2, based on high end concentration values and Appendix E, Table E-3. Quantities are given in short tons, where 1 short ton = 2,000 lbs.

One exception to the assumption that metal compounds in fuel convert to lowest weight metal oxides during combustion is mercury. Mercury exists as a compound in coal. Current information

estimates that mercury compounds found in coal convert to either divalent mercury or elemental mercury during combustion. At this point, the percent conversion of either form of mercury is unknown. Therefore, while divalent mercury will readily combine to form a compound, EPA is allowing facilities to use the lower molecular weight of elemental mercury when making threshold determinations (*Study of Hazardous Air Pollutant Emissions from Electricity Generating Units – Final Report to Congress,* February 1998*)*. In this case, elemental mercury is considered manufactured for threshold purposes. Unless facilities have information to indicate otherwise, they should assume that they manufacture elemental mercury during combustion, and that 100% of the mercury portion of the mercury compounds in the coal convert to elemental mercury. In this case, you must apply the weight of the metal, rather than the metal oxide toward the manufacturing threshold for mercury. If the facility does not have information on the concentration of mercury compounds in coal used, there are several sources of information to obtain this as previously discussed. Otherwise, EPA has provided default values in Table 3-4 and Table 3-5.

Table 3-8 shows the estimated pounds of metal oxide manufactured per gallon of fuel oil No. 6 combusted and the estimated gallons of fuel oil No. 6 needed to be consumed to manufacture 25,000 pounds of the metal oxide. Table 3-9 shows the estimated pounds of metal oxide manufactured per gallon of fuel oil No. 2 combusted and the estimated gallons of fuel oil No. 2 needed to be consumed to manufacture 25,000 pounds of the metal oxide as a quick reference for facilities.

Table 3-8
Concentrations of EPCRA Section 313 Metals and their Compounds in No. 6 Fuel Oil and Pounds of Metal Oxide Manufactured per Gallon of Fuel Oil Combusted

EPCRA Section 313 Metal/ Lowest Weight Metal Oxide* That May Be Manufactured from the Metal	Metal Concentration in No. 6 Fuel Oil in Units of Micrograms/Gram	Pounds of Metal Oxide Manufactured per Gallon of Fuel Oil No. 6 Combusted	Approximate Gallons of Oil Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Manganese/MnO	0.35	3.6E-06	6.9E+09
Nickel/NiO	26.0	2.6E-04	9.5E+07
Lead/PbO	1.41	1.2E-05	2.1E+09
Cadmium/CdO	0.02	1.8E-07	1.4E+11
Copper/Cu_2O	0.3	2.7E-06	9.3E+09
Cobalt/CoO	1.63	1.7E-05	1.5E+09
Selenium/SeO_2	0.095	1.1E-06	2.3E+10
Beryllium/BeO	0.027	6.0E-07	4.2E+10
Arsenic/As_2O_3	0.306	3.2E-06	7.7E+09
Antimony/Sb_2O_3	0.01	9.6E-08	2.6E+11
Mercury/Hg*	0.0092	7.4E-08*	3.4E+11
Chromium/CrO	0.31	3.2E-06	7.7E+09
Silver/Ag_2O	0.0002	2.0E-09	1.5E+13

* Mercury compounds in coal are likely to convert to elemental mercury during combustion. Value represents pounds of elemental mercury manufactured per gallon of fuel oil No. 6 combusted.
Note: Values are calculated based on a density of 8 lb/gal for Fuel Oil No. 6

Table 3-9
Concentrations of EPCRA Section 313 Metals and their Compounds in No. 2 Fuel Oil and Pounds of Metal Oxide Manufactured per Gallon of Fuel Oil Combusted

EPCRA Section 313 Metal/ Lowest Weight Metal Oxide* That May Be Manufactured from the Metal	Metal Concentration in No. 2 Fuel Oil in ppm	Pounds of Metal Oxide Manufactured per Gallon of Fuel Oil No. 2 Combusted	Approximate Gallons of Fuel Oil Needed To Be Consumed to Manufacture 25,000 Lbs. of the Metal Oxide
Copper/Cu_2O	5.60	4.4E-05	5.7E+08
Nickel/NiO	3.38	3.0E-05	8.3E+08
Chromium/CrO	0.95	8.7E-06	2.9E+09
Mercury/Hg*	0.40	2.8E-06	8.9E+09
Manganese/MnO	0.21	1.9E-06	1.3E+10
Cadmium/CdO	0.21	1.7E-06	1.5E+10
Arsenic/As_2O_3	0.09	8.3E-07	3.0E+10
Beryllium/BeO	0.05	9.7E-07	2.6E+10

* Mercury compounds in coal convert to elemental mercury during combustion. Value represents pounds of elemental mercury manufactured per gallon of fuel oil No. 2 combusted.

Source: *Economic Analysis of the Final Rule to Add Certain Industry Groups to EPCRA Section 313*, Appendix E, Table E

Manufacture of Acid Aerosols During Combustion . During combustion of fuel, facilities may manufacture hydrochloric acid (HCl) (acid aerosols), hydrogen fluoride (HF), and sulfuric acid (acid aerosols). If aerosol forms of hydrochloric or sulfuric acid are produced, then amounts produced must be applied toward the manufacturing threshold for these EPCRA Section 313 chemicals. To estimate quantities of acid aerosols manufactured during combustion, facilities can use monitoring data, equipment specifications, air permits, and industry literature. In the absence of better data, facilities can use the HCl and HF emission factors presented in Table 3-10. Use the emission factor that corresponds to the type of coal being combusted. If your facility combusts a mixture of coal types, and knows the mixture ratio, you may apply this ratio to the emission factors in Table 3-10. Facilities that do not know the type of coal they use should assume the coal is bituminous or subbituminous, since these types are most commonly used. The factors in Table 3-10 are more appropriate than AP-42 factors, which are averages of factors for each type of coal.

Example - Manufacture of Sulfuric Acid (Acid Aerosols)

An electricity generating facility combusts coal. As a result of the combustion operation, the facility emits sulfur dioxide (SO_2), sulfur trioxide (SO_3), and particulate sulfates through a point source. Once emitted, the sulfur trioxide readily reacts with water vapor (both in air and in flue gases) to form a sulfuric acid mist. For purposes of EPCRA Section 313, must the facility report on the manufacture of sulfuric acid (acid aerosols)?

No. The sulfuric acid formed in the chemical reaction of sulfur trioxide and water that often occurs in the air after releasing sulfur trioxide is not included in threshold determinations. The facility owner/operator is not responsible for tracking or reporting on the formation of a EPCRA Section 313 chemical once a chemical is released from a facility. However, if the reaction of sulfur trioxide and water takes place prior to being emitted (e.g., in the stack), the facility would be required to factor the quantity of sulfuric acid mist generated towards the manufacture threshold. If the threshold is exceeded, the facility owner/operator must report all releases and other waste management estimates of sulfuric acid (acid aerosols) from the facility.

For guidance on calculating the amount of sulfuric acid (acid aerosols) manufactured during combustion, refer to: *Emergency Planning and Community Right-to-Know Act--Section 313: Guidance for Reporting Sulfuric Acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)*, EPA, March 1998, available on EPA's website at http://www.epa.gov/tri.

Calculating Thresholds for Hydrochloric Acid (Acid Aerosols) and Selenium

A facility in Wyoming combusts 1 million tons of subbituminous coal in the reporting year. What quantity of selenium compounds and HCl (acid aerosols) are manufactured?

Hydrochloric Acid (Acid Aerosols):
The HCl emission factor for subbituminous coal is 1.9 lb/ton coal (see Table 3-10).

1.9 lb HCl/ton coal x 1,000,000 tons coal = 1,900,000 pounds Hcl (acid aerosols)

Therefore, 1.9 million pounds of HCl are manufactured and the 25,000 pound threshold has been exceeded. Form R reporting for HCl (acid aerosols) is required.

Selenium Compounds:
Based on the concentration of selenium in Table 3-5, the concentration factor for selenium oxide (SeO_2) is 1.44 x 10^{-3} lb SeO_2/ton coal.

1.44 x 10^{-3} lb SeO_2/ton coal x 1,000,000 tons of coal = 1,440 pounds of SeO_2 produced.

Therefore, 1,440 pounds of selenium compounds are manufactured and the 25,000 pound threshold was not exceeded. Form R reporting for selenium compounds is not required.

Manufacture of Formaldehyde During Combustion. Table 3-11 lists emission factors of formaldehyde produced during the combustion of coal, No. 6 fuel oil, No. 2 fuel oil, and natural gas. Based on these emission factors, the amount of fuel consumed to manufacture more than 25,000 pounds of the EPCRA Section 313 chemical is also provided. In the absence of better information, the emission factors in these tables can be used to calculate threshold determinations.

Table 3-10
Emission Factors For HCl and HF Manufactured During Combustion of Coal

Coal Type	Emission factor[a]	
	HF	HCl
Anthracite Coal (pulverized coal and traveling grate stokers)	0.18	0.91
Bituminous Coal (pulverized coal: wet and dry bottom, cyclone, spreader stoker, traveling grate (overfeed) stoker, pulverized coal: dry bottom (tangential firing, atmospheric fluidized bed))	0.23	1.9
Subbituminous coal (pulverized coal: wet and dry bottom cyclone, spreader stoker, traveling grate (overfeed) stoker, pulverized coal: dry bottom (tangential firing)),	0.23	1.9
Lignite (pulverized coal, pulverized coal: tangential firing, cyclone, traveling grate (overfeed) stoker, spreader stoker	0.01	0.01

Source: *Hydrogen Chloride and Hydrogen Fluoride Emission Factors for the NAPAP Emission Inventory; U.S. EPA, Office of Research and Development; 1985*

a. Pound per ton of coal

Table 3-11
Emission Factors and Triggering Thresholds For Formaldehyde Manufactured During Combustion

Fuel Source	Emission Factor (units of measure)	Combusted to Manufacture 25,000 lbs. of Formaldehyde
Natural Gas	1.55e-01 lb/M-ft^3	161,290 M-ft^3
No. 2 Fuel Oil	61 lb/Mgal[a]	410 Mgal
No. 6 Fuel Oil	33 lb/Mgal	758 Mgal
Coal	2.4e-04 lb/ton	104 Mtons

Source: *AP-42, External Combustion Sources*, Tables 1.4-4, 1.3-7, 1.3-8, and 1.1-13.
Note: M-ft^3, Mgal and Mtons indicate millions of cubic feet, millions of gallons, and millions of tons, respectively.
a. Emission factor is the upper range for No. 2 fuel oil combustion.

Manufacture During Flue Gas Desulfurization (FGD). Many electricity generating facilities use various types of flue gas desulfurization (FGD) systems to remove sulfur dioxide from flue gas. In some cases, the flue gas passes through a limestone slurry, where calcium from the limestone reacts with sulfur dioxide in the flue gas. This produces various calcium compounds, and may result in the coincidental manufacture of metal compounds. EPCRA Section 313 metal compounds may exist in limestone as metal carbonates (e.g., cobalt carbonate) or as other metal compounds (e.g., silver sulfide). As flue gas passes through the limestone slurry, metal compounds in limestone may convert to other metal compounds, such as metal sulfites or sulfates. The amount of a compound within a EPCRA Section 313 metal compound category produced as a result of chemical conversion must be applied to the manufacturing threshold, even if the new metal compound is within the same compound category.

To determine the identity and amount of metal compounds manufactured during FGD, facilities should use the best "readily available data". This may include analyses of limestone or lime solution, process knowledge, data on sulfur content of coal, literature about reactions that take place in FGD systems and information about the composition of FGD wastes and flue gas (see Chapter 4.2). In the absence of better data, facilities can assume that all metal compounds in limestone will convert to either metal sulfites or metal sulfates. The sulfate/sulfite ratio of FGD waste is chiefly determined by the sulfur content of the coal burned and the use of forced sludge oxidation. Lower sulfur content in coal generally produces a sludge high in sulfates, while coal with a higher sulfur content will be high in sulfites. Forced oxidation converts sulfites in FGD sludge to sulfates, improving the disposal properties of the sludge. In the absence of better data, facilities that combust low-sulfur western coal, or use a forced oxidation step (regardless of sulfur content) should assume that metal compounds in limestone convert to metal sulfates. Table 3-12 provides concentrations of metals in limestone, and shows the amount of metal sulfate manufactured per pound of limestone used. Facilities that combust high-sulfur eastern coal and

do not use a forced oxidation step should assume that metal compounds in limestone convert to metal sulfites. Table 3-13 provides concentrations of metals in limestone, and shows the amount of metal sulfite manufactured per pound of limestone used.

Table 3-12
EPCRA Section 313 Metal Constituents of Limestone and the Estimated Pounds of Limestone Needed to Manufacture 25,000 Lbs. of Metal Sulfate

EPCRA Metal	Concentration in Limestone (ppm)	Pounds of Metal Sulfate per Ton of Limestone Used (Western Coal, or Any Coal with Forced Oxidation Systems)
Arsenic/$As_2(SO_4)_3$	2.5	0.015
Barium/$BaSO_4$	2000	6.8
Cadmium/$CdSO_4$	2	0.007
Chromium/$CrSO_4$	500	2.85
Cobalt/$CoSO_4$	5	0.026
Copper/Cu_2SO_4	10	0.035
Lead/$PbSO_4$	100	0.29
Manganese/$MnSO_4$	1100	6.04
Mercury	1	0.002
Nickel/$NiSO_4$	20	0.105
Selenium/$Se(SO_4)_2$	.08	0.00055
Silver/Ag_2SO_4	1	0.003
Zinc/$ZnSO_4$	200	0.99

Source: *The Release of Trace Metals From Limestone During Flue Gas Desulfurization by Electric Utilities, Chemistry Report*, OPPT, March 26, 1997.

Table 3-13
EPCRA Section 313 Metal Constituents of Limestone and the Estimated Pounds of Metal Sulfite Manufactured per Ton of Limestone Used

EPCRA Metal	Concentration in Limestone (ppm)	Pounds of Metal Sulfite Manufactured per Ton of Limestone Used (Eastern Coal)
Arsenic/$As_2(SO_3)_3$	2.5	0.013
Barium/$BaSO_3$	2000	6.3
Cadmium/$CdSO_3$	2	0.007
Chromium/$CrSO_3$	500	2.5
Cobalt/$CoSO_3$	5	0.024
Copper/Cu_2SO_3	10	0.033
Lead/$PbSO_3$	100	0.28
Manganese/$MnSO_3$	1100	5.4
Mercury	1	0.002
Nickel/$NiSO_3$	20	0.094
Selenium/$Se(SO_3)_2$	.08	0.00048
Silver/Ag_2SO_3	1	0.003
Zinc/$ZnSO_3$	200	0.89

Source: *The Release of Trace Metals From Limestone During Flue Gas Desulfurization by Electric Utilities, Chemistry Report*, OPPT, March 26, 1997.

Importing. The "manufacture" threshold includes importing an EPCRA Section 313 chemical if the facility has *caused* the chemical to be imported. If your facility orders or enters into an agreement to obtain or accept an EPCRA Section 313 chemical (or a mixture or other trade name product or waste containing an EPCRA Section 313 chemical) from a source outside the customs territory of the United States (the 50 states, the District of Columbia, and Puerto Rico) then your facility has imported a listed EPCRA Section 313 chemical and amounts must be considered toward the manufacturing threshold. Note that if an entity other than the facility, such as a third party not directly associated with the facility (e.g., a waste or chemical broker), ordered the waste or chemical without specific direction from the facility, then that third party has "caused" the chemical to be imported, and the facility does not need to consider the EPCRA Section 313 chemical toward the manufacturing threshold. Imported chemicals, as well as any others that undergo a manufacturing activity, may also be subsequently processed and/or otherwise used, and amounts associated with these activities need to be applied to all appropriate threshold determinations.

Example - Importing that Qualifies as Manufacturing

Fuel oil containing EPCRA Section 313 chemicals above *de minimis* is produced in Mexico by an American owned company and is sent to the U.S. When the facility operating within the U.S. receives the fuel oil, has it manufactured the EPCRA Section 313 chemicals contained in the fuel oil?

Yes, if the receiving facility either has a contract or agreement in place to receive "imported" fuel oil and is functioning as the importing facility. Amounts of EPCRA Section 313 chemicals received in the fuel oil must be counted toward the "manufacturing" threshold.

Processing

Processing means preparing an EPCRA Section 313 chemical, or a mixture or other trade name product containing an EPCRA Section 313 chemical, for distribution in commerce (usually thought of as the intentional incorporation of an EPCRA Section 313 chemical into a product). Perhaps the most pivotal element of the processing definition is that the EPCRA Section 313 chemical must be prepared for *distribution into commerce*. If a material is produced or recovered for use on-site, the material has not been prepared for distribution into commerce, and thus is not counted towards the processing threshold (see the discussion of otherwise use for the applicability of chemicals used on-site). In addition, distribution into commerce does not only mean that the material must be sold to a customer. Distributed in commerce includes any distributive activity in which benefit is gained by the transfer, even if there is no direct monetary gain (e.g., intra-company transfers).

Transfers Off-site for Recycling. Amounts of EPCRA Section 313 chemicals sent off-site for recycling also must be considered toward the processing threshold of 25,000 pounds. Amounts of materials containing EPCRA Section 313 chemicals sent off-site for recycling are prepared for

distribution into commerce. Materials sent off-site for recycling must undergo a recovery step and are, therefore, considered a waste and not eligible for the *de minimis* exemption. Wastes destined for off-site recycling are considered wastes sent off-site for further waste management, which are not eligible for the *de minimis* exemption and must be reported on the Form R in Sections 6 and 8.

Transferring a waste which contains an EPCRA Section 313 chemical off-site for energy recovery is not considered processing, even if the waste has been blended with other wastes and repackaged. Sending a commercial product fuel off site (for example, to a customer or distribution center) is considered processing assuming that the facility sending the commercial fuel off-site has blended and/or repackaged the fuel. For example, a facility should not count EPCRA Section 313 chemicals in high carbon ash or spent solvents that are sent off-site for energy recovery toward their processing threshold. However, if a threshold for EPCRA Section 313 chemicals contained in these materials has been exceeded elsewhere at the facility, then these amounts would be reported as transferred off-site for energy recovery.

Transfers Off-site for Direct Reuse. Amounts of EPCRA Section 313 chemicals sent off-site for direct reuse must be considered toward the processing threshold of 25,000 pounds. Materials are considered to be sent off-site for direct reuse if the materials are distributed into commerce and are going to be directly used in an operation or application without any recovery or other extraction of contaminants; for example, ash sent off-site for concrete manufacturing. Materials sent off-site for direct reuse are not reported on the Form R in Sections 6 and 8 as recycled or released because the materials are not considered wastes. Because materials sent off-site for direct reuse are not considered wastes, these materials may qualify for the *de minimis* exemption, if any EPCRA Section 313 chemical in the material is below the *de minimis* level (see Chapter 3.2.2.2). EPCRA Section 313 chemicals in waste that are sent off-site for further waste management, e.g., disposal are not considered to be reused.

A primary example of a processing activity that may take place at electricity generating facilities is preparing for distribution of ash into commerce for direct reuse or recycling. Facilities that send ash off-site for direct reuse must count amounts of EPCRA Section 313 chemicals in the ash toward their processing thresholds. For example, some electricity generating facilities may sell ash to construction companies for direct reuse in the manufacture of cement blocks. These electricity generating facilities must apply the amounts of EPCRA Section 313 chemicals in the ash distributed into commerce towards the processing threshold. As another example, some electricity generating facilities may send ash off-site for vanadium recycling. Facilities must apply the amounts of EPCRA Section 313 chemicals in the ash toward the processing threshold.

Table 3-14 describes the subsections of processing for reporting purposes.

Table 3-14
Definitions and Examples of Processed Chemicals

Processing Activity Subcategory	Examples
As a reactant	May not occur in the electricity generating industry.
As a formulation component	May not occur in the electricity generating industry.
As an article component	May not occur in the electricity generating industry.
Repackaging for distribution into commerce	Facilities may repackage fly ash resulting from combustion, and distribute it into commerce for use in concrete manufacturing.

* More complete discussions of the industry-specific examples can be found in Chapter 4 of this guidance manual.

Otherwise Use

"Otherwise use" is any use of an EPCRA Section 313 chemical that does not fall under the definitions of "manufacture" or "process." Chemicals otherwise used are not incorporated into a product that is distributed into commerce and includes such uses as a processing or manufacturing aid and for such ancillary uses as treating wastes.

Otherwise use of an EPCRA Section 313 chemical also includes disposal, stabilization (without subsequent distribution in commerce), and treatment for destruction if the:

(1) EPCRA Section 313 chemical that was disposed, stabilized, or treated for destruction was received from off-site for the purposes of further waste management, or

(2) EPCRA Section 313 chemical that was disposed, stabilized, or treated for destruction that was manufactured as a result of waste management activities of materials received from off-site for the purpose of further waste management.

The following discussion describes the subsections of the otherwise use threshold for reporting purposes (see Table 3-15).

Table 3-15
Definitions and Examples of Otherwise Used Chemicals

Activity	Examples
As a chemical processing aid	May not occur in the electricity generating industry.
As a manufacturing aid	Metals used to maintain power lines within the facility.
Ancillary or other use	Combustion of coal or oil containing EPCRA Section 313 chemicals above the *de minimis* level. Metals used to maintain/replace process equipment. Ammonia used in water treatment. Ethylene glycol sprayed on coal to prevent freezing. Thiourea used as an inhibitor in cleaning solution for removal of scale deposits and metals from tube walls.

* More complete discussions of the industry-specific examples can be found in Chapter 4 of this guidance manual.

Combustion. All EPCRA Section 313 chemicals contained in fuels combusted for energy production are considered otherwise used. However, this type of chemical use is eligible for the *de minimis* exemption, and many of the EPCRA Section 313 chemicals contained in commonly used fuels exist in below *de minimis* concentrations. As a result, facilities do not have to apply chemicals present in coal and oil that exist below *de minimis* levels towards the otherwise use activity threshold.

Unless a facility has information indicating otherwise, they may assume that chemicals in coal are below *de minimis* levels. Other fuel types, however, may contain EPCRA Section 313 chemicals above *de minimis* levels. For example, No. 6 fuel oil may contain benzo(a)anthracene, a member of the polycyclic aromatic compound chemical category, in concentrations above *de minimis* levels. EPA has assembled information on EPCRA Section 313 chemicals in various fuel types from a number of sources. This information is provided in Table 3-4. In the absence of better facility-specific data, facilities may use this table to calculate threshold quantities for EPCRA Section 313 chemicals otherwise used in fuels.

Other Activities. Otherwise use includes the use of EPCRA Section 313 chemicals in activities such as cleaning, maintenance, and water purification. The use of an EPCRA Section 313 chemical to treat another chemical constitutes otherwise use.

Other Examples of Chemicals that Electricity Generating Facilities "Otherwise-Use"

- Chemicals used to clean boilers, cooling towers, and other equipment;

- Chemicals in materials that are used to maintain process equipment (e.g., lubricants, solvents, condenser tubes);
- Chemicals used to treat boiler make-up water, or cooling tower water (e.g., chlorine, chlorine dioxide, bromine);
- Chemicals used to prevent corrosion, (e.g., ammonia, hydroquinone, and hydrazine);
- Chemicals used to treat wastes, such as coagulants, or flocculants;
- Chemicals in fuel used in any on-site equipment (other than motor vehicles eligible for the motor vehicle maintenance exemption);
- Chemicals in ash (or other wastes) that is received from off-site and disposed on-site.

Example - Ash Received from Off-Site

An electricity generating facility receives ash containing an EPCRA Section 313 chemical from other facilities (e.g., remote peaker units). The electricity generating facility disposes this ash and ash generated from its own operation, in its on-site landfill. The facility must consider the amount of the EPCRA Section 313 chemical in the ash received from off-site and disposed on-site as "otherwise used." However, ash generated on-site and disposed of on-site is not considered "otherwise used." If the facility exceeds an activity threshold for the EPCRA Section 313 chemical, it must report on the Form R all amounts disposed, regardless of whether the facility generated the ash on-site or received it from off-site. The EPCRA Section 313 chemicals in the ash are not eligible for the *de minimis* exemption

Waste Management Activities. For purposes of the otherwise use definition, EPA interprets waste management activities to include recycling, combustion for energy recovery, treatment for destruction, waste stabilization, and release, including disposal. However, for calculating thresholds, the only quantities that should be applied to the otherwise use threshold are those that are treated for destruction, stabilized, or disposed on-site. Waste management does not include the storage, container transfer, or tank transfer of an EPCRA Section 313 chemical if no recycling, combustion for energy recovery, treatment for destruction, waste stabilization, or release of the chemical occurs at the facility (62 FR 23850; May 1, 1997).

Table 3-16
EPA Guidance Related to Waste Management Activities

Waste Management Activity	Description
Recycling	As referenced in the May 1, 1997, *Federal Register* and defined in the document, *Interpretations of Waste Management Activities: Recycling, Combustion for Energy Recovery, Treatment for Destruction, Waste Stabilization, and Release* (April 1997), recycling means: (1) the recovery for reuse of an EPCRA Section 313 chemical from a gaseous, aerosol, aqueous, liquid, or solid stream; or (2) the reuse or the recovery for use of an EPCRA Section 313 chemical that is a RCRA hazardous waste as defined in 40 CFR Part 261. Recovery is the act of extracting or removing the EPCRA Section 313 chemical from a waste stream and includes: (1) the reclamation of the EPCRA Section 313 chemical from a stream that entered a waste treatment or pollution control device or process where destruction of the stream or destruction or removal of certain constituents of the stream occurs (including air pollution control devices or processes, wastewater treatment or control devices or processes, Federal or state permitted treatment or control devices or processes, and other types of treatment or control devices or processes); and (2) the reclamation for reuse of an "otherwise used" EPCRA Section 313 chemical that is spent or contaminated and that must be recovered for further use in either the original or any other operations.
Combustion for energy recovery	Combustion for energy recovery is interpreted by EPA to include the combustion of an EPCRA Section 313 chemical that is (1) (a) a RCRA hazardous waste or waste fuel, (b) a constituent of a RCRA hazardous waste or waste fuel, or (c) a spent or contaminated "otherwise used" material; and that (2) has a significant heating value and is combusted in an energy or materials recovery device. Energy or materials recovery devices are boilers and industrial furnaces as defined in 40 CFR §372.3 (See 62 FR 23891). If a reported toxic chemical is incinerated but does not contribute energy to the process (e.g., metal, metal compounds, and chlorofluorocarbons), it must be considered treatment for destruction. In determining whether an EPCRA Section 313 chemical is combusted for energy recovery, the facility should consider the heating value of the EPCRA Section 313 chemical and not the heating value of the chemical stream.
Treatment for destruction	Means the destruction of an EPCRA Section 313 chemical in waste such that the substance is no longer the EPCRA Section 313 chemical subject to reporting. Treatment for destruction does not include the destruction of an EPCRA Section 313 chemical in waste where the EPCRA Section 313 chemical has a heat value greater than 5,000 British Thermal Units (BTU) and is combusted in any device that is an industrial boiler or furnace. (See 40 CFR §372.3.) "Treatment for destruction" includes acid or alkaline neutralization if the EPCRA Section 313 chemical is the entity that reacts with the acid or base. "Treatment for destruction" does not include: (1) neutralization of a waste stream containing EPCRA Section 313 chemicals if the EPCRA Section 313 chemicals themselves do not react with the acid or base (See 40 CFR §372.3), (2) preparation of an EPCRA Section 313 chemical for disposal, (3) removal of EPCRA Section 313 chemicals from waste streams, and (4) activities intended to render a waste stream more suitable for further use or processing, such as distillation or sedimentation. (Note: Amounts of metals CAN NOT be destroyed and therefore should not be reported as treated for destruction.)

Waste stabilization	Means any physical or chemical process used to either reduce the mobility of hazardous constituents in a hazardous waste or eliminate free liquid as determined by a RCRA approved test method (e.g., Test Method 9095). A waste stabilization process includes mixing the hazardous waste with binders or other materials and curing the resulting hazardous waste and binder mixture. Other synonymous terms used to refer to this process are "stabilization," "waste fixation," or "waste solidification." (See 40 CFR §372.3.)
Release	***Release*** is defined by EPCRA Section 329(8) to mean any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles) of any EPCRA Section 313 chemical. (See 40 CFR §372.3.)
Disposal	***Disposal*** means any underground injection, placement in landfills/surface impoundments, land treatment, or other intentional land disposal. (See 40 CFR §372.3.)

(See EPA document, *Interpretations of Waste Management Activities: Recycling, Combustion for Energy Recovery, Waste Stabilization and Release* for further detail.*)*

Waste management activities conducted by a facility on EPCRA Section 313 chemicals in wastes generated on-site are not considered an otherwise use of that chemical. The otherwise use threshold applies to amounts disposed, stabilized (without subsequent distribution in commerce), or treated for destruction from wastes received from off-site or from chemicals generated from waste received from off-site.

Example - Otherwise Use

A facility captures leachate from a landfill, treats the leachate with an EPCRA Section 313 chemical, and then uses the treated leachate (which now contains the EPCRA Section 313 chemical) as on-site irrigation water. Is the facility "otherwise using" the EPCRA Section 313 chemical in the irrigation water, and should the facility report the EPCRA Section 313 chemical as a release to land in Section 5.5.4, Other Disposal?

Yes. Use of EPCRA Section 313 chemicals contained in the treated leachate for irrigation purposes is considered an "otherwise use" and amounts of these chemicals contained in the treated leachate must be counted toward the "otherwise use" threshold. Any EPCRA Section 313 chemicals manufactured during the treatment of the leachate would also need to be considered toward the "manufacturing" threshold. The treated leachate, and EPCRA Section 313 chemicals contained in the treated leachate, are also considered a waste and any "otherwise use" of EPCRA Section 313 chemicals contained in the treated leachate is not eligible for the *de minimis* exemption. The "otherwise use" of these chemicals for irrigation constitutes a release to land and would be reportable in Part II 5.5.4 Other Disposal.

Example - Timing

A facility receives waste containing an EPCRA Section 313 chemical from off-site and disposes the waste on-site. Should the facility count the EPCRA Section 313 chemicals in the waste towards the 'otherwise use' threshold upon receipt of the waste shipment (e.g., signing the hazardous waste manifest) or upon actual disposal?

The facility must count the amount of the EPCRA Section 313 chemical towards its otherwise use threshold upon actual disposal of the waste. EPCRA Section 313 chemicals are applied toward the otherwise use threshold upon the performance of those activities. The facility does not "otherwise use" the EPCRA Section 313 chemical in the waste received from off-site until the facility disposes the waste.

3.2.1 Concentration Ranges for Threshold Determination

You are required to use your best readily available information for estimating EPCRA Section 313 threshold determinations and release and other waste managed calculations. In some cases, the exact concentration of an EPCRA Section 313 chemical in a mixture, or other trade name product or in a waste may not be known. In these cases, the waste profile, customer, supplier, or MSDS may only provide ranges, or upper or lower bound concentrations. EPA has developed the following guidance on how to determine concentrations from this type of information for use in threshold determinations:

- If exact concentration is provided, use it.

- If the concentration is provided as a lower and upper bound or as a range, you should use the mid-point in your calculations for the threshold determination. For example, the waste profile states methanol is present in a concentration of not less than 20% and not more than 40%, or it may be stated as present at a concentration between 20 to 40%. You should use 30% methanol in your threshold calculations.

- If only the upper bound concentration is provided you must use this value in your threshold calculation.

- If only the lower bound concentration of the EPCRA Section 313 chemical is specified and the concentration of other components are given, subtract the other component values from 100%. The remainder should be considered the upper bound for the EPCRA Section 313 chemical and you should use the given lower bound to calculate the mid-point as discussed above. For example, the waste profile states that a solvent contains at least 50% MEK and 20% non-hazardous surfactants. Subtracting the non-hazardous contents from 100% leaves 80% as the upper bound for MEK. The mid-point between upper (80%) and lower (50%) bounds is 65%, which is the value you should use in your threshold calculation.

- If only the lower bound is specified and no information on other components is given assume the upper bound is 100% and calculate the mid-point as above.

Even if the concentration of a chemical is known through engineering knowledge only, the facility is still required to consider the chemical for threshold determinations. For example, facility engineers may have knowledge that nitric acid is manufactured in an on-site incinerator. If there are no waste profiles or permit information specifically listing nitric acid, the facility must still consider the chemical for threshold determinations. This determination should be made based on their best readily available information, be it process knowledge or other reasonable estimation techniques.

When determining concentration information for wastes, it is important to understand that the *de minimis* exemption does NOT apply to wastes. If your waste profiles (or other information) indicate that there are chemicals that are below the detection limit, you may need to include those chemicals in your threshold determinations and release and other waste management calculations. If you have no information to indicate that the chemical exists in the waste stream, you may assume that the concentration is zero. If the facility has reason to believe that the EPCRA Section 313 chemical is present in the waste, you may use half of the detection limit.

Example - Average Concentration

Is it appropriate for an electricity generating facility to develop an average concentration for an EPCRA Section 313 chemical contained in the different fuels used by the facility, and then use that average as a basis of threshold determination? If so, does EPA have a recommended approach for developing such an average?

EPCRA allows facilities to use "readily available data" to provide information required under EPCRA Section 313. When data are not readily available, EPCRA allows facilities to use "reasonable estimates"of the amounts involved. A facility must use its best judgment to determine whether data are "readily available." Thus, with regard to use of average concentration levels, a facility must use its best judgment to decide whether the raw data from which it might base any average concentration level are readily available. In any event, a facility should carefully document its decision making. For example, if a facility decides to use average concentration levels, it should document why the raw data from which the averages are based are not readily available, how it arrived at any average concentration level used, and why the average concentration level is a "reasonable estimate"of the amount of the EPCRA Section 313 chemical in the waste stream. EPA does not have a recommended approach for determining average concentration levels.

3.2.2 Evaluation of Exemptions

EPCRA Section 313 provides facilities with certain exemptions:

- Laboratory activities exemption;
- *De minimis* exemption;
- Article exemption;
- Exemptions that apply to the otherwise use of chemicals: routine janitorial/facility grounds maintenance exemption; personal use exemption; structural component exemption; motor vehicle maintenance exemption; exemption for air or water drawn from the environment or municipal sources for certain uses.

These exemptions are described in detail below.

3.2.2.1 Laboratory Activities Exemption.

This exemption includes EPCRA Section 313 chemicals that are manufactured, processed, or otherwise used in a laboratory under the supervision of a technically qualified individual. This exemption may be applicable in such circumstances as laboratory sampling and analysis, research and development, and quality assurance and quality control activities. It does not include pilot plant scale or specialty chemical production. It also does not include laboratory support activities. For example, chemicals used to maintain laboratory equipment are not eligible for the laboratory activities exemption.

Example - Laboratory Activities Exemption

If a facility takes a sample from its process stream to be tested in a laboratory for quality control purposes, are releases of an EPCRA Section 313 chemical from the testing of the sample in the laboratory exempt under the laboratory activities exemption?

Yes, provided that the laboratory at the covered facility is under the direct supervision of a technically qualified individual as provided in 40 CFR 372.38(d). The laboratory exemption applies to the "manufacture," "process," or "otherwise use" of EPCRA Section 313 chemicals and any associated release and other waste management amounts that take place in a qualifying laboratory.

3.2.2.2 *De Minimis* Exemption

If the amount of EPCRA Section 313 chemical(s) present in a mixture or other trade name product processed or otherwise used is below its *de minimis* concentration level, that amount is considered to be exempt from threshold determinations and release and other waste management calculations. (Note that this exemption does not apply to manufacturing, except for importation or as an impurity as discussed below.) Because wastes are not considered mixtures or other trade name products, the *de minimis* exemption cannot apply to wastes. The *de minimis* concentration for

mixtures or other trade name products is 1%, except for OSHA-defined carcinogens, which have a 0.1% *de minimis* concentration. If a mixture or other trade name product contains more than one member of a compound category, the weight percent of all members must be summed. If the total meets or exceeds the category's *de minimis* level, the *de minimis* exemption does not apply. Information may only be available that lists the concentration of chemicals in mixtures as a range. EPA has developed guidance on how to determine quantities that are applicable to threshold determinations, release, and other waste management calculations when this range straddles the *de minimis* value. EPA has published several detailed questions and answers and a directive in the *1998 EPCRA Section 313 Questions and Answers Document* that may be helpful if you have additional concerns about the *de minimis* exemption. The *TRI Forms and Instructions* list each EPCRA Section 313 chemical and compound category with the associated *de minimis* value.

The *de minimis* exemption also applies in limited circumstances to the manufacture of EPCRA Section 313 chemicals. In the specific case where EPCRA Section 313 chemicals are coincidentally manufactured in a product and remain in the product as an impurity which is then subsequently distributed into commerce, amounts of EPCRA Section 313 chemicals are eligible for the *de minimis* exemption. The *de minimis* exemption also applies to EPCRA Section 313 chemicals in an imported mixture or other trade name product.

The *de minimis* exemption, however, does not apply to EPCRA Section 313 chemicals that are coincidentally manufactured as byproducts that are separated from the product, nor does it apply to chemicals that are coincidentally manufactured as a result of waste treatment or other management activities, or to waste brought on site for waste management. Electricity generating facilities must consider amounts of EPCRA Section 313 chemicals manufactured during combustion. Combustion may result in the coincidental manufacture of such EPCRA Section 313 chemicals as sulfuric acid (acid aerosols), hydrochloric acid (acid aerosols), hydrofluoric acid, and certain metals and metal compounds, as discussed earlier in this chapter.

Example -Ash Distributed into Commerce

A covered facility combusts coal in a combustion unit. The coal contains a EPCRA Section 313 chemical below *de minimis* amounts. During combustion, EPCRA Section 313 chemicals are manufactured. The ash containing the EPCRA Section 313 chemical is generated from the combustion of the coal. The ash which meets industry specification is then sold to another facility for use in the manufacture of concrete. If the EPCRA Section 313 chemicals in the ash are below the appropriate *de minimis* concentration, are they eligible for the *de minimis* exemption?

The EPCRA Section 313 chemicals in the coal being combusted should be considered towards the facility's otherwise use threshold and this activity is eligible for the *de minimis* exemption. The EPCRA Section 313 chemicals that are manufactured as a result of the combustion process are byproducts and therefore not eligible for the *de minimis* exemption when determining whether the manufacturing threshold has been exceeded. The EPCRA Section 313 chemicals in the ash that is sold are considered processed. After combustion, when the facility is preparing the EPCRA Section 313 chemicals in ash for distribution in commerce, they are eligible for the *de minimis* exemption.

Since the de minimis exemption does not apply to the coincidental manufacture of chemicals as byproducts, the formation of these compounds in any concentration must be considered for threshold determinations and release and other waste management calculations. The *de minimis* exemption applies to materials otherwise used or processed, such as ash distributed into commerce for direct reuse.

***De Minimis* Exemption Applies**	***De Minimis* Exemption Does Not Apply**
A facility combusts coal and oil on-site to generate power for distribution into commerce. The *de minimis* exemption applies to the otherwise use threshold for the EPCRA Section 313 chemicals in the fuel that were otherwise used.	**A facility combusts coal and oil on-site to generate power for distribution into commerce. The *de minimis* exemption does not apply to the manufacture of EPCRA Section 313 chemicals (e.g., sulfuric acid (acid aerosols), metal compounds, etc.) during combustion. If the facility exceeds a threshold, they must consider the amount of EPCRA Section 313 chemical coincidentally manufactured toward the manufacturing threshold. They must also consider all releases and other waste management quantities that result from the manufacture of these compounds from combustion.**
A facility otherwise uses EPCRA Section 313 chemicals on-site to maintain and clean equipment. The *de minimis* exemption applies to threshold determinations and release and other waste management activities for those chemicals otherwise used.	**A facility receives ash from off-site containing EPCRA Section 313 chemicals for disposal. Because the facility receives the waste ash from off-site for purposes of further waste management, the *de minimis* exemption does not apply, and the facility must consider the amount of the EPCRA Section 313 chemical towards its "otherwise use" threshold. If the facility exceeds the threshold, it must report the amount of EPCRA Section 313 chemical disposed on-site, and any other releases and waste management activities on the Form R.**
A facility distributes ash (which meets industry specifications) containing EPCRA Section 313 chemicals into commerce for use in the manufacture of concrete. This activity constitutes a processing activity, and the *de minimis* exemption applies to amounts of EPCRA Section 313 chemicals in the ash distributed into commerce, and to releases and other waste management activities associated with this processing activity.	**EPCRA Section 313 chemicals in ash sent off-site for use as roadfill, landfill, and in mining reclamation are being managed as a waste; therefore they are not eligible for the *de minimis* exemption.**

Once the *de minimis* level has been met or exceeded, the exemption no longer applies to that process stream, even if the concentration of the EPCRA Section 313 chemical in a mixture or other trade name product later drops below the *de minimis* level. All releases and other waste management activities are subject to reporting after the *de minimis* concentration has been equaled or exceeded, provided an activity threshold has been exceeded.

Example - *De Minimis*

A facility receives a mixture with an EPCRA Section 313 chemical in a concentration below the *de minimis* concentration. During processing, the concentration of the EPCRA Section 313 chemical exceeds its *de minimis* level. This facility must consider amounts toward threshold determination and releases and other waste management activities that take place after the point in the process where the *de minimis* level is met or exceeded. The facility does not have to consider toward threshold determinations or release and other waste management estimates, activities that took place before the *de minimis* level was met or exceeded.

3.2.2.3 Article Exemption

An article is defined as a manufactured item if each of the three criteria below applies:

- Is formed to a specific shape or design during manufacture;
- Has end-use functions dependent in whole or in part upon its shape or design; and
- Does not release an EPCRA Section 313 chemical under normal conditions of processing or otherwise use of the item at the facility.

If you receive a manufactured item from another facility and process or otherwise use the item without changing the shape or design, and your processing or otherwise use results in the release of 0.5 pound or less of the EPCRA Section 313 chemical in a reporting year from all like articles, then the EPCRA Section 313 chemical in that item is exempt from threshold determinations and release and other waste management reporting. The article exemption does not apply to the manufacturing of items at your facility.

The shape and design of a manufactured item can change somewhat during processing and otherwise use activities as long as part of the item retains the original dimensions. That is, as a result of processing or otherwise use, if an item retains its initial thickness or diameter, in whole or in part, then it still meets the definition of article. If the item's basic dimensional characteristics are totally altered during processing or otherwise use, the item would not meet the definition, even if there were no releases of an EPCRA 313 chemical from these manufactured items. As an example, items that do not meet the definition would be items that are cold extruded, such as bar stock that is formed into wire. However, stamping a manufactured item into pieces that are recognizable as the original articles would not change the exemption status as long as the diameter and the thickness of the item remain unchanged. For instance, metal wire may be bent and sheet metal may be cut, punched, stamped, or pressed without losing the article status as long as no change is made in the diameter of the wire or tubing or the thickness of the sheet and, more important, there are no releases of the EPCRA Section 313 chemical(s).

Any processing or otherwise use of an article that results in a release above 0.5 pound per year for each EPCRA Section 313 chemical for all like articles will negate the article exemption. Cutting, grinding, melting, or other processing of a manufactured item could result in a release of an EPCRA Section 313 chemical during normal conditions of use and, therefore, could negate the exemption as an article if the total release exceeds 0.5 pound in a year. However, if <u>all</u> of the resulting waste is recycled or reused, either on site or off site such that the release and other waste management of the EPCRA Section 313 chemical in all like articles does not exceed 0.5 pound, then the article exemption status is maintained. Also, if the processing or otherwise use of similar manufactured items results in a total release and other waste management of less than or equal to 0.5 pound of any individual EPCRA

Section 313 chemical in a calendar year, EPA will allow this quantity to be rounded to zero and the manufactured items to maintain their article exemption. The 0.5 pound limit does not apply to each individual article; instead, it applies to the sum of releases and other waste management activities (except recycling) from processing or otherwise use of all like articles for each EPCRA Section 313 chemical contained in these articles.

For additional information, refer to the *1998 EPCRA Section 313 Questions and Answers* document presents several specific questions and answers/discussion pertaining to the article exemption.

3.2.2.4 Exemptions that Apply to the Otherwise Use of EPCRA Section 313 Chemicals

Some exemptions are limited to the "otherwise use" of an EPCRA Section 313 chemical. EPCRA Section 313 chemicals used in these activities do not need to be included in a facility's threshold determinations nor the associated release and other waste management calculations, provided thresholds are met elsewhere. The following otherwise use activities are considered exempt (see most current version of the *TRI Forms and Instructions,* and the *1998 EPCRA Section 313 Questions and Answers* document).

- **EPCRA Section 313 chemicals used in routine janitorial or facility grounds maintenance**. Examples are bathroom cleaners and fertilizers and garden pesticides in similar type or concentration distributed in consumer products. Materials used to clean process-related equipment do not qualify for this exemption.

- **EPCRA Section 313 chemicals for personal use**. Examples are foods, drugs, cosmetics, and other personal items including those items used in cafeterias and infirmaries.

Example - Personal Use Exemption

Ammonia used to clean a cafeteria grill is exempt from threshold determinations and release and other waste management calculations. Chlorine added to the water supply system to prepare potable water for consumption at the facility is also exempt under the personal use exemption.

- **EPCRA Section 313 chemicals in structural components of the facility**. This exemption applies to EPCRA Section 313 chemicals present in materials used to construct, repair, or maintain non-process related structural components of a facility. An example common to all facilities would be the solvents and pigments used to paint the administrative office buildings. Materials used to construct, repair, or maintain process-related equipment (e.g., storage tanks, reactors, and piping) are not exempt.

- **EPCRA Section 313 chemicals used to maintain facility motor vehicles**. This exemption includes the use of EPCRA Section 313 chemicals for the purpose of maintaining motor vehicles operated by the facility. Common examples include EPCRA Section 313 chemicals in gasoline, radiator coolant, windshield wiper fluid, brake and transmission fluid, oils and lubricants, batteries, cleaning solutions, and solvents in paint used to touch up the vehicle. Motor vehicles include cars, trucks, forklifts, and locomotives. Note that this exemption applies only to the OTHERWISE USE of the chemical only . The coincidental manufacture of EPCRA Section 313 chemicals resulting from combustion of gasoline is not considered part of the exemption and any amounts of EPCRA Section 313 chemicals coincidentally manufactured should be considered part of the manufacturing threshold.

Example - Motor Vehicle Exemption

A facility purchases ethylene glycol, and uses it on-site to prevent coal from freezing. The facility must include the amount of ethylene glycol used on the coal for threshold determinations and release and other waste management calculations. The facility also uses ethylene glycol in antifreeze and in windshield washer fluid in vehicles operated by the facility. This amount is exempt under the motor vehicle exemption. The facility would not include the amount of ethylene glycol in the windshield washer fluid or anti-freeze when making its threshold determination or in its release and other waste management calculations.

This exemption does NOT apply to stationary equipment. The use of lubricants and fuels for stationary process equipment (e.g., pumps and compressors) and stationary energy sources (e.g., furnaces, boilers, heaters), are NOT exempt.

Example - Use of Lubricants

Lubricants containing EPCRA Section 313 chemicals used on facility vehicles or on-site structural maintenance activities that are not integral to the process are exempt activities. However, lubricants used to maintain pumps and compressors, which aid in facility process-related operations, are not exempt and the amount of the chemical in that lubricant should be applied to the otherwise use threshold.

- **EPCRA Section 313 chemicals in certain air and water drawn from the environment or municipal sources**. Included are EPCRA Section 313 chemicals present in process water and non-contact cooling water drawn from the environment or a municipal source, or chemicals present in compressed air or air used in combustion.

Example - Chemicals in Process Water

A facility uses river water for non-contact cooling purposes. The river water contains 100 pounds of an EPCRA Section 313 chemical. Amounts of the EPCRA Section 313 chemicals contained in the river water do not have to be considered for threshold determinations or releases or other waste management calculations because the EPCRA Section 313 chemicals was present as it was drawn from the environment.

3.2.3 Additional Guidance on Threshold Calculations for Certain Activities

This section covers two specific situations in which the threshold determination may vary from normal facility operations: reuse and remediation activities of EPCRA Section 313 chemicals.

3.2.3.1 On-site Reuse Activities

Threshold determinations of EPCRA Section 313 chemicals that are reused at the facility are based only on the amount of the EPCRA Section 313 chemical that is added during the year, and not the total volume in the system or the amounts reused.

Example - Reuse Activities

A facility operates a heat transfer unit that contains 15,000 pounds of ethylene glycol at the beginning of the year that was in use in prior years. The system is charged with 2,000 pounds of ethylene glycol during the reporting year. The facility has therefore "otherwise used" only 2,000 pounds of the covered EPCRA Section 313 chemical within that particular reporting year. A facility reporting for the first time would consider only the amount of EPCRA Section 313 chemical that is added during its first reporting year towards its "otherwise use" threshold for that year. If, however, the entire heat transfer unit was recharged with 15,000 pounds of ethylene glycol during the year, the facility would consider the 15,000 pounds toward its otherwise use threshold and, exceeding the otherwise use threshold, be required to report.

3.2.3.2 Remediation Activities

EPCRA Section 313 chemicals undergoing remediation (e.g., Superfund) are not being manufactured, processed, or otherwise used. Therefore, they are not included in the threshold determinations.

If you, however, are conducting remediation for an EPCRA Section 313 chemical that is also being manufactured, processed, or otherwise used by the facility above an activity threshold level, you must consider this activity in your release and other waste management calculations. In that case, you must report any release and other waste management of an EPCRA Section 313 chemical due to remediation in Part II, Sections 5 through 8, accordingly, of the Form R. Those quantities, however, would not be considered as part of the reportable amount for determining Form A eligibility, because

they are not considered part of normal production-related activities.

3.3 Step 3. Determine which EPCRA Section 313 chemicals exceed a threshold

The final step is to determine which chemicals exceed a threshold. At this point you should have:

1. Determined each EPCRA Section 313 chemical at your facility;

2. Determined the activity threshold for each EPCRA Section 313 chemical (manufactured, processed, or otherwise used) and calculated the quantity for each activity.

Now, you must sum the usage for each chemical by activity, subtract all exempt quantities, and compare the totals to the applicable thresholds. Each EPCRA Section 313 chemical exceeding any one of the activity thresholds requires the submission of a Form R. Provided you meet certain criteria you may be eligible to file a Form A rather than a Form R.

POSSIBLE ERROR - What if Your Facility Has No Releases and Other Waste Management Quantities of EPCRA Section 313 Chemicals?

If you meet all reporting criteria and exceed any threshold for an EPCRA Section 313 chemical, you must file a Form R or Form A for that chemical, even if you have zero releases and no other waste management activities. Exceeding the chemical activity threshold, not the quantity released and otherwise managed as waste, determines whether you must report. Note that if the total annual reportable amount is 500 pounds or less, and you do not exceed one million pounds manufactured, processed, or otherwise used for that chemical, then you are eligible to submit a Form A rather than a Form R for that chemical (see Chapter 2.9).

Calculating the Manufacturing Threshold for Section 313 Chemicals in Fuels

Electricity generating facilities typically do not manufacture chemicals or products intentionally. However, these facilities may coincidently manufacture Section 313 chemicals during fuel combustion and, a certain degree, in wastewater treatment and other waste management operations. You will also need to consider whether EPCRA Section 313 chemicals are produced coincidentally, even if the chemical exists for only a short period of time, and later is destroyed by air control equipment. Most common to electricity generating facilities, fuel combustion may result in the manufacture of metal compounds (usually as a result of oxidation), or the conversion metal compounds to the parent metal (e.g., mercury compounds in coal convert to elemental mercury). In addition, acid aerosols may be manufactured as a result of the combustion of fuels The following discussion describes how to calculate the manufacturing threshold for these situations.

To calculate the amount of EPCRA Section 313 metal compounds manufactured during

combustion of fuels, you will need to determine the concentration of each metal present in the waste being combusted. The best readily available information should be used to estimate the approximate concentration of the metal(s) in the fuels used. From this information, you can estimate amounts of metal or metal compounds and acid aerosols manufactured. If you have data regarding chemical concentrations in the fuels combusted (e.g., supplier information and/or analytical data) and believe that is the best readily available information, then you should use this information. If specific concentration data of the metals in the fuels do not exist, you can assume that the metals will convert to the lowest weight metal oxide possible. A more detailed discussion can be found in Chapter 3.2 of this document. During combustion, other EPCRA Section 313 chemicals could be manufactured, particularly acid aerosols. For instance, sulfuric acid (acid aerosols) could be produced depending on a variety of factors such as sulfur content of the fuels. If you have specific data on the manufacture of acid aerosols, then use it. If data are not available, EPA has published guidance on calculating the amount of sulfuric acid (acid aerosols) manufactured during combustion; *Guidance for Reporting Sulfuric Acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size),* EPA, March 1998, available on EPA's TRI website at http://www.epa.gov/tri.

Calculating the Manufacturing Thresholds for Section 313 Chemicals in Wastes

In electricity generating facilities, some waste management activities may result in the manufacture of EPCRA Section 313 chemicals. For instance, wastewater activities may result in the generation of EPCRA Section 313 chemicals. To estimate the amount of EPCRA Section 313 chemicals manufactured during wastewater treatment, the Clean Water Act typically requires facilities to monitor some EPCRA Section 313 chemicals. In particular, the facility's wastewater permit application may have more detailed, chemical-specific monitoring data. However, it is important to note how the chemical is monitored in relation to the EPCRA Section 313 chemical being evaluated. For example, wastewater permits may require monitoring for the nitrate ion, but the nitrate compound category is calculated by the total weight of the nitrate compound in aqueous solutions.

Calculating the Otherwise Use and Processing Thresholds for Section 313 Chemicals in Wastes

To determine if a chemical exceeds the processing and/or otherwise use threshold, you must calculate the annual activity usage of that chemical. For wastes, start with the amount of chemical in stored waste as of January 1, add the amount of the chemical in waste both received from off-site and generated on-site and any amounts that are manufactured during the treatment or recovery process, and subtract the amount remaining in storage on December 31. The waste manifests received from your customers will be an invaluable source for determining the quantities of different types of wastes managed, particularly in terms of classifying the types of otherwise use activities the wastes may or may not have undergone.

Calculating Thresholds for Section 313 Chemicals in Purchases

For purchased chemicals, start with the amount of chemical at the facility as of January 1, add any purchases during the year and the amount manufactured (including imported), and subtract the amount remaining in the inventory on December 31. If necessary, adjust the total to account for exempt activities (see Chapter 3.2.2 for a discussion of exemptions). You should then compare the result to the appropriate threshold to determine if you are required to submit an EPCRA Section 313 report for that chemical.

Keep in mind that the threshold calculations are independent for each activity: manufactured, processed, and otherwise used. If more than one activity threshold applies, the amount associated with each threshold is determined separately.

Table 3-17 presents a worksheet that may be helpful when conducting your threshold determinations and Table 3-18 illustrates an example of how the work sheet can be used for the following example:

Example - Threshold Worksheet

Because your facility combusts coal to generate electricity for purposes of distribution into commerce, you are required to consider the manufacture of EPCRA Section 313 chemicals as by-products of combustion. Using the emission factor for hydrochloric acid (acid aerosols), 1.9 pounds/ton for your coal type, plus the amount of coal combusted (1.0 million tons) for the reporting year, you calculate the amount of hydrochloric acid (acid aerosols) produced to be 1.9 million pounds. Therefore, you would have exceeded the 25,000 pound threshold for manufacture of hydrochloric acid (acid aerosols), and you would be required to submit a Form R. Because you manufactured more than one million pounds of the EPCRA Section 313 chemical, you cannot file a Form A.

Table 3-17 Section 313 Reporting Threshold Worksheet

Facility Name:
Toxic Chemical or Chemical Category:
CAS Number:
Reporting Year:

Date Worksheet Prepared: _____
Prepared By: _____

Amounts of the toxic chemical manufactured, processed, or otherwise used.

Mixture Name or Other Identifier	Information Source	Total Weight (lb)	Percent TRI Chemical by Weight	TRI Chemical Weight (in lbs)	Amount of the Listed Toxic Chemical by Activity (in lbs.):		
					Manufactured	Processed	Otherwise Used
1.							
2.							
3.							
4.							
Subtotal:					**(A)_____lbs.**	**(B)_____lbs.**	**(C)_____lbs.**

Exempt quantity of the toxic chemical that should be excluded.

Mixture Name as Listed Above	Applicable Exemption (de minimis, article, facility, activity)	Fraction or Percent Exempt (if Applicable)	Amount of the Toxic Chemical Exempt from Above (in lbs.):		
			Manufactured	Processed	Otherwise Used
1.					
2.					
3.					
4.					
Subtotal:			**(A_1)_____lbs.**	**(B_1)_____lbs.**	**(C_1)_____lbs.**

Amount subject to threshold: ($A-A_1$)_____ lbs. ($B-B_1$)_____ lbs. ($C-C_1$)_____ lbs.
Compare to threshold for Section 313 reporting. 25,000 lbs 25,000 lb 10,000 lbs.

If any threshold is exceeded, reporting is required for all activities. Do not submit this worksheet with Form R, retain it for your records.

Table 3-18. Sample Section 313 Reporting Threshold Worksheet

Facility Name: ABC Electricity Generating Company
Toxic Chemical or Chemical Category: Hydrochloric Acid (acid aerosols)
CAS Number: 7647-01-0
Reporting Year: 1998

Date Worksheet Prepared: May 1, 1999
Prepared By: _____

Amounts of the toxic chemical manufactured, processed, or otherwise used.

Mixture Name or Other Identifier	Information Source	Total Weight (lb)	Percent TRI Chemical by Weight	TRI Chemical Weight (in lbs)	Amount of the Listed Toxic Chemical by Activity (in lbs.):		
					Manufactured	Processed	Otherwise Used
1. Subbituminous Coal	Emission Factor	2 billion	1.9lb/ton coal	1,900,000	1,900,000	---	---
2.					---	---	---
3.							
4.							
Subtotal:				**1,900,000**	**(A) 1,900,000 lbs.**	**(B) 0 lbs.**	**(C) 0 lbs.**

Exempt quantity of the toxic chemical that should be excluded.

Mixture Name as Listed Above	Applicable Exemption (de minimis, article, facility, activity)	Fraction or Percent Exempt (if Applicable)	Amount of the Toxic Chemical Exempt from Above (in lbs.):		
			Manufactured	Processed	Otherwise Used
1. None					
2.					
3.					
4.					
Subtotal:			**(A_1) 0 lbs.**	**(B_1) 0 lbs.**	**(C_1) 0 lbs.**

Amount subject to threshold: ($A-A_1$) 1,900,000 lbs. ($B-B_1$) 0 lbs. ($C-C_1$) 0 lbs.
Compare to threshold for Section 313 reporting. 25,000 lbs. 25,000 lbs. 10,000 lbs.

3-60

If any threshold is exceeded, reporting is required for all activities. Do not submit this worksheet with Form R, retain it for your records.

Chapter 4 - Estimating Releases and Other Waste Management Quantities

4.0 PURPOSE

This chapter is intended to help you in developing a systematic approach for conducting release and other waste management calculations specific to electricity generating facilities. Once you have determined which EPCRA Section 313 chemicals have exceeded thresholds at your facility, as described in Chapter 3, you must then estimate amounts of these chemicals in waste, by particular waste management type (e.g., release to air, transfer off-site for waste management, etc.). To aid your facility in making these calculations, this chapter has been divided into two parts. The first part provides a general approach to identifying sources of potential releases and other waste management activities, collecting data, and determining the most appropriate method(s) to develop estimates. Chapter 4.1 also provides insights into the requirements, recommended approaches, and other nuances associated with developing comprehensive and accurate estimates for reportable EPCRA Section 313 chemicals. To illustrate this approach, a diagram of a recommended steps for estimating quantities of reportable EPCRA Section 313 chemicals released or otherwise managed as wastes is provided in Figure 4-1.

Chapter 4.2 of this chapter provides a focused discussion with examples of methods and tools to use in calculating estimates of releases and other waste management activities specific to many electricity generating operations.

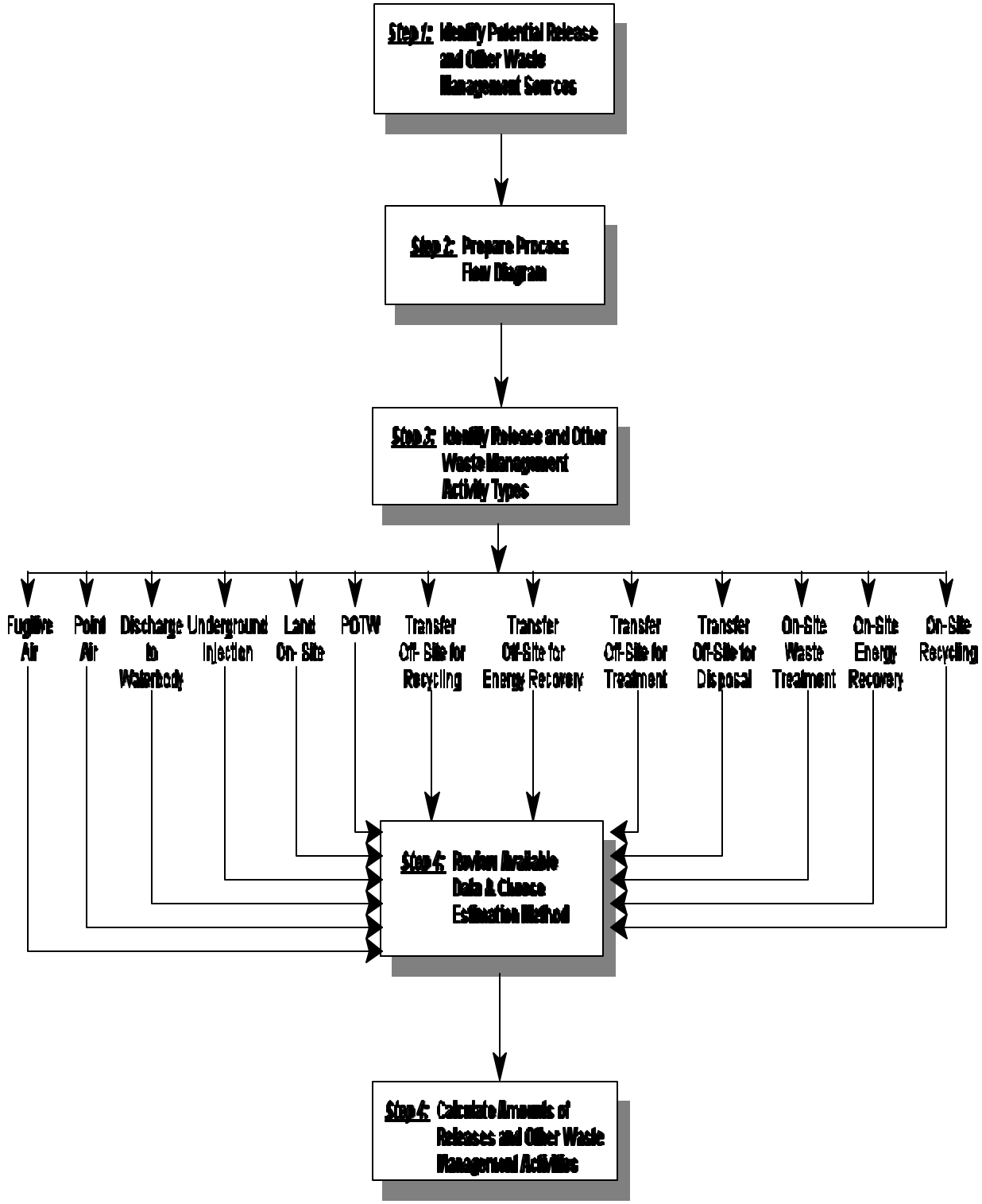


Figure 4-1 Release and Other Waste Management Calculation Approach

4.1 General Steps for Determining Releases and Other Waste Management Activities

You can develop release and other waste management estimates by completing these four basic steps. See Figure 4-1 for illustration of this four-step process.

Step 1) Identify potential sources of chemicals released or otherwise managed as waste.

Step 2) Prepare a process flow diagram.

Step 3) Identify on-site releases, off-site transfers, and other on-site waste management activity types.

Step 4) Determine the most appropriate method(s) to develop the estimates for releases and other waste management activity quantities and calculate the estimates.

These steps are described in detail in the following sections.

4.1.1 Step 1: Identify Potential Sources of Chemical Release and Other Waste Management Activities

The first step in release calculations is to identify all areas at your facility that could potentially release reportable Section 313 chemicals. Consider all potential sources at which reportable EPCRA Section 313 chemicals may be released and otherwise managed from each unit operation and process. Remember to include upsets and routine maintenance activities. Potential sources include the following:

- Relief valves;
- Pumps;
- Stacks;
- Volatilization from process or treatment;
- Fittings;
- Transfer operations;
- Flanges;
- Storage tanks;
- Stock pile losses;
- Waste treatment discharges;
- Process discharge stream;
- Container residues;
- Recycling and energy recovery byproducts;
- Accidental spills and releases;
- Storm water runoff;

- Clean up and housekeeping practices;
- Treatment sludge; and
- Combustion byproducts.

Next, you must identify the reportable EPCRA Section 313 chemicals that are released and otherwise managed from each source. A thorough knowledge of the facility's operations and processes will be required to make an accurate determination of which chemicals are involved, including those EPCRA Section 313 chemicals that are coincidentally manufactured during these processes.

4.1.2 Step 2: Prepare a Process Flow Diagram

Preparing a process flow diagram will help you calculate your releases by illustrating the life-cycle of the reportable EPCRA Section 313 chemical(s), as well as help you identify any sources of chemicals that are released and otherwise managed as waste at your facility that you might have missed in step 1. Depending on the complexity of your facility, you may want to diagram individual processes or operations rather than the entire facility. The diagram should illustrate how materials flow through the processes and identify material input, generation, and output points. By reviewing each operation separately, you can determine where EPCRA Section 313 chemicals are manufactured, processed, or otherwise used and the medium to which they will be released on-site, transferred off-site for further waste management, or otherwise managed as wastes on-site.

4.1.3 Step 3: Identify On-Site Releases, Off-Site Transfers and On-Site Waste Management Activity Types

For each identified source of an EPCRA Section 313 chemical, you must examine all possible releases and waste management activities. Figure 4-2 is a schematic of releases and other waste management activities as they correspond to individual data elements on the Form R. Remember to include both routine operations and accidents when identifying types of chemical management activities. This diagram, along with the following descriptions, can be used as a checklist to make sure all possible types of releases and other waste management activities have been considered.

a. Fugitive or Non-Point Air Emissions (Part II, Section 5.1 of Form R) - Emissions to the air that are not released through stacks, vents, ducts, pipes, or any confined air stream. Examples include:

- Equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines, etc.;
- Releases from building ventilation systems, such as a roof fan in an open room;
- Evaporative losses from solvent cleaning tanks, surface impoundments, and spills; and
- Emissions from any other fugitive or non-point sources.

b. **Stack or Point Air Emissions (Part II, Section 5.2 of Form R)** - All emissions to the air which occur through stacks, vents, ducts, pipes, or any confined air stream, including storage tank emissions and emissions from air pollution control equipment. Emissions released from general room air through a ventilation system are not considered stack or point releases for the purpose of EPCRA Section 313 reporting unless they are channeled through an air pollution control device. Instead, they are considered fugitive releases. You should note that some state air quality agencies consider ventilation systems without an attached pollution control device to be a stack or point source, and other agencies consider releases from storage tanks to be fugitive emissions.

c. **Discharges to Receiving Streams or Water Bodies (Part II, Section 5.3 of Form R)** - Direct wastewater discharges to a receiving stream or surface water body. Discharges usually occur under a National Pollutant Discharge Elimination System (NPDES) permit.

d. **Underground Injection On site to Class I Wells (Part II, Section 5.4.1 of Form R) and to Class II through V Wells (Part II, Section 5.4.2 of Form R)** Disposal into an underground well at the facility. These wells may be monitored under an Underground Injection Control (UIC) Program permit. RCRA Hazardous Waste Generator Reports may be a good source of information for wastes injected into a Class I well. Injection rate meters combined with waste profiles may provide the necessary information for all classes of wells.

e. **Releases to Land On Site (Part II, Section 5.5 of Form R)** - All releases to land on site, both planned (i.e., disposal) and unplanned (i.e., accidental release or spill). The four predefined subcategories for reporting quantities released to land within the boundaries of the facility are:

e(1). **Landfill** - The landfill may be either a RCRA permitted or a non-hazardous waste landfill. Both types are included if they are located on site.

e(2). **Land treatment/application farming** - Land treatment is a disposal method in which a waste containing an EPCRA Section 313 chemical is applied to or incorporated into soil. Volatilization of an EPCRA Section 313 chemical due to the disposal operation must be included in the total fugitive air releases and/or should be excluded from land treatment/application farming to accurately represent the disposition of the EPCRA Section 313 chemical and to avoid double counting.

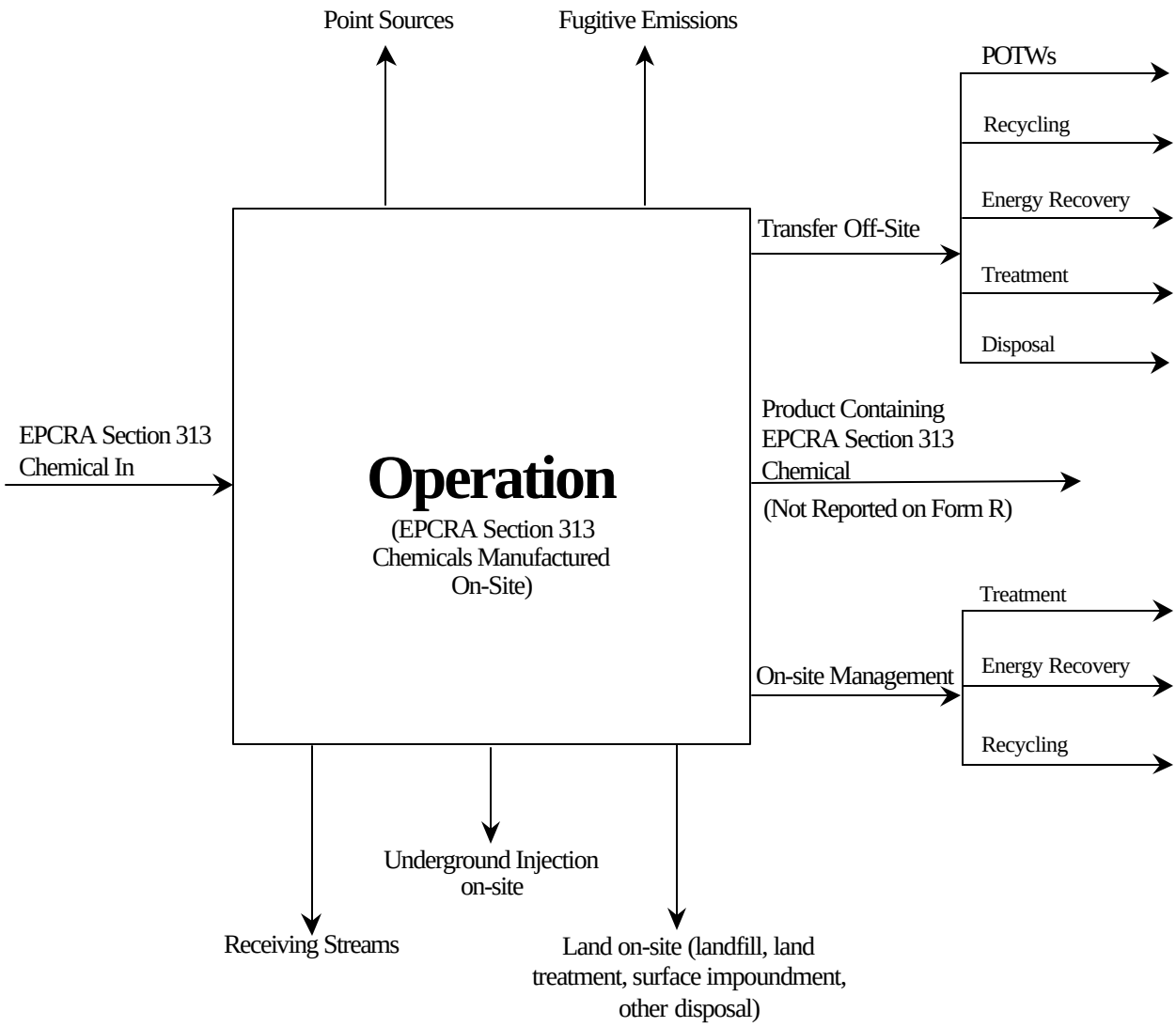


Figure 4-2. Possible Release and Other Waste Management Types for EPCRA Section 313 Chemicals

Sludge and/or aqueous solutions that contain biomass and other organic materials are often collected and applied to farm land. This procedure supplies a nitrogen source for plants and supplies metabolites for microorganisms. EPA considers this operation to be land treatment/farming if it occurs on site. If a facility sends this material off site for the same purpose, it is considered to be a "transfer to an off site location, disposal" and should be reported under Part II, Sections 6.2 and 8.1 of the Form R.

The ultimate disposition of the chemical after application to the land does not change the required reporting. For example, even if the chemical is eventually biodegraded by microorganisms or plants, it is not considered recycled, reused, or treated.

e(3). Surface impoundment - A surface impoundment is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials that is designed to hold an accumulation of wastes containing free liquids. Examples include: holding, settling, storage, and elevation pits; ponds; and lagoons. Ash disposed in evacuated areas would also be reported here. You do not have to report quantities of an EPCRA Section 313 chemical that are released to a surface impoundment as part of a wastewater treatment operation in this section. However, if the sludge from the surface impoundment contains the EPCRA Section 313 chemical, then the EPCRA Section 313 chemical in the sludge must be estimated in this section unless the sludge is removed and subjected to another waste management activity. In that case, it should be reported for that activity, as appropriate.

e(4). Other disposal - Releases to land that do not fit the categories of landfills, land treatment, or surface impoundment are classified as other disposal. This category also includes any spills or leaks of the EPCRA Section 313 chemical to land.

f. Transfers Off Site to a Publicly Owned Treatment Works (POTW) (Part II, Section 6.1 of Form R) The amount of EPCRA Section 313 chemical in water transferred to an off site POTW.

g. Transfers to Other Off-Site Locations (Part II, Section 6.2 of Form R) All amounts of EPCRA Section 313 chemicals transferred off-site for the purposes of waste treatment, disposal, recycling, or energy recovery. Be sure to include quantities of the EPCRA Section 313 chemical in non- hazardous wastes (such as sanitary waste and facility trash) transferred off-site and metals in waste transferred off site for recycling.

Any residual chemicals in "empty" containers transferred off-site would also be reported in Section 6.2. EPA expects that all containers (bags, totes, drums, tank trucks, etc.) will have a small amount of residual solids and/or liquid. On-site cleaning of containers must be considered for EPCRA Section 313 reporting. If the cleaning occurs with a solvent (organic or aqueous), you must report the disposition of the waste solvent as appropriate. If the containers are sent off site for disposal or reclamation, you should report the EPCRA Section 313 chemical in this section.

h. On-Site Waste Treatment (Part II, Section 7A of Form R) All on-site waste treatment of reported EPCRA Section 313 chemicals. The information reported in Section 7A focuses on the treatment of the waste stream. The information includes; type of waste stream (gaseous, aqueous or non-aqueous liquid, or solid); treatment methods or sequence; influent concentrations of the EPCRA Section 313 chemical; treatment efficiency of each method or sequence; and whether efficiency data are based on actual operating data. Metals compounds in waste subjected to a combustion process are not destroyed but should still be reported as going through the treatment process, with a treatment efficiency of zero.

Example - On-Site Waste Treatment

A process at the facility generates a wastewater stream containing an EPCRA Section 313 chemical (chemical A). A second process generates a wastewater stream containing two EPCRA Section 313 chemicals, a metal (chemical B) and a mineral acid (chemical C). Thresholds for all three EPCRA Section 313 chemicals have been exceeded and you are in the process of completing separate Form Rs for each chemical.

All wastewater streams are combined and sent to an on-site wastewater treatment system before being released to a POTW. This system consists of an oil/water separator which removes 99% of chemical A; a neutralization tank where the pH is adjusted to 7.5, thereby destroying 100% of the mineral acid (chemical C), and a settling tank where 95% of the metal (chemical B) is removed from the water (and eventually landfilled off site).

Section 7A should be completed slightly differently for each chemical for which a Form R must be filed. The table accompanying this example shows how Section 7A should be completed for each chemical. First, on each Form R you should identify the type of waste stream in Section 7A.1a as wastewater (aqueous waste, code W). Next, on each Form R you should list the code for each of the treatment steps that are applied to the entire waste stream, regardless of whether the operation affects the chemical for which you are completing the Form R (for instance, the first four blocks of Section 7A.1b of all three Form Rs should show: P19 (liquid phase separation), C11 (neutralization), P11 (settling/clarification), and NA (to signify the end of the treatment system). Note that Section 7A.1b is the only section of the Form R that is not chemical specific. It applies to the entire waste stream being treated. Section 7A.1c of each Form R should show the concentration of the specific chemical in the influent to the first step of the process (oil/water separation). For this example, assume chemicals A, B, and C are all present at concentrations greater than 1%. Therefore, code “1" should be entered. Section 7A.1d is

also chemical specific. It applies to the efficiency of the entire system in destroying and/or removing the chemical for the Form R you are currently completing. 99% should be entered when filing for chemical A, 95% for chemical B, and 100% for chemical C. Finally, you should report whether the influent concentration and efficiency estimates are based on operating data for each chemical, as appropriate.

Example - On-Site Waste Treatment (cont.)

Chemical A

7A.1a	7A.1b			7A.1c	7A.1d	7A.1e	
	1. P19	2. C11					
W	3. P11	4. NA	5.	1	99 %	Yes	No
	6.	7.	8.			X	

Chemical B

7A.1a	7A.1b			7A.1c	7A.1d	7A.1e	
	1. P19	2. C11					
W	3. P11	4. NA	5.	1	95 %	Yes	No
	6.	7.	8.			X	

Chemical C

7A.1a	7A.1b			7A.1c	7A.1d	7A.1e	
	1. P19	2. C11					
W	3. NA	4.	5.	1	100 %	Yes	No
	6.	7.	8.			X	

Note that the quantity removed and/or destroyed is not reported in Section 7 and that the efficiency reported in Section 7A.1d refers to the amount of EPCRA Section 313 chemical destroyed and/or removed from the applicable waste stream. The amount actually destroyed should be reported in Section 8.6 (quantity treated on site). For example, when completing the Form R for chemical B you should report "0" pounds in Section 8.6 because the metal has been removed from the wastewater stream, but not actually destroyed. The quantity of chemical B that is ultimately land filled off site should be reported in Section 6.2 and 8.1. However, when completing the Form R for chemical C you should report the entire quantity in Section 8.6 because raising the pH to 7.5 will completely destroy the mineral acid.

I. On-Site Energy Recovery (Part II, Section 7B of Form R) All on-site energy recovery of reported EPCRA Section 313 chemicals must be reported. EPA's view is that chemicals that do not contribute significant heat energy during combustion processes should not be considered for energy recovery. Therefore, only chemicals with a significant heating value (e.g., heating value high enough to sustain combustion) that are combusted in an energy recovery unit, such as an industrial furnace, kiln, or boiler can be reported for energy recovery. If an EPCRA Section 313 chemical is incinerated on-site but does not significantly contribute energy to the process (e.g., chlorofluorocarbons), it must be considered on-site waste treatment (see Chapter 4.1.3, h. above). Metal and metal compounds in a waste that is combusted cannot be

considered combusted for energy recovery because metals do not have any heat value.

j. On-Site Recycling (Part II, Section 7C of Form R) All on-site recycling methods used on EPCRA Section 313 chemicals must be reported.

k. Source Reduction and Recycling Activities (Part II, Section 8 of Form R)[2] Provide information about source reduction and recycling activities related to the EPCRA Section 313 chemical for which releases and other waste management activities are being reported. Section 8 uses some data collected to complete Part II, Sections 5 through 7. For this reason, Section 8 should be completed last. The relationship between Sections 5, 6, and 8.8 to Sections 8.1, 8.3, 8.5, and 8.7 are provided in equation forms below.

k(1). Quantity Released (Part II, Section 8.1 of Form R) - The quantity reported in Section 8.1 is the quantity reported in all of Section 5 plus the quantity of metals and metal compounds reported as discharged off site to POTWs in Section 6.1 plus the quantity reported as sent off site for disposal in Section 6.2 minus the quantity reported in Section 8.8 that was released on-site or transferred off-site for disposal:

Section 8.1 = Section 5 + Section 6.1 (metals and metal compounds) + Section 6.2 (disposal) - Section 8.8 (release or off-site disposal only)

k(2). Quantity Used for Energy Recovery On-Site (Part II, Section 8.2 of Form R) - Estimate a quantity of the EPCRA Section 313 chemical in wastes combusted for energy recovery on-site. This estimate should be the quantity of the chemical combusted in the process for which codes were reported in Section 7B (unless the 7B code is related to a Section 8.8 activity). Test data from trial burns or other monitoring data may be used to estimate the quantity of the EPCRA Section 313 chemical combusted for energy recovery purposes. If monitoring data are not available, vendor specifications regarding combustion efficiency may be used as they relate to the reportable EPCRA Section 313 chemical. A quantity should be reported in Section 8.2 when a method is reported in Section 7B (unless the 7B code is related to a Section 8.8 activity). Combustion for energy recovery is interpreted by EPA to include the combustion of an EPCRA Section 313 chemical that is (1) (a) a RCRA hazardous waste or waste fuel, (b) a constituent of a RCRA hazardous waste or waste fuel, or (c) a spent or contaminated "otherwise used" material; and

[2]The subsection 8.1 through 8.8 designation are those for the 1997 Form R. Please refer to the current reporting year's *TRI Forms and Instructions* for any changes.

that (2) has a significant heating value and is combusted in an energy or materials recovery device. Energy or materials recovery devices are boilers and industrial furnaces as defined in 40 CFR 372.3 (see 62 FR 23891, May 1, 1997). If a reported EPCRA Section 313 chemical is incinerated but does not contribute energy to the process (e.g., metal, metal compounds, and chlorofluorocarbons), it must be considered treatment for destruction. In determining whether an EPCRA Section 313 listed chemical is combusted for energy recovery, the facility should consider the heating value of the EPCRA Section 313 chemical and not of the chemical stream. Note that "NA" should be reported for EPCRA Section 313 chemicals which are halogens, CFCs, halons, and metals.

k(3). Quantity Used for Energy Recovery Off-Site (Part II, Section 8.3 of Form R) - The quantity reported in Section 8.3 is the quantity reported in Section 6.2 for which energy recovery codes are reported. If a quantity is reported in Section 8.8, subtract any associated off-site transfers for energy recovery:

Section 8.3 = Section 6.2 (energy recovery) - Section 8.8 (off-site energy recovery)

Combustion for energy recovery is interpreted by EPA to include the combustion of an EPCRA Section 313 chemical that is (1) (a) a RCRA hazardous waste or waste fuel, (b) a constituent of a RCRA hazardous waste or waste fuel, or (c) a spent or contaminated "otherwise used" material; and that (2) has a significant heating value and is combusted in an energy or materials recovery device. Energy or materials recovery devices are boilers and industrial furnaces as defined in 40 CFR 372.3 (see 62 FR 23891, May 1, 1997). If a reported EPCRA Section 313 chemical is incinerated but does not contribute energy to the process (e.g., metal, metal compounds, and chlorofluorocarbons), it must be considered treatment for destruction. In determining whether an EPCRA Section 313 listed chemical is combusted for energy recovery, the facility should consider the heating value of the EPCRA Section 313 chemical and not of the chemical stream. Note that "NA" should be reported for EPCRA Section 313 chemicals which are halogens, CFCs, halons, and metals.

k(4). Quantity Recycled On-Site (Part II, Section 8.4 of Form R) - Estimate a quantity of the EPCRA Section 313 chemical recycled in wastes on-site. This estimate should be the quantity of the chemical recycled in the operation for which codes were reported in Section 7C (unless the 7C code is related to a Section 8.8 activity). A quantity should be reported in Section 8.4 when a

method of on-site recycling is reported in Section 7C (unless the 7C code is related to a Section 8.8 activity). To estimate this quantity, you should determine if operating data exist which indicate a recovery efficiency and use that efficiency value combined with throughput data to calculate an estimate. If operating data are unavailable, use available vendor specifications.

k(5). Quantity Recycled Off-Site (Part II, Section 8.5 of Form R) - The quantity reported in Section 8.5 will generally be the same as the quantity reported in Section 6.2 for which recycling codes are reported. If a quantity is reported in Section 8.8, subtract any associated off-site transfers for recycling:

§8.5 = §6.2 (recycling) - §8.8 (off-site recycling)

k(6). Quantity Treated On-Site (Part II, Section 8.6 of Form R) - Waste treatment in Section 8 is limited to the destruction or chemical conversion of the EPCRA Section 313 chemical in wastes. The quantities reported in Section 8.6 will be those treated in a subset of the operations for which codes were reported in Section 7A, where treatment can include physical removal of the EPCRA Section 313 chemical(s) from a waste stream. To estimate the quantity, you should determine if operating data exist which indicate a treatment (e.g., destruction or chemical conversion of EPCRA Section 313 chemical) efficiency and use that efficiency value combined with throughput data to calculate an estimate. Because metals cannot be destroyed or chemically converted into something other than the metal or metal compound, metals cannot be reported as treated in Sections 8.6 or 8.7. Note that conversion of a metal from one oxidation state to another (e.g., Cr(VI) to Cr(III) is not considered treatment in Section 8.6. If operating data are unavailable, use available vendor specifications. Section 7A must be completed if a quantity is entered into Section 8.6.

k(7). Quantity Treated Off-Site (Part II, Section 8.7 of Form R) - This quantity reported in Section 8.7 must be the same as the quantity reported in Section 6.2 for which treatment codes are reported and quantities sent to a POTW as reported in Section 6.1 except for metal and metal compounds. If a quantity is reported in Section 8.8, subtract any associated off-site transfers for treatment:

Section 8.7 = Section 6.1 (except metals and metal compounds) + Section 6.2 (treatment) - Section 8.8 (off-site treatment)

Because metals cannot be destroyed or chemically converted into something other than the metal or metal compound, metals cannot be reported as treated

in Sections 8.6 or 8.7. Quantities of metals reported in Section 6.1 and 6.2 as being treated should be reported in Section 8.1 (Quantity Released) unless the facility has knowledge that the metal is being recovered.

k(8). Quantity Released to the Environment as a Result of Remedial Actions, Catastrophic Events, or One-Time Events Not Associated with Production Processes (Part II, Section 8.8 of Form R) - The purpose of this section is to separate quantities recycled, used for energy recovery, treated, or released (including disposal) that are associated with normal or routine production from those that are not. The quantity reported in Section 8.8 is the quantity of the EPCRA Section 313 chemical released directly into the environment or sent off-site for recycling, waste treatment, energy recovery, or disposal during the reporting year due to any of the following events:

(1) Remedial actions;
(2) Catastrophic events such as earthquakes, fires, or floods; or
(3) One-time events not associated with normal or routine production processes.

The quantity reported in Section 8.8 should not be included with quantities reported in Part II, Sections 8.1 through 8.7 of Form R, but should be included in Part II, Sections 5 and 6 of Form R as appropriate. The on-site waste management activities should also be reported in Section 7.

Spills that occur as a routine part of production operations and could be reduced or eliminated by improved handling, loading, or unloading procedures are included in the quantities reported in Sections 8.1 through 8.7 as appropriate. On-site releases and off-site transfers for further waste management resulting from remediation of an EPCRA Section 313 chemical or an unpreventable accident unrelated to production (such as a hurricane) are reportable in Section 8.8.

On-site treatment, energy recovery, or recycling of EPCRA Section 313 chemicals in wastes generated as a result of remedial actions, catastrophic events, or one-time events not associated with production processes are not reported in Part II, Section 8.8 nor Sections 8.1 through 8.7 of Form R.

k(9) Prior Year Estimates (for Part II, Sections 8.1 – 8.7 of Form R) -. In several instances, the Form R prompts the facility for information from prior reporting years. In Section 8, Source Reduction and Recycling Activities, Column A of Sections 8.1-8.7 requests release and other waste management information from the prior reporting year. Because 1998 is the first year that

Electricity generating facilities were required to collect data for EPCRA Section 313 reporting, you may enter "NA" in column A for Form Rs for RY 1998 only. In Section 8.9, you are required to provide a production ratio or activity index to reflect either the ratio of current year's production to prior year's production or an index of the current year's activity to prior year's activity with respect to the reportable EPCRA Section 313 chemical. Because you were not required to collect data prior to 1998, recently added facilities as a result of the industry expansion rulemaking may also enter "NA" in Section 8.9 for Form Rs for RY 1998 only.

POSSIBLE ERROR - Double Counting

Releases and other waste management activities should not be inadvertently "double counted." A single wastewater discharge should not be listed as both a release to water (on site) and a discharge to POTW (off site). Similarly, a release to land should not be listed as both a release to land (on site) and a transfer to an off-site landfill. Estimates of releases and other waste management activities should be prepared for Sections 5 through 7 of the Form R. For the most part, Section 8 relies on the data collected to complete these previous sections. Therefore, Section 8 should be completed last. However, the data elements of Section 8 (8.1 through 8.7) are mutually exclusive and care should be taken to avoid double counting.

4.1.4 Step 4: Determine the Most Appropriate Method(s) to Develop the Estimates for Releases and Other Waste Management Activity Quantities and Calculate the Estimates

After you have identified all of the potential sources for release and other waste management activity types, you must next estimate the quantities of each reportable chemical released and otherwise managed as waste. EPA has identified four basic methods that may be used to develop estimates (each estimate has been assigned a code that must be identified when reporting). The methods and corresponding codes are:

- Monitoring Data or Direct Measurement (M);
- Mass Balance (C);
- Emission Factors (E); and,
- Engineering Calculations (O).

Descriptions of these techniques are provided in *Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form*. They are also briefly described below. EPA does not require you to conduct additional sampling or testing for Section 313 reporting; however, you are required to use the best readily available information or prepare reasonable estimates.

For example, emission factors or engineering calculations may not be the best readily available information when other data, such as stack testing, are available. For each reported amount, you are required to identify only the primary method used for each estimate.

Based on site-specific knowledge and potential data sources available, you should be able to determine the best method for calculating quantities for each release and other waste management activity.

Many potential sources of data exist for these (and other) methods of developing estimates. Table 4-1 presents potential data sources and the estimation methodology in which they are most likely to be used.

Table 4-1
Potential Data Sources for Release and Other Waste Management Calculations

DATA SOURCES	
Monitoring Data (M)	**Mass Balance (C)**
C Stack monitoring data C Outfall monitoring data C Air permits C Industrial hygiene monitoring data C NPDES permits C POTW pretreatment standards C Effluent limitations C RCRA permit C Hazardous waste analysis C pH for acids C Continuous emission monitoring	C Supply records C Hazardous material inventory C Air emissions inventory C Pollution prevention reports C Hazardous waste manifests C Spill event records
Emission Factors (E)	**Engineering Calculations (O)**
C AP-42 or other EPA emission factors C Published facility or trade association chemical-specific emission factors	C Volatilization rates C Raoult's Law C Henry's Law C Solubilities C Non-published emission factors C Facility or trade association non chemical specific emission factors (e.g., SOCMI factors) C Process knowledge

Once estimation methods have been determined for all potential sources, releases and other waste management activities, an estimate for each reportable EPCRA Section 313 chemical can be developed corresponding to the data elements on Form R.

4.1.4.1 Monitoring Data or Direct Measurement (code M)

Using monitoring data or direct measurements is usually the best method for developing estimates for chemical releases and other waste management activity quantities estimates. Your facility may be required to perform monitoring under provisions of the Clean Air Act (CAA), Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), or other regulations. If so, these data should be available for developing estimates. Data may have also been collected for your facility through an occupational health and safety assessment. If only a small amount of direct measurement data are available or if you believe the monitoring data are not representative, you must determine if another estimation method would give a more accurate result.

Example - Monitoring Data

Data from the on-site wastewater treatment facility indicate that the annual average concentration of copper in the POTW discharge is 2 mg/L. The wastewater treatment facility processed 1.5 million gallons of water in 1997. The treated wastewater is discharged to an off-site POTW. The amount of copper transferred off site to the POTW (for Part II, Section 6.1 of the Form R) is estimated as follows:

Amount of copper transferred

$$= (2mg/L) * \left(\frac{1g}{1{,}000mg}\right) * \left(\frac{1lb}{453.59g}\right) * \left(\frac{1L}{0.2642gal}\right) * (1{,}500{,}000gal/yr)$$

$$= 25lbs/yr$$

POSSIBLE ERROR - Treatment Efficiencies

Vendor data on treatment efficiencies often represent ideal operating conditions. Thus, you should adjust such data to account for downtime and process upsets during the actual reporting year that would result in lower efficiencies. Remember that efficiencies reported by vendors are often general and may not apply to specific chemicals or uses of the equipment. For example, an incinerator or flare may be 99.99% efficient in combusting organic chemicals, but will have a zero percent efficiency in combusting metals.

4.1.4.2 Mass Balance (code C)

A mass balance involves determining the amount of an EPCRA Section 313 chemical entering and leaving an operation. The mass balance is written as follows:

Input + Generation = Output + Consumption

where:

- Input refers to the materials (chemicals) entering an operation. For example, chlorine added to process water as a disinfectant would be considered an input to the water treatment operation.

- Generation identifies those chemicals that are created during an operation (manufactured, including coincidental manufacturing). For example, additional ammonia, sodium nitrite, or nitrate compounds may be coincidentally manufactured in biological wastewater treatment systems.

- Output means any avenue by which the EPCRA Section 313 chemical leaves the operation. Output may include on-site releases and other on-site waste management activities; transfers for treatment, disposal, energy recovery, or recycling; or the amount of chemical that leaves with the final product. In a solvent recovery operation, for example, the recovered solvent product and wastes generated from the process are outputs.

- Consumption refers to the amount of chemical that is converted to another substance during the operation (i.e., reacted). For example, phosphoric acid would be consumed by neutralization during wastewater treatment.

The mass balance technique may be used for manufactured, processed, or otherwise used chemicals. It is typically useful for chemicals that are "otherwise used" and do not become part of the final product, such as catalysts, solvents, acids, and bases. For large inputs and outputs, a mass balance may not be the best estimation method, because slight uncertainties in mass calculations can yield significant errors in the release and other waste management estimates.

Example - Estimating Releases to Air Using Mass Balance

A facility uses an EPCRA Section 313 chemical as a refrigerant in condensers to control air emissions and adds 20,000 pounds to the refrigeration system in 1998 (to make up for system losses). The chemical is released to the air from relief vents, during system filling operations and from leaks in valves and fittings. During system maintenance, the lines are bled directly into water and the system is vented to the air. Monitoring data of the wastewater, including chemical concentrations and wastewater throughput, indicate that 1,200 pounds of the chemical were discharged to the wastewater in 1998. The remaining losses are assumed to be fugitive air releases and are estimated as follows:

Fugitive air releases of the EPCRA Section 313 chemical

= Amount input (lbs/yr) - Amount released to wastewater (lbs/yr)

= 20,000 lbs/yr - 1,200 lbs/yr

= 18,800 lbs/yr

POSSIBLE ERROR - Mass Balances for Otherwise Used Chemicals

If you are performing mass balance to estimate the quantity for a particular data element, make sure you include all inputs and outputs as precisely as possible. If, for example, you identify all inputs properly, but you fail to include all outputs, your estimate could be inaccurately inflated. Furthermore, if all inputs and outputs are identified, but are not precise, the estimate of the release in question could also be inaccurate.

4.1.4.3 Emissions Factors (code E)

An emission factor is a representative value that attempts to relate the quantity of a chemical released with an associated activity. These factors are usually expressed as the weight of chemical released divided by a unit weight, volume, distance, or duration of the activity releasing the chemical (e.g., pounds of chemical released per pounds of product produced). Emission factors, commonly used to estimate air emissions, have been developed for many different industries and activities. You should carefully evaluate the source of the emission factor and the conditions for its use to determine if it is applicable to the situation at your facility.

Many emission factors are available in EPA's *Compilation of Air Pollutant Emission Factors* (AP-42). The use of AP-42 emission factors is appropriate in developing estimates for emissions from boilers and process heaters. Equations are presented in AP-42 to calculate chemical specific emission factors for liquid material loading/unloading of transportation vehicles and storage tanks. AP-42 can be accessed at EPA's Technology Transfer Network (TTN) website: http://www.epa.gov/ttn/chief/ap42.html.

It should be noted that, for purposes of EPCRA Section 313 reporting, the only estimates that can be reported as "emission factors (code E)" are published chemical-specific emission factors.

Example - Emission Factors

Emission factors have been developed for air releases of fuel constituents and combustion products from boiler operations. AP-42 lists a range of formaldehyde emission factors when No. 6 fuel oil is consumed:

0.024 to 0.061 lbs formaldehyde generated/10^3 gallons No. 6 fuel oil fired.

A facility operating a boiler using No. 6 fuel oil could use the above emission factor to determine the amount of formaldehyde generated and subsequently released to the air. If 1,000,000 gallons of No. 6 fuel oil is used during a reporting year, the amount of formaldehyde generated would be between:

(0.024 lbs/10^3 gal) x (1,000,000 gallons) and (0.061 lbs/10^3 gal) x (1,000,000 gallons) = 24 and 61 lbs of formaldehyde

The mid-point of these two values, 42.5 pounds, should be use in developing release estimates assuming that a threshold has been exceeded for formaldehyde.

NOTE: In addition to combustion by-products, there are other EPCRA Section 313 chemicals in No. 6 fuel oil that should be considered for EPCRA Section 313 reporting.

4.1.4.4 Engineering Calculations (code O)

Engineering calculations are assumptions and/or judgements used to estimate quantities of EPCRA Section 313 chemicals released or otherwise managed. The quantities are estimated by using physical and chemical properties and relationships (e.g., ideal gas law, Raoult's law) or by modifying an emission factor to reflect the chemical properties of the EPCRA Section 313 chemical in question. Engineering calculations rely on the process parameters; you must have a thorough knowledge of the operations at your facility to complete these calculations.

Engineering calculations can also include computer models. Several computer models are available for estimating emissions from landfills, wastewater treatment, water treatment, and other processes.

Non-chemical-specific emission factors (e.g., SOCMI emission factors) and non-published emission factors also can be used as discussed in Section 4.1.4.3, but must be classified as "engineering calculations" for EPCRA Section 313 reporting.

Example - Engineering Calculations

Stack monitoring data are available for xylene but you have exceeded a threshold for toluene and must determine amount released or otherwise managed. Toluene is used in the same application as xylene at your facility. You can estimate the emissions of toluene by adjusting the monitoring data of xylene by a ratio of the vapor pressure for xylene to toluene. This example is an engineering calculation based on physical properties and process operation information:

From facility stack monitoring data, an estimated 200 lbs. of xylene is released as air emissions during the reporting year. Toluene is also present in the air emissions, but not monitored. The stack operates at approximately 125°C. Based on literature data, the vapor pressures at 125°C for toluene is 1.44 atmospheres and for xylene is 0.93 atmospheres. Using a ratio of the vapor pressures, the amount of toluene released as air emissions from the stack can be calculated:

$$\frac{\text{X lbs/yr toluene}}{\text{200 lbs/yr xylene}} = \frac{\text{1.44 atm (vapor pressure of toluene)}}{\text{0.93 atm (vapor pressure of xylene)}}$$

$$\text{X lbs/yr toluene} = \frac{\text{(200 lbs/yr xylene) x (1.44 atm toluene)}}{\text{(0.93 atm xylene)}}$$

Completing the calculation, the facility determines that 310 pounds of toluene were released as stack air emissions during the reporting year.

4.1.4.5 Estimating Releases and Other Waste Management Quantities

Once all sources, types, and appropriate estimation methodologies have been identified, you can estimate the release and other waste management activity quantities for each data element of the Form R. The recommended approach is that you estimate the amounts released from all sources at your facility by the data element on the form R (i.e., first estimate all fugitive emissions for a Section 313 chemical (Part II, Section 5.1), then estimate all stack air releases for a Section 313 chemical (Part II, Section 5.2), etc.). Table 4-2 presents a work sheet that may be helpful in compiling this information.

If you submit a Form R, you must also enter on-site waste treatment information in Section 7A, including the code for each treatment method used, the treatment efficiency for the chemical in the treated waste stream, and the concentration of the chemical in the influent sent to treatment. You should report treatment methods that do not actually destroy or remove the chemical by entering "0" for removal efficiency. Similarly, on-site energy recovery methods and on-site recycling methods must be reported in Section 7B and 7C, respectively.

Table 4-2 Release and Other Waste Management Quantity Estimation Worksheet

Facility Name:
Toxic Chemical or Chemical Category:
CAS Number:
Reporting Year:

Date Worksheet Prepared: __
Prepared by:

ON-SITE			
Release or Other Waste Management Activity Type	**Amount (lbs)**	**Basis of Estimate**	**Form R Element**
FUGITIVE AIR			
Equipment Leaks			5.1, (8.1 or 8.8)
Process Areas			5.1, (8.1 or 8.8)
Evaporative Losses (spills, surface impoundments)			5.1, (8.1 or 8.8)
Total =			5.1, (8.1 or 8.8)
STACK AIR			
Process Vents			5.2, (8.1 or 8.8)
Storage Tanks			5.2, (8.1 or 8.8)
Control Device Stacks			5.2, (8.1 or 8.8)
Other			5.2, (8.1 or 8.8)
Total =			5.2, (8.1 or 8.8)
RECEIVING STREAM/WATER BODY DISCHARGE			
Stormwater Discharge			5.3, (8.1 or 8.8)
On-Site Treatment Plant Discharge			
Total =			
ON-SITE UNDERGROUND INJECTION			
Underground Injection to Class I Wells			5.4, (8.1 or 8.8)
Underground Injection to Class II -V Wells			5.4, (8.1 or 8.8)
ON-SITE LAND			
Landfill			5.5, (8.1 or 8.8)
Land Treatment/Application Farming			5.5,(8.1,8.6, or 8.8)
Surface Impoundment			5.5,(8.1 or 8.8)
Other			
Total =			5.5,(8.1 or 8.8)
ON-SITE ENERGY RECOVERY			8.2
ON-SITE RECYCLING			8.4
ON-SITE TREATMENT			8.6

OFF-SITE				
Release or Other Waste Management Activity Type	**Amount (lbs)**	**Basis of Estimate**	**Form R Data Element**	**Off-Site Location (name)**
OFF-SITE DISPOSAL				
Solidification/Stabilization (metals and metal compounds only)			6.2, (8.1 or 8.8)	
Amount of metal and metal compounds to POTW			6.1, (8.1 or 8.8)	
Wastewater Treatment (excluding POTWs) metals and metal compounds only			6.2, (8.1 or 8.8)	
Underground Injection			6.2, (8.1 or 8.8)	
Landfill/Surface Impoundment			6.2, (8.1 or 8.8)	
Land Treatment			6.2, (8.1 or 8.8)	
Other Land Disposal			6.2, (8.1 or 8.8)	
Other Off-site Management			6.2, (8.1 or 8.8)	
OTHER AMOUNTS SENT OFF-SITE				
Amounts sent for storage			6.2, (8.1 or 8.8)	
Amounts sent for unknown waste management practice			6.2, (8.1 or 8.8)	
OFF-SITE TREATMENT				
Solidification/Stabilization			6.2,(8.7 or 8.8)	
Incineration/Thermal Treatment			6.2, (8.7 or 8.8)	
Incineration/Insignificant Fuel Value			6.2, (8.7 or 8.8)	
Wastewater Treatment (to POTW excluding metals and metal compounds)			6.1, (8.7 or 8.8)	
Wastewater Treatment (Excluding POTW and metal and metal compounds)			6.2, (8.7 or 8.8)	
Transfer to Waste Treatment Broker			6.2, (8.7 or 8.8)	
OFF-SITE ENERGY RECOVERY				
Off-site Energy Recovery			6.2, (8.3 or 8.8)	
Transfer to Energy Recovery Broker			6.2, (8.3 or 8.8)	
OFF-SITE RECYCLING				
Solvents/Organics Recovery			6.2, (8.5 or 8.8)	
Metals Recovery			6.2, (8.5 or 8.8)	
Other Reuse or Recovery			6.2, (8.5 or 8.8)	

Acid Regeneration			6.2, (8.5 or 8.8)	
Transfer to Recycling Waste Broker			6.2, (8.5 or 8.8)	

4.1.5 OTHER FORM R ELEMENTS

4.1.5.1 Maximum Amount On-Site (Part II, Section 4.1 of Form R)

In this section of the Form R, you are required to report the code that indicates the maximum quantity of the EPCRA Section 313 chemical present at your facility at any time during the reporting year. This estimate includes any amount of the chemical on-site in storage, in process vessels, in treatment units, and in shipping containers. This calculation includes EPCRA Section 313 chemical present in purchased chemicals and in wastes. When performing the calculation, use only the total amount of the chemical present at your site at **any one time**. For example, in March, your facility receives 2,000 pounds of an EPCRA Section 313 chemical in a mixture used for water treatment. This is the first shipment received during the reporting year. Your facility uses all but 500 pounds of the chemical. In July, your facility receives another shipment containing 2,500 pounds of the same chemical, and you do not receive any other amounts of the chemical during the reporting year. Provided this is your only use of the EPCRA Section 313 chemical, your maximum amount on-site is 3,000 pounds (range code 03).

Example - Maximum Amount On-Site for Landfills

How do facilities that operate landfills report maximum amount of a chemical on-site? Does this data element take into account amounts of a chemical that have been disposed of in prior years.

No. Facilities do not have to count amounts of the EPCRA Section 313 chemical that it disposed of on-site in previous years. Wastes that are released to such management units as surface impoundments, and landfills should be counted for the purposes of data element 4.1, Part II, of the Form R during the reporting year that they are disposed.

4.1.5.2 Production Ratio or Activity Index (Part II, Section 8.9 of Form R)

For this data element, you are required to provide a ratio of reporting year production to prior year production or provide an "activity index" based on a variable other than production that is the primary influence on the quantity of the reported EPCRA Section 313 chemical recycled, used for energy recovery, treated, or disposed. The ratio or index must be reported to the nearest tenths or hundredth place (e.g., one or two digits to the right of the decimal point). Because the facilities added by the facility expansion rulemaking were not required to collect data until RY 1998, these facilities may enter "NA" in this data element regardless of whether the chemical existed at your facility in the previous year (i.e., RY 1997). In future years, however, Electricity generating facilities may only enter "NA" in the production ratio or activity index data element if the EPCRA Section 313 chemical was not

manufactured, processed, or otherwise used in the year prior to the reporting year for which a Form R is being submitted.

You may choose either the production ratio or activity index depending on the chemical and how the chemical is used at your facility. The major factor in selecting whether to use a production ratio or activity index, is typically a measure of which threshold applies. Typically, production ratio would apply to EPCRA Section 313 chemicals manufactured and processed by a facility, while otherwise use activities would be best measured using an activity index. A key consideration in developing a methodology for determining a production ratio/activity index is that you should choose a methodology that will be least likely to be affected by potential source reduction activities. In most cases, the production ratio or activity index should be based on some variable of production or activity rather than on EPCRA Section 313 chemical or material usage.

For example, suppose you use an EPCRA Section 313 chemical as a cleaning solvent to perform tank washouts. Using a production ratio of the amount of the cleaning solvent used between the prior and current reporting years may seem logical but may not take into consideration potential source reduction activities such as product reformulation. As a result, an activity index may be more appropriate, such as the number of tank washouts conducted, which would be more accurate in reflecting the potential source reduction activities that could be implemented for that chemical and/or activity.

Example - Production Ratio

A facility uses coal as its fuel for its electricity generating combustion units and exceeds the manufacturing threshold for several EPCRA Section 313 metal compounds. The facility produces 100 megawatt-hours of electricity in the previous year. For the current reporting year, the facility produces 120 megawatt-hours of electricity. As a result, the production ratio for these EPCRA Section 313 metals would be calculated by dividing megawatt-hours produced from this year by megawatt-hours produced from last year.

$$\frac{\text{120 megawatt - hours (current reporting year)}}{\text{100 megawatt - hours (previous reporting year)}}$$

Production Ratio = 1.20

4.1.5.3 Source Reduction (Part II, Sections 8.10 and 8.11 of Form R)

The final two sections of the Form R are used for reporting any source reduction activities conducted at the facility. Section 8.10 asks whether there has been any source reduction at the facility **during the current reporting year**. If so, *TRI Forms and Instructions* provides a list of three-digit codes that the facility must choose from to describe these source reduction activities. Source reduction activities do not include recycling, treating, using for energy recovery, or disposing of an EPCRA

Section 313 chemical. Report in this section only the source reduction activities implemented to reduce or eliminate the quantities reported in Section 8.1 through 8.7.

Under Section 8.11, check "yes" if you would like to attach any optional information on source reduction, recycling, or pollution control activities for the EPCRA Section 313 chemical at your facility. This information can be reported for the current reporting year, or for prior year activities. The Agency asks that you limit this information to one page that summarizes the source reduction, recycling, or pollution control activities implemented by your facility.

4.2 Calculating Release and Other Waste Management Estimates at Electricity Generating Facilities

This section discusses the most common releases and other waste management activities at electricity generating facilities, and gives guidance for estimating these quantities. The discussion is organized by release or other waste management type, as follows:

- Fugitive Air Emissions
- Stack or Point Source Air Emissions
- Water Discharges
- Releases to Land
- On-site Waste Management
- Transfers Off-site
- Pollution Prevention Data

Facilities must report all releases and other waste management activities of any EPCRA Section 313 chemicals that exceed activity thresholds at the facility, including those associated with the combustion of fuels other than coal or oil (e.g., natural gas). While this chapter is designed primarily for electricity generating facilities that combust oil and/or coal for the purpose of generating power for distribution in commerce, the release and other waste management reporting issues may be relevant to all potentially reporting facilities. In particular, facilities that combust fuels, including coal or oil, will find the estimation techniques discussed in this chapter (e.g., methods of calculating discharges to water) useful.

As mentioned earlier in Chapter 4, process flow diagrams are a very useful way for facilities to identify all sources of releases and other waste management activities. Figure 4-3 illustrates common operations and releases and other waste management outputs at electricity generating facilities. While differing in some important respects, most conventional electricity generating facilities rely on the same basic mechanism. Fuel is ignited and burned within a boiler chamber composed of thousands of feet of water-filled tubes. The heat of combustion heats the water in the boiler tubes, creating high temperature and high pressure steam The steam passes through turbines causing the turbine blades to rotate and a shaft connected to the turbine blades drives electric generators, yielding electric power. In this fashion,

the chemical energy of the fossil fuel is converted to heat energy through combustion, then to mechanical energy in the turbines, and finally to electrical energy in the generators. Transmission lines, substations, and switching stations channel generated electricity to various customers. While Figure 4-3 is not meant to represent all electricity generating facilities, it can be used as a starting point for creating a facility-specific process flow diagram.

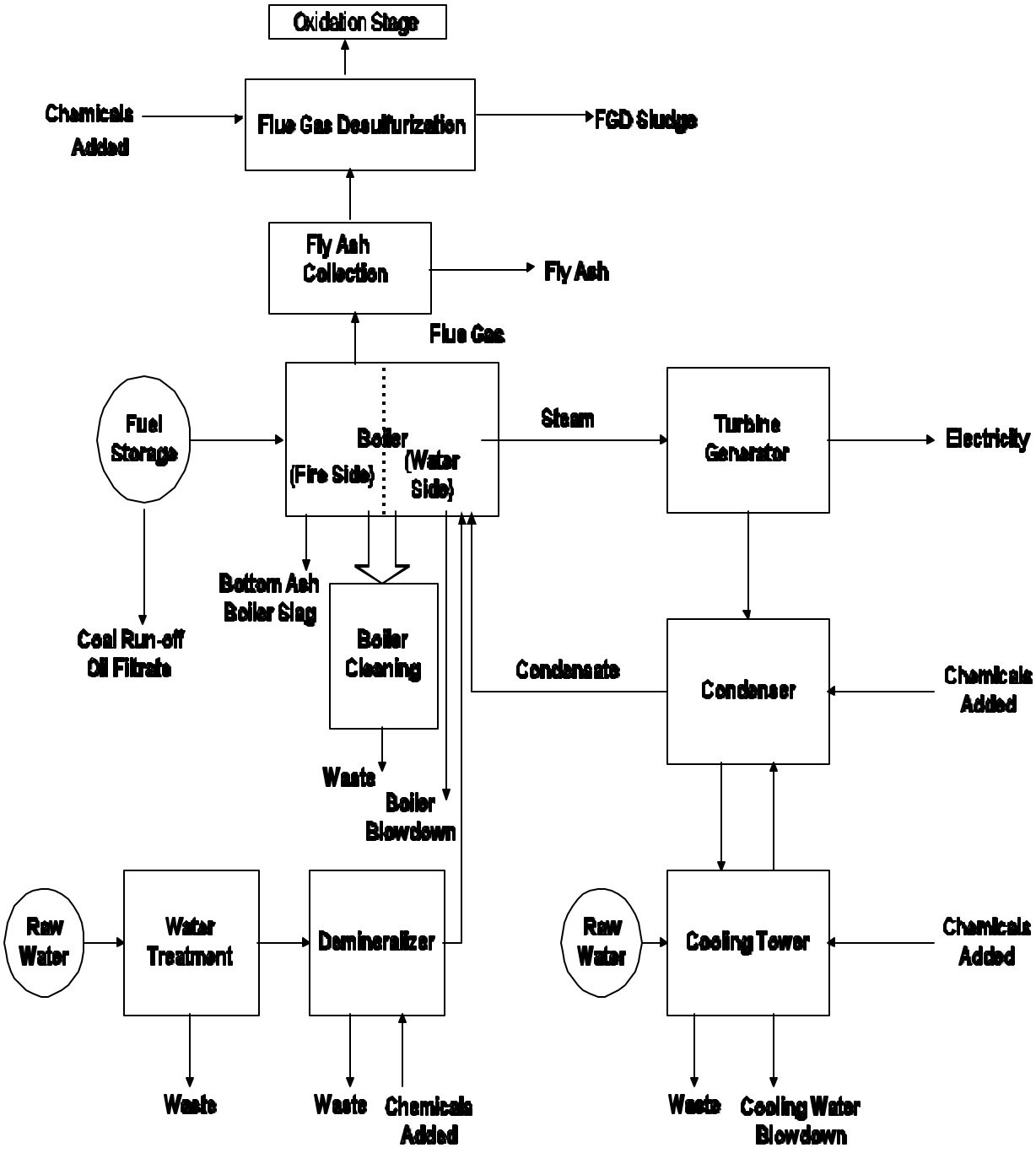


Figure 4-3 Process Flow Diagram at Electricity Generating Facilities

4.2.1 Fugitive Air Emissions, Section 5.1 of Form R.

Fugitive air emissions can occur from a number of sources. The primary fugitive emissions sources for EPCRA Section 313 chemicals at electricity generating facilities are likely to be:

- Storage and handling of the fuels containing EPCRA Section 313 chemicals above *de minimis* levels;
- Handling and storage of ash containing EPCRA Section 313 metal compounds manufactured as by-products of fuel combustion; and
- Wastewater treatment and other sources, including cleaning operations and spills, containing EPCRA Section 313 chemicals

Fuel. Fugitive emissions may occur during storage and handling of fuels including coal and oil. Concentrations of EPCRA Section 313 chemicals in these fuels will greatly affect the need to determine if fugitive emissions will have to be calculated for handling activities during use of fuels. For coal, the EPCRA Section 313 chemicals are likely to be present in concentrations below *de minimis* levels. During the otherwise use of coal, EPCRA Section 313 chemicals below *de minimis* levels do not have to be considered toward threshold determinations and release or other waste management calculations. (Note that any coincidental manufacturing that occurs during combustion must be considered because the *de minimis* exemption does not apply to the manufacture of a byproduct (see below)). Fuel oils may have EPCRA Section 313 chemicals above *de minimis* levels, and facilities should consider fugitive emissions resulting from the handling and storage of fuel oils, particularly lighter oils. EPA's *Protocol For Equipment Leak Emission Estimates* (EPA-453/R-95-017) presents a comprehensive discussion of how to estimate equipment leaks, such as those from valves, seals, and connectors in fuel handling equipment. This document is available at http://www.epa.gov/ttnchie1/fyi.html. Four approaches for estimating equipment leak emissions, in order of increasing refinement, are presented:

Fugitive Emissions and the *De minimis* Exemption

EPCRA Section 313 chemicals in fuel, along with other mixtures or other trade name products, that are processed or otherwise used are eligible for the *de minimis* exemption.

Fugitive emissions of EPCRA Section 313 chemicals below *de minimis* levels in ash being prepared for distribution into commerce for direct reuse (i.e., processed) are exempt from threshold determinations and release or other waste management calculations.

EPCRA Section 313 chemicals manufactured during combustion that are subsequently managed in ash as a waste (e.g., disposal) are not eligible for the *de minimis* exemption. Facilities must consider fugitive emissions of these chemicals, that occur during transportation, handling, disposal, or other activities associated with ash, regardless of concentration because the *de minimis* exemption generally does not apply to the manufacture of EPCRA Section 313 chemicals.

- Average emission factor approach;
- Screening ranges approach;
- EPA correlation approach; and
- Unit-specific correlation approach.

In general, the more refined approaches require more data and provide more accurate emission estimates for a process unit. Also, it is important to recognize in calculating estimates for these sources, you may have already calculated these estimates as a result of separate requirements under the Clean Air Act, particularly the Title V requirements.

In the average emission factor approach and the screening ranges approach, emission factors are combined with equipment counts to estimate emissions. EPA has also developed emission factors for the synthetic organic chemical manufacturing industry (SOCMI), refineries, oil and gas production units, and petroleum marketing terminals. The SOCMI emission factors are presented in Table 4-3. These average factors must be multiplied by the number of pieces of equipment being considered and the length of time each piece of equipment is in service. The average emission factors vary depending on the service category (e.g., gas, light liquid, or heavy liquid), and the total organic compound (TOC) concentration of the stream. To estimate emissions with the EPA correlation approach, measured concentrations (screening values) for all equipment are individually entered into general correlations developed by the EPA. In the unit-specific correlation approach, screening and leak rate data are measured for a select set of individual equipment components and used to develop unit-specific correlations. Screening values for all components are then entered into these unit-specific correlations to estimate emissions.

Table 4-3
SOCMI AVERAGE EMISSION FACTORS*

Equipment type	Service	Emission factors[a] (lbs/hr/source)
Valves	Gas Light liquid Heavy liquid	0.0132 0.00888 0.00051
Pump seals[b]	Light liquid Heavy liquid	0.0439 0.0190
Compressor seals	Gas	0.503
Pressure relief valves	Gas	0.229
Connectors	All	0.00403
Open-ended lines	All	0.0037
Sampling connections	All	0.0331

**Protocol for Equipment Leak Emission Estimates* (EPA, EPA-453/R-95-017)
a These factors are for total organic compound emissions
b The light liquid pump seal factor can be used to estimate the leak rate from agitator seals

The general equation for estimating TOC mass emissions from an equipment leak using average emission factors is:

$$E_{TOC} = F_A * WF_{TOC} * N$$

where:

E_{TOC} = emission range of TOC from all equipment in the stream of a given equipment type (lb/hr)
F_A = average emission factor for the equipment type (lb/hr/source)
WF_{TOC} = average weight fraction of TOC in the stream
N = number of pieces of equipment

And the equation for determining the emissions of a specific VOC in a mixture or other trade name product from equipment is:

$$E_x = E_{TOC} * (WP_x/WP_{TOC})$$

where:

E_x = The mass emissions of organic chemical "x" (lb/hr)
E_{TOC} = The TOC mass emissions from the equipment (lb/hr)
WP_x = The concentration of organic chemical "x" in the equipment in weight percent
WP_{TOC} = The TOC concentration in the equipment in weight percent.

Calculation of Equipment Leak Emissions

At an electricity generating facility, aviation gasoline passes through a system containing 100 connectors from storage to the combustion unit. The aviation gasoline contains 85 weight percent TOC. The aviation gasoline is in contact with the connectors in the system for 8,000 hours during the year. The weight percent of toluene in the waste is 5.6% based on the facility's data. The emissions of TOC would be calculated as:

E_{TOC} = $F_A * WF_{TOC} * N$ * (Number of hours in contact during the year)
= (0.00403 lb/hr/connector) (0.85) (100) (8000 hrs/year)
= 2,740 lb/year of TOC from connectors

The emissions of toluene from the connectors would be calculated as:

E_x = $E_{TOC} * (WP_x/WP_{TOC})$
= 2,740 lb/year * (0.056/0.85)
= 181 lb/year of toluene from connectors

This average emission factor approach is presented as an option for facilities with no data concerning equipment leaks. As with all estimates derived for compliance with EPCRA Section 313, it is the

facility's responsibility to choose the best method for estimating releases from equipment leaks.

Ash. Facilities may generate fugitive emissions during management of dry ash or dry FGD waste. The fly ash handling operations in most electricity generating facilities consist of pneumatic systems or enclosed and hooded systems, which are vented through control devices. Therefore, the fugitive particulate matter emissions from these systems are anticipated to be minimal. You should review readily available data at your facility to identify what fugitive emissions may occur and to what extent those emissions can be quantified. For example, you may have permit requirements in regards to particulate matter emissions and, as part of these permits, may have facility-specific or other emission factors for particulate matter released during ash management. Estimates for fugitive emissions may be derived by combining these data with data on the measured or default concentrations of metal concentrations in ash, along with annual throughput data. In particular, it may be useful to review your permit applications, which may contain more detailed analyses of the potential for fugitive air emissions related to ash management activities and, in some cases, may contain actual monitoring data or facility-derived emission factors. Facilities that do not have such data may use other sources, including engineering judgement to estimate fugitive emissions.

Wastewater Treatment. Fugitive air emissions of volatile EPCRA Section 313 chemicals from wastewater treatment units could be estimated using one of several programs, such as CHEMDAT8 and WATER8. Volatile chemicals can evaporate from solid waste and non-volatile chemicals can be released to the air via particulate emissions (e.g., ash). One tool that can be used to estimate emissions in these situations is CHEMDAT8 (See box.) Other programs are available commercially.

WATER8

A computer program, WATER8, is available for estimating the fate of organic compounds in various wastewater treatment units, including collection systems, aerated basins, and other units. WATER8 is written to run under DOS without the need to purchase other programs. WATER8 contains useful features such as the ability to link treatment units to form a treatment system, the ability for recycle among units, and the ability to generate and save site-specific compound properties. The WATER8 program and users manual can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/software.html#water8.

Transfer and treatment operations will result in fugitive air emissions, but waste previously disposed of in landfills or surface impoundments will also generate emissions. These emissions need to be considered in your release calculations as well. These emissions will be dependent on the types and quantities of wastes placed in the landfill or surface impoundments as well as the design and operating practices of the landfill.

CHEMDAT8

Analytical models have been developed to estimate emissions of organic compounds via various pathways from wastewater and waste management units. Some of these models have been assembled into a spreadsheet called CHEMDAT8 for use on a PC. A user's guide for CHEMDAT8 is also available. Area emission sources for which models are included in the spreadsheet are as follows: nonaerated impoundments, which include surface impoundments and open top wastewater treatment tanks; aerated impoundments, which include aerated surface impoundments and aerated WWT tanks; disposal impoundments, which include nonaerated disposal impoundments; land treatment; and landfills. These models can be used to estimate the magnitude of site air emissions for regulatory purposes. The CHEMDAT8 program and manual can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/software.html#water8.

Other Sources - Equipment, Storage, Spills, Leaks, Cleaning, etc. Fugitive air releases of EPCRA Section 313 chemicals can occur from equipment in use, leaks in valves and fittings, losses during cylinder changeovers, and periodic process-related cleaning operations. For small quantities of EPCRA Section 313 chemicals otherwise used, engineering judgment can be used to estimate fugitive releases (e.g., based on the volume of the connecting hose and the number of changeovers). If significant quantities of chemicals are handled, fugitive releases can be estimated using the emission factors discussed previously in regards to the use of fuels.

Releases From Transportation Vehicles

A facility is responsible for reporting releases and other waste management activities for an EPCRA Section 313 chemical that occur during loading or unloading of a transportation vehicle provided an activity threshold has been exceeded for that chemical. Releases of an EPCRA Section 313 chemical from a transportation vehicle that occur while the material is still under "active shipping papers" is considered to be in transportation and is not subject to EPCRA Section 313 requirements (EPCRA Section 327). For example, a facility shipping ash containing nickel oxide for direct reuse off site is not responsible for reporting releases once the shipping papers have been signed. The facility is responsible for reporting releases of EPCRA Section 313 chemicals, including those that occur during storage of the chemicals in the transportation vehicle while the vehicle is on property owned or operated by the facility, up until the point that the shipping papers have been signed.

4.2.2 Stack or Point Source Air Emissions, Section 5.2 of Form R.

Stack emissions of EPCRA Section 313 chemicals can occur from the combustion stack, storage tanks, and plant maintenance activities. Each is discussed below.

Stack Emissions from Combustion. Amounts of EPCRA Section 313 chemicals not captured in particulate control devices or in flue gas desulfurization (FGD) systems exit as stack emissions. Some EPCRA Section 313 chemicals manufactured during fuel combustion include hydrogen fluoride, hydrochloric acid (acid aerosols), sulfuric acid (acid aerosols), numerous metal compounds in ash (e.g., barium compounds), and formaldehyde. As previously discussed in Chapter 3, the amount of EPCRA Section 313 chemicals manufactured should be based on the best readily

available data on constituents and associated concentrations of the coal, oil, or other fuel sources. Using specific data on the fuels combusted will be extremely useful in identifying the type and quantity of EPCRA Section 313 chemicals manufactured and which should form the basis of estimating amounts ultimately released as stack air emissions or otherwise managed as wastes.

Releases of EPCRA Section 313 chemicals to the stack air emission sources may be calculated using a number of methods. It is the responsibility of each facility to determine the best data to use. The best data source would be facility-specific monitoring data if enough data were available to sufficiently characterize the emissions on a EPCRA Section 313 chemical-specific basis. Unfortunately, these types of data are rarely available. One of the best practical alternatives is emission factors for the particular type of fuel that is being combusted. This document presents many of these emission factors as default values to consider if no other data exist or are readily available. Other sources, such as Electrical Power Research Institute's (EPRI) PISCES database, provide emission factors and models to calculate air emissions, including stack emissions.

When other data are not available, EPA has emission factors which can be applied in calculating stack air emission estimates. EPA's *Compilation of Air Pollutant Emission Factors (AP-42)* provides emission factors for many chemicals resulting from various combustion fuel sources, including coal and oil. Table 4-4 presents AP-42 emission factors for metals released during combustion of coal and fuel oil No. 6. These factors are based on a limited number of samples and may not reflect more accurate information available to the facility for the particular type of coal combusted and pollution control devices used. Table 4-5 presents emissions factors for various organic compounds during controlled coal combustion. Tables 4-6 and 4-7 show emission factors of metals and organic compounds (respectively) released during combustion of natural gas. These tables are specific to

Use of AP-42 Emission Factors

The general equation for emission estimation is:

$$E = A \times EF \times (1-ER/100)$$

where:

E = emissions,
A = activity rate,
EF = emission factor, and
ER = overall emission reduction efficiency, %.

ER is further defined as the product of the control device destruction or removal efficiency and the capture efficiency of the control system. When estimating emissions for a long time period (e. g., one year), both the device and the capture efficiency terms should account for upset periods as well as routine operations. Note that some emission factors already incorporate a removal efficiency term.

Table 4-4

EPCRA Section 313 Metal Emission Factors for Combustion of Coal and Fuel Oil No. 6

CONTROLLED COAL COMBUSTION[a]			NO. 6 FUEL OIL COMBUSTION[c]	
EPCRA Section 313 Metal	Emission Factor (lb/ton)[b]	Emission Factor Rating	Average Emission Factor[d] (lb/10^3 Gal)	Emission Factor Rating
Antimony	1.8E-05	A	5.25E-03	E
Arsenic	4.1E-04	A	1.32E-03	C
Barium	N/A*	N/A*	2.57E-03	D
Beryllium	2.1E-05	A	2.78E-05	C
Cadmium	5.1E-05	A	3.98E-04	C
Chromium	2.6E-04	A	8.45E-04	C
Chromium (VI)	7.9E-05	D	2.48E-04	C
Cobalt	1.0E-04	A	6.02E-03	D
Copper	N/A*	N/A*	1.76E-03	C
Lead	4.2E-04	A	1.51E-03	C
Manganese	4.9E-04	A	3.00E-03	C
Mercury	8.3E-05	A	1.13E-04	C
Nickel	2.8E-04	A	8.45E-02	C
Selenium	1.3E-03	A	6.83E-04	D

Source: AP-42 Chapter 1, External Combustion Sources.

[a]The emission factors were developed from emissions data at eleven facilities firing bituminous coal, fifteen facilities firing subbituminous coal, and from two facilities firing lignite. The factors apply to boilers utilizing either venturi scrubbers, spray dryer absorbers, or wet limestone scrubbers with an electrostatic precipitator (ESP) or Fabric Filter (FF). In addition, the factors apply to boilers using only an ESP, FF, or venturi scrubber. SCCs = pulverized coal-fired, dry bottom boilers, 1-01-002-02/22, 1-02-002-02/22, 1-03-002-06/22; pulverized coal, dry bottom, tangentially-fired boilers, 1-01-002-12/26, 1-02-002-12/26, 1-03-002-16/26; cyclone boilers, 1-01-002-03/23, 1-02-002-03/23, 1-03-002-03/23; and, atmospheric fluidized bed combustors, circulating bed, 1-01-002-18/38, 1-02-002-18, and 1-03-002-18.

[b]Emission factor should be applied to coal feed, as fired. To convert from lb/ton to kg/Mg, multiply by 0.5.

[c]Data are for residual oil fired boilers, Source Classification Codes (SCCs) 1-01-004-01/04.

[d]To convert from lb/10^3 gal to kg/10^3 L, multiply by 0.12.

*N/A - data not available for this metal

Table 4-5

Emission Factors for Organic EPCRA Section 313 Chemicals from Controlled Coal Combustion

Pollutant[b]	Emission Factor[c] (lb/ton)	Emission Factor Rating
Acetaldehyde	5.7E-04	C
Acetophenone	1.5E-05	D
Acrolein	2.9E-04	D
Benzene	1.3E-03	A
Benzyl chloride	7.0E-04	D
Bromoform	3.9E-05	E
Carbon disulfide	1.3E-04	D
2-Chloroacetophenone	7.0E-06	E
Chlorobenzene	2.2E-05	D
Chloroform	5.9E-05	D
Cumene	5.3E-06	E
2,4-Dinitrotoluene	2.8E-07	D
Dimethyl sulfate	4.8E-05	E
Ethyl benzene	9.4E-05	D
Formaldehyde	2.4E-04	A
Hexane	6.7E-05	D
Methyl ethyl ketone	3.9E-04	D
Methyl hydrazine	1.7E-04	E
Methyl methacrylate	2.0E-05	E
Methylene chloride	2.9E-04	D
Phenol	1.6E-05	D
Propionaldehyde	3.8E-04	D
Tetrachloroethylene	4.3E-05	D
Toluene	2.4E-04	A
1,1,1-Trichloroethane	2.0E-05	E
Styrene	2.5E-05	D

Pollutant[b]	Emission Factor[c] (lb/ton)	Emission Factor Rating
Xylenes	3.7E-05	C
Vinyl acetate	7.6E-06	E

[a] Source: AP-42 Chapter 1, External Combustion Sources. Factors were developed from emissions data from ten sites firing bituminous coal, eight sites firing subbituminous coal, and from one site firing lignite. The emission factors are applicable to boilers using both wet limestone scrubbers or spray dryers and an electrostatic precipitator (ESP) or fabric filter (FF). In addition, the factors apply to boilers utilizing only an ESP or FF. SCCs = pulverized coal-fired, dry bottom boilers, 1-01-002-02/22, 1-02-002-02/22, 1-03-002-06/22; pulverized coal, dry bottom, tangentially-fired boilers, 1-01-002-12/26, 1-02-002-12/26, 1-03-002-16/26; cyclone boilers, 1-01-002-03/23, 1-02-002-03/23, 1-03-002-03/23; and, atmospheric fluidized bed combustors, circulating bed, 1-01-002-18/38, 1-02-002-18, and 1-03-002-18.

[b]Pollutants sampled for but not detected in any sampling run include: Carbon tetrachloride- 2 sites; 1,3-Dichloropropylene- 2 sites; N-nitrosodimethylamine- 2 sites; Ethylidene dichloride- 2 sites; Hexachlorobutadiene- 1 site; Hexachloroethane- 1 site; Propylene dichloride- 2 sites; 1,1,2,2-Tetrachloroethane- 2 sites; 1,1,2-Trichloroethane- 2 sites; Vinyl chloride- 2 sites; and, Hexachlorobenzene- 2 sites.

[c]Emission factor should be applied to coal feed, as fired. To convert from lb/ton to kg/Mg, multiply by 0.5.

Table 4-6
Emission Factors for EPCRA Section 313 Metals from Natural Gas Combustion [a]

EPCRA Section 313 Metal	Average Emission Factor [b] (lb/million ft ^{3})
Arsenic	2.30E-04
Barium	2.40E-03
Chromium	1.10E-03
Cobalt	1.20E-04
Copper	2.51E-04
Lead	2.71E-04
Manganese	3.81E-04
Nickel	3.61E-03
Vanadium	3.21E-03

[a] Data are for natural gas boilers controlled with overfire air and flue gas recirculation.
Source Classification Codes 1-01-006-04.

[b] Based on data from one source test. To convert from lb/million ft^3 to kg/million m^3 ,multiply by 16.0.
Emission Factor Rating: E

Table 4-7
Emission Factors for Speciated Organic Compounds from Natural Gas Combustion [a]

Organic Compound	Average Emission Factor (lb/million ft^3)
Formaldehyde	1.55E-01 [b]
Naphthalene	2.40E-04 [c]
Phenanthrene	1.00E-05 [c]
Toluene	2.20E-03 [c]

[a] Data are based on boilers that were both controlled and uncontrolled for criteria pollutant emissions. Source Classification Codes 1-01-006-01, 1-01-006-04. To convert from lb/million ft^3 to kg/million m^3, multiply by 16.0.
[b] References 31-36.
[c] Reference 32. Based on data from one source test.
Emission Factor Rating is E for all chemicals except formaldehyde, which is C.

certain conditions (e.g., coal classification, boiler configuration). AP-42 emission factors for other chemicals and fuels are also available. For example, there are AP-42 emission factors for organic compounds released from the combustion of residual oils (which include No. 6 fuel oil) and distillate fuels (which include No.2 fuel oil), and for various chemicals released during the combustion of liquefied petroleum gas, wood waste, and waste. AP-42 can be found at http://www.epa.gov/ttn/chief/ap42etc.html.

Combustion of coal may also result in emissions of sulfuric acid (acid aerosols), hydrochloric acid (acid aerosols), and hydrogen fluoride (HF). The quantities of these chemicals must be applied to the manufacturing threshold (as discussed in Section 3 of this document). To estimate stack air emissions of these acids when no better data are available, assume the amount released is the amount manufactured minus amounts removed by air control devices. Efficiency estimates for air pollution control devices can be obtained from monitoring data, vendor specifications, and air permit applications. Note that chlorine (7782-50-5) and fluorine (7782-41-4) may also be formed. Facilities must use their best available information to estimate these quantities.

Storage Tanks. Electricity generating facilities should consider point source air emissions from tanks that store materials containing volatile chemicals, such as Fuel oil No.2 and hydrazine. *AP-42* provides detailed information on the calculation of air emissions during the storage and transfer of liquids. A number of equations used to calculate air emissions from storage tanks can be found in *AP-42*, Chapter 7. Total emissions from storage tanks are equal to the sum of the standing storage loss and working loss. Variables such as tank design, liquid temperature, and wind velocity are taken into account when determining standing storage loss and working loss. The emission equations for fixed-roof tanks in AP-42 were developed for vertical tanks; however, the equations can also be used for horizontal tanks by modifying the tank parameters as specified in AP-42. Many of these equations have been incorporated into computer models such as TANKS3 (See box on TANKS3 for more information).

AP-42: Emission Factor Quality Ratings Used in Tables 4-4 and 4-5

A Excellent. Factor is developed from A- and B-rated source test data taken from many randomly chosen facilities in the industry population. The source category population is sufficiently specific to minimize variability.

B Above average. Factor is developed from A- or B-rated test data from a "reasonable number" of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. As with an A rating, the source category population is sufficiently specific to minimize variability.

C Average. Factor is developed from A-, B-, and/or C-rated test data from a "reasonable number" of facilities. Although no specific bias is evident, it is not clear if the facilities tested represent a random sample of the industry. As with the A rating, the source category population is sufficiently specific to minimize variability.

D Below average. Factor is developed from A-, B- and/or C-rated test data from a small number of facilities, and there may be reason to suspect that these facilities do not represent a random sample of the industry. There also may be evidence of variability within the source population.

E Poor. Factor is developed from C- and D-rated test data, and there may be reason to suspect that the facilities tested do not represent a random sample of the industry. There also may be evidence of variability within the source category population.

Once the total volatile organic compound (VOC) loss is calculated, you can then determine the emission rate of each constituent in the vapor. In general, the emission rate for individual components can be estimated by multiplying the weight fraction of the constituent in the vapor by the amount of total VOC loss. The weight fraction of the constituent in the vapor can be calculated using the mole fraction and the vapor pressure of the constituent (equations found in AP-42). The weight percent can also be obtained from the SPECIATE database. The SPECIATE data base contains organic compound and particulate matter speciation profiles for more than 300 source types. The profiles attempt to break down the total VOC or particulate emissions from a particular source into the individual compounds. The SPECIATE database can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/software.html#speciate.

TANKS3

The TANKS3 program is designed to estimate emissions of organic chemicals from several types of storage tanks. The calculations are performed according to EPA's AP-42, Chapter 7. After the user provides specific information concerning a storage tank and its liquid contents, the system produces a report which estimates the chemical emissions for the tank on an annual or partial year basis. The user can also determine individual component losses by using one of the specification options available in the program.

The TANKS3 program relies on a chemical database of over 100 organic liquids and a meteorological database which includes over 250 cities in the United States; users may add new chemicals and cities to these databases by providing specific information through system utilities. On-line help provides documentation and user assistance for each screen of the program. The TANKS3 program and manual can be downloaded from the world wide web at http://www.epa.gov/ttn/chief/tanks.html.

Plant Maintenance. Facilities should not forget to consider stack or point source emissions generated from periodic plant maintenance activities. For example, facilities that evaporate or incinerate boiler cleaning wastes should examine EPCRA Section 313 chemicals generated from theses activities. Facilities can use air permit applications and associated materials as well as process knowledge to estimate emissions from evaporation or incineration of boiler wastes.

4.2.3 Discharges to Receiving Streams or Water Bodies, Section 5.3 of Form R; and Discharges to Publicly Owned Treatment Works (POTWs), Section 6.1 of Form R.

Wastewaters discharged include process wastewater, coal pile run-off, and storm water. Each is discussed below.

Process Wastewater. Facilities may discharge wastewater resulting from various on-site operations. The two main sources of wastewater are ash transport water and cooling water. Facilities may also discharge miscellaneous plant wastewater, water remaining after FGD sludge dewatering, and wastewater from periodic boiler and equipment cleaning operations.

A facility that discharges or has the potential to discharge water containing regulated wastes must operate under the terms of Federal, State, and/or local permits, such as a NPDES direct discharge permit, or a POTW indirect discharge agreement. The permit(s) or agreement usually require measurements of the water volume and monitoring of some generalized wastewater parameters including concentrations of various constituents. In some cases, the constituent analyses required for permit compliance includes EPCRA Section 313 chemicals. In other cases, facilities may have conducted more detailed analysis of specific constituents in its wastewaters as part of its NPDES or POTW discharge applications. In these instances, releases can be calculated by multiplying the volume of wastewater released by the concentration of the chemical released. Otherwise, the facility should use their best readily available information in making these estimates as needed. See box for an

example calculation.

Based on the concentration and wastewater flow data available, an estimate of discharges to water can be calculated. Facilities should calculate the daily average discharges of a reportable EPCRA Section 313 chemical in pounds and should use those estimates to determine the annual discharge in pounds per year. Using the daily concentration data available for the reportable chemical combined with the wastewater flow data for each of the sampling dates, calculate an estimate of pounds per day for each sampling date. After the calculations are made for each monitoring point (e.g., daily, monthly), the pounds discharged are averaged to determine an average daily discharge amount, which would be multiplied by the number of days discharges were possible (e.g., 365 days a year). If no chemical-specific monitoring data exist, process knowledge (or in some cases, mass balance) may be used to develop an estimate.

Example Calculation of Yearly Wastewater Discharge

A facility has monitoring data on discharges to water of xylene, a EPCRA Section 313 chemical, and a Form R report is required. In this example, monitoring data on this chemical are only available for two days in the year. The daily quantities of pounds of xylene released for those two dates would then be divided by the number of sample dates to determine the daily average for the whole reporting year, which would be used to estimate the annual discharge of xylene in wastewater:

Date	Concentration (mg/l)	Flow (MGD)	Daily Discharge
3/1	1.0	1.0	8.33 lbs.
9/8	0.2	0.2	0.332 lbs.

Annual Calculation:
(8.33 lbs. + 0.332 lbs.)/2 days x 365 days/year = 1580.82 lbs/yr

Discharges of listed acids may be reported as zero if all discharges have been neutralized to pH 6 or above. If wastewater containing a listed acid is discharged below pH 6, then releases of the acid must be calculated and reported, except for hydrochloric and sulfuric acid which are only reportable in the aerosol form. For more information on calculating such discharges of acids, see EPA's *Estimating Releases of Mineral Acid Discharges Using pH Measurements* (EPA 745/F-97-003, June 1991).

Reminder: Reporting of Aqueous Ammonia

Facilities may use ammonia or ammoniated cleaners during boiler cleaning. When reporting releases and other waste management activities of ammonia, remember to report only 10 percent of the total amount of ammonia if released or managed in aqueous form.

No releases to water of chlorine are typically expected. Chlorine reacts very quickly with water to form HOC1, $C1^-$, and H^+. Although this is an equilibrium reaction; at a pH above 4, the equilibrium shifts almost completely toward formation of these products. Therefore, essentially zero releases of chlorine to water are expected to occur under normal circumstances.

Coal Pile Runoff. As discussed in Chapter 3, coal stored in exposed piles may be subject to rainfall, snowfall, spraying for dust control or to prevent freezing, which may create acidic leachate that flows in underground streams or collect under the piles forming runoff. In addition to the chemicals applied to the coal pile such as ethylene glycol, the dissolution of the metal compounds typically found in coal may lead to the manufacture of metal compounds. As a result, on-site storage of coal may result in coal pile run-off containing reportable EPCRA Section 313 chemicals. If you believe that conditions exist at your facility that generate and/or release EPCRA Section 313 chemicals from coal piles, then you should include this as a source of making threshold and release and other waste management calculations. In doing so, you may apply data used for threshold determinations. If you believe that these releases result in releases to surface water, you may combine these data with data on the estimated quantity of runoff to derive an estimate of EPCRA Section 313 chemicals released.

Storm Water Runoff. Storm water runoff at electricity generating facilities may contain EPCRA Section 313 chemicals washed from outdoor materials such as coal or other raw materials, waste, and land features. You must report the amount of non-exempt EPCRA Section 313 chemicals in storm water runoff (including unchanneled runoff). If you do not have periodic measurements of storm water releases, but have chemical-specific monitoring data on the reportable EPCRA Section 313 chemicals, you should use these data to calculate the quantity discharged and the percent contribution from storm water to the overall water discharge estimate. See the current *TRI Forms and Instructions* document for guidance on calculating storm water runoff.

4.2.4 Disposal to Land On-site, Section 5.5 of Form R.

Facilities dispose of combustion wastes (e.g., ash), FGD wastes, and other wastes on site. Accidental releases can also lead to EPCRA Section 313 chemicals being disposed to land on-site. Each of these is discussed below.

***Combustion Wastes*.** Some electricity generating facilities dispose of large amounts of ash containing EPCRA Section 313 chemicals on-site. Most electricity generating facilities dispose of ash at sites that are not contiguous or adjacent to the facility. Bottom or fly ash may be disposed in landfills, surface impoundments, or other waste management units. Some facilities may also dispose boiler slag (bottom ash particles in a molten state) containing EPCRA Section 313 chemicals.

Facilities must report all non-exempt releases of EPCRA Section 313 chemicals in ash that is disposed on-site, regardless of concentration, provided that thresholds have been exceeded for these chemicals. Ash disposed in a landfill or otherwise applied to the land is considered a waste management activity and must be reported.

Facility specific information, such as waste analyses and process knowledge, can be used to estimate amounts of EPCRA Section 313 chemicals in combustion wastes. In the absence of data determined to be better, facilities can use default values for concentrations of metals in ash, presented in

Table 4-8.

Table 4-8 Total Constituent Concentrations of Elements in Combustion Residuals

Element	Fly Ash (ppm)	Bottom Ash (ppm)	Oil Ash (ppm)
Antimony	131	10	1,072
Arsenic	6,300	168	10,000
Barium	13,800	9,360	1,000
Cadmium	130	10	11
Chromium	900	5,820	4,390
Copper	2,200	932	130,000
Lead	2,120	1,082	100,000
Manganese	3,000	1,940	1,170
Mercury	12	4.2	1
Nickel	4,300	2,939	180,000
Selenium	134	14	500
Silver	36	9.9	10
Vanadium	1,180	537	460,000
Zinc	3,500	1,796	100,000

Source: *Inorganic and Organic Constituents in Fossil Fuel Combustion Residues, Volume 1, Critical Review, Battelle, Pacific Northwest Laboratory* for EPRI, EA5176, August 1987.

Flue Gas Desulfurization (FGD) Wastes. Wet FGD systems result in a waste slurry of hydrated calcium sulfate and sulfite, and unreacted lime, which may be dewatered and/or stabilized with fly ash and disposed in impoundments or landfills. Dry FGD systems spray an alkaline solution into the flue gas to react with the sulfur oxides. The water from the solution evaporates into the flue gas, leaving a dry powder, which is collected by a particulate collector such as a baghouse, and often disposed on-site. Metal compounds coincidentally manufactured in FGD systems must be considered toward threshold determinations and release and other waste management calculations, and are not subject to the *de minimis* exemption.

Several data sources may be used to calculate the amount of EPCRA Section 313 chemicals in FGD wastes. These sources include waste analyses, NPDES permits, and waste characterization performed to meet state or other solid waste management requirements. The best "readily available" data should be used to estimate concentrations of EPCRA Section 313 chemicals in FGD sludge solids and liquors. In the absence of facility specific data, the values presented in Table 4-9 may be used to

estimate concentrations of certain trace metals in FGD sludge solids and liquors. Only the weight of the parent metal must be considered when reporting releases and other waste management activities of EPCRA Section 313 metal compounds.

Table 4-9. Concentrations of Certain Trace Metals in FGD Sludge Solids and Liquors

Trace Element	Sludge Solids (ppm)	Sludge Liquors (ppm)
Arsenic	52.0	0.1
Boron	530.0	76.0
Cadmium	25.0	0.1
Chromium	180.0	0.3
Copper	340.0	0.5
Mercury	6.0	0.1
Lead	290.0	0.5
Selenium	60.0	1.9

Source: The Release of Trace Metals From Limestone During Flue Gas Desulfurization by Electric Utilities, p.7.

Other Wastes. Electricity generating facilities may also dispose of other wastes such as filtration and coagulation residues, demineralization regenerant products, brine from reverse osmosis, slurries from polishers, blowdown from boilers and recirculating cooling water systems, cooling tower sludges, solids from oil filtration and settled materials from coal pile runoff. To calculate quantities of EPCRA Section 313 chemicals that may be present in these wastes, facilities can use waste analyses, process knowledge, operating records, pollution prevention data, mass balance or other readily available information sources.

Note that you must report the ultimate known disposition of an EPCRA Section 313 chemical in the reporting year. In other words, you may need to consider any cross-media transfers that may result from land disposal. If a waste has been disposed in a land disposal unit, but a portion of that waste volatilizes into the air, or a portion of that waste discharges to a surface water, the ultimate disposition of the reportable EPCRA Section 313 chemical during the reporting year must be reported for the year in which the waste was disposed. Therefore, only the quantity that remains in a surface impoundment, ash pond, or other land disposal unit must be reported as a release to land, while the amount that is released to another media must be reported as released to that media.

Accidental Releases to Land. Leaks, spills, and drips from the loading and transfer of oil and other materials received at the facility should be considered and reported in your release estimates. Data concerning specific incidents (such as notification reports or incident logs) should be used to estimate releases. In calculating quantities related to accidental releases, you are required to report the ultimate disposition in the reporting year of the EPCRA Section 313 chemical(s) released. For instance, releases to land (e.g., Other Disposal, Section 5.5.4 of Form R), would only include the quantity of spilled material which was not cleaned up as a response to the accident. Equations found in Section 6 of EPA's *Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Form*, provide guidance on calculating releases from chemical spills or leaks, including liquid discharges, fraction of discharge flashed, vaporization, two-phase discharges, and gas discharges.

Example - Seepage From a Landfill

If a facility in one of the new industries, which begins reporting for activities conducted in 1998, has information on the amount of seepage from a landfill in 1998, do they report this amount as a release to land, since they were not required to report the initial disposal to land in the previous year?

No, facilities are required to report only the amounts which are disposed during the year in which they are disposed, provided certain thresholds have been meet and the facility does not conduct any further activities involving amounts previously disposed. Amounts which move within the same media, such as seepage from a landfill to surrounding soils do not have to be included in release estimates in subsequent years. EPA requires reporting of the amount of EPCRA Section 313 chemical placed in an on-site landfill during the year. It is not necessary to estimate migration from the landfill in subsequent years, provided the facility does not conduct activities that further involve the EPCRA Section 313 chemical disposed.

4.2.5 Transfers Off-site, Section 6.2 of Form R.

Electricity generating facilities may send wastes off-site for waste management. Most commonly, combustion wastes will be sent off-site for disposal. For example, electricity generating facilities may send EPCRA Section 313 chemicals in ash off-site for disposal in a landfill. Facilities must report the quantities of EPCRA Section 313 chemicals in these wastes in Sections 6.2 and 8 of Form R. These amounts are reportable whether they are sent to a facility within the same company, or to a different company. For example, if an electricity generating facility sends ash to a landfill owned by the same company that is on non-contiguous, non-adjacent property (i.e., a separate facility), then the electricity generating facility must report those amounts as transferred off-site if the ultimate disposition in the reporting year is for disposal.

Waste Management Codes for Metals

Metals and metal compounds in wastewater sent off-site for treatment should be reported using code M62 - "Wastewater Treatment (Excluding POTW) - Metals and Metal Compounds Only". Similarly, metals in solids sent off-site for solidification or stabilization should be reported using code M41 - "Solidification/Stabilization - Metals and Metal Compounds Only". These codes are considered disposal codes for EPCRA Section 313 reporting purposes.

EPCRA Section 313 chemicals in ash sent off-site for use in mining reclamation or to be used as aggregate in road construction are also considered off-site transfers of wastes for disposal. These uses of ash are not considered analogous to using a substitute material with a commercial value. You must report amounts of EPCRA Section 313 chemicals in ash sent off-site for mining reclamation or for use as road aggregate on the Form R. Because these chemicals are being managed as a waste by the off-site location, the *de minimis* exemption does not apply.

The same methods discussed previously for estimating quantities disposed on-site can be used to estimate amounts sent off-site for disposal. Wastes sent off-site that are regulated under RCRA Subtitle C will also have waste analyses and waste profiles.

Electricity generating facilities may also distribute ash into commerce for use in the construction industry, or for metals recovery. When ash is distributed in commerce to be directly used by an off-site entity, the amounts of EPCRA Section 313 chemicals distributed in commerce are not reported on the Form R. For example, an electricity generating facility that sells ash to a construction facility who incorporates the ash directly into the manufacture of cement, does not report quantities of EPCRA Section 313 chemicals in that ash on the Form R. However, EPCRA Section 313 chemicals sent off-site in waste for recycling; for example, oil combustion ash sent off-site for vanadium recovery will undergo a waste management activity and should be reported on the Form R as a transfer off-site for recycling in Sections 6.2 and 8.5 of Form R. Facilities may use metal analyses of ash along with the quantities of the ash sent off-site for disposal or recycling to calculate the pounds of the metal transferred off-site.

Example - Storage of Ash on Land

Is ash placed on-site in a landfill waiting to be sold during construction season considered a release to land for the reporting year prior to its transfer?

Material that is placed in a landfill on site during a reporting year does not have to be reported as a release to land on-site if the landfill was only used for temporary storage. EPA will consider the landfill used for temporary storage if the facility routinely made off-site transfers of material from the pile during that reporting year or the facility had a contract in place before the end of the reporting year to transfer the material and transferred the material containing EPCRA Section 313 chemicals off-site before that year's report was required or by July 1, whichever comes first.

4.2.6 On-site Waste Management Methods, Section 7A, 7B, and 7C of Form R.

On-site waste management at electricity generating facilities include treatment and energy recovery. Recycling of wastes is not usually performed at electricity generating facilities.

On-site Treatment Methods, Section 7A of Form R. Electricity generating facilities may

treat wastes on-site using various methods. When completing a Form R for a chemical, you must report all treatment methods performed on the waste containing that chemical, regardless of its efficiency. For each treatment method, report the applicable code given in the *TRI Forms and Instructions* document. The following are some examples of treatment methods that electricity generating facilities may use:

1Ash or other solid wastes may pass through several steps, including filtration (P12), sludge dewatering (P13), settling/clarification (P11), and thermal drying/dewatering (F83).

2Facilities commonly treat flue gas using scrubbers (A03), electrostatic precipitators (A05), and baghouses (A06).

- Wastewater (such as coal pile runoff, boiler cleaning wastewater, etc.) may go through several treatment steps, including neutralization (C11), settling/clarification (P11), filtration (P12), chemical precipitation - lime or sodium hydroxide (C01), sludge dewatering - non-thermal (P13), or other physical treatment (e.g., evaporation) (P99).

- Some facilities incinerate (F99 and other F codes) plant maintenance wastes, such as those from boiler cleaning.

For metal compounds, the calculation of the reportable concentration and waste treatment efficiency must be based on the weight of the parent metal, not on the weight of the metal compounds. Metals are not destroyed, only physically removed or chemically converted from one form into another. The waste treatment efficiency reported must represent only physical removal of the parent metal from the waste stream (except for incineration), not the percent chemical conversion of the metal compound. If a listed waste treatment method converts but does not remove a metal (e.g., chromium reduction), the method must be reported with a waste treatment efficiency of zero.

All data available at your facility must be used to calculate waste treatment efficiency and the influent concentration of the EPCRA Section 313 chemical. If data are lacking, estimates can be made using best engineering judgement or other methods.

On-site Energy Recovery Processes, Section 7B. Facilities should only report energy recovery methods used on EPCRA Section 313 chemicals in wastes. Therefore, combustion of commercially available fuels, such as coal or oil, is not considered energy recovery under EPCRA Section 313 or the Pollution Prevention Act. Coal tar, a by-product of destructive distillation in the production of coke, is not a waste and, therefore, its combustion is not reportable in Section 7B (or Section 8) of Form R. As discussed in Chapter 4.1 of this document, facilities can only report energy recovery of EPCRA Section 313 chemicals if they have a significant heating value and are burnt on-site in a combustion unit that is integrated into an energy recovery system.

4.2.7 Source Reduction and Recycling Activities, Section 8 of Form R.

In chapter 4.1.3, the general method for developing Section 8 quantities was discussed. Two examples of how to calculate Section 8 quantities are presented below:

Table 4-10: Examples of Section 8 Reporting

Section	Metal Compounds	Sulfuric Acid (Acid Aerosols) and HCl (Acid Aerosols)
Section 8.1, Quantity released	Fugitive and stack air emissions, releases to water and POTW, and off-site waste transfers for disposal	Fugitive and stack air emissions (cannot release the aerosol in liquid or solid form)
Section 8.2, Quantity used for energy recovery on-site	Not applicable to these metal compounds that are products of combustion	Not applicable to these acid aerosols that are products of combustion
Section 8.3, Quantity used for energy recovery off-site	Not applicable to these metal compounds that are products of combustion	Not applicable to these acid aerosols that are products of combustion
Section 8.4, Quantity recycled on-site	Not generally performed at EGFs	Not generally performed at EGFs
Section 8.5, Quantity recycled off-site	Off-site waste transfers with recycling codes	Not generally transferred off site in aerosol form
Section 8.6, Quantity treated on-site	Not possible to destroy metal compound	Treated in scrubbers such as FGD systems
Section 8.7, Quantity treated off-site	Not possible to destroy metal compound	Not generally transferred off site in aerosol form

4.2.8 Source Reduction Activities, Section 8.10 of Form R.

Facilities have the opportunity to report source reduction actions initiated during the reporting year on the Form R using codes listed in the Form R and Instructions. Some examples of source reduction activities and suggested codes are given below.

- Reducing the frequency of boiler cleanings and, therefore, the amount of boiler cleaning wastes by tracking process chemistry and monitoring boiler cleanliness to determine more precisely the need for cleaning. (W13: Improved maintenance scheduling, recordkeeping, or procedures)

- Reducing the frequency of boiler cleanings and the amount of boiler cleaning wastes by applying a protective coating to the inside surfaces of boiler tubes to prevent accumulation of scale on tube surfaces. (W52: Modified equipment, layout or piping)

- Reducing the need for corrosion inhibitors in cooling towers by using inert construction materials, such as polyethylene and stainless steel, rather than carbon steel. (W42: Substituted raw materials, or W58: Other process modifications)

- Spraying coal piles with an anionic detergent to reduce bacterial oxidation of sulfide minerals, lowering the acidity of the pile, and decreasing the amount of EPCRA Section 313 chemicals in coal pile runoff. (W49: Other raw material modifications)

APPENDIX A
REPORTING GUIDANCE DOCUMENTS

General Guidance

Air/Superfund National Technology Guidance Study Series, no date.
Internet Availability: None
Hardcopy Availability: NTIS
Order Number: PB96-162-490

Chemicals in Your Community: A Guide to the Emergency Planning and Community Right-To-Know Act, 1993.
Internet Availability: http://www.epa.gov/swercepp/gen-pubs.html
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-550-K-93-003

Common Synonyms for Chemicals Listed Under Section 313 of the Emergency Planning and Community Right-To-Know Act, March 1995.
Internet Availability: None
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-745-R-95-008

Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act and Section 112(r) of the Clean Air Act, as amended (Title III List of Lists), November 1998.
Internet Availability: http://www.epa.gov/swercepp/gen-pubs.html
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-550-B-98-017

The Emergency Planning and Community Right-to-Know Act: Section 313 Release Reporting Requirements, December 1997 (brochure).
Internet Availability: None
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-745-K-97-002

EPCRA Section 313 Questions & Answers, Revised 1998 Version, December 1998.
Internet Availability: http://www.epa.gov/tri
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-745-B-99-004

Executive Order 12856 - Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements: Questions and Answers.
Internet Availability: None
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-745-R-95-011

Interpretations of Waste Management Activities: Recycling, Combustion for Energy Recovery, Treatment for Destruction, Waste Stabilization and Release, April 1997.
Internet Availability: None
Hardcopy Availability: EPCRA Hotline
Order Number: No order number

Standard Industrial Classification Manual, 1987.
Internet Availability: None (see http://www.epa.gov/tdbnrmrl/help/l_help7.htm for codes)
Hardcopy Availability: NTIS
Order Number: PB-87-100-012

Supplier Notification Requirements
Internet Availability: None
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-560-4-91-006

Toxic Chemical Release Inventory Reporting Forms and Instructions (TRI Forms and Reporting Requirements), March 23, 1998
Internet Availability: http://www.epa.gov/tri
Hardcopy Availability: NCEPI or EPCRA Hotline
Order Number: EPA-745-K-98-001

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Hardcopy Availability: NTIS
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(202) 260-0178 (fax)

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(703) 412-9810 (inside the Washington, DC Area)
TDD: (800) 553-7672 (outside the Washington, DC Area)
(703) 412-3323 (inside the Washington, DC Area)

RTK-Net
1742 Connecticut Avenue, NW
Washington, DC 20009-1146
(202) 797-7200
Internet Home Page: http://www.rtknet.org

Technology Transfer Network (TTN)
(919) 541-5384 (Help Desk)
Internet Home Page: http://www.epa.gov/ttn

EPA Toxic Release Inventory General Information and Guidance
Internet Home Page: http://www.epa.gov/tri

U.S. Government Printing Office (GPO)
(202) 512-1800
(202) 512-2250 (fax)
Internet Availability: http://www.gpo.gov

*For the latest list of industry-specific and other technical guidance documents, please refer to the latest version of the *Toxic Chemical Release Inventory Reporting Forms and Instructions, Appendix H.*

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