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EPA EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT - SECTION 313:

Guidance for Reporting Toxic Chemicals: Pesticides and Other Persistent Bioaccumulative Toxic (PBT) Chemicals

Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires certain facilities manufacturing, processing, or otherwise using listed toxic chemicals to report the annual quantity of such chemicals entering each environmental medium. Such facilities must also report pollution prevention and recycling data for such chemicals, pursuant to section 6607 of the Pollution Prevention Act, 42 U.S.C. 13106. When enacted, EPCRA Section 313 established an initial list of toxic chemicals that was comprised of more than 300 chemicals and 20 chemical categories. EPCRA Section 313(d) authorizes EPA to add chemicals to or delete chemicals from the list, and sets forth criteria for these actions. EPCRA Section 313 currently requires reporting on over 600 chemicals and chemical categories.

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DISCLAIMER

This guidance document is intended to assist industry with EPCRA Section 313 reporting for pesticides and other PBT chemicals. In addition to providing an overview of aspects of the statutory and regulatory requirements of the EPCRA Section 313 program, this document also provides recommendations and emission factors to assist industry with EPCRA reporting. These recommendations do not supersede any statutory or regulatory requirements, are subject to change, and are not independently binding on either EPA or covered facilities. Additionally, if a conflict exists between guidance on this site and the statutory or regulatory requirements, the conflict must be resolved in favor of the statute or regulation. Although EPA encourages industry to consider these recommendations and emission factors, in reviewing this document, industry should be aware that these recommendations and emission factors were developed to address common circumstances at typical facilities. The circumstances at a specific facility may significantly differ from those contemplated in the development of this document. Thus individual facilities may find that the recommendations and emission factors provided in this document are inapplicable to their processes or circumstances, and that alternative approaches or information are more accurate and/or more appropriate for meeting the statutory and regulatory requirements of EPCRA Section 313. To that end, industry should use facility specific information and process knowledge, where available, to meet the requirements of EPCRA Section 313. Facilities are encouraged to contact the Agency with any additional or clarifying questions about the recommendations and emission factors in this document, or if the facility believes that EPA has incorrectly characterized a particular process or recommendation. Additional guidance documents, including industry specific and chemical specific guidance documents, are also available at the EPA TRI website: <http://www.epa.gov/tri>.

SECTION 1.0 INTRODUCTION

Section 1.1 Background

On October 29, 1999, EPA promulgated the Final Rule on Persistent, Bioaccumulative, and Toxic (PBT) chemicals (64 FR 58666). This rule added several chemicals to Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) list of toxic chemicals and established lower reporting thresholds for these and other PBT chemicals that were already reportable under Section 313. The specific additions/revisions to the Toxics Release Inventory (TRI) reporting requirements for the chemicals covered in this document are summarized below in Table 1-1.

Table 1-1

Select Chemical Additions/Revisions Based on the PBT Chemical Rule

Chemical Name or Chemical Category	CASRN	Section 313 Reporting Threshold (pounds)
Aldrin	309-00-2	100
Benzo(g,h,i,)perylene[1,2]	191-24-2	10
Chlordane	57-74-9	10
Heptachlor	76-44-8	10
Hexachlorobenzene	118-74-1	10
Isodrin	465-73-6	10
Methoxychlor	72-43-5	100
Octachlorostyrene[1]	29082-74-4	10
Pendimethalin	40487-42-1	100
Pentachlorobenzene[1]	608-93-5	10
Polychlorinated biphenyl (PCBs)	1336-36-3	10
Tetrabromobisphenol A[1]	79-94-7	100
Toxaphene	8001-35-2	10
Trifluralin	1582-09-8	100

[1]These chemicals and chemical categories were added to the EPCRA Section 313 chemical list as a result of the PBT rule, published on October 29, 1999.
[2]Benzo(g,h,i)perylene is a PAC; however it is listed separately on the EPCRA Section 313 chemical list and is not part of the PAC chemical category.

The chemicals presented in Table 1-1 are referred to as "PBT Chemicals" throughout this document. The purpose of this guidance document is to assist facilities in complying with the reporting requirements of EPCRA Section 313 for these PBT chemicals. Table 1-1 lists the reporting thresholds for the PBT chemicals discussed in this guidance document. Facilities that meet the EPCRA Section 313 employee threshold and SIC code requirements, and that exceed the reporting threshold for these PBT chemicals are subject to the new EPCRA Section 313 annual reporting requirements beginning with reporting year 2000, with the first reports due by July 1, 2001.

This document explains the EPCRA Section 313 reporting requirements, and provides guidance on how to estimate annual releases and other waste management quantities of PBT chemicals from certain industries and industrial activities. Because each facility is unique, the recommendations presented may have to be adjusted to the specific nature of operations at your facility or industrial activity.

A primary goal of EPCRA is to increase the public's knowledge of, and access to, information on the presence and release and other waste management activities of EPCRA Section 313 toxic chemicals in their communities. Under EPCRA Section 313, certain facilities exceeding reporting thresholds are required to submit annual toxic chemical release forms. These forms 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. EPCRA mandates that EPA establish and maintain a publicly available database consisting of the information reported under Section 313. This database, known as the Toxics Release Inventory (TRI), can be accessed through the following sources:

- EPA's Internet site, www.epa.gov/tri;
- TRI Explorer Internet site, www.epa.gov/triexplorer;
- Envirofacts Warehouse Internet site, www.epa.gov/enviro/html/tris/tris_overview.html; and
- EPA's annual TRI data release materials (summary information).

The objectives of this guidance document are to:

- Provide explanation and assistance on EPCRA Section 313 reporting requirements for select PBT chemicals;
- Promote consistency in the method of estimating annual releases and other waste management quantities of select PBT chemicals for certain industries and industrial classes; and
- Reduce the level of effort expended by those facilities that prepare an EPCRA Section 313 report for these PBT chemicals.

Section 1.2 Who Must Report?

To understand the following discussion 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, which is controlled by, or which is under common control with such person)." (EPCRA Section 328(4)). 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 where services or industrial operations are performed" (40 CFR 372.3).

EPA recognizes that for business reasons it may be easier and more appropriate for establishments at one facility to report separately. However, the combined quantities of EPCRA Section 313 chemicals and chemical categories manufactured, processed, or otherwise used in all establishments making up that facility must be considered for threshold determinations. Also, the combined release and other waste management activities reported singly for each establishment must total those for the facility as a whole (40 CFR 372.30(c)).

Note that if a facility is comprised of more than one establishment, once an activity threshold is met by the facility, provided that the facility meets the SIC Code and employee threshold criteria, release and other waste management activities from all establishments at the facility must be reported (40 CFR 372.30(c)).

A facility is subject to the provisions of EPCRA Section 313, if it meets all three of the following criteria:

- It is included in Standard Industrial Classification (SIC) codes 20 through 39; SIC code 10 (except SIC codes 1011, 1081, and 1094); SIC code 12 (except SIC code 1241); SIC code 4911 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), SIC code 4931 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce), or SIC code 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce); SIC code 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, subtitle C, 42 U.S.C. section 6921 *et seq*.); SIC code 5169; SIC code 5171; or SIC code 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); and

- It has 10 or more full-time employees (or the equivalent of 20,000 hours per year); and

- It manufactures (includes imports), processes, or otherwise uses any of the toxic chemicals listed on the EPCRA Section 313 list in amounts greater than the threshold quantities established in 40 CFR 372.25, 372.28. See Section 1.3.

These three criteria alone, not a facility's release and other waste management quantities, determine whether a facility must prepare an EPCRA Section 313 report. A facility that meets these three criteria is still required to prepare an EPCRA Section 313 report even if that facility has no releases and other waste management quantities of EPCRA Section 313 chemicals or chemical categories.

In addition, pursuant to Executive Order 13148 entitled "Greening the Government Through Leadership in Environmental Management," federal facilities are required to comply with the reporting requirements of EPCRA Section 313. This requirement is mandated regardless of the federal facility's SIC code.

Section 1.3 What are the Reporting Thresholds for PBT Chemicals?

Thresholds are specified amounts of listed toxic chemicals manufactured, processed, or otherwise used during the calendar year that trigger reporting requirements. EPCRA Section 313 establishes default reporting thresholds, but authorizes EPA to establish lower thresholds for particular chemicals, classes of chemicals, or categories of facilities, if a different threshold is warranted. EPA has used this authority to establish lower thresholds for PBT chemicals (see 40 CFR 370.28; 64 FR 58666). Therefore, provided the facility meets the SIC code and employee threshold criteria, reporting is required for the PBT chemicals aldrin, methoxychlor, pendimethalin, tetrabromobisphenol A, and trifluralin:

- If a facility *manufactures* more than 100 pounds of that PBT chemical during the calender year.
- If a facility *processes* more than 100 pounds of that PBT chemical during the calender year.
- If a facility *otherwise uses* more than 100 pounds of that PBT chemical during the calender year.

In addition, provided that the facility meets the SIC code and employee threshold criteria, reporting is required for the PBT chemicals benzo(g,h,i)perylene, chlordane, heptachlor, hexachlorobenzene, isodrin, octachlorostyrene, pentachlorobenzene, polychlorinated biphenyl (PCBs), and toxaphene:

- If a facility *manufactures* more than 10 pounds of that PBT chemical during the calendar year.
- If a facility *processes* more than 10 pounds of that PBT chemical during the calendar year.
- If a facility *otherwise uses* more than 10 pounds of that PBT chemical during the calendar year.

The terms manufacture, process, and otherwise use are defined at 40 CFR 372.3 as:

Manufacture means to produce, prepare, import, or compound a toxic chemical. Manufacture also applies to a toxic chemical that is produced coincidentally during the manufacture, processing, otherwise use, or disposal of another chemical or mixture of chemicals, including a toxic chemical that is separated from that other chemical or mixture of chemicals as a byproduct, and a toxic chemical that remains in that other chemical or mixture of chemicals as an impurity.

Process means the preparation of a toxic 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 substance, or (2) As part of an article containing the toxic chemical. Process also applies to the processing of a toxic chemical contained in a mixture or trade name product.

Otherwise use means any use of a toxic chemical, including 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 a toxic chemical does not include disposal, stabilization (without subsequent distribution in commerce), or treatment for destruction unless:

(1) The toxic chemical that was disposed, stabilized, or treated for destruction was received from offsite for the purposes of further waste management; or

(2) The toxic 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. Relabeling or redistributing of the toxic chemical in which no repackaging of the toxic chemical occurs does not constitute otherwise use or processing of the toxic chemical.

The quantities of PBT chemicals included in threshold determinations are not limited to the amounts released to the environment. All PBT chemicals manufactured, processed, or otherwise used are to be counted toward threshold determinations, including any amount of PBT chemicals that may be generated in closed systems. Quantities required to meet the threshold for some fuels and other raw materials may be found in Table 3-1. For more information on threshold determinations for PBT chemicals, see Section 3.1.1.

Section 1.4 What Other Changes to the EPCRA Section 313 Reporting Requirements Apply to PBT Chemicals?

EPA has also made modifications and/or clarifications to certain reporting exemptions and requirements for the PBT chemicals that are subject to the lower reporting thresholds. Each of the changes as they apply to PBT chemicals is discussed in the following subsections.

1.4.1 *De Minimis* Exemption

The *de minimis* exemption allows facilities to disregard certain minimal concentrations of toxic chemicals in mixtures or other trade name products they process or otherwise use when making threshold determinations and release and other waste management calculations.

EPA eliminated the *de minimis* exemption for EPCRA Section 313 PBT chemicals. This means that facilities are required to include all amounts of PBT chemicals in threshold determinations and all amounts of PBT chemicals in release and other waste management calculations regardless of the concentration of PBT chemicals in mixtures or trade name products (40 CFR 372.38(a)). However, the elimination of the *de minimis* exemption for PBT chemicals does not affect the applicability of the *de minimis* exemption to the supplier notification requirements.

1.4.2 Alternate Reporting Threshold (One Million Pounds) and Form A

The "Alternate Threshold for Facilities with Low Annual Reportable Amounts," provides facilities otherwise meeting EPCRA Section 313 reporting thresholds the option of certifying on a Form A (a two-page certification statement) that they do not exceed 500 pounds for the total annual reportable amount for that chemical, and that their amounts manufactured, processed, or otherwise used for that chemical do not exceed one million pounds.

EPA has excluded PBT chemicals from eligibility for the "Alternate Threshold for Facilities with Low Annual Reportable Amounts" (40 CFR 372.27(e)). Therefore, the alternate threshold of one million pounds and the Form A certification statement are not options for PBT chemicals.

1.4.3 Range Reporting

For facilities with total annual releases or off-site transfers of an EPCRA Section 313 chemical of less than 1,000 pounds, EPA generally allows the amounts to be reported on the Form R either as an estimate or by using ranges.

For PBT chemicals, EPA has eliminated the range reporting option for releases and other waste management activities. This means that for those sections of the Form R for which range reporting is an option, the option cannot be used when reporting on PBT chemicals (40 CFR 372.85 (b)(15)(i)). Thus, facilities are required to report an actual number rather than a selected range. However, the elimination of range reporting for PBT chemicals for releases and transfers does not affect the applicability of range reporting of the maximum amount on site as required by EPCRA Section 313(g).

1.4.4 Data Precision

Facilities should report for PBT chemicals at a level of precision supported by the data and the estimation techniques on which the estimate is based. However, the smallest quantity that need be reported on the Form R for PBT chemicals is 0.1 pounds.

SECTION 2.0 SOURCES AND USES OF PESTICIDES AND OTHER SELECT PBT CHEMICALS

The following paragraphs describe pesticides and other select chemicals regulated by the PBT rule. Please be aware that while some historical frequency data are provided below, the lower reporting thresholds now in effect are expected to increase the number of reports submitted for each chemical.

Aldrin

Aldrin is a soil insecticide that was used on crops from the 1950s until the early 1970s, at which time all uses except termite control were canceled. Aldrin is now listed by EPA as a canceled pesticide, and it is no longer manufactured or used in any circumstance in the United States. The collection and eventual destruction of aldrin at Resource Conservation Recovery Act (RCRA) Subtitle C transfer and disposal facilities falls under the TRI reporting requirements. This chemical may still be otherwise used and should continue to be reported to the EPA for TRI purposes. One Form R was received for aldrin in 1999.

Benzo(g,h,i)perylene

Benzo(g,h,i)perylene is a polycyclic aromatic compound (PAC). It may be found in oil, coal, wood, and natural gas. Formation of benzo(g,h,i)perylene and other PACs occurs as a by-product of incomplete combustion. Fossil fuel combustion for heat and power generation is the primary source of PACs; however, other industrial processes also contribute. For example, benzo(g,h,i)perylene may be manufactured during synthetic fuel production, coal processing, and petroleum refining. For more information on sources of PACs and benzo(g,h,i)perylene, refer to U.S. EPA's *Guidance for Reporting Toxic Chemicals: Polycyclic Aromatic Compounds Category.* Benzo(g,h,i)perylene was added to the EPCRA Section 313 list of toxic chemicals in 1999.

Chlordane

Chlordane is a broad-spectrum insecticide that was used on agricultural crops, in homes and gardens, for turf and ornamentals, and for termite and ant control. It has been banned from domestic use since 1988, but was manufactured for export up until 1997 by one corporation. Chlordane collected and disposed of at RCRA Subtitle C transfer and disposal facilities should continue to be reported to EPA for TRI purposes. In 1999, four Form R reports were submitted for chlordane.

Heptachlor

Heptachlor was first registered in the United States in 1952 for use as a broad-spectrum insecticide, but was also used for home and garden insect control, for termite control, and as a seed treatment. It is presently used in the United States only to control fire ants in buried transformer and telephone/cable boxes. The production of heptachlor in the United States ended in 1997, but heptachlor collected and disposed of at RCRA Subtitle C transfer and disposal facilities should continue to be reported to EPA for TRI purposes. In 1999, four Form R reports were submitted for heptachlor.

Hexachlorobenzene

Hexachlorobenzene was produced up until 1985 as a pesticide/fungicide used to treat wheat seeds, onions, and sorghum. It is no longer used as an active ingredient; however, it is contained as an impurity or formed as a by-product during the manufacturing of several common pesticides currently in use including atrazine, lindane, maleic anyhydride, and propazine.

Hexachlorobenzene may also be produced as a by-product in the manufacture of chlorinated organics (such as carbon tetrachloride, perchloroethylene, trichloroethylene, ethylene dichloride, and 1,1,1-trichloroethane), in certain metal smelting and refining operations, during the combustion of chlorinated organic chemicals, and in coal-fired utility boilers. It is usually

found in the still bottoms generated during chlorinated organic chemical purification and may be emitted from distillation columns. Hexachlorobenzene may also be indirectly produced during chlorine manufacturing, tire manufacturing, and some metal manufacturing operations (metallic magnesium and aluminum foundries/smelters) (1,3,4). In 1999, 20 Form Rs were submitted for hexachlorobenzene.

Isodrin

Isodrin is an insecticide that is no longer manufactured or used commercially in the United States. Small releases or other waste management activities of isodrin may be reported in TRI as remaining stockpiles are collected for destruction. In addition to any residual release or other waste management activities from the manufacture and use of isodrin, it may also be indirectly created/released from coal mining, foundries, waste incineration, and nonferrous metals manufacturing. Although it was reportable, no Form Rs were submitted for isodrin in 1999.

Methoxychlor

Methoxychlor is currently used as an insecticide to control flies, mosquitoes, cockroaches, chiggers, and a variety of other insects. Methoxychlor and other related methoxychlor products are used on fruits, vegetables, and other plants (10). Reporting is expected during manufacturing, formulation, packaging, and disposal of methoxychlor. In 1999, three Form Rs were submitted for methoxychlor.

Octachlorostyrene

Octachlorostyrene is not manufactured as a commercial product, and no commercial uses of octachlorostyrene are known. It is a possible by-product of chlorine production, metal product/finishing operations, pesticide manufacturing, and high-temperature incineration of chlorinated hydrocarbons (especially plastic wastes). It has been identified as a by-product from the manufacture of carbon tetrachloride and perchloroethylene.

Added to the EPCRA Section 313 list of toxic chemicals in 1999, octachlorostyrene has not been reportable to EPA for TRI purposes in the past. Due to its structural similarity to hexachlorobenzene it may be manufactured as a by-product in many of the same processes as hexachlorobenzene.

Pendimethalin

Pendimethalin is currently used as an insecticide and herbicide on a variety of agricultural crops. It is currently registered as the active ingredient in 58 pesticide products intended for agricultural, domestic, and commercial uses. Reporting of pendimethalin is expected to occur from manufacturing, formulation, packaging, and activities associated with its use. In 1999, ten Form Rs were submitted for pendimethalin.

Pentachlorobenzene

Pentachlorobenzene is used exclusively as an intermediate in the production of the fungicide pentachloronitrobenzene (quintozene). It is found in the quintozene process waste stream as an unreacted intermediate and in the final product as an impurity. Pentachlorobenzene may be produced whenever organic compounds are burned in the presence of a chlorine source, as well as in small quantities in waste incineration, cement kilns, and secondary copper production processes.

Information on releases of pentachlorobenzene is limited. However, it is structurally similar to hexachlorobenzene and may be a by-product in chemical reactions that are known to produce hexachlorobenzene as a by-product.

Pentachlorobenzene was not reportable to EPA for TRI purposes in 1999. However, eight Form Rs were submitted for quintozene. Since pentachlorobenzene is found in the quintozene process waste stream it is expected that pentachlorobenzene will also be reported at the same facilities.

Polychlorinated Biphenyls (PCBs)

PCBs (Chemical Abstract Service Registry Number 1336-36-3) are a group of over 200 synthetic halogenated aromatic hydrocarbons that were commercially used and sold as a mixture of isomers. Since the 1930s, PCBs have been used as dielectric agents (high- and low-voltage power capacitors and small industrial capacitors in equipment such as air conditioners, pumps, and fans), heat transfer agents, lubricants, flame retardants, plasticizers, and waterproofing materials. Depending on conditions, PCBs may be inadvertently created in some chlorinated organic chemical processes.

While many boilers and other combustion facilities burn virgin oil, some do not. That is, some facilities use fuel which has been gathered from other locations by oil recyclers; this fuel is commonly called "used oil". In some instances, used oil may contain PCBs. If your facility combusts used oil and you do not have better data, assume that the upper bound concentration of PCBs is 2 ppm. If, for example, a boiler is a TSCA-qualified combustion facility, then the concentration of PCBs may be greater than 2 ppm.

Domestic production of PCBs was banned in 1976. In 1979, the PCB Ban Rule was issued requiring all non-totally enclosed PCB activity to be authorized by EPA. Examples of authorized activities include servicing PCB transformers and PCB-contaminated transformers, servicing railroad transformers and mine equipment, and use in heat transfer and hydraulic systems.

In general, PCBs may be released from the authorized handling of PCBs in the activities described above, the waste management activities associated with PCB-contaminated wastes, and from combustion processes. Specific activities that might lead to releases of PCBs include used oil handling at bulk stations and bulk terminals, residual oil combustion, waste incineration (tires, medical/biological/hazardous/municipal waste, and sewage sludge), and any waste management activities in which PCB-contaminated soil, transformers, capacitors, or other materials are handled. In 1999, 16 Form Rs were submitted for PCBs.

Tetrabromobisphenol A

Tetrabromobisphenol A (TBBPA) is the largest globally produced brominated flame retardant. It is often used in plastics and engineering resins for printed circuit boards and computer equipment. TBBPA may be used as a reactive or additive flame retardant in acrylonitrile-butadiene-stryrene (ABS) resins, epoxy and polycarbonate resins, high-impact polystyrene, unsaturated polyester resins, and thermoplastic polymers. When TBBPA is used as a reactive flame retardant, it is chemically transformed into another substance. In this instance, TBBPA is not present in the finished substance, except as trace amounts of unreacted starting material.

TBBPA is currently only produced at two facilities in the United States. TBBPA releases and other waste management activities associated with these facilities should be reported to TRI. Other reporting is expected from facilities using TBBPA in the manufacture of consumable goods such as televisions, VCRs, computer wire and cable, printed circuit boards, and computer housings. Many products containing TBBPA may be subject to the EPCRA Section 313 article exemption.

Reporting year 2000 will be the first year TBBPA is reported under EPCRA Section 313. However, in 1999, 124 Form Rs were submitted for decabromodiphenyl oxide (DBDPO), a similar brominated flame retardant used in various resins.

Toxaphene

Toxaphene is a polychlorinated camphene that was first commercialized in 1948 and became one of the most widely used chlorinated pesticides in the history of U.S. agriculture. It was used on a variety of crops as well as on livestock and poultry. All domestic uses of toxaphene were banned in 1990, but it is still used as an insecticide on bananas and pineapples in Puerto Rico and the Virgin Islands. Efforts made in several states to collect out of date and banned pesticides have resulted in the collection of tens of thousands of pounds of toxaphene,

which were presumably sent to RCRA Subtitle C transfer and disposal facilities. Four Form Rs were received for toxaphene in 1999.

Trifluralin

Trifluralin is a herbicide that is currently used primarily on cotton and soybean crops. In 1995, trifluralin use was estimated to be 25.6 million pounds. As this herbicide continues to be manufactured, releases and waste management activities associated with its manufacture and distribution should continue to be reported in TRI. In 1999, 11 Form Rs were submitted for trifluralin.

SECTION 3.0 GUIDANCE ON ESTIMATING ENVIRONMENTAL RELEASES OF PBT CHEMICALS

Section 3.1 General Guidance

EPA is providing the following guidance for use by facilities in estimating and reporting annual releases and other waste management quantities for PBT chemicals. It is not designed to provide exhaustive guidance for all situations involving PBT chemicals. Guidance documents for reporting the following PBT chemicals are also available: polycyclic aromatic carbons, mercury and mercury compounds, and dioxin and dioxin-like compounds. Please consult industry specific guidance documents applicable to your facility for more detailed guidance. Additional information and guidance is also available from the EPA's EPCRA Hotline, **1-800-424-9346**, and the Toxics Release Inventory (TRI) website at **http://www.epa.gov/tri**. EPA also publishes an annual guidance document for EPCRA Section 313 reporting entitled *Toxic Chemical Release Inventory Reporting Forms and Instructions*. You should consult the most current version before preparing any report for your facility.

This document includes concentration and emission factor data which may be used as default values in calculating activity thresholds, releases and other waste management quantities. EPA recommends that facilities complete these calculations using best readily available information applicable to their operations, even when it differs from the data provided herein. EPA also recommends that facilities maintain documentation of the basis for making these estimates. Facilities are not required to perform additional testing for EPCRA Section 313 reporting.

3.1.1 Threshold Determination

As mentioned previously, EPA lowered the reporting threshold for PBT chemicals for each of the reporting activities (manufacturing, processing, and otherwise use). Each activity threshold is determined independently. When determining if a threshold is exceeded for PBT chemicals, you should calculate the amount of each PBT chemical

manufactured, the amount of each PBT chemical processed, and the amount of each PBT chemical otherwise used. Quantities required to meet the threshold for some fuels and other raw materials may be found in Table 3-1. The following example illustrates how to determine if a threshold has been exceeded for a PBT chemical.

Example – Threshold Determination Using Published Data

This sample calculation illustrates the use of published chemical-specific concentration data to determine threshold quantities.

Your facility has a primary SIC Code covered by EPCRA Section 313 reporting requirements and has over 200 full-time employees. Your facility requires large quantities of steam in the manufacturing process generated by oil-fired boilers. The No. 6 fuel oil you purchase to use in the boilers contains trace amounts of benzo(g,h,i)perylene. The combustion of the fuel oil constitutes otherwise use of benzo(g,h,i)perylene. You need to determine if your facility otherwise uses benzo(g,h,i)perylene in an amount exceeding the annual reporting threshold of 10 pounds.

To determine if your facility exceeds the otherwise use threshold for benzo(g,h,i)perylene, you must determine the amount of benzo(g,h,i)perylene present in the No. 6 fuel oil you purchased. Using the concentration in Table 3-1, benzo(g,h,i)perylene is present in residual fuel at a concentration of 26.5 ppm. The density of No. 6 fuel oil is 8 lb/gal, and your facility used 144,000 gallons of No. 6 fuel oil during the reporting year. The quantity used to determine if you are required to report may be calculated as follows:

(144,000 gal/yr oil consumed) × (26.5 lb benzo(g,h,i)perylene/1E+6 lb residual oil) × (8 lb/gal oil density)
= 30.5 lb/yr benzo(g,h,i)perylene used

Your facility exceeded the otherwise used threshold of 10 lb/year and is required to report.

The concentration of an EPCRA Section 313 PBT chemical may be known as a specific concentration, as an average, as a range, or as an upper or lower boundary. If you know the specific concentration of the EPCRA Section 313 chemical in the stream, you must use that value (40 CFR 372.30 (b)(i). If only an average concentration is provided (e.g., by the supplier), use that value in the threshold calculation. If only the upper bound concentration is known, you must use that value in the threshold calculation (40 CFR 372.30(b)(3)(ii)). If only the lower bound concentration is provided or the concentration is given as a range or an upper and lower boundary, EPA has developed the following guidance on the use of this type of information in threshold determinations:

- If the concentration is given as a range or an upper and lower boundary, EPA recommends that you use the mid-point in your calculations.

- If only the lower bound concentration of the EPCRA Section 313 chemical is given and the concentrations of the other components are given, EPA recommends that you subtract the other component total from 100% to calculate the upper bound of the PBT chemical concentration. EPA then recommends that you should then determine the mid-point for use in your calculations.

- If only the lower bound concentration of the EPCRA Section 313 chemical is given and the concentration of the other components is not given, EPA recommends that you assume the upper bound for the PBT chemical is 100% and use the mid-point. Alternatively, product quality requirements or information available from the most similar process stream may be used to determine the upper bound of the range.

Chemical production facilities may manufacture PBT chemicals for other industry use. Production records are a great source for determining the amount manufactured. You must also include the importing of PBT chemicals in your manufacturing threshold determination. (EPCRA Section 313 (b)(l)(c)(i)). You should easily obtain these amounts from purchasing records.

Table 3-1 provides concentrations of benzo(g,h,i)perylene in fuels. EPA recognizes that the scientific literature shows that there is significant variability in the concentrations of benzo(g,h,i)perylene in fuels. As always, facilities should use the best available information that is applicable to their operations. In the absence of better data, EPA recommends using the default values listed in Table 3-1 for these commonly used fuels.

Diesel fuel is also a likely source of benzo(g,h,i)perylene; EPA does not have a default value for sites to use at this time.

Table 3-1

Quantity of Benzo(g,h,i)perylene Required to Meet the Reporting Threshold in Common Fuels

Fuel Type	Benzo(g,h,i)perylene Concentration (ppm)	Reference	Quantity Needed to Meet Threshold (gallons)[b]
No. 2 Fuel Oil	0.05	11	2.82×10^7
No. 6 Fuel Oil (Bunker C)	26.5	12	4.78×10^4
Gasoline	2.55	13	7.00×10^5
Paving Asphalt	1.2	6	7.69×10^5
Crude Oil	(a)		

(a) Benzo(g,h,i)perylene concentration in crude oil depends on the crude oil type. Additional benzo(g,h,i)perylene may be formed during petroleum refining operations.
(b) Assumes the following densities: No. 2 Fuel Oil = 7.1 lb/gallon; No. 6 Fuel Oil = 7.9 lb/gallon; gasoline = 5.6 lb/gallon; and paving asphalt = 10.84 lb/gallon.

If you perform threshold calculations for benzo(g,h,i)perylene, you should also perform threshold calculations for the polycyclic aromatic compound (PAC) category. Benzo(g,h,i)perylene (a PAC) is reported separately from the PAC chemical category. The reporting threshold for benzo(g,h,i)perylene is 10 lb/yr and the reporting threshold for the PAC category is 100 lb/yr. If you exceed a reporting threshold for both benzo(g,h,i)perylene and the PAC category, separate Form Rs must be submitted. For more information on the PAC chemical category, refer to the EPCRA Section 313 *Guidance for Reporting Toxic Chemicals*: *Polycyclic Aromatic Compounds Category.*

3.1.2 Exemptions

EPA has established four classes of exemptions: *de minimis*, article, facility/laboratory related, and activity related. Chemicals or chemical categories that qualify for these exemptions may be excluded from threshold determinations and release or other waste management estimations.

The PBT final rule states that the *de minimis* exemption does not apply to PBT chemicals or chemical categories (40 CFR 372.38(a)).

For purposes of the article exemption (40 CFR 372.38(b)), an article is defined as a manufactured item that:

- 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 or chemical category under normal conditions of processing or otherwise use of the item at the facility (40 CFR 372.3).

If you receive a manufactured article from another facility (e.g., a transformer containing PCBs), the PBT chemical in that article may be exempt from threshold determinations and release and other waste management calculations if you meet the following:

- You process or otherwise use it without changing the shape or design; and
- Your processing or otherwise use does not result in the release of more than 0.5 pound of the PBT chemical or any other TRI chemical in a reporting year from all like articles.

COMMON ERROR - PCBs in Articles

EPA has stated that transformers are *articles* (and thus exempt from threshold determinations), but that the *release* or removal of fluid from the transformer negates the *article* status. The *article* status of only those transformers that have fluids removed (e.g., servicing or retro filling), or have fluids escape are affected. However, the PCBs are still not considered towards the reporting threshold if no new PCB-containing fluid is added, since the threshold determination is based on fluid added, not lost.

EPA has stated that disposal or removal of *articles* does not constitute a *release*. Therefore, disposal on site, or off-site transfer of the whole transformer with fluid content undisturbed, does not negate the *article* status. The transformer is not included in threshold determinations and does not have to be reported as a *release* or an off-site transfer of PCBs for purposes of Section 313 reporting.

When calculating the threshold for *otherwise use*, a facility must consider only the amount of PCBs added to transformers during the reporting year (e.g, "topping off" a transformer), not the amount of working fluid contained in the transformer. (Ref: USEPA, 1998 EPCRA Section 313 Q&A, Directive #6)

Any PBT chemicals manufactured, processed, or otherwise used in laboratories under the supervision of a technically qualified individual may be exempt from threshold determinations and release and other waste management calculations (40 CFR 372.38(d)).

The activity-related exemptions are available for PBT chemicals (see 40 CFR 372.38.)

Section 3.2 Methods for Calculating Annual Releases and Other Waste Management Quantities of PBT Chemicals

You must estimate release and other waste management quantities if the reporting threshold for one of the manufacturing, processing, or otherwise use activities is exceeded. EPA recommends that you calculate PBT releases and other waste management activities by following these steps:

1. Identify the processes/operations in which PBT chemicals may be manufactured, processed, or otherwise used.

2. Determine potential sources of releases and other waste management activities (e.g., process wastewater discharge, emissions from operations).

3. Identify the types of releases and other waste management activities. These types correspond to the Form R (e.g., stack emissions, sent off site for recycling).

4. Determine the most appropriate estimation method(s) and calculate the estimates for release and other waste management quantities.

During threshold determinations, you should have identified the processes and operations in which PBT chemicals are found. Potential release and other waste management sources of PBT chemicals include the following:

- Accidental spills and releases;
- Air pollution control devices (e.g., baghouses, electrostatic precipitators, and scrubbers);
- Clean up and housekeeping practices;
- Combustion by-products;

- Container residues;
- Process discharge stream;
- Recycling and energy recovery by-products;
- Storage tanks;
- Tower stacks;
- Transfer operations;
- Treatment sludge;
- Volatilization from processes; and
- Waste treatment discharges.

After determining the release and other waste management activity sources of PBT chemicals, you are ready to determine the types of releases and other waste management activities. These final destinations of PBT chemicals (not including incorporation into a final product) correspond to elements of the Form R. The potential types of releases and other waste management activities include:

- Fugitive or nonpoint air emissions (Part II, Section 5.1 of Form R): PBT chemical emissions are considered to be fugitive if not released through stacks, vents, ducts, pipes, or any other confined air stream. You must include (1) fugitive equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines, etc.; (2) evaporative losses from surface impoundments and spills; (3) releases from building ventilation systems; and (4) any other fugitive or non-point air emissions.

- Stack or point air emissions (Part II, Section 5.2 of Form R): PBT chemical emissions are considered to be stack if released through stacks, confined vents, ducts, pipes, or other confined air streams. You must include storage tank emissions. Air releases from air pollution control equipment would generally fall in this category. Using the control efficiency of an air pollution control device, you can determine how much of the PBT chemical is released through the air device.

- Discharges to receiving streams or water bodies (Part II, Section 5.3 of Form R): PBT chemicals may be released in wastewater directly from the process or from a treatment system. Monitoring is often performed at either type of outfall. This information can be used to determine the concentrations of PBT chemicals leaving the facility.

- Underground injection on site (Part II, Section 5.4 of Form R): This waste management type is not common for PBT chemicals.

- Disposal to land on site (Part II, Section 5.5 of Form R): This type of release may occur if materials containing PBT chemicals are spilled during processing or transfer operations.

- Discharges to Publicly Owned Treatment Works (POTW) (Part II, Section 6.1 of Form R): As with the receiving stream discharge, monitoring may be available to determine the PBT chemical concentration in a waste stream from a process or from a treatment operation.

- Transfers to other off-site locations (Part II, Section 6.2 of Form R): This type includes transferring PBT chemicals off site for recovery. Other sources include used baghouse wastes sent to landfills, or other PBT chemical wastes sent off site for disposal, treatment, or recycling.

- On-site waste treatment (Part II, Section 7A of Form R): You should report the amount of PBT chemicals treated by your facility. Following treatment, PBT chemicals may be present in sludge or the water (at a reduced concentration).

- On-site energy recovery (Part II, Section 7B of Form R): EPA believes that chemicals that do not contribute significant heat energy during the combustion process should not be considered for energy recovery.

- On-site recycling (Part II, Section 7C of Form R). If you perform recycling, you should report the amount recycled in Section 7C of the Form R.

After you have identified all of the potential sources for release and other waste management activities, you must estimate the quantities of PBT chemicals released and otherwise managed as waste from these sources.

EPA has identified four basic methods that may be used to develop estimates (each method has been assigned a code that must be included 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 the U.S. EPA publication, *Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Release Inventory Forms* (8).

Many data sources exist for these (and other) methods of developing estimates. Table 3- 2 presents potential data sources and the estimation methodology in which each estimation source is most likely to prove useful. Based on site-specific knowledge and potential data sources available, you should be able to determine the best method for calculating each release and other waste management activity quantity.

Air emission monitoring for PBT chemicals may be required under industry National Emission Standards for Hazardous Air Pollutants (NESHAPs), referred to as Maximum Achievable Control Technology (MACT) Standards. The HAP list includes PCBs, chlordane, heptachlor, hexachlorobenzene, methoxychlor, toxaphene, and trifluralin. Standards have been finalized for some industry source categories and additional categories are upcoming.

Emission factors that may apply to the PBT chemicals addressed in this document are presented in Table 3-3. Note that emission factor units vary from one factor to another.

Table 3-2

Potential Data Sources for Release and Other Waste Management Calculations

DATA SOURCES	
Monitoring Data C Air permits C Continuous emission monitoring C Effluent limitations C Hazardous waste analysis C Industrial hygiene monitoring data C NPDES[1] permits C Outfall monitoring data C POTW pretreatment standards C RCRA[2] permit C Stack monitoring data C New Source Performance Standards C Title V Permit Data C MACT[7] Standards **Emission Factors** C AP-42[3] chemical specific emission factors C Facility or trade association derived chemical-specific emission factors	**Mass Balance** C Air emissions inventory C Hazardous material inventory C Hazardous waste manifests C MSDSs[4] C Pollution prevention reports C Spill event records C Supply and purchasing records **Engineering Calculations** C NTI[6] database C Facility non chemical-specific emission factors. C Henry's Law C Raoult's Law C SOCMI[5] or trade association non-chemical specific emission factors C Solubilities C Volatilization rates

[1]National Pollutant Discharge Elimination System.
[2]Resource Conservation Recovery Act.
[3]Compilation of Emission Factors, U.S. EPA.
[4]Material Safety Data Sheets.
[5]Synthetic Organic Chemicals Manufacturing Industry.
[6]National Toxic Inventory.
[7]Maximum Achievable Control Technology.

Table 3-3

Published Emission Factors for Select PBT Chemicals

PBT Chemical	Source Category	Emission Factor	Emission Factor Units	Reference[1]
PCBs	Hazardous waste incineration	2.0×10^{-3}	lb/ton PCB burned	2
	Residual oil combustion	1×10^{-6}	lb/lb PCB burned	2
Hexachlorobenzene	Secondary aluminum casting (using hexachloroethane for hydrogen degassing), controlled	1.00×10^{-2}	lb/ton Al produced [2]	5
	Secondary copper smelting/refining (charge with scrap copper and brass: cupolas), controlled	7.80×10^{-5}	lb/ton scrap feed [2]	5
	Incineration (industrial/hazardous waste), miscellaneous controls	3.80×10^{-5}	lb/ton waste feed [2]	5
	Primary iron (windbox, discharge end, sinter breaker), controlled	3.00×10^{-6}	lb/ton sinter produced [2]	5
	Cement manufacturing (kilns including preheater/precalciner kiln, including fuel supplement wastes), controlled	9.2×10^{-7}	lb/ton clinker produced [2]	5
	Cement manufacturing (kilns including preheater/precalciner kilns, excluding fuel supplement wastes), controlled	3.40×10^{-7}	lb/ton clinker produced [2]	5
	Coal combustion (utility), controlled	1.2×10^{-6}	lb/ton coal burned [2]	5
	Coal combustion (industrial), uncontrolled or low efficiency particulate controls	1.6×10^{-7}	lb/ton coal burned [2]	5
	Wood/bark waste combustion, controlled	1.20×10^{-7}	lb/ton wood waste burned [2]	5
	Carbon tetrachloride production	4.05×10^{-5}	lb HCB/lb production	7
	Perchloroethylene production	4.31×10^{-5}	lb HCB/lb production	7
	1,1,1-trichloroethane production	1.08×10^{-6}	lb HCB/lb production	7
	Ethylene dichloride production	8.50×10^{-7}	lb HCB/lb production	7
	Trichloroethylene production	6.86×10^{-7}	lb HCB/lb production	7
Benzo(g,h,i)perylene	Controlled coal combustion	2.7×10^{-8}	lb/ton coal combusted	9
	Wood waste combustion (with PM controls, 50% moisture basis; 4500 Btu/lb higher heating value)	1.41×10^{-6}	lb/ton wood waste burned	9
	No. 6 Fuel oil combustion	2.26×10^{-6}	lb/1000 gal oil combusted	9

PM - Particulate Matter
HCB - hexachlorobenzene
[1]Corresponds to references listed in Section 3.0.
[2] Converted from metric units

The use of one of these factors is illustrated in the following example.

Example - Release and Other Waste Management Estimation

This sample calculation illustrates how you might estimate release and other waste management quantities for Form R reporting.

The threshold determination in Section 3.1.1 showed that you otherwise used a total of 30.5 pounds of benzo(g,h,i)perylene during the combustion of 144,000 gallons of residual fuel oil. Using an emission factor of 2.26×10^{-6} lb benzo(g,h,i)perylene/1000 gal residual oil combusted, air emissions may be calculated as follows:

Quantity released = $(2.26 \times 10^{-6}$ lb benzo(g,h,i)perylene /1000 gal oil) × (144,000 gal oil)
= 3.25×10^{-4} lb/yr

Since this is less than 0.1 pounds, you need only report zero pounds in Part II, Sections 5.2 and 8.1 of the 2000 Form R.

In cases where testing is available, releases may be quantified as shown in the following example.

Example - Release and Other Waste Management Estimation (Waste Treatment)

Your facility is a RCRA Subtitle C transfer and disposal facility that collects and treats a variety of hazardous wastes, including hexachlorobenzene. In 1999, your facility accepted 10,000 pounds of hexachlorobenzene in various industrial wastes. You have tested your thermal incinerators and have found you can achieve 99.999% removal and destruction efficiency for all organics.

The quantity treated on site may be calculated as follows:

Quantity treated on site = 10,000 (lb hexachlorobenzene incinerated/year × (0.99999)
= 9,999.9 (lb/year)

You should report this amount as being treated on site in Part II, Section 7A.

The amount released through the incinerator stack is the difference between the amount incinerated and the amount treated, or 0.1 (lb/year). You should report this amount in Part II, Sections 5.2 and 8.1 of the 2000 Form R.

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