



United States  
Environmental Protection  
Agency

Office of Information  
Analysis and Access

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## **EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT SECTION 313**

### **EPCRA/TRI TRAINING MATERIALS**

**Reporting Year 2000**  
Spring 2001

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### **TWO-DAY WORKSHOP**

Module 2: PBT Reporting

## **TRAINING DISCLAIMER**

This document was developed for the sole purpose of helping potential reporters understand and comply with the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA). Nothing in this document is intended to independently alter, supplement, or revoke the statutory and/or regulatory requirements imposed by EPCRA section 313 and the applicable regulations at 40 CFR 372, et seq. Although these training materials provide an overview of the section 313 reporting requirements, facilities should consult the statute and regulations when developing threshold determinations and calculating releases and other waste management amounts. Facilities should be aware that EPA also provides guidance documents containing both sector specific guidance and guidance on specific elements of the EPCRA section 313 program. Covered facilities are encouraged to consult these guidance documents for additional assistance. Facilities may also receive specifically for Reporting Year 2000, for reports due on July 1, 2001. Facilities should be aware that EPA may promulgate regulatory changes to the EPCRA section 313 program that may alter reporting requirements for future reporting years.

## **REPORTING REQUIREMENTS FOR PERSISTENT, BIOACCUMULATIVE, AND TOXIC (PBT) CHEMICALS: AN OVERVIEW**

### **THE PBT RULE**

- PBT chemical rule published in the *Federal Register* (October 29, 1999; 64 FR 58666)
- Rule applies beginning RY 2000, reports due July 1, 2001
- Rule adds new chemicals to the TRI list
- Rule identifies a subset of chemicals (PBT chemicals) with lower thresholds and special reporting requirements (§372.28)

## PBT CHEMICALS

- Eighteen chemicals and chemical categories are subject to the PBT chemical rule:
  - Pesticides - Aldrin, Chlordane, Heptachlor, Isodrin, Methoxychlor, Pendimethalin, Toxaphene, and Trifluralin
  - Aromatics - Benzo(g,h,i)perylene, Polycyclic aromatic compounds (PAC) category, Dioxin and dioxin-like compounds category, Hexachlorobenzene, Octachlorostyrene, Pentachlorobenzene, Polychlorinated biphenyls (PCB), and Tetrabromobisphenol A (TBBPA)
  - Metals - Mercury and Mercury compounds

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## PBT CHEMICALS AND THRESHOLDS

### Manufacture, process, and otherwise use thresholds:

- |                 |  |   |
|-----------------|--|---|
| ■ 100 lbs./yr - | Aldrin<br>Methoxychlor<br>Pendimethalin                            | Polycyclic Aromatic Cmpds.<br>Tetrabromobisphenol A<br>Trifluralin  |
| ■ 10 lbs./yr -  | Chlordane<br>Heptachlor<br>Mercury<br>Toxaphene<br>Isodrin<br>PCBs | Benzo(g,h,i)perylene<br>Hexachlorobenzene<br>Mercury compounds<br>Octachlorostyrene<br>Pentachlorobenzene |
| ■ 0.1 g/yr -    | Dioxin and dioxin-like compounds                                   |   |

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## **PBT CHEMICALS**

- The following chemicals were **NOT** designated as PBT chemicals for RY 2000:

- Vanadium (except when contained in alloy)\*
- Vanadium compounds\*
- Lead\*\*
- Lead compounds\*\*

\* Vanadium has a new qualifier and vanadium compounds is a new non-PBT listing

\*\* A separate rulemaking has designated lead and lead compounds as PBT chemicals beginning RY 2001

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## **PBT CHEMICALS AND EXEMPTIONS**

- The *de minimis* exemption has been eliminated for PBT chemicals except for purposes of supplier notification
  - Users of mixtures must use best readily available information to determine the PBT chemicals present and their concentrations
- No other Section 313 regulatory exemptions were modified or restricted by the PBT chemical rule

H-6

## **PBT THRESHOLDS**

- **The combination of the low thresholds and no *de minimis* exemption means that a thorough review of chemical activities may be needed to achieve compliance with the PBT chemical rule**
  - **Impurities need to be evaluated regardless of concentration**
  - **Chemicals used in low volumes need to be considered**

H-7

## **SUPPLIER NOTIFICATION**

- **The supplier notification requirements have not changed**
- **The *de minimis* exemption still applies to supplier notification**
- **Suppliers can claim a chemical constituent trade secret and provide a generic chemical name**
  - **If the facility has no information to identify the constituent as a PBT chemical, the threshold should be 25,000/10,000 pounds based on the activity**
  - **If the facility has information that the constituent is a PBT chemical but does not know which PBT chemical activity threshold applies (i.e., 0.1 gram, 10 pounds, or 100 pounds), the 100 pound threshold should be used**

H-8

## **PBT REPORTING**

- **EPA has modified the Form R for PBT chemicals**
  - **Part II, Section 1.4 has been added to Form R**
    - » **Allows for reporting the distribution of each member of the dioxin and dioxin-like category as percentages among the 17 category members**
  - **When reporting on dioxin and dioxin-like category, ATRS will automatically recognize units of measure as grams**
  - **ATRS will allow for decimal reporting for PBT chemicals (e.g., 9.3 pounds)**

H-9

## **PBT REPORTING**

- **For PBT chemicals, EPA is requiring more precise reporting:**
  - **EPA has prohibited use of Form As**
  - **EPA has prohibited use of range codes for reporting releases and other waste management quantities**

H-10

## **DATA PRECISION**

- **Report releases and other waste management quantities at a level of precision supported by the data and estimation techniques used**
  - If 157.243 pounds calculated, report 157.243, 157.24, 157.2, 157, 160, or 200 pounds depending on accuracy/quality of data and estimation techniques used
- **For PBT chemicals, 0.1 pound is the smallest amount required to be reported (except for dioxin and dioxin-like compounds)**
  - Estimates  $\leq 0.05$  pounds can be rounded down to zero pounds

H-11

## **DATA PRECISION**

- **For dioxin and dioxin-like compounds, 100 micrograms (equals 0.0001 grams) is the smallest amount required to be reported**
  - Estimates  $\leq 50$  micrograms (equals 0.00005 grams) can be rounded to zero grams
- **Report releases and other waste management quantities at a level of precision supported by the data and estimation techniques used**
  - If 1.57243 grams calculated, report 1.57243, 1.5724, 1.572, 1.57, 1.6, or 2 grams depending on accuracy/quality of data and estimation techniques used

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## **POLYCYCLIC AROMATIC COMPOUNDS (PACs) AND BENZO(G,H,I)PERYLENE**

### **PACs AND BENZO(G,H,I)PERYLENE**

- **PBT activity threshold**
  - PAC category threshold: 100 pounds
  - Benzo(g,h,i)perylene threshold: 10 pounds
- **3-Methylcholanthrene and Benzo(j,k)fluorene (fluoranthene) are being added as members of the PAC category**
- **All members (new and old) of the newly expanded PAC category are PBT chemicals**
- **Benzo(g,h,i)perylene is an individually listed polycyclic aromatic hydrocarbon (PAH) that is a PBT chemical**
  - Not a member of PAC category

## POLYCYCLIC AROMATIC COMPOUNDS

Benzo(a)anthracene	7H-Dibenzo(c,g)carbazole
Benzo(b)fluoranthene	Dibenzo(a,e)fluoranthene
Benzo(j)fluoranthene	Dibenzo(a,e)pyrene
Benzo(k)fluoranthene	Dibenzo(a,h)pyrene
Benzo(j,k)fluorene (fluoranthene)*	Dibenzo(a,l)pyrene
Benzo(r,s,t)pentaphene	7,12-Dimethylbenz(a)anthracene
Benzo(a)phenanthrene (chrysene)	Indeno(1,2,3-cd)pyrene
Benzo(a)pyrene	3-Methylcholanthrene*
Dibenz(a,h)acridine	5-Methylchrysene
Dibenz(a,j)acridine	1-Nitropyrene
Dibenzo(a,h)anthracene	* Newly listed (October 29, 1999; 64 FR 58666)

I-3

## SOURCES OF POLYCYCLIC AROMATIC COMPOUNDS

- Coal
- Fuel oil and other petroleum products
- Asphalt
- Creosote wood treatment

I-4

## **POLYCYCLIC AROMATIC COMPOUNDS**

- **PACs are found in coal, fuel oil and other petroleum products**
- **Default concentrations (weight-based)**
  - 10 ppm in No. 2 fuel oil (Ref. 5)
  - 2,461 ppm in No. 6 fuel oil (Ref. 2)
  - Also present in other fossil fuels, petroleum products, coal tars, etc.
- **Considered otherwise used if combusted on-site**
- **Considered processed if distributed in fuels, petroleum products, and other products**

I-5

## **POLYCYCLIC AROMATIC COMPOUNDS**

- **PACs are also coincidentally manufactured during the combustion of fossil fuel**
- **Default air emission factors:**
  - 1.12 pounds per million tons of coal combusted in a boiler with air pollution controls (Ref. 3)
  - $3.15 \times 10^{-5}$  pounds per million standard cubic feet natural gas burned in a utility boiler (Refs. 3, 4)
  - 0.0165 pounds per million gallons of No. 6 fuel oil burned in a utility boiler (Ref. 3)

I-6

## POLYCYCLIC AROMATIC COMPOUNDS

- **Additional factors for coal and oil combustion available in *Locating And Estimating Air Emissions From Sources Of Polycyclic Organic Matter* (Ref. 4)**
  - Includes several factors available for different types of coal, types of boilers, and different types of air pollution control
  - Contains emission factors for several members of the PAC category, benzo(g,h,i)perylene, and other chemicals

I-7

## BENZO(G,H,I)PERYLENE

- **Benzo(g,h,i)perylene is a separately listed polycyclic aromatic hydrocarbon**
  - Similar to PACs and found in same materials
  - Benzo(g,h,i)perylene is not a member of the PAC category
- **Default concentrations**
  - 0.05 ppm in No. 2 fuel oil (Ref. 5)
  - 26.5 ppm in No. 6 fuel oil (Ref. 2)
  - Present in other fossil fuels, petroleum products, coal tars, etc.

I-8

## **BENZO(G,H,I)PERYLENE**

- **Benzo(g,h,i)perylene is coincidentally manufactured during the combustion of fossil fuel**
- **Default air emission factors:**
  - **0.027 pounds per million tons coal combusted in a boiler with air pollution controls (Ref. 3)**
  - **0.00226 pounds per million gallons of No. 6 fuel oil burned in a boiler (Ref. 3)**

I-9

## **PACs AND BENZO(G,H,I)PERYLENE EXERCISE**

- **A facility transitioned from combusting No. 6 fuel oil to combusting No. 2 fuel oil during the reporting year. The facility combusted 3,000 gallons of No. 6 fuel oil and 1,000,000 gallons of No. 2 fuel oil in an utility boiler.**
- **Has an activity threshold been exceeded?**
  - **Assume No. 6 fuel oil has a density of 8.0 pounds per gallon and No. 2 fuel oil has a density of 7.0 pounds per gallon.**

I-10

## PACs AND BENZO(G,H,I)PERYLENE

### ■ For more information:

1. *Draft Guidance for Reporting Toxic Chemicals: Polycyclic Aromatic Compounds Category*. U.S. EPA, Office of Information Analysis and Access. 2000. Available at <http://www.epa.gov/tri>
2. *Using Systematic and Comparative Analytical Data to Identify the Source of an Unknown Oil on Contaminated Birds*. Wang, Z. et al. *Journal of Chromatography A*. Volume 775, pp. 251-265. 1997.
3. *Compilation of Air Pollutant Emission Factors (AP-42)*, Volume 1, Fifth Edition, Chapters 1.1, 1.3, & 1.4. U.S. EPA, Office of Air Quality Planning and Standards. 1998. Available at <http://www.epa.gov/ttn/chief/ap42/index.html>
4. *Locating And Estimating Air Emissions From Sources Of Polycyclic Organic Matter*. U.S. EPA, Office of Air Quality Planning and Standards. 1998. Available at <http://www.epa.gov/ttn/chief/le/index.html>
5. *Transport and Fate of non-BTEX Petroleum Chemicals in Soil and Groundwater*. American Petroleum Institute, API Publication Number 4593. 1994. Available at <http://global.ihs.com/>

## **DIOXIN AND DIOXIN-LIKE COMPOUNDS (DLCs)**

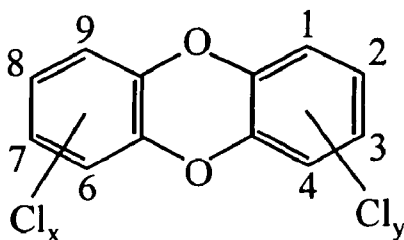
### **DIOXIN AND DIOXIN-LIKE COMPOUNDS**

- **PBT activity threshold: 0.1 gram**
- **Dioxin and dioxin-like compounds (DLCs) category qualifier reads:**
  - “Manufacturing; and the processing or otherwise use of dioxin and dioxin-like compounds if the dioxin and dioxin-like compounds are present as contaminants in a chemical and if they were created during the manufacturing of that chemical.”**
  - **Qualifier designed to focus on new environmental loadings of dioxin and DLCs**

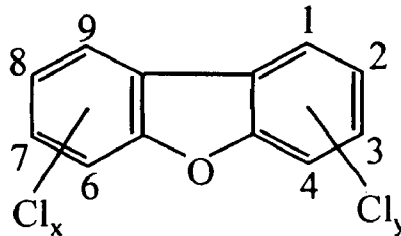
## DIOXIN AND DIOXIN-LIKE COMPOUNDS

- Category includes polychlorinated dioxins and furans with chlorine in at least the 2, 3, 7, and 8 positions

Dibenzo-p-dioxin



Dibenzofuran



J-3

## DIOXIN AND DIOXIN-LIKE COMPOUNDS

- Reporting must be based on total weight in grams of the members of the dioxin and DLCs category
  - Quantities of dioxin and DLCs entered on the Form R or into ATRS must be in grams by weight
- Some literature contains information about dioxin and DLCs emissions in terms of grams TEQ (toxicity equivalency)
  - Do not use in threshold determinations
  - Do not report these values on Form R
- TEQs are based on toxicity equivalency factors (TEFs) for dioxins and DLCs, not just the weight
  - TEFs - estimates of the toxicity of dioxin and DLCs relative to the toxicity of 2,3,7,8-TCDD

J-4



## DIOXIN AND DIOXIN-LIKE COMPOUNDS

- Form R Part II, Section 1.4 allows for reporting the distribution of each member of the dioxin and DLCs category as percentages among the 17 category members. This is only required if such information is available from the facility's data used to report

- Allows conversion of reported quantity into individual chemical estimates and TEQs
- List is in EPA's *TRI Reporting Forms and Instructions* document

### 1.4 Distribution of Each Member of the Dioxin and Dioxin-like Compounds Category.

(If there are any numbers in boxes 1-17, then every field must be filled in with either 0 or some number between 0.01 and 100. Distribution should be reported in percentages and the total should equal 100%. If you do not have speciation data available, indicate NA.)

NA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

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## DIOXIN AND DIOXIN-LIKE COMPOUNDS

Calculating Section 1.4 using EPA's default emission factors for oil-fired utility boilers

No.	Member Name	Concentration (pg/L oil)	Relative Percentage	No.	Member Name	Concentration (pg/L oil)	Relative Percentage
1	1,2,3,4,6,7,8-HpCDF	184	5.18%	10	1,2,3,4,6,7,8-HpCDD	477	15.01%
2	1,2,3,4,7,8,9-HpCDF	0	0%	11	1,2,3,4,6,7,8,9-OCDF	0	0%
3	1,2,3,4,7,8-HxCDF	76.5	2.41%	12	1,2,3,4,6,7,8,9-OCDD	2055	64.65%
4	1,2,3,6,7,8-HxCDF	35.4	1.11%	13	1,2,3,7,8-PeCDF	64.1	2.02%
5	1,2,3,7,8,9-HxCDF	0	0%	14	2,3,4,7,8-PeCDF	49.3	1.55%
6	2,3,4,6,7,8-HxCDF	23.8	0.75%	15	1,2,3,7,8-PeCDD	24.7	0.78%
7	1,2,3,4,7,8-HxCDD	83.3	1.99%	16	2,3,7,8-TCDF	0	0%
8	1,2,3,6,7,8-HxCDD	65.8	2.07%	17	2,3,7,8-TCDD	0	0%
9	1,2,3,7,8,9-HxCDD	79.7	2.51%				

Source: EPA's *Guidance for Reporting Toxic Chemicals within the Dioxin and Dioxin-like Compounds Category* (Ref. 1).

### 1.4 Distribution of Each Member of the Dioxin and Dioxin-like Compounds Category.

(If there are any numbers in boxes 1-17, then every field must be filled in with either 0 or some number between 0.01 and 100. Distribution should be reported in percentages and the total should equal 100%. If you do not have speciation data available, indicate NA.)

NA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	5.16	0	2.41	1.11	0	0.75	1.99	2.07	2.51	15.01	0	64.65	2.02	1.55	0.78	0	0

J-6

## **DIOXIN AND DIOXIN-LIKE COMPOUNDS**

- **Example calculation of emissions for a system that emits 1 gram per year of Octachlorodibenzofuran (ODCF) and 1 gram per year of 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin**
  - Correct quantity to report on Form R is 2 grams
  - TEQ quantity is 0.0101 grams (TEFs are 0.0001 and 0.01)

J-7

## **DIOXIN AND DIOXIN-LIKE COMPOUNDS**

- **Dioxin and DLCs may be manufactured when chlorine-containing materials are involved in combustion or other high-temperature processes**
- **Default air emission factors (Ref. 1):**
  - 1.71 nanograms of dioxin and DLCs per kilogram of coal combusted in an utility boiler (equivalent to 1.55 grams per million tons)
  - 3.1786 nanograms of dioxin and DLCs per liter of fuel oil combusted in an utility boiler (equivalent to 0.0120 grams per million gallons)
  - 12.2 nanograms of dioxin and DLCs per kilogram of hazardous waste combusted in a boiler or industrial furnace (other than a cement kiln) (equivalent to 11.1 grams per million tons)

J-8

## **DIOXIN AND DIOXIN-LIKE COMPOUNDS**

### **■ Additional default air emission factors (Ref.1):**

- 89.78 nanograms of dioxin and DLCs per kilogram of copper scrap fed to a secondary copper smelter (equivalent to 0.0815 grams per thousand tons)
- 16.24 nanograms of dioxin and DLCs per kilogram of wood (dry wt.) combusted in an utility boiler (equivalent to 14.73 grams per million tons)
- 2.4 nanograms of dioxin and DLCs per kilogram of wood waste and bark (as fired) at pulp mills or lumber and wood product industry facility boilers (equivalent to 2.2 grams per million tons)

J-9

## **DIOXIN AND DIOXIN-LIKE COMPOUNDS**

### **■ Additional default factors (Ref.1):**

- 105.7 picograms of dioxin and DLCs per liter of waste water from bleached chemical pulp mills discharged to surface water (equivalent to 0.400 grams per billion gallons)
- 500 nanograms of dioxin and DLCs per kilogram of waste water sludge from bleached chemical pulp mills (equivalent to 0.454 grams per thousand tons)

J-10

## DIOXIN AND DIOXIN-LIKE COMPOUNDS

- **What needs to be done to exceed the 0.1 gram activity threshold?**
  - 64,500 tons of coal need to be combusted in an utility boiler to exceed the threshold
  - 8.33 million gallons of fuel oil need to be combusted in a utility boiler to exceed the threshold
  - 1,230 tons copper scrap need to be fed to a secondary copper smelter

J-11

## DIOXIN AND DIOXIN-LIKE COMPOUNDS

- **For more information:**
  1. *Guidance for Reporting Toxic Chemicals within the Dioxin and Dioxin-like Compounds Category.* U.S. EPA, Office of Information Analysis and Access. 2000. Available at <http://www.epa.gov/tri>
  2. *Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds. Part 1: Estimating Exposure to Dioxin-Like Compounds. Volume 2: Sources of Dioxin-Like Compounds in the United States.* U.S. EPA, Office of Research and Development. 2000. Available at <http://www.epa.gov/ncea/pdfs/dioxin/part1and2.htm>

J-12

## **MERCURY AND MERCURY COMPOUNDS**

## **MERCURY AND MERCURY COMPOUNDS**

- **PBT activity threshold:**
  - 10 pounds for mercury
  - 10 pounds for mercury compounds
- **Mercury compounds are present in crude oil, fuel oils, and coal**
  - Combustion of fuels is expected to be the main source of mercury reporting
- **Mercury may be present in mined ores**

## **MERCURY AND MERCURY COMPOUNDS**

### **■ Manufacturing**

- Fuel combustion
- Metal mining and beneficiation
- Petroleum refining

K-3

## **MERCURY AND MERCURY COMPOUNDS**

### **■ Processing**

- Petroleum refineries and bulk petroleum stations
- Coal mining and metal mining and beneficiation
- Carbon black and coke production
- Cement and clay products
- Fabricated metal products
- Electronic and electrical products (e.g., bulbs, switches, batteries)
- Other products (e.g., thermometers)

K-4

## **MERCURY AND MERCURY COMPOUNDS**

### **■ Otherwise use**

- Chlor-alkali production
- Cement and clay products
- Fabricated metal products
- Electrical products (e.g., bulbs, switches, batteries)
- Other products (e.g., thermometers)

K-5

## **MERCURY AND MERCURY COMPOUNDS**

### **■ Mercury concentrations in light bulbs (Ref. 3):**

- Less than 40 milligrams per 4-foot fluorescent bulb
- 45–75 milligrams per high intensity discharge lamps
- 8–25 milligrams in sodium lamps

### **■ Use of bulbs - generally articles exempt**

- Articles exemption negated if > 0.5 pounds of Section 313 chemical released (and not recycled) during reporting year from all like items

K-6

## MERCURY AND MERCURY COMPOUNDS

### ■ Mercury concentrations in coal and other materials:

- Use the best readily available data. Usually, ICR data for your facility if available
- If ICR data for your facility not available, choices are:
  - » Develop an average from ICR data for the type of coal that your facility burns (e.g., Pennsylvania bituminous) (Ref. 5)
  - » EPA's *EPCRA Section 313 Industry Guidance: Electricity Generating Facilities* (Ref. 2)
  - » U.S. Geological Survey's (USGS) coal quality data base (Ref. 4)
  - » Other data

K-7

## MERCURY AND MERCURY COMPOUNDS

### ■ Default concentrations in ash (Ref. 2):

- No. 6 Fuel oil ash: 1 ppm as Hg; 1.04 ppm as Hg<sub>2</sub>O
- Coal fly ash: 12 ppm as Hg; 12.5 ppm as Hg<sub>2</sub>O
- Coal bottom ash: 4.2 ppm as Hg; 4.37 ppm as Hg<sub>2</sub>O

K-8



## **MERCURY AND MERCURY COMPOUNDS**

### **■ Default air emission factors (Ref. 6):**

- **Fluorescent lamp manufacturing: 8 lbs./ton mercury (uncontrolled)**
- **Fluorescent lamp crushing: 1.9 lbs./billion lamps (fabric filter, carbon adsorber)**
- **Thermometer manufacturing: 18 lbs./ton mercury (uncontrolled)**
- **Coke production: 60 lbs./million ton coke (fabric filter, electrostatic precipitator (ESP))**
- **Lime manufacture: 3.0 lbs./million ton lime (fabric filter)**
- **Carbon black manufacture: 300 lbs./million ton carbon black (fabric filter)**

K-9

## **MERCURY AND MERCURY COMPOUNDS**

### **■ Default air emission factors (Ref. 7):**

- **Primary copper smelting: 78 lbs./million ton metal**
- **Steel mill - electric arc furnace: 72 lbs./million ton scrap feed**
- **Ferrous foundries: 350 lbs./million ton metal charged**
- **Glass manufacture: 100 lbs./million ton silica (particulate matter (PM) control)**
- **Brick manufacture, coal-fired: 96 lbs./million ton brick (uncontrolled)**
- **Industrial/hazardous waste incinerators: 5.4 lbs./thousand ton waste incinerated**

K-10

## MERCURY AND MERCURY COMPOUNDS

■ For more information:

1. *Draft Guidance for Reporting Toxic Chemicals: Mercury and Mercury Compounds Category*. U.S. EPA, Office of Information Analysis and Access. 2000. Available at <http://www.epa.gov/tri>
2. *EPCRA Section 313 Industry Guidance: Electricity Generating Facilities*. U.S. EPA, Office of Pollution Prevention and Toxics. 2000. Available at <http://www.epa.gov/tri>
3. *Mercury Study Report to Congress Volume II: An Inventory of Anthropogenic Mercury Emissions in the United States*. U.S. EPA, Office of Air Quality Planning and Standards and Office of Research and Development. 1997. Available at <http://www.epa.gov/ttnuatw1/112nmerc/mercury.html>
4. *U.S. Geological Survey Coal Quality (Coalqual) Database: Version 2.0*. U.S. Geological Survey. 2000. Available at <http://energy.er.usgs.gov/products/databases/CoalQual/>
5. *Mercury ICR*. U.S. EPA, Unified Air Toxics Website. 2000. Available at <http://www.epa.gov/ttnuatw1/combust/utiltox/utoxpg.html#DA2>
6. *Locating & Estimating Air Emissions from Sources of Mercury and Mercury Compounds*. U.S. EPA, Office of Air Quality Planning and Standards, 1997. Available at <http://www.epa.gov/ttn/chief/le/index.html>
7. *Final – Supplementary Guide for Reporting to the National Pollutant Release Inventory – Alternate Thresholds-2000*. Environment Canada, Pollution Data Branch. 2000. Available at <http://www.ec.gc.ca/pdb/npri/2000/index.html#Gdocs>

## **PESTICIDES**

## **PESTICIDES**

- **RY 2000 PBT listed pesticides:**

- Pendimethalin
- Trifluralin
- Methoxychlor
- Heptachlor
- Toxaphene
- Isodrin
- Aldrin
- Chlordane

- **All of these pesticides were already on the list of TRI chemicals**

## **PESTICIDES**

- **Potential reporting facilities include:**
  - **Manufacturers of the pesticides**
  - **Processors of the pesticides**
  - **TSDFs that manage pesticide-containing wastes may be otherwise using the pesticides**
- **EPA does not expect any additional reports on these pesticides from users of pesticides**
  - **Most of these pesticides would not be used at reporting facilities**
  - **Even if a reporting facility used one of these pesticides, the use may qualify for the facility and grounds maintenance exemption if use not process related**

L-3

## **PENDIMETHALIN**

- **PBT activity threshold: 100 pounds**
- **Pendimethalin, also known as benzenamine, is currently being used as an insecticide and herbicide**
  - **Primarily used as a herbicide on crops**
  - **58 pendimethalin products registered for agricultural, domestic, and commercial uses and is applied by broadcasting, directed spray and soil treatment**
- **Releases of pendimethalin are expected to occur from manufacturing, formulation, packaging, and disposal activities associated with its use**

L-4

## **TRIFLURALIN**

- **PBT activity threshold: 100 pounds**
- **Trifluralin is a herbicide used primarily on cotton and soybean crops**
- **Releases of trifluralin are expected to occur from manufacturing, formulation, packaging, and disposal activities associated with its use**

L-5

## **METHOXYCHLOR**

- **PBT activity threshold: 100 pounds**
- **Methoxychlor is an insecticide used to control insects on agricultural crops, livestock, grain storage, home gardens, and pets**
- **Methoxychlor may be applied to large areas such as beaches, estuaries, and marshes for control of flies and mosquito larvae**
- **It may also be used for spray treatment of garbage and sewage areas**

L-6

## **HEPTACHLOR**

- **PBT activity threshold: 10 pounds**
- **Heptachlor was used as a broad-spectrum insecticide on crops, home and gardens, and as a seed treatment**
- **Most uses of heptachlor were banned by EPA in 1978**
  - **Presently used to control fire ants in buried, pad-mounted electric power transformers and in underground cable television and telephone cable boxes**
- **Manufacture in U.S. ceased in 1997**

L-7

## **TOXAPHENE**

- **PBT activity threshold: 10 pounds**
- **Toxaphene was used as an insecticide since the late 1940s to control pests on cotton, vegetables, livestock and poultry, and soybeans**
- **Most domestic uses of toxaphene banned in 1990, but still used as an insecticide on bananas and pineapples in Puerto Rico and the Virgin Islands**

L-8

## **ISODRIN**

- **PBT activity threshold: 10 pounds**
- **Isodrin is an insecticide no longer manufactured or used commercially in the U.S.**
- **Isodrin may also be coincidentally manufactured from coal mining, foundries, waste incineration, and nonferrous metals manufacturing**

L-9

## **ALDRIN**

- **PBT activity threshold: 100 pounds**
- **Aldrin was used as a soil insecticide on crops beginning in the 1950s**
- **Aldrin is not manufactured or used under any circumstances in the U.S.**

L-10

## **CHLORDANE**

- **PBT activity threshold: 10 pounds**
- **Chlordane was used as a broad-spectrum insecticide on:**
  - **Crops**
  - **Gardens**
  - **Landscaping**
  - **Termite and ant control**
- **All end uses of chlordane were banned by EPA in 1988; however, still manufactured for export until 1997**



## **OTHER PBT CHEMICALS**

## **OTHER PBT CHEMICALS**

- Polychlorinated biphenyls (PCBs)
- Tetrabromobisphenol A (TBBPA)
- Hexachlorobenzene (HCB)
- Pentachlorobenzene
- Octachlorostyrene (OCS)

## **POLYCHLORINATED BIPHENYLS (PCBs)**

- **PBT activity threshold: 10 pounds**
- **Most manufacture of PCBs banned in 1976**
  - **Further restrictions on the use of PCBs**

**M-3**

## **POLYCHLORINATED BIPHENYLS (PCBs)**

- **Current and/or former products containing PCBs:**
  - **Dielectric agents**
  - **Heat transfer agents**
  - **Lubricants**
  - **Flame retardants**
  - **Plasticizers**
  - **Waterproofing materials**
  - **Used oils**

**M-4**

## **POLYCHLORINATED BIPHENYLS (PCBs)**

### **■ Manufacturing**

- PCBs may be manufactured as a product of incomplete combustion (PICs)

### **■ Processing**

- Recycling or reuse of PCBs

### **■ Otherwise use**

- Installation of PCBs into electrical equipment
- On-site treating or disposing PCB-contaminated waste received from off-site
- Combusting PCB-contaminated oil

M-5

## **POLYCHLORINATED BIPHENYLS (PCBs)**

### **■ Not manufacturing, processing, or otherwise use**

- On-site disposal or treatment of PCBs not received from off-site
- Off-site shipment of PCBs for disposal or treatment

M-6

## **POLYCHLORINATED BIPHENYLS (PCBs)**

### **■ Default air emission factors (Ref. 2):**

- **Municipal waste combustion 5.5 lbs./ million ton waste burned**
- **Medical waste incineration 46.5 lbs./million ton waste burned**
- **Other biological incineration 46.5 lbs./million ton waste burned**
- **Sewage sludge incineration 10.8 lbs./million ton dry sludge burned**
- **Scrap tire incineration 378 lbs./million ton tire burned**

**M-7**

## **POLYCHLORINATED BIPHENYLS (PCBs)**

### **■ Default air emission factors (Ref. 1):**

- **Landfill waste gas flare  $6.10 \times 10^{-3}$  lb./million Btu heat input**
- **Incineration (refuse derived fuel (RDF)) 180 lbs./million ton RDF burned**

**M-8**

## **POLYCHLORINATED BIPHENYLS (PCBs)**

### **■ For more information:**

- 1. Draft Guidance for Reporting Toxic Chemicals: Pesticides and Other Persistent Bioaccumulative Toxic (PBT) Chemicals.** U.S. EPA, Office of Information Analysis and Access. 2000. Available at <http://www.epa.gov/tri>
- 2. 1990 Emissions Inventory of Section 112(c)(6) Pollutants.** U.S. EPA. 1998. Available at <http://www.epa.gov/ttncaaa1/t3/meta/m23804.html>

M-9

## **TETRABROMOBISPHENOL A (TBBPA)**

- PBT activity threshold: 100 pounds**
- TBBPA - flame retardant used in plastics and engineering resins for printed circuit boards and computer equipment**
- TBBPA is used in manufacturing polymers, such as**
  - Acrylonitrile Butadiene Styrene (ABS)
  - Epoxy and polycarbonate resins
  - High-impact polystyrene
  - Phenolic resins
  - Adhesives
  - Unsaturated polyester resins
  - Thermoplastic polyesters

M-10

## **TETRABROMOBISPHENOL A**

### **■ TBBPA - used as a flame retardant two ways**

- **Reactive TBBPA** - chemically bound to a polymer backbone. TBBPA ceases to exist, except for some small residual amounts
  - » Used in a liquid epoxy mixture to make printed circuit boards
- **Additive TBBPA** - added to mixture, but not reacted. TBBPA retains its chemical identity
  - » TBBPA concentrations can exceed 15% in some ABS resins

M-11

## **TETRABROMOBISPHENOL A**

### **■ What facilities are impacted?**

- **Manufacturers and processors of TBBPA**
  - **Processors of plastics containing TBBPA, such as manufacturers of printed circuit boards and computer housings**
  - **Waste management facilities**
- ### **■ Facilities using computers that contain TBBPA in their housings not impacted**
- **Probably qualify for the articles exemption**

M-12

## **HEXACHLOROBENZENE (HCB)**

- **PBT activity threshold: 10 pounds**
- **Up until 1985, manufactured as a pesticide/fungicide used to treat wheat seeds, onions, and sorghum**
- **Manufactured as an impurity or formed as a by-product during production of maleic anhydride and propazine, pentachlorophenol, pesticides, chlorinated organic chemicals, chlorine gas**
- **Impurity in pesticides (Ref. 4):**
  - 1,000 ppm in Dacthal
  - 50 ppm in chlorothalonil and picloram
  - 1 ppm in atrazine and simazine
  - 100 ppm in lindane
  - 500 ppm in pentachloronitrobenzene

**M-13**

## **HEXACHLOROBENZENE (HCB)**

- **May be manufactured in refining operations**
- **May be manufactured in coal-fired boilers**
  - 1.2 lbs./million ton coal burned in an utility boiler (Ref. 2)
  - 0.16 lb./million ton coal burned in an industrial boiler (Ref. 2)
- **Other combustion**
  - Wood/bark waste combustion 0.12 lb./million ton wood waste burned (Ref. 2)

**M-14**

## **HEXACHLOROBENZENE (HCB)**

- **Incineration of waste manufactures HCB (Ref. 2):**
  - **58 lbs./million ton municipal waste burned (single chamber/waterwall with electrostatic precipitator (ESP)/dry scrubber)**
  - **1.714 lbs./million ton biomedical waste incinerated**
  - **0.66 lb./million ton dry sewage sludge incinerated**
  - **538 lbs./million ton wood waste/municipal refuse burned (uncontrolled)**

**M-15**

## **HEXACHLOROBENZENE (HCB)**

- **May be manufactured in the production of carbon tetrachloride, perchloroethylene, trichloroethylene, ethylene dichloride, and 1,1,1-trichloroethane**
  - **Usually found in the still bottoms from chlorinated organic chemical purification**
  - **Is emitted to air from from chlorinated organic chemical purification (Ref. 3)**
    - » **81.0 lbs. emitted/thousand ton carbon tetrachloride produced**
    - » **86.2 lbs. emitted/thousand ton perchloroethylene produced**

**M-16**



## **HEXACHLOROBENZENE (HCB)**

- **May be manufactured during high-temperature processes involving chlorine atoms**
  - **Cement manufacturing**
    - » **0.34 lb./million ton clinker produced (controlled) (Ref. 2)**

**M-17**

## **HEXACHLOROBENZENE (HCB)**

- **Manufactured at metal foundries/smelters**
  - **Magnesium production - magnesium chloride reduced at carbon electrode and produces chlorinated organics (Ref.1)**

**M-18**

## HEXACHLOROBENZENE (HCB)

### ■ For more information:

1. *Draft Guidance for Reporting Toxic Chemicals: Pesticides and Other Persistent Bioaccumulative Toxic (PBT) Chemicals*. U.S. EPA, Office of Information Analysis and Access. 2000. Available at <http://www.epa.gov/tri>
2. *Final—Supplementary Guide for Reporting to the National Pollutant Release Inventory—Alternate Thresholds-2000*. Environment Canada, Pollution Data Branch. 2000. Available at <http://www.ec.gc.ca/pdb/npri/index.html>
3. *Estimation of National Hexachlorobenzene Emissions for 1990*. U.S. EPA, Office of Air Quality Planning and Standards. 1993.
4. *1990 Emissions Inventory of Section 112(c)(6) Pollutants*. U.S. EPA, Emissions, Monitoring and Analysis Division and Air Quality Strategies and Standards Division. 1998. Available at <http://www.epa.gov/ttncaaa1/t3/meta/m23804.html>

M-19

## PENTACHLOROBENZENE

- PBT activity threshold: 10 pounds
- Manufactured and processed as an intermediate in pentachloronitrobenzene production
  - Pentachlorobenzene is an impurity in pentachloronitrobenzene
  - Pentachlorobenzene also found in wastes from pentachloronitrobenzene production

M-20

## **PENTACHLOROBENZENE**

- **Any high-temperature process involving chlorine may manufacture pentachlorobenzene**
  - **Waste incinerators, cement kilns, and secondary copper production**
- **Pentachlorobenzene is expected to be found where HCB found**

M-21

## **OCTACHLOROSTYRENE**

- **PBT activity threshold: 10 pounds**
- **No commercial uses known**
- **Possible byproduct of chlorine production, chlorination reactions, and metal product/finishing operations**
- **Manufactured by the high-temperature incineration of chlorinated hydrocarbons**
- **Octachlorostyrene expected to be found where HCB found**

M-22