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TOXICS RELEASE INVENTORY

Guidance for Reporting the Polycyclic Aromatic Compounds Category

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. EPCRA section 313 is also known as the Toxics Release Inventory (TRI).

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DISCLAIMER

This guidance document is intended to assist industry with EPCRA section 313 reporting for polycyclic aromatic compounds. 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 emissions 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 emissions factors, in reviewing this document, industry should be aware that these recommendations and emissions 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 emissions 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. EPCRA section 313 also provides that, in the absence of such readily available data, a reporting facility may make reasonable estimates to meet those EPCRA section 313 requirements. Facilities are encouraged to contact the Agency with any additional or clarifying questions about the recommendations and emissions 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 on TRI's GuideME website:
https://ofmpub.epa.gov/apex/guideme_ext/f?p=guideme:gd-list

SECTION 1.0 INTRODUCTION

On October 29, 1999, EPA promulgated the Final Rule on Persistent, Bioaccumulative, and Toxic (PBT) chemicals (64 FR 58666). This rule added two chemicals to the existing polycyclic aromatic compounds (PACs) category on the list of toxic chemicals subject to the reporting requirements under section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). EPA also lowered the reporting threshold for the PACs category to 100 pounds. The two added PACs were benzo(j,k)fluorene and 3-methylcholanthrene. On November 26, 2010, EPA added four chemicals to the existing PACs category. The four added PACs were 1,6-dinitropyrene; 1,8-dinitropyrene; 6-nitrochrysene; and 4-nitropyrene. The 25 chemicals comprising the PACs category, their Chemical Abstracts Service (CAS) Registry numbers, and common sources are listed in Table 1-1. The Persistent Bioaccumulative Toxic (PBT) chemical final rule also added benzo(g,h,i)perylene, a PBT chemical PAC, to the EPCRA section 313 list of individual chemicals. Benzo(g,h,i)perylene has a reporting threshold of 10 lb/yr and is reported separately from the PACs category. Refer to the EPCRA section 313 *Guidance for Reporting Pesticides and Other Persistent Bioaccumulative Toxic (PBT) Chemicals* for more information.

Table 1-1: Chemicals Included in the EPCRA Section 313 PACs Category

Chemical Name	CAS Number	Sources
Benzo(a)anthracene	56-55-3	Product of incomplete combustion (PIC); fossil fuels (FF)
Benzo(a)phenanthrene (chrysene)	218-01-9	PIC; FF; coke plant exhaust
Benzo(a)pyrene	50-32-8	PIC; FF; coal tar; municipal incinerator emissions
Benzo(b)fluoranthene	205-99-2	PIC; FF
Benzo(j)fluoranthene	205-82-3	PIC; FF; coal tar
Benzo(k)fluoranthene	207-08-9	PIC; FF; coal tar
Benzo(j,k)fluorene (fluoranthene)	206-44-0	PIC; FF; coal tar
Benzo(r,s,t)pentaphene	189-55-9	PIC; FF; coal tar
Dibenz(a,h)acridine	226-36-8	PIC (particularly coal burning processes)
Dibenz(a,j)acridine	224-42-0	PIC (particularly coal burning processes)
Dibenzo(a,h)anthracene	53-70-3	PIC; FF; coal tar; gasoline engine exhaust tar
Dibenzo(a,e)fluoranthene	5385-75-1	PIC
Dibenzo(a,e)pyrene	192-65-4	PIC; FF
Dibenzo(a,h)pyrene	189-64-0	PIC; FF; coal tar
Dibenzo(a,l)pyrene	191-30-0	PIC; coal gasification
7H-Dibenzo(c,g)carbazole	194-59-2	Coal burning processes; coal tar and coal distillates
7,12-Dimethylbenz(a)anthracene	57-97-6	Produced in small quantities as a research chemical, not formed during combustion
1,6-Dinitropyrene	42397-64-8	PIC (diesel exhaust, municipal waste, coal fly ash, extracts of coke-oven emissions)
1,8-Dinitropyrene	42397-65-9	PIC (diesel exhaust, municipal waste, coal fly ash, extracts of coke-oven emissions)
Indeno(1,2,3-cd)pyrene	193-39-5	PIC; FF; coal tar

Chemical Name	CAS Number	Sources
3-Methylcholanthrene	56-49-5	Produced in small quantities as a research chemical, not formed during combustion
5-Methylchrysene	3697-24-3	PIC
6-Nitrochrysene	7496-02-8	PIC (diesel exhaust, municipal waste, coal fly ash, extracts of coke-oven emissions)
1-Nitropyrene	5522-43-0	Diesel and gasoline engines; coal fired energy conversion plants; aluminum smelter stack gases
4-Nitropyrene	57835-92-4	PIC (diesel exhaust, municipal waste, coal fly ash, extracts of coke-oven emissions)

Sources: Aronson, D., and Howard, P.H. Sources of Individual PAHs Listed in the PBT Chemical Pool, January 2000; U.S. Department of Health and Human Services, Report on Carcinogen, Fourteenth Edition, RoC Profile for Nitroarenes (selected), National Toxicology Program, November 3, 2016.

The purpose of this guidance document is to assist facilities in complying with the reporting requirements of EPCRA section 313 for the PACs category. Facilities that meet the EPCRA section 313 employee threshold and industry code requirements, and that exceed the reporting threshold for the PACs category are subject to the EPCRA section 313 annual reporting requirements. The lower reporting threshold began with reporting year 2000 (reports due by July 1, 2001). 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.

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

Section 1.1 Polycyclic Aromatic Compounds - Their Structure and Formation

PACs are a subset of a broad class of chemicals identified as polycyclic organic matter (POM). POM, a complex mixture containing thousands of organic compounds, is found in fossil fuels, oil, coal, wood, and natural gas. POM is also found as suspended particulate matter in the urban atmosphere, from the incomplete combustion/pyrolysis of fuels (coal, oil, natural gas, and wood).

PACs may also be referred to as polycyclic, or polynuclear, aromatic hydrocarbons (PAHs). The chemical structure is characterized by three or more aromatic (e.g., benzene) rings, usually fused together such that each pair of fused rings shares two carbons. The PAC structure can contain five-membered nonaromatic hydrocarbon rings fused to the six-membered rings, e.g., benzo(j)fluoranthene. PACs can also contain atoms other than carbon and hydrogen, such as nitrogen. Because of the high nitrogen content of coal, the coal burning process commonly produces EPCRA section 313 PACs category chemicals containing nitrogen (such as dibenz(a,h)acridine).

Most of the 25 listed PACs are products of incomplete combustion; see Table 1-1. Two exceptions, 7,12-dimethylbenz(a)anthracene and 3-methylcholanthrene, are produced in small quantities as research chemicals and are not products of incomplete combustion (1). Twelve of the 25 are reported to be found in fossil fuels (1). EPCRA section 313 PAC category chemicals are also found in coal tar and coal distillates.

Fossil fuel combustion for heat and power generation is the primary source of PACs; however, other industrial processes also contribute. EPCRA section 313 PACs may be generated from the production of synthetic fuels from coal, petroleum, and other feedstocks as well as the manufacture of products other than fuels from coal and petroleum feedstocks. By-products of coal processing and petroleum refining such as heavy oils, crude tars, coal tars, coal distillates, and residues are likely to contain significant quantities of PACs.

These by-products are themselves often used in other industrial processes. Various liquid fractions distilled from tars and pitches can be used to produce chemicals such as benzene, toluene, xylene, phenols, creosols, and naphthalene. Pitches can be processed to make asphalt roofing and road surfacing material. Tars and pitches can be used in wood preservation and in the manufacture of carbon black, tar-epoxy coatings, and hydrocarbon resins. Coal tar pitch used at smelting facilities may also contain PACs.

Several factors influence the quantity and types of PACs generated: the combustion/pyrolysis method or industrial process; the method or process efficiency; the temperature range, and duration of combustion; and the material combusted/pyrolyzed or processed. Incomplete or inefficient combustion/pyrolysis processes tend to generate larger quantities of PACs. Higher temperature processes generate PACs that are higher in aromatic content.

EPA's publication, *Locating & Estimating Air Emissions from Sources of Polycyclic Organic Matter*, EPA-454/R-98-014, contains PACs emissions factors for eight PACs chemicals in the PACs category (benz(a)anthracene, benzo(a)phenanthrene (chrysene), benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, indeno(1,2,3- cd)pyrene), and 1-nitropyrene for the following sources potentially covered by EPCRA section 313 reporting requirements (2):

- Wood waste and bark fired industrial boilers;
- Natural gas fired industrial boilers;
- Coal fired industrial boilers;
- Oil and waste oil fired industrial boilers;
- Stationary diesel, natural gas, and gas turbine engines;
- Waste combustion systems for facilities regulated under subtitle C of RCRA;
- Primary aluminum producers – various processes;
- Electric arc furnaces;
- Iron foundries;
- Secondary lead smelters;
- Petroleum catalytic cracking;
- Asphalt roofing manufacture;
- Hot mix asphalt plants;
- Coke ovens;
- Portland cement kilns – wet and dry process; fired by various combinations of coal, coke, gas, and hazardous waste;
- Pulp mills – Kraft recovery furnaces and lime kilns;
- Carbon black manufacturing;
- Creosote wood treatment; and
- Rayon based carbon fiber manufacturing.

EPA's publication *Compilation of Air Pollutant Emission Factors*, commonly referred to as AP-42, is an additional reference for emissions factors for many industries and industrial processes (3). PAC emissions factors are available for oil, coal, natural gas and wood combustion; for diesel engines; carbon black manufacturing; and hot mix asphalt plants.

Section 1.2 General TRI Reporting Instructions

For general instruction regarding compliance with EPCRA section 313 requirements and form completion, please see the most recent version of the Toxic Chemical Release Inventory Reporting Forms and Instructions, available at: https://ofmpub.epa.gov/apex/guideme_ext/f?p=guideme:rfi-home.

SECTION 2.0 GUIDANCE ON REPORTING AND ESTIMATING ENVIRONMENTAL RELEASES OF PACS

Section 2.1 Introduction

You have determined that your facility is included in a covered industry code, has 10 or more full-time employee equivalents, and manufactures, processes, or otherwise uses one or more of the chemicals included in the EPCRA section 313 PACs category. The last step to establish if your facility must submit an EPCRA section 313 report is to determine if your facility has exceeded the reporting threshold amount of 100 pounds for the chemicals in the PACs category.

This document includes concentration and emissions 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 if 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.

As discussed in Section 1.1, most of the 25 listed PACs are products of incomplete combustion; see Table 1-1. Table 2-1 presents a list of some mixtures, and their CAS numbers, that might contain EPCRA section 313 PACs. It is suggested that you begin the threshold determination process by reviewing those two tables and compiling a list of all the fuels, mixtures, and other products, including but not limited to those listed in Table 2-1, used at your facility.

The concentration of an individual PAC in fuels and mixtures should always be based first on any specific information you have for the fuels, mixtures, or other products used at your facility. MSDSs are one source of information on the type and concentration of chemicals in mixtures. In the absence of such information, published data on the typical concentrations of the PACs found in those materials should be used.

The EPCRA section 313 listed toxic chemical creosote is an example of a mixture which may contain PACs. Creosote (CAS No. 8001-58-9) is a mixture that is often used as a wood preservative. The creosote mixture consists of hundreds of chemicals, and may include PACs listed at 40 CFR Section 372.28. In the October 29, 1999 Persistent, Bioaccumulative, Toxic Chemical final rule, EPA provided no exceptions to the reporting of PACs at the lower reporting threshold.

Therefore, facilities must include PACs contained in creosote in their threshold calculations. If a facility exceeds the applicable threshold, a separate Form R for PACs, including any PACs in the creosote mixture, must be filed. Furthermore, when reporting PACs, the *de minimis* exemption is inapplicable, and neither range reporting options nor the Form A may be used. See 40 CFR Sections 372.38(a); 372.85(b); 372.27(e). In the event that a facility exceeds the reporting thresholds for both creosote and PACs, the facility must file a Form R for PACs, and either a Form R or, if applicable, a Form A for creosote.

Table 2-1: Some Mixtures That Might Contain EPCRA Section 313 PACs[a]

Mixture Name	CAS Number[b]
Aromatic hydrocarbons, polycyclic	130498-29-2
Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polystyrene pyrolysis-derived	101794-76-7
Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene pyrolysis-derived	101794-75-6

Mixture Name	CAS Number[b]
Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene-polypropylene pyrolysis-derived	101794-74-5
Aromatic hydrocarbons, C20-28, polycyclic, mixed aromatic oil-polystyrene pyrolysis-derived	101794-73-4
Aromatic hydrocarbons, C20-28, polycyclic, mixed aromatic oil-polyethylene pyrolysis-derived	101794-72-3
Aromatic hydrocarbons, C20-28, polycyclic, mixed aromatic oil-polyethylene-polypropylene pyrolysis-derived	101794-71-2
Aromatic hydrocarbons, polycyclic, from decomposition of solvent extracted coal tar pitch-2,4,6-trinitrophenol-reaction products	94113-85-6
Aromatic hydrocarbons, polycyclic, from decomposition of iodine-solvent extracted coal tar pitch charge-transfer complexes	94113-84-5
Aromatic hydrocarbons, polycyclic, toluene dealkylation distillation residues	93762-97-1
Aromatic hydrocarbons, polycyclic, cyclohexanone-extracted residue	68409-74-5
Aromatic hydrocarbons, polycyclic, alkylnaphthalene-toluene thermal hydrodealkylation distillation residues	68333-90-4
Petroleum	8002-05-9
Anthracene oil	90640-80-5
Coke (coal tar), low-temperature, low-temperature gasification pitch, calcined	150339-33-6
Tar bases, coal, low-temperature, crude	141785-66-2
Extracts (coal), coal tar pitch solvent	130576-63-5
Extracts (coal), coal tar pitch solvent, reaction products with 2,4,6-trinitrophenol	94113-98-1
Extracts (coal), coal tar pitch solvent, reaction products with iodine	94113-97-0
Extract residues (coal), liquefaction heavy acid, alkaline extracts	94113-96-9
Extract residues (coal), naphthalene oil acid, alkaline extracts	94113-95-8
Distillates (coal tar), low-temperature, pitch	140413-63-4
Distillates (coal tar), upper, fluorene-low	140203-27-6
Distillates (coal tar), high-temperature, heavy oils	140203-21-0
Distillates (coal tar), gasification, pitch, full range	140203-20-9
Distillates (coal tar), gasification, heavy oils, pyrene fraction	140203-19-6
Distillates (coal tar), pitch, pyrene fraction	91995-52-7
Distillates (coal tar), pitch, heavy oils	91995-51-6
Distillates (coal tar), pitch, pyrene fraction	91995-42-5
Distillates (coal), liquefaction, heavy	91995-25-4
Distillates (coal tar), heavy oils	90640-86-1
Distillates (coal tar), upper, fluorene-rich	84989-11-7
Distillates (coal tar), upper, fluorene-free	84989-10-6
Pitch, coal tar, high-temperature, heat-treated	12575-60-8
Pitch, mixed brown-coal tar-ethylene manufacturing pyrolysis oil distribution	100403-59-6
Pitch, brown-coal tar	100403-58-5
Pitch, coal tar, high-temperature, secondary	94114-13-3

Mixture Name	CAS Number[b]
Pitch, coal gasification tar, low-temperature	94114-12-2
Residues, alkene-alkyne manufacturing pyrolysis oil byproduct distillation	93686-02-3
Residues, olefin manufacturing pyrolysis oil distillation	92062-01-6
Residues (coal tar), pitch distillation	92061-94-4
Residues (coal tar), anthracene oil distillation	92061-92-2
Residues (coal), coke-oven gas-polycyclic aromatic hydrocarbons reaction products distillation	92061-88-6
Aromatic hydrocarbons, polycyclic, automobile scrap shredder waste pyrolysis products	94581-00-7
Aromatic hydrocarbons, polycyclic, scrap cable pyrolysis	90989-45-0
Polyamides, polyester-, wastes, pyrolyzed, pyrolysis oil	100801-78-3
Polyamides, polyester-, wastes, pyrolyzed, pitch residue fraction	100801-77-2
Polyamides, polyester-, wastes, pyrolyzed, heavy oil fraction	100801-75-0
Hydrocarbon oils, aromatic, mixed with polyethylene, pyrolyzed, middle oil fraction	101227-14-9
Hydrocarbon oils, aromatic, mixed with polystyrene, pyrolyzed, middle oil fraction	101227-13-8
Hydrocarbon oils, aromatic, mixed with polyethylene and polypropylene, pyrolyzed, middle oil fraction	100801-64-7

[a] It cannot be determined from the mixture name if a chemical from the category is actually contained in the mixture.
[b] CAS definitions for most of the mixtures are provided in Appendix A.

Other important mixtures containing PACs are fuels. Table 2-2 provides concentrations of PACs in fuels. Be aware that these values only include a limited number of the specific PAC chemicals listed in the compound category. Analyses that include all of the chemicals are not available at this time. EPA recognizes that the scientific literature shows that there is significant variability in the concentration of PACs 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 2-2 for these commonly used fuels.

Diesel fuel is also a likely source of PACs; EPA does not have a default value for sites to use at this time.

Table 2-2: Quantity of PACs Required to Meet the Reporting Threshold in Fuels and Asphalt

Fuel Type	Concentration	Reference	Quantity Needed to Meet Threshold (gallons)[b]
No. 6 Fuel Oil (Bunker C)	2461 ppm	7	5.144×10^3
No. 2 Fuel Oil	10.0 ppm	8	1.41×10^6
Crude Oil	[a]	—	—
Gasoline	17 ppm	9	1.06×10^6
Paving Asphalt [c]	178 ppm	10	5.18×10^4

[a] PACs concentration in crude oil depends on the crude oil type. Additional PACs 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.
[c] Paving asphalt is also known as bituminous concrete.

Also in the absence of site specific data, the coincidental manufacturing of PACs in the combustion of fuels can be estimated using published emissions factors such as those found in EPA publications *Compilation of Air Pollutant Emission Factors*, AP-42 and *Locating & Estimating Air Emissions from Sources of Polycyclic Organic Matter*, see Table 2-3. Note that these values only include a limited number of PACs included in the PACs category.

The absence of information in Table 2-2 and Table 2-3 on the other members of the EPCRA section 313 PACs chemical category should not be interpreted to mean that those PACs are not present in the fuel oil or in the combustion products. EPCRA section 313 requires that you use the best, readily available information in preparing the report. Thus, if you have information on the presence and concentration of members of the EPCRA section 313 PACs chemical category not included in the values provided in the tables you must use that data in your threshold determinations.

Table 2-3: Emissions Factors for PACs From Combustion Sources

Combustion Source	Average Emissions Factor	Reference
Natural Gas-Fired Boilers	8.69×10^{-7} lb/MMCF	2[a]
Natural Gas-Fired Boilers	4.37×10^{-7} lb/MMCF	2[b]
Residual Oil Fired Boilers	1.65×10^{-5} lb/10^3 gal	3[c]
Coal-Fired, Controlled	1.12×10^{-6} lb/ton	3[d]
Wood Waste Combustion, Particulate Matter Control	5.15×10^{-5} lb/ton	3[e]

[a] Source Classification Codes (SCC) Number 1-02-006-01, 02, 03; uncontrolled; based on 10 units tested: 2 firetube, 1 scotch, 7 watertube, rated capacity range: 7.2-178 MMBtu/hr.
[b] SCC Number 1-03-006-01, 02; uncontrolled; based on 5 packaged watertube boilers tested, rated capacity range: 17.4-126 MMBtu/hr. EPA recommends that facilities choose between this value and the one above by matching the type of boiler.
[c] Section 1.3, Fuel Oil Combustion, Table 1.3-9; SCC 1-01-004-01/04
[d] Section 1.1, Supplement E, Table 1.1-13; factors developed from emissions data from six sites firing bituminous coal, four sites firing subbituminous coal, and from one site firing lignite. Factors apply to boilers using both wet limestone scrubbers or spray dryers with an ESP or fabric filter. The factors also apply to boilers using only an ESP or fabric filter. Emissions factor should be applied to coal feed, as fired, and are lb of pollutant per ton of coal combusted.
[e] Section 1.6, Supplement E, Table 1.6-4. Units are lb of pollutant/ton of wood waste burned. Emissions factors based on wet, as fired wood waste with average properties of 50 weight % moisture and $4500 Btu/lb heating value. PM controls include fabric filter, multi-cyclones, ESP, and wet scrubbers.

The concentration of an EPCRA section 313 PACs category 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 PACs 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 this 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 PAC is given and the concentrations of the other components are given, EPA recommends that you subtract the other component's total from

100% to calculate the upper bound concentration. EPA then recommends that you determine the midpoint for use in your calculations.

- If only the lower bound concentration of the PAC is given and the concentration of the other components is not given, EPA recommends that you assume the upper bound for the PAC 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.

Section 2.2 Threshold Determination

The following sample calculation will illustrate the use of published chemical specific concentration data and emissions factors in the determination of threshold quantities.

Keep in mind that if there are other manufacturing, processing, or otherwise use activities at your facility of the PACs included in the EPCRA section 313 PACs chemical category these must be included in your threshold determination.

Example 1: Threshold Determination Using Published Data

Your facility has a primary industry code covered by EPCRA section 313 reporting requirements and over 200 full-time employees. Your facility requires large quantities of steam in the manufacturing process and you use oil-fired boilers to generate the steam. The #6 fuel oil you purchase contains PACs included in the EPCRA section 313 PACs chemical category. The combustion of the fuel oil generates EPCRA section 313 PAC chemicals, in addition to other products (some of which, such as formaldehyde, may also be EPCRA section 313 chemicals). You need to determine if your facility otherwise uses and/or coincidentally manufactures EPCRA section 313 PACs category chemicals in an amount exceeding the annual reporting threshold of 100 pounds.

Otherwise used

Table 2-2 contains concentration information on the EPCRA section 313 PACs category chemicals in #6 fuel oil. The total concentration for PACs is 2461 ppm. Using 7.9 lb/gal as the density of #6 fuel oil, you would exceed the otherwise used threshold of 100 lb/year with the consumption of 5,144 gallons of #6 fuel oil.

$$(5{,}144\ \text{gal/yr; oil consumed}) \times (2461\ \text{lb}/10^6\ \text{lb; PAC concentration}) \times (7.9\ \text{lb/gal; oil density}) > 100\ \text{pounds/year}$$

Your facility exceeds the reporting threshold, therefore a Form R must be prepared for the PACs chemical category.

Manufactured

Table 2-3 contains an uncontrolled emission factor for PAC chemicals in #6 fuel oil. The emission factor is 1.65×10^{-5} pounds/1,000 gallons of fuel oil burned. The uncontrolled emission factor can be equated to the quantity generated by the coincidental manufacturing.

If this was the only source of EPCRA section 313 PAC category chemicals your facility would have to burn over 6.07 billion gallons of residual fuel oil during the reporting year to manufacture over 100 pounds of the PAC chemicals required to trigger the EPCRA section 313 reporting threshold for the PACs chemical category.

$$(6.07 \times 10^9\ \text{gal/yr; oil burned}) \times (1.65 \times 10^{-5}\ \text{lb}/10^3\ \text{gal; PAC concentration}) > 100\ \text{pounds/year}$$

Your facility exceeds the reporting threshold, therefore a Form R must be prepared for the PACs chemical category.

Section 2.3 Methods for Calculating Annual Releases and Other Waste Management Quantities of Chemicals in the PACs Chemical Category

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 PAC releases and other waste management activities by following these steps:

1. Identify the processes/operations where PACs may be manufactured, processed, or otherwise used.

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

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

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

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

- Accidental releases;
- Air pollution control devices (stack releases);
- Combustion by-products;
- Process discharge stream (e.g. scrubber wastewater);
- Energy recovery by-products;
- Tower stacks; and
- Volatilization from processes.

After determining the release and other waste management activity sources of PACs, you are ready to determine the types of releases and other waste management activities. These final destinations of the PACs 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): PACs 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): PACs 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 the quantity of PACs released through the air device.

- Discharges to receiving streams or water bodies (Part II, Section 5.3 of Form R): PACs may be present in scrubber wastewater. Monitoring is often performed at outfalls. This information can be used to determine the concentration of PACs leaving the facility.

- Underground injection on site (Part II, Section 5.4 of Form R)

- Disposal to land on site (Part II, Section 5.5 of Form R)
- 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 PAC concentration in a wastewater stream.
- Transfers to other off-site locations (Part II, Section 6.2 of Form R):
- On-site waste treatment (Part II, Section 7A of Form R): You should report the amount of PACs treated by your facility; however this practice is not common for PACs.
- On-site energy recovery (Part II, Section 7B of Form R): This waste management activity is not common for PACs.
- On-site recycling (Part II, Section 7C of Form R): This waste management activity is not common for PACs.

After you have identified all of the potential sources for release and other waste management activity types, you must estimate the quantities of PACs released and otherwise managed as waste.

EPA has identified 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:

- Estimate is based on continuous monitoring data or measurements for the EPCRA section 313 chemical (M1);
- Estimate is based on periodic or random monitoring data or measurements for the EPCRA section 313 chemical (M2);
- Estimate is based on mass balance calculations, such as calculation of the amount of the EPCRA section 313 chemical in streams entering and leaving process equipment (C);
- Estimate is based on published emissions factors, such as those relating release quantity to through-put or equipment type (e.g., air emissions factors) (E1);
- Estimate is based on-site specific emissions factors, such as those relating release quantity to through-put or equipment type (e.g., air emissions factors) (E2);
- Estimate is based on other approaches such as engineering calculations (e.g., estimating volatilization using published mathematical formulas) or best engineering judgment. This would include applying estimated removal efficiency to a waste stream, even if the composition of the stream before treatment was fully identified through monitoring data (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* (6) and the current version of the Toxic Chemical Release Inventory Reporting Forms and Instructions.

Many data sources exist for these (and other) methods of developing estimates. Table 2-4 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.

Table 2-4: Potential Data Sources for Release and Other Waste Management Calculations

Data Sources	
Monitoring Data	**Mass Balance**
Air permits Continuous emission monitoring Effluent limitations Hazardous waste analysis Industrial hygiene monitoring data NPDES[1] permits Outfall monitoring data POTW pretreatment standards RCRA[2] permit (not common for PACs) Stack monitoring data New Source Performance Standards Title V MACT[7] Standards	Air emissions inventory Hazardous material inventory Hazardous waste manifests SDSs[4] Pollution prevention reports Spill and accidental release event records Supply and purchasing records (not common for PACs)
Emissions Factors	**Engineering Calculations**
AP-42[3] chemical specific emissions factors Facility or trade association derived chemical-specific emissions factors	NTI[6] database Facility non chemical-specific emissions factors. Henry's Law Raoult's Law SOCMI[5] or trade association non-chemical specific emissions factors Solubilities Volatilization rates

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

The following sample calculation will illustrate how you might estimate the release and other waste management quantities for reporting on the Form R.

Example 2: Release and Other Waste Management Estimation

Let us assume that your threshold determination showed that in the combustion of fuel oil to generate steam for the manufacturing process, you coincidentally manufactured a total of 155 pounds of the PACs in the EPCRA section 313 PACs chemical category. While you have not tested the efficiency of the air pollution control devices on your oil-fired burners (testing is not required for EPCRA section 313 reporting purposes) the pollution control device manufacturer's data states that the devices will provide 85% control and removal.

Quantity released = 155 lb/year × (1 - 0.85; control device efficiency) = 23.25 pounds/year.

This should be reported in Part II, Sections 5.2 and 8.1 of the Form R. The PACs captured by the control device also need to be reported.

SECTION 3.0 REFERENCES

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9. Guerin, M.R. *Energy Sources of Polycyclic Aromatic Hydrocarbons.* Oak Ridge National Laboratory, Oak Ridge, TN. Conf. 770130-2. 1977. 78 pp. (Cited in Reference 5, p. A-11, 12).

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APPENDIX A. DEFINITIONS OF VARIOUS MIXTURES, WITH CAS NUMBERS, THAT MAY CONTAIN CHEMICALS IN THE EPCRA SECTION 313 PACs CATEGORY

CASRN	Definition
101794-76-7	Aromatic hydrocarbons, C-20-28, polycyclic, mixed coal-tar pitch-polystyrene pyrolysis-derived Definition: A complex combination of hydrocarbons obtained from mixed coal tar pitch-polystyrene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 100°C to 220°C (212°F to 428°F) according to DUN 52025.
101794-75-6	Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene pyrolysis-derived Definition: A complex combination of hydrocarbons obtained from mixed coal tar pitch-polyethylene pyrolysis. Combined primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 100°C to 220°C (212°F to 428°F) according to DIN 52025.
101794-74-5	Aromatic hydrocarbons, C20-28, polycyclic, mixed coal-tar pitch-polyethylene- polypropylene pyrolysis-derived Definition: A complex combination of hydrocarbons obtained from mixed coal tar pitch-polyethylene-polypropylene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having a softening point of 100°C to 220°C (212°F to 428°F) according to DIN 52025.
101794-73-4	Aromatic hydrocarbons, C20-28, polycyclic, mixed aromatic Oil-polystyrene pyrolysis-derived Definition: A complex combination of hydrocarbons obtained from mixed aromatic oil-polystyrene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 30°C to 140°C (86°F to 284°F) according to DIN 52025.
101794-72-3	Aromatic hydrocarbons, C20-28, polycyclic, mixed aromatic oil-polyethylene pyrolysis-derived Definition: A complex combination of hydrocarbons obtained from mixed aromatic oil-polyethylene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 30°C to 140°C (86°F to 284°F) according to DIN 52025.
101794-71-2	Aromatic hydrocarbons, C20-28, polycyclic, mixed aromatic oil-polyethylene- polypropylene pyrolysis-derived Definition: A complex combination of hydrocarbons obtained from mixed aromatic oil-polyethylene-propylene pyrolysis. Composed primarily of polycyclic aromatic hydrocarbons having carbon numbers predominantly in the range of C20 through C28 and having a softening point of 30°C to 140°C (86°F to 184°F) according to DIN 52025.
94113-85-6	Aromatic hydrocarbons, polycyclic, from decompn. of solvent extd. coal tar pitch-2,4,6-tricnitrophenol-reaction products Definition: A complex combination of organic compounds obtained by addition of a picric acid solution to the solvent extract of a bituminous coal tar pitch and decomposition of the precipitated pitch-picric acid reaction product with bases. Composed primarily of high molecular weight polycyclic aromatic compounds.

CASRN	Definition
94113-84-5	Aromatic hydrocarbons, polycyclic, from decompn. of iodine-solvent extd. coal-tar pitch cargo-transfer complexes Definition: A complex combination of organic compounds obtained by addition of iodine solution to the solvent extract of a bituminous coal tar pitch and decomposition of the precipitated pitch iodine reaction products. Composed primarily of high molecular weight polycyclic aromatic compounds.
93762-97-1	Aromatic hydrocarbons, polycyclic, toluene dealkylation distillation residues Definition: A complex combination of hydrocarbons obtained from the distillation of products from the thermal hydrodealkylation of toluene. It consists of predominantly bi- and polynuclear aromatic hydrocarbons such as diphenyl, methyldiphenyl, fluorene, and phenanthrene.
68409-74-5	Aromatic hydrocarbons, polycyclic, cyclohexanone, ext. residues Definition: A complex residuum from the cyclohexanone extraction of anthracene salts. It consists predominantly of polynuclear aromatic hydrocarbons such as anthracene.
68333-90-4	Aromatic hydrocarbons, polycyclic, alkylnaphthalene-toluene thermal hydrodealkylation distillation residues Definition: The complex residuum from the distillation of products from the thermal hydrodealkylation of alkylnaphthalene and toluene. It consists predominantly of bi- and polynuclear aromatic hydrocarbons such as naphthalenes, biphenyl, fluorene, and phenanthrene.
8002-05-9	Petroleum Definition: A complex combination of hydrocarbons. It consists predominantly of aliphatic, alicyclic, and aromatic hydrocarbons. It may also contain small amounts of nitrogen, oxygen, and sulfur compounds. This category encompasses light, medium, and heavy petroleums, as well as the oils extracted from tar sands. Hydrocarbonaceous materials requiring major chemical changes for their recovery or conversion to petroleum refinery feedstocks such as crude shale oils, upgraded shale oils and liquid coal fuels are not included in this definition.
90640-80-5	Anthracene oil Definition: A complex combination of polycyclic aromatic hydrocarbons obtained from coal tar having an approximate distillation range of 300°C to 400°C (572°F to 752°F). Composed primarily of phenanthrene, anthracene, and carbazole.
141785-66-2	Tar bases, coal, low-temperature, crude Definition: The reaction product obtained by neutralizing the acidic extract of alkali- washed low-temperature coal tar middle oil with an alkaline solution, such as aqueous sodium hydroxide, to obtain the free bases. Composed primarily of a complex mixture of aromatic nitrogen bases.
140203-34-5	Tar bases, coal liquefaction, heavy oil fraction Definition: The heavy oil obtained by the high pressure hydrogenation of bituminous coal is subjected to acid extraction and then neutralized. The crude bases thus obtained contain polynuclear nitrogen aromatics such as quinoline, acridine, and phenanthridine.

CASRN	Definition
130576-63-5	Extracts (coal), coal tar pitch solvent Definition: Solvent extract of bituminous coal tar pitch. Composed primarily of polycyclic aromatic hydrocarbons.
94113-98-1	Extracts (coal), coal tar pitch solvent, reaction products with 2,4,6-trinitrophenol Definition: Insoluble reaction product obtained by addition of a picric acid solution to the solvent extract of a bituminous coal tar pitch. Composed primarily of polycyclic aromatic hydrocarbons.
94113-97-0	Extracts (coal), coal tar pitch solvent, reaction products with iodine Definition: Extract obtained by adding an iodine solution to the solvent extract of a bituminous coal tar pitch. Composed primarily of polycyclic aromatic hydrocarbons.
94113-96-9	Extract residues (coal), liquefaction heavy acid, alkaline extracts Definition: The neutral oil obtained by debasing and dephenolating the heavy oil from the high pressure hydrogenation of bituminous coal. Composed primarily of unsubstituted and alkyl-substituted aromatic polynuclear hydrocarbons that are partially hydrogenated and may contain heteroatoms.
94113-95-8	Extract residues (coal), naphthalene oil acid, alkaline extracts Definition: The neutral oil obtained by debasing and dephenolating the middle oil from the low temperature carbonization of bituminous coal. Composed primarily of a mixture of mono- and polynuclear, substituted and unsubstituted aromatic and naphthenic hydrocarbons and heterocycles as well as paraffinic hydrocarbons.
140413-63-4	Distillates (coal tar), low-temperature, pitch Definition: The distillate obtained during the heat treatment of low temperature coal tar pitch having an approximate distillation range of 100°C to 400°C (212°F to 752°F). Composed primarily of a complex mixture of aromatic compounds.
140203-27-6	Distillates (coal tar), upper, fluorene-low Definition: A complex combination of hydrocarbons obtained by the crystallization of the fractional distillates from tar oil. It consists of aromatic polycyclic hydrocarbons, primarily diphenyl, dibenzofuran, and acenaphthene.
140203-21-0	Distillates (coal tar), gasification, pitch, full range Definition: The distillate obtained during the heat treatment of pitch obtained from coal gasification tar having an approximate distillation range of 100°C to 400°C (212°F to 752°F). Composed primarily of aromatic and other hydrocarbons, phenolic compounds, and aromatic nitrogen compounds.
140203-19-6	Distillates (coal tar), gasification, heavy oils, pyrene fraction Definition: The distillate from the fractional distillation of coal gasification tar having an approximate boiling range of 350°C to 450°C (662°F to 842°F). Composed primarily of phenanthrene and anthracene homologs, tetranuclear aromatic hydrocarbons which may also contain heteroatoms, high-boiling aliphatic and naphthenic hydrocarbons, and polynuclear phenols.

CASRN	Definition
91995-52-7	Distillates (coal tar), pitch, pyrene fraction Definition: The redistillate obtained from the fractional distillation of pitch distillate and boiling in the range of approximately 380°C to 410°C (716°F to 770°F). Composed primarily of tri- and polynuclear aromatic hydrocarbons and heterocyclic compounds.
91995-51-6	Distillates (coal tar), pitch, heavy oils Definition: The distillate from the distillation of the pitch obtained from bituminous high temperature tar. Composed primarily of tri- and polynuclear aromatic hydrocarbons and boiling in the range of approximately 300°C to 470°C (572°F to 878°F). The product may also contain heteroatoms.
91995-42-5	Distillates (coal tar), heavy oils, pyrene fraction Definition: The redistillate obtained from the fractional distillation of pitch distillate boiling in the range of approximately 350°C to 400°C (662°F to 752°F). Consists predominantly of tri- and polynuclear aromatics and heterocyclic hydrocarbons.
91995-25-4	Distillates (coal), liquefaction, heavy Definition: the heavy oil obtained by distillation in the range of approximately 300°C to 550°C (572°F to 1022°F) of coal oil from the catalytic hydrogenation of coal and coal-derived products. Composed primarily of polynuclear aromatics and naphthenes. The product contains sulfur, oxygen, and nitrogen compounds.
90640-86-1	Distillates (coal tar), heavy oils Definition: The distillate from the fractional distillation of coal tar having an approximate distillation range of 300°C to 400°C (572°F to 752°F). Composed primarily of tri- and polynuclear aromatic hydrocarbons and heterocyclic compounds.
84989-11-7	Distillates (coal tar), upper, fluorene-rich Definition: A complex combination of hydrocarbons obtained by the crystallization of the fractional distillates from coal tar. It consists of aromatic and polycyclic hydrocarbons, primarily fluorene and acenaphthene.
84989-10-6	Distillates (coal tar), upper, fluorene-free Definition: A complex combination of hydrocarbons obtained by the crystallization of tar oil. It consists of aromatic polycyclic hydrocarbons, primarily diphenyl, dibenzofuran, and acenaphthene.
121575-60-8	Pitch, coal tar, high-temperature, heat-treated Definition: The heat treated residue from the distillation of high temperature coal tar. A black solid with an approximate softening point from 80°C to 180°C (176°F to 356°F). Composed primarily of a complex mixture of three or more membered condensed ring aromatic hydrocarbons.

CASRN	Definition
100403-59-6	Pitch, mixed brown-coal tar-ethylene manufacturing pyrolysis oil distillation Definition: The residue from the joint distillation of brown coal tar and pyrolysis residual oil from ethylene plants. Composed primarily of polynuclear aromatic and naphthenic hydrocarbons which can be alkyl- and vinyl-substituted and can contain heteroatoms, paraffin hydrocarbons, and high-boiling mono- and dinuclear phenols. It is a black solid with a softening point of 60°C (140°F) according to DIN 52025.
100403-58-5	Pitch, brown-coal tar Definition: The residue from the distillation of brown coal tar formed by carbonization up to 1250°C (2282°F). Composed primarily of polynuclear aromatic and naphthenic hydrocarbons and heterocycles, paraffin hydrocarbons, and high-boiling mono- and dinuclear phenols. It is a black solid with a softening point of 50°C to 120°C (122°F to 248°F) according to DIN 52025.
94114-13-3	Pitch, coal tar, high-temperature, secondary Definition: The residue obtained during the distillation of high boiling fractions from bituminous coal high temperature tar and/or pitch coke oil, with a softening point of 140°C to 170°C (284°F to 338°F) according to DIN 52025. Composed primarily of tri- and polynuclear aromatic compounds which also contain heteroatoms.
94114-12-2	Pitch, coal gasification tar, low-temperature Definition: The residue from the distillation of bituminous coal pressure gasification tar. A black solid with a softening point of greater than 60°C (140°F) according to DIN 52025 and composed primarily of a complex mixture of polynuclear aromatic and naphthenic hydrocarbons that may be alkyl substituted and may contain heteroatoms, high boiling aliphatic hydrocarbons and polynuclear phenols.
93686-02-3	Residues, alkene-alkyne manufactured by pyrolysis oil byproduct distillation Definition: A complex combination of hydrocarbons obtained as a residue from the distillation of residual oils that are obtained by the pyrolytic recovery of alkenes and alkynes from mineral oil products or natural gas. It consists predominantly of tri- and polynuclear aromatic and alkylaromatic hydrocarbons and has a softening point of approximately 60°C to 180°C (140°F to 356°F) according to DIN 52025.
92062-01-6	Residues, olefin manufacturing pyrolysis oil distillation Definition: A complex combination of hydrocarbons obtained as a residue from the distillation of residual oils that are obtained by the pyrolytic recover of alkenes and alkynes from petroleum products or natural gas. It consists predominantly of tri- and polynuclear aromatic and alkylaromatic hydrocarbons having a softening point of 20°C to 60°C (68°F to 140°F) according to DIN 52025.
92061-94-4	Residues (coal tar), pitch distillation Definition: Residue from the fractional distillation of pitch distillate boiling in the range of approximately 400°C to 470°C (752°F to 878°F). Composed primarily of polynuclear aromatic hydrocarbons, and heterocyclic compounds.
92061-92-2	Residues (coal tar), anthracene oil distillation Definition: The residue from the fraction distillation of crude anthracene boiling in the approximate range of 340°C to 400°C (644°F to 752°F). It consists predominantly of tri- and polynuclear aromatic and heterocyclic hydrocarbons.

CASRN	Definition
92061-88-6	Residues (coal), coke-oven gas-polycyclic aromatic hydrocarbons reaction products distillation Definition: The residue from the distillation of a complex reaction product, obtained by reaction of gases obtained by the dry distillation of bituminous coal with a distillate, consisting of di- and trinuclear aromatic hydrocarbons and their alkyl derivatives, with a softening point of 30°C to 50°C (86°F to 122°F). The residue consists predominantly of substituted aromatic di- and polynuclear hydrocarbons and sulfur- containing compounds.
94581-00-7	Aromatic hydrocarbons, polycyclic, automobile scrap shredder waste pyrolysis products Definition: Pyrolysis product obtained from the thermal treatment of the organic portion of shredder waste arising from automobile scrap. Composed primarily of mono- to tetracyclic aromatic hydrocarbons and their alkyl derivatives.
90989-45-0	Aromatic hydrocarbons, polycyclic, scrap cable pyrolysis Definition: Fraction formed by the thermal treatment of scrap cables at about 700°C (1292°F) with extensive exclusion of air. Consists chiefly of mono- to tetranuclear aromatic hydrocarbons and their alkyl derivatives.
100801-78-3	Polyamides, polyester-, wastes, pyrolyzed, pyrolysis oil Definition: The oil obtained from the pyrolysis of textile wastes from a polyamide/ polyester fiber mixture at 600°C to 800°C (1112°F to 1472°F). It consists predominantly of benzene and naphthalene and their homologs, benzonitrile, and other di- and polynuclear aromatic hydrocarbons.
100801-77-2	Polyamides, polyester-, wastes pyrolyzed, pitch residue fraction Definition: A residue from the distillation of textile waste pyrolysis oil. It consists predominantly of polynuclear aromatic hydrocarbons boiling in a range above 350°C (662°F).
100801-75-0	Polyamides, polyester-, wastes, pyrolyzed, heavy oil fraction Definition: A fraction from the distillation of textile waste pyrolysis oil. It consists predominantly of benzonitrile, naphthalene, and homologs and other di- and polynuclear aromatic hydrocarbons boiling in the range of 200°C and 350°C (392°F to 662°F).
101227-14-9	Hydrocarbon oils, aromatic, mixed with polyethylene, pyrolyzed, middle oil fraction Definition: The oil obtained from the heat treatment of polyethylene with aromatic oils. It consists predominantly of naphthalene and its homologs, 1,3-diphenylpropane and other polynuclear aromatic hydrocarbons boiling in a range of approximately 200°C to 400°C (392°F to 752°F).
101227-13-8	Hydrocarbon oils, aromatic, mixed with polystyrene, pyrolyzed, middle oil fraction Definition: The oil obtained from the heat treatment of polystyrene with aromatic oils. It consists predominantly of naphthalene and its homologs, 1,3-diphenylpropane, and other polynuclear aromatic hydrocarbons boiling in a range of approximately 200°C to 400°C (392°F to 752°F).

CASRN	Definition
100801-64-7	Hydrocarbon oils, aromatic, mixed with polyethylene and polypropylene, pyrolyzed, middle oil fraction Definition: The oil obtained from the heat treatment of a polyethylene/polypropylene mixture with aromatic oils. It consists predominantly of naphthalene and its homologs, 1,3-diphenylpropane and other polynuclear aromatic hydrocarbons boiling in a range of approximately 200°C to 400°C (392°F to 752°F).