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This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 261, 266, 268, 271, and 302

[SWH-FRL-5327-2]

RIN 2050-AD88

Hazardous Waste Management System; Identification and Listing of Hazardous Waste: Petroleum Refining Process Wastes; Land Disposal Restrictions for Newly Identified Wastes; and CERCLA Hazardous Substance Designation and Reportable Quantities

AGENCY: Environmental Protection Agency.

ACTION: Notice of proposed rulemaking.

SUMMARY: The U.S. Environmental Protection Agency (EPA) is proposing to amend the regulations for hazardous waste management under the Resource Conservation and Recovery Act (RCRA) by listing, as hazardous wastes, three residuals from petroleum refining processes because certain disposal practices may present a risk to human health or the environment. EPA is also proposing not to list as hazardous eleven process residuals. This action proposes to add the toxic constituents found in the wastes to the list of constituents that serves as the bases for classifying wastes as hazardous.

This action is proposed pursuant to RCRA section 3001(b) and section 3001(e)(2), which direct EPA to make a hazardous waste listing determination for "refining wastes." The effect of this proposed regulation would be to subject these wastes to regulation as hazardous wastes under Subtitle C of RCRA. Additionally, this action proposes to designate the wastes proposed for listing as hazardous substances subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and to adjust the one-pound statutory reportable quantities (RQs) for these substances.

In support of the Agency's regulatory reinvention efforts, this action also proposes changes to the RCRA regulations to promote the environmentally sound recycling of oil-bearing residuals. Specifically, the Agency is proposing to broaden the existing exemption for certain wastes from the definition of solid waste. These include oil-bearing residuals from specified petroleum refining sources inserted into the petroleum refining process, and spent caustic from liquid treating operations when used as a feedstock. Today's proposal also would exempt from the definition of hazardous waste mixtures of clarified slurry oil (CSO) storage tank sediment and/or in-line filter/separation solids with tank wastewaters, provided that the waste is discharged to the oil recovery sewer before primary oil/water/solids separation, and ceramic support media separated from spent hydrotreating/hydrorefining catalysts.

Finally, EPA is proposing to apply universal treatment standards (UTS) under the Land Disposal Restrictions program to the Petroleum Refining Wastes proposed for listing in this rulemaking.

DATES: EPA will accept public comments on this proposed rule until February 20, 1996. Comments postmarked after this date will be marked "late" and may not be considered. Any person may request a public hearing on this proposal by filing a request with Mr. David Bussard, whose address appears below, by December 4, 1995.

ADDRESSES: The official record of this rulemaking is identified by Docket Number F-95-PRLP-FFFFF. The public must send an original and two copies (and a voluntary copy on a computer diskette) of their comments to: EPA RCRA Docket Clerk (5305W), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460. Place the docket number F-95-PRLP-FFFFF on your comments. Through November 13, 1995, copies of materials relevant to this proposed rulemaking are located in the docket at the address listed above. The Agency plans to relocate the docket on November 14, 1995, and the docket will be physically closed from November 14, 1995 to November 26, 1995. Special arrangements for reviewing docket materials during this time can be made

by calling (202) 260-9327. The Agency will be issuing a separate Federal Register notice explaining this change.

Starting November 27, 1995, the EPA RCRA Docket will be located at Crystal Gateway #1, 1st Floor, 1235 Jefferson Davis Highway, Arlington, VA. Comments may be delivered to that location. The docket is open from 9:00 a.m. to 4:00 p.m., Monday through Friday, excluding Federal holidays. The public can make an appointment to review docket materials by calling (202) 260-9327. Starting November 27, 1995, the new telephone number for the docket will be (703) 603-9230. The public may copy 100 pages from the docket at no charge; additional copies are \$0.15 per page.

Requests for a hearing should be addressed to Mr. David Bussard at: Hazardous Waste Identification Division, Office of Solid Waste (5304), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT: The RCRA/Superfund Hotline, toll-free, at (800) 424-9346 or at (703) 920-9810. The TDD Hotline number is (800) 553-7672 (toll-free) or (703) 486-3323 in the Washington, D.C. metropolitan area. For technical information on the RCRA hazardous waste listings, contact Maximo Diaz, Jr., Office of Solid Waste (5304), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, D.C., 20460, (202) 260-4786.

For technical information on the CERCLA aspects of this rule, contact: Mr. Jack Arthur, Response Standards and Criteria Branch, Emergency Response Division (5202G), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, D.C. 20460, (703) 603-8760.

SUPPLEMENTARY INFORMATION: The contents of the preamble to this proposed rule are listed in the following outline:

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- I. Legal Authority

Today's regulations are being proposed under the authority of sections 2002(a) and 3001(b)(1) and (e)(2) of the Solid Waste Disposal Act, as amended, 42 U.S.C. 6912(a), and 6921(b) and (e)(1), (commonly referred to as RCRA), and section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9602(a).
- II. Background
 - A. *Schedule Suit*

In 1989, the Environmental Defense Fund (EDF) sued the Agency, in part, for failing to meet the statutory deadlines of section 3001(e)(2) of RCRA (EDF v.

Browner; Civ. No. 89-0598 D.D.C.). To resolve most of the issues in the case, EDF and EPA entered into a consent decree which was approved by the court on December 9, 1994. The consent decree sets out an extensive series of deadlines for promulgating RCRA rules and for completing certain studies and reports. Paragraph 1.k of the consent decree obligates the EPA to promulgate a final listing determination on or before October 31, 1996, for the following petroleum refining process residuals: clarified slurry oil sludge¹ from catalytic cracking, crude storage tank sludge, catalyst from catalytic hydrotreating, process sludge from sulfur complex and H₂S removal facilities, off-spec product and fines from thermal processes, catalyst from catalytic reforming, unleaded storage tank sludge, catalyst from catalytic hydrorefining, catalyst and fines from catalytic cracking, catalyst from sulfur complex and H₂S removal facilities, spent caustic from liquid treating, catalyst from H₂SO₄ alkylation, sludge from HF alkylation, and sludge from H₂SO₄ alkylation. Today the EPA is proposing listing determinations for these residuals in accordance with the consent decree's deadline for this rulemaking proposal.

B. Existing Petroleum Refining Listings and Other Relevant Agency Actions

1. Listings

A number of wastes from petroleum refineries have been previously listed as hazardous. The Agency notes that today's proposal does not affect the scope of the existing hazardous waste listings (described below) or the applicability of CERCLA to these wastes. EPA is not soliciting comments concerning these listings and does not intend to respond to any such comments received.

In addition, EPA-classified listed hazardous wastes are hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. CERCLA hazardous substances are listed in Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs), and include the listed hazardous wastes from petroleum refining in Table II-1.

¹ While the consent decree uses the term "sludge" to refer to any solid, semi-solid, or liquid residual, the term is defined more narrowly for RCRA Subtitle C (§ 260.10). Throughout today's proposal

the Agency has used the term "sediment" to denote solid, semi-solid, or liquid residuals deposited from industrial process liquids.

TABLE II-1.—LIST OF CURRENTLY REGULATED RCRA WASTES AND CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

Hazardous substance	Statutory RQ pounds (kg)	Final RQ pounds (kg)
K048—Dissolved air flotation (DAF) float from the petroleum refining industry	1(.454)	10(4.54)
K049—Slop oil emulsion solids from the petroleum refining industry	1(.454)	10(4.54)
K050—Heat exchange bundle cleaning sludge from the petroleum refining industry	1(.454)	10(4.54)
K051—API separator sludge from the petroleum refining industry	1(.454)	10(4.54)
F037—Petroleum refinery primary oil/water/solids sludge	1(.454)	1(.454)
F038—Petroleum refinery secondary (emulsified) oil/water/solids separation sludge	1(.454)	1(.454)

2. Definition of Solid Waste Exemptions

The jurisdictional boundaries of RCRA are established primarily by the definition of solid waste, i.e., materials are subject to regulation under RCRA only if they meet the regulatory definition of solid waste. Secondary materials, including those EPA today is proposing to list as hazardous, may be excluded from the definition of solid waste and therefore from regulation under RCRA if they are recycled in certain ways. Today's notice describes how each material is typically managed. The notice also discusses existing regulatory exclusions that may apply to a particular refining residual, depending on how that residual is managed.

It is important to note that EPA is currently evaluating the existing RCRA regulatory program, with emphasis on the need to clarify RCRA jurisdiction, particularly as it applies to secondary materials destined for recycling. Additionally, the Agency plans to develop a simpler, more streamlined approach to regulating hazardous waste recycling. One of the Agency's goals in revising the RCRA regulations is to address outstanding jurisdictional issues that specifically affect the petroleum refining industry. The petroleum industry poses unique regulatory issues largely because existing exclusions from the definition of solid waste generally do not apply to secondary materials used to produce fuels, the primary product of the refining industry.

The current definition of solid waste at 40 CFR 261.2 classifies secondary materials destined for recycling as solid wastes if the recycling is a form of waste management. Conversely, if the materials are recycled as part of an ongoing manufacturing process, they are not solid wastes. Accordingly, the existing rules specifically exclude secondary materials from the definition of solid waste that are: used directly (i.e., without reclamation) as ingredients in manufacturing processes to make new products; used directly as effective substitutes for commercial products; or

returned directly to the original process from which they are generated as a substitute for raw material feed stock. These exclusions do not apply to materials that are either contained in, or used to produce fuels, however, and therefore do not generally apply to secondary materials recycled as part of the petroleum refining process. Petroleum industry representatives have long argued that oil-bearing secondary materials used as ingredients in the petroleum refining process to make fuel should be excluded from regulation under RCRA.

Today's proposal, which deals specifically with petroleum residuals, gives EPA the opportunity to address some larger, longstanding issues involving where the boundaries of RCRA should be drawn regarding jurisdiction over the petroleum industry. Therefore, in addition to addressing specific regulatory issues that may arise as a result of a decision to list an individual petroleum wastestream, the Agency is proposing more comprehensive revisions to the RCRA regulations relating to materials that are generated by and recycled within the petroleum industry. (See Section III.E.)

C. EPA's Hazardous Waste Listing Determination Policy

Today's listing determination proposal follows the elements of the Agency's hazardous waste listing determination policy. That policy was presented in the dyes and pigments listing determination proposal (59 FR 66072, December 22, 1994). Readers are referred to that notice for a description of EPA's listing policy. Also, Section III.F.2., "Risk Analysis," contains a discussion of how elements of EPA's listing policy were applied in today's listing determination.

III. Today's Action

A. Summary of Today's Action

1. Summary of Proposed Listing Determinations

In today's notice, EPA is proposing to add three wastes generated during petroleum refining operations to the list of hazardous wastes in 40 CFR 261.32. A summary of the waste groupings proposed for listing are provided below with their proposed corresponding EPA Hazardous Waste Numbers.

K170—Clarified slurry oil storage tank sediment and/or in-line filter/separation solids from petroleum refining operations.

K171—Spent hydrotreating catalysts from petroleum refining operations (As discussed in III.A.2 below, this listing does not include ceramic support media.)

K172—Spent hydrorefining catalysts from petroleum refining operations (As discussed in III.A.2 below, this listing does not include ceramic support media.)

EPA is proposing to list certain wastes in this rule because these materials meet the criteria set out in 40 CFR 261.11(a)(3) for listing a waste as hazardous. EPA assessed and considered the factors contained in these criteria primarily by incorporating them as elements in a risk assessment. Based on this assessment, EPA is proposing to list those wastes that pose a substantial present or potential hazard to human health or the environment when improperly managed.

Upon promulgation of these proposed listings, all wastes meeting the listing descriptions would become hazardous wastes and would require treatment, storage, or disposal at RCRA Subtitle C permitted facilities. Residuals from the treatment, storage, or disposal of the wastes included in this proposed listing also would be classified as hazardous wastes pursuant to the "derived-from" rule (40 CFR 261.3(c)(2)(I)). For example, ash or other residuals from treatment of the listed wastes would be subject to RCRA Subtitle C hazardous

waste regulations. Also, 40 CFR 261.3(a)(2)(iv) (the "mixture" rule) provides that, with certain limited exceptions, any mixture of a listed waste and a solid waste is itself a RCRA hazardous waste.

However, when these materials are recycled as described in 40 CFR 261.2(e)(1)(iii) or 261.4(a)(8), they are not solid wastes and are not subject to hazardous waste regulations. For example, if a material is collected and returned in a closed-loop fashion to the same process, it is not regulated. As discussed further in Section III.E of this notice, the Agency is proposing some modifications to these recycling exemptions.

This action also proposes not to list as hazardous eleven residuals generated from petroleum refining operations:

- Crude oil storage tank sediment.
- Unleaded gasoline storage tank sediment.
- Off-specification product and fines from thermal processes.
- Catalyst from reforming.
- Catalyst from H₂SO₄ alkylation.
- Sludge from H₂SO₄ alkylation.
- HF alkylation sludge.
- Spent caustic from liquid treating.
- Catalyst and fines from catalytic cracking.
- Catalyst from sulfur complex and H₂S removal facilities.
- Sludge from sulfur complex and H₂S removal facilities.

The Agency requests comments on the proposal not to list the above wastes. While the agency is proposing not to list crude oil storage tank sediment, the Agency specifically requests comment on the merits of listing this waste. Crude oil storage tank sediment could be finalized as a listing in response to comment. The Agency also requests comment on the data used in this proposal, the methodology and assumptions used in the risk assessment, the waste groupings chosen by the Agency, and other information and analyses supporting the proposed listings.

2. Summary of Definition of Solid Waste and Other Exemptions Proposed in Today's Notice

While the primary purpose of today's proposal is to present the Agency's findings with respect to the hazards posed by the 14 residuals identified in the consent decree, the Agency also conducted a parallel effort to analyze the applicability of the definition of solid waste to these residuals, and to identify appropriate exemptions to the proposed listings that reflect the Agency's investigation (i.e., the appropriate scope of the proposed

listings) and that encourage responsible recycling activities. The proposed exemptions and scope limitations are summarized below and discussed in detail in the following sections.

a. Hazardous Petroleum Refinery Residuals Returned to Refinery Processes. The Agency is proposing to broaden the existing exemption in 40 CFR 261.4(a)(12) for oil-bearing residuals from specified petroleum refining sources that are inserted into the petroleum refining process. If finalized, the existing exemption would be expanded to allow for reinsertion of a broader array of residuals into more parts of the refinery, including the coking process. The exemption would continue to be limited to situations where inappropriate storage or accumulation does not occur, and to processes that do not result in coke products that exhibit any of the characteristics of hazardous waste. A detailed discussion of this proposal is provided in Section III.E.

b. Use of Spent Caustics as Feedstocks. Section III.G.6 describes the Agency's findings with respect to spent caustic from liquid treating operations and its status as a solid waste when used as a feedstock. A significant management practice for this residual is off-site use as a feedstock in the manufacture of naphthenic or cresylic acids. The Agency proposes an exclusion from the definition of solid waste in Section III.G.6, clarifying that spent liquid treating caustics from petroleum refineries and used as feedstock in the manufacture of naphthenic and cresylic acid products are not solid wastes.

c. Third Party Recycling of Spent Petroleum Catalysts. Section III.J describes the Agency's rationale for proposing an exclusion from the 40 CFR 266 Subpart H boiler and industrial furnace standards for spent hydrotreating and hydrorefining catalyst recovery furnaces. Spent hydrotreating and hydrorefining catalysts, two of the petroleum refining residuals proposed today for listing, are frequently regenerated for reuse or reclaimed off-site to recover nonprecious metals such as nickel, molybdenum, cobalt, and vanadium and other compounds sold as products (i.e., aluminum sulfate derived from the alumina substrate material).

d. Wastewaters. The turnaround of both crude oil storage tanks and clarified slurry oil storage tanks may result in the generation of process wastewaters. The scope of the Agency's listing determinations for crude oil storage tank sediment and CSO storage tank sediment and/or in-line filter/separation solids, as described in

Section III.G.1 and 2, respectively, does not include these wastewaters. These sections also describe the limitation of the scope of the listings to sediments generated from tanks that are directly associated with petroleum refining operations, reflecting the Agency's lack of data regarding the nature of sediments generated from tankage at facilities that are not petroleum refineries.

In section III.K., the Agency proposes to exclude from the definition of hazardous waste mixtures of crude oil storage tank sediment (if listed) or of CSO storage tank sediment with tank wastewaters, provided the waste waters are discharged to the oil-recovery sewer before primary oil/water/solids separation.

e. Catalyst Support Balls. Upon removal from catalyst beds and/or during catalyst regeneration or reclamation, spent catalysts are separated from the support media that is used in the catalytic reactors to optimize mixing and flow within the reactor beds. The scope of the Agency's listing determinations for hydrotreating and hydrorefining catalysts, as described in Section III.J, does not include these ceramic support media.

f. Application of Existing Exemptions to the Residuals of Concern. Section III.G.5 describes EPA's findings with respect to spent sulfuric acid used as a catalyst in refinery alkylation processes. The Agency concluded that this residual is already managed in a way that is virtually exempt from the definition of solid waste under 40 CFR 261.4(a)(7).

B. Description of the Industry

Petroleum refineries are defined as "establishments primarily engaged in the production of gasoline, distillate fuel oils, residual fuel oils, naphtha, liquefied refinery gases, and lubricants through the integration of fractionation and/or straight distillation of crude oil, re-distillation of unfinished petroleum derivatives, cracking, or other processes" (Office of Management and Budget, 1987).

The refineries use a complex combination of interdependent operations to produce these petroleum-derived products. Depending upon the type of crude being processed, the type of product to be produced, and the process units present at a refinery, various combinations of processes may be employed to effect the separation of crude fractions. Petroleum refining operations and processes include desalting of crude, atmospheric and vacuum distillation, hydrotreating, catalytic cracking, thermal processing and upgrading of residual fuel oil, light

hydrocarbon processing, hydrocracking, catalytic reforming, alkylation, extraction, isomerization, processing of lubricating oil, removal of sulfur, and blending of products. Additional processes may also be employed to produce additives or other desired products.

Today's proposal is based on the Agency's analysis of data characterizing the industry in 1992. In 1992, 185 operating refineries were reported by the U.S. Department of Energy's Petroleum Supply Annual, with a total distillation capacity of 15 million barrels of crude oil per calendar day.

C. Overview of EPA's Information Collection Activities

OSW's listing determination for the petroleum refining industry has been underway since 1992 and can be characterized in terms of two major avenues for information collection: field work and survey evaluation.

1. Field Investigations and Sampling

As part of the Agency's field work, engineering site visits, familiarization sampling, and record sampling were conducted. Twenty-five refineries were randomly selected for evaluation in the field program. The industry was stratified into large and small refineries and the 25 refineries were selected randomly (and proportionately) from the two strata so that any differences in waste generation and management practices could be observed.

Engineering site visits were conducted at each of the targeted refineries, at which time the Agency conducted extensive discussions with the facilities and representatives of the American Petroleum Institute (API) to certify each of the potential sampling locations would result in samples that were representative of normal operating conditions and typical industry practices.

Sixty three record samples of the listing residuals of concern were collected and analyzed. All sample volumes were obtained in duplicate for the purpose of providing API with sample splits. Of the 63 samples collected, 46 were split directly with API; the remaining 17 were either split with the refinery (12 samples) or only collected as single EPA aliquot (5 samples). Of the 46 split samples, the analytical data for 31 were compared directly to the API data. The results of the comparison indicated good agreement. The sampling and analysis plans and analytical data reports that are not Confidential Business Information (CBI) are available in the docket for this rule (see ADDRESSES

section), and provide detailed discussions regarding the identification and collection of samples. The Listing Background Document available in the docket provides additional information on the Agency's field program, including a more detailed discussion of EPA's site selection process.

EPA's approach to sample analysis is described generally in its Quality Assurance Project Plan (QAPjP), dated October 21, 1992 (describing the familiarization phase of this investigation) and September 22, 1993 (describing the record sampling phase of this investigation) available in the docket of today's rule. Target analytes were identified by compiling lists of target constituents used in previous OSW investigations, including the petroleum refining listing investigation conducted in the 1980s, the 1984 "Skinner List" (guidance issued by OSW for the characterization of wastes derived from petroleum refinery wastewater treatment sludge), and the Delisting Program. Additional constituents were added to reflect waste-specific concerns such as amines from sulfur-removal residuals, and fluorides from HF alkylation residuals. The Agency's contracted laboratory confirmed its ability to reliably and adequately quantify the target analytes during the analysis of six familiarization samples collected during the engineering site visits. Upon completion of the familiarization sample analysis effort, EPA finalized the target analyte list and QAPjP with a list of more than 180 target constituents. In addition, during both familiarization and record sampling and analysis, the Agency quantified the ten most abundant nontarget volatile and the 20 most abundant nontarget semi-volatile organics in each sample.

The Agency believes that the samples collected and analyzed under its field investigations are generally representative of residuals typically generated throughout the industry. This belief is based on (1) the extensive discussions between the Agency, the targeted facilities and API regarding the sampling protocol and sample representativeness; (2) the Agency's broader understanding of the residuals and the industry's array of management practices developed during extensive review of the industry-wide survey (described below); and (3) the fact that the toxicants that ultimately were found through risk assessment modeling to show significant risk and serve as the proposed basis for listing in today's notice are all common refinery constituents of concern (e.g., benzene, arsenic, polynuclear aromatic

hydrocarbons (PAHs)) that are found in virtually all crudes and thus reasonably are expected to be present in refinery residuals across the Nation.

2. RCRA Section 3007 Survey

The survey effort included the development, distribution, and assessment of an extensive industry-wide section 3007 survey. The questionnaire covered topics such as crude oil and product information, facility and unit process flow diagrams, process descriptions, residual generation and management profiles, residual and contaminated soil and debris characterization, residual management unit and media characterization, general facility characterization (focussing on exposure pathway characterization), source reduction efforts, and certification.

The survey was distributed in September 1993 to all refineries identified as active in 1992 in the DOE Petroleum Supply Annual. Of the 185 surveys distributed, completed responses were obtained for 172 refineries. The remaining refineries notified EPA that they had stopped operations at some point in or after 1992 and thus were unable to complete the survey.

The Agency entered the completed surveys into a relational database known as the 1992 Petroleum Refining Database (PRDB). An exhaustive engineering review of each facility's response was then conducted, resulting in follow-up letters to most of the industry which sought clarifications, corrections, and additional data where needed. The responses to the follow-up letters were entered into the database. A wide variety of additional quality assurance checks were run on the data, with added emphasis on the listing residuals, to ensure that the residuals of concern were characterized as completely and accurately as possible. Follow-up telephone interviews were conducted as necessary to address remaining data issues. After extensive review, the Agency believes that the data are reliable and represent the industry's current residual generation and management practices.

D. Description of the Process Residuals in Comparison With the Consent Decree Language

The consent decree identifies fourteen residuals for which the Agency must make proposed listing determinations in this rulemaking. Upon investigation of the categories identified in the consent decree, the Agency determined that several of the categories should be split into distinct subcategories to allow the

Agency to differentiate between unique residuals. For example, the consent decree identified as one residual catalysts from sulfur complex and H₂S removal facilities. There are two major subcategories of catalysts used in refinery sulfur removal facilities: Claus

catalysts (an alumina bauxite catalyst) and tail gas treating catalysts (typically a cobalt/molybdenum catalyst). These wastes are inherently different in their composition, application, and management, and thus were assessed

separately in the Agency's risk assessment.

Table III-1 identifies the residuals in the consent decree, describes their coverage in the listing determinations proposed in today's rulemaking, and the action proposed.

TABLE III-1.—CONSENT DEGREE RESIDUALS

Residuals identified in the consent decree	Coverage in today's rulemaking
Crude oil storage tank sludge	Crude oil storage tank sediment.
Unleaded storage tank sludge	Unleaded gasoline storage tank sediment.
Clarified slurry oil sludge from catalytic cracking	Clarified slurry oil (CSO) storage tank sediment and/or in-line filter/separation solids.
Catalyst from catalytic hydrotreating	Non-precious metal hydrotreating catalysts.
Catalyst and fines from catalytic cracking	Equilibrium catalysts and catalyst fines were evaluated as individual subcategories based on differences in particle sizes and management practices.
Catalyst from catalytic hydrorefining	Non-precious metal hydrorefining catalysts.
Catalyst from catalytic reforming	Includes spent catalysts and fines.
Catalyst from H ₂ SO ₄ alkylation	Spent sulfuric acid.
Sludge from H ₂ SO ₄ alkylation	Same.
Sludge from HF alkylation	Neutralization sludges.
Off-spec product and fines from thermal processes	Same.
Spent caustic from liquid treating	Same.
Process sludge from sulfur complex and H ₂ S removal facilities	Sludges from amine-based sulfur removal systems, including turnaround sludges and filter cartridges.
Catalyst from sulfur complex and H ₂ S removal facilities	Claus catalyst, an alumina-based sulfur conversion catalyst. SCOT®-like catalyst, a cobalt/molybdenum tailgas treating catalyst.

E. Hazardous Oil-Bearing Residuals Returned to Refinery Processes

EPA is today proposing to exclude from the definition of solid waste oil-bearing residuals from specified petroleum industry sources that are inserted into the petroleum refining process (including the petroleum coker) along with normal process streams, if these materials are not stored in a manner involving placement on the land, or accumulated speculatively before being so recycled, and if the resulting coke product does not exhibit one or more of the characteristics of hazardous waste.

1. Background

a. *January 8, 1988 Proposal.* On January 8, 1988, EPA proposed rules to implement a decision by the District of Columbia Circuit Court regarding EPA's statutory authority to regulate recycled materials. See 53 FR 519, January 8, 1988. In its decision in *American Mining Congress v. EPA*, 824 F. 2d 1177 (D.C. Cir. 1987) (*AMC I*), the D.C. Circuit Court held that EPA's rules defining the statutory term "solid waste" (RCRA Section 1004(27)) exceeded the Agency's statutory authority to the extent that the rules asserted jurisdiction over "materials that are recycled and reused in an ongoing manufacturing or industrial process." *Id.* at 1186 (emphasis original). The court held that "Because these materials

have not yet become part of the waste disposal problem," *Id.*, they are not yet "discarded" within the meaning of Section 1004(27) and so cannot be considered to be "solid wastes."

In its January 1988 proposal, EPA responded to the *AMC I* decision specifically as it applied to petroleum refining industry operations. The Agency proposed to exclude from the regulatory definition of solid waste oil bearing petroleum residuals that are returned for further refining "as part of one continuous and ongoing process." (53 FR 525, January 8, 1988.) More specifically, EPA proposed to exclude oil-bearing residues from the refining process when those residues are generated on-site and reinserted on-site into the petroleum refining process (including the coker), provided that the residues were not speculatively accumulated or stored in a manner involving land placement.

Subsequent decisions have established that the decision in *AMC I* is relatively narrow. In particular, courts have rejected the argument that "potential reuse of a material prevents the Agency from classifying it as 'discarded.'" *American Mining Congress v. EPA*, 907 F. 2d 1179, 1186 (D.C. Cir. 1990) (*AMC II*). The proper test as to when, as a matter of law, the Agency is foreclosed from classifying a material as a solid waste is when a material is "destined for immediate reuse in

another phase of the industry's ongoing production process" and that "have not yet become part of the waste disposal problem." *Id.* at 1186. EPA retains considerable discretion in ascertaining how to apply this standard. For example, secondary materials generated by one industry and sent to another industry for reclamation could be classified as solid wastes (although EPA retains discretion as to whether to make that determination). (*American Petroleum Inst. v. EPA*, 906 F. 2d 726, 740-41 (D.C. Cir. 1990); *Ilco v. EPA*, 996 F. 2d 1126 (11th Cir. (1993); *Owen Electric Steel v. Browner*, 37 F. 3d 146 (4th Cir. 1994)). So can secondary materials generated on-site, stored in wastewater treatment impoundments, and reclaimed within the process which generated them. *AMC II*. EPA also must normally justify determinations that a secondary material being recycled is not a solid waste by showing how the determination is consistent with RCRA's objective to "establish a cradle-to-grave regulatory structure for the safe handling of hazardous wastes." *API*, 906 F. 2d at 741.

b. *July 28, 1994 Final Recovered Oil Rule.* On July 28, 1994, EPA finalized parts of the January 8, 1988 proposal pertaining to petroleum refining industry operations. The proposal was based on the Court's decision in *AMC I*. As noted, however, post-*AMC I* decisions make clear that the statute

affords EPA great latitude to set the jurisdictional parameters of RCRA. As a consequence, the final exclusion is more narrow than the one proposed: it excludes a more limited set of materials, and imposes greater restrictions on where the materials can be inserted within the petroleum refining process.

In its January 1988 proposal, EPA did not distinguish between recovered oil and oil-bearing hazardous sludges, nor did it distinguish between the petroleum coker and other petroleum process units in defining the scope of the proposed petroleum refining exclusion. In contrast, in the July 28, 1994 rule, EPA limited the exclusion to recovered oil from petroleum refining, exploration and production that are inserted into the petroleum refining process prior to distillation and catalytic cracking. Also, the final exclusion thus does not apply to recovered oil reinserted into the petroleum coker. (§ 261.4(a)(12)).

(1) *Definition of Recovered Oil.*

Recovered oil, as defined in § 261.4(a)(12), includes materials that are primarily oil and that are recovered from any phase of petroleum exploration, refining, production, and transportation. As explained in the July 28, 1994 rule, EPA limited the exclusion to recovered oil because recovered oil is equivalent to the raw materials normally used in the petroleum refining process in its composition and management.

The exclusion does not apply to hazardous oil-bearing sludges. EPA reasoned that these materials are typically unlike raw materials normally used in the petroleum refining process (i.e., crude oil). First, oil-bearing sludges are not normally composed primarily of oil. Additionally, the units in which they are managed (e.g., API separators, DAF units, land treatment units and surface impoundments) are not parts of the refining process, but instead function as waste holding and treatment units. Finally, EPA cited damage incidents associated with management of such materials as confirmation that these materials can be part of the waste disposal problem.

(2) *Limitation on Point of Insertion.*

The final recovered oil exclusion does not apply to recovered oil or other hazardous oil-bearing secondary materials that are inserted into the petroleum coker. EPA decided not to exclude materials that are recycled in the petroleum coker because of concerns about the fate of the hazardous constituents that may be contained in the recovered oil. As stated in the preamble to the recovered oil rule, the Agency was concerned that toxic constituents could end up in the coke

product in quantities that could be harmful to human health and the environment when the coke is burned as a fuel. See 59 FR 38542, July 28, 1994. EPA had limited data on the composition of hazardous oil-bearing residuals compared to normal coker feed and was concerned that additional toxic constituents (e.g., heavy metals) that may be present in these secondary materials could be discarded by simple incorporation into the coke product, in which case the coke could be part of the waste disposal problem when burned.

The Agency therefore retained jurisdiction over recovered oil, and other hazardous oil-bearing secondary materials that are inserted into the petroleum coker. Cokers that receive hazardous oil-bearing waste as a feedstock are currently not subject to regulation under RCRA, however. (59 FR 38542, July 28, 1994.) (See also May 3, 1995 letter to Ralph J. Colleli, API Counsel, from Michael Shapiro, Director, Office of Solid Waste).

2. Proposed Amendments To Address Hazardous Residuals Returned to the Refining Process

a. Summary of Proposed Amendments. In the preamble to the final recovered oil rule, EPA indicated that the rulemaking was not necessarily its final disposition of jurisdictional issues relating to the petroleum industry, and that further exclusions might be warranted after additional study (59 FR 38536, and 38541, July 28, 1994). Since promulgation of the recovered oil rule, EPA has received numerous comments from petroleum industry representatives objecting to the Agency's decision to narrow the scope of the originally proposed exclusion. Industry representatives continue to assert that cokers are an integral part of the petroleum refining process and that the practice of recycling oil-bearing secondary materials (including recovered oil) as feed to petroleum cokers, or elsewhere to the refining process, falls outside of RCRA jurisdiction. In light of these comments, and as part of its continued efforts to define more clearly the scope of RCRA jurisdiction within the petroleum industry, EPA has reviewed its position regarding whether exclusions should apply only to recovered oil and whether reinsertion into petroleum cokers as well as earlier parts of the refining process should be excluded.

Accordingly, the Agency has reevaluated existing information on oil-bearing residuals and their use in the petroleum refining process. In particular, EPA has reviewed existing information on the composition of oil-

bearing refinery residuals and the fate of toxic constituents contained in secondary materials that are reinserted into the coker. In addition, the Agency has obtained more detailed information from the petroleum refining industry on the coking process itself. The Agency's analysis, which is discussed in detail below, supports broadening the existing recovered oil exclusion. Therefore, EPA is today proposing to expand the recovered oil exclusion to cover all oil-bearing secondary materials that are generated within the petroleum refining industry and are reinserted into the petroleum refining process (including distillation, catalytic cracking, fractionation, or thermal cracking (i.e., coking)).

Under today's proposal, § 261.4(a)(12) would be revised to provide that oil-bearing residuals from specified petroleum industry sources that are inserted into the petroleum refining process (including the coker) along with normal process streams would be excluded from the definition of solid waste, if the material is not stored in a manner involving placement on the land, or accumulated speculatively before being recycled and (if insertion is into the coker) if the coke product does not exceed characteristically hazardous levels. More specifically, today's proposed exclusion would cover oil-bearing secondary materials that are generated on-site at refineries, transported intracompany from off-site, or received from any off-site facilities (intercompany transfers) in the following SIC codes: 1311, 1321, 1381, 1382, 1389 (oil and gas extraction), 2911 (petroleum refining), 4612 and 4613 (crude oil and refined petroleum pipelines), 4922 and 4923 (natural gas transmission and distribution), 4789 (independent pipeline operators), and 5171 and 5172 (petroleum product bulk stations and terminals). It should be noted that certain existing exclusions provided under § 261.6 that pertain specifically to petroleum refining wastes would become unnecessary as a result of today's proposal. The Agency will amend these provisions as necessary in its final rulemaking.

Today's proposal would not effect the current regulatory status of petroleum refinery wastewaters. EPA considers refinery wastewaters to be discarded materials and therefore solid wastes potentially subject to regulation under RCRA (59 FR 38539, July 28, 1994). Likewise, wastewater treatment systems in which RCRA hazardous wastes are managed would continue to be subject to regulation as hazardous waste management units or exempt under 40 CFR 264.1 under today's proposal.

Today's proposed exclusion would also be expanded to include recovered oil that is generated from certain organic chemical industry operations and inserted into a petroleum refining process along with normal process streams.

b. Rationale for Proposed Amendments. (1) Exclusion for Oil-Bearing Residuals Returned to Refining Process. Today's proposed exclusion applies to any oil-bearing residual material from any phase of petroleum exploration, refining, transport or marketing that is inserted directly into any part of the refining process. These materials are most likely to be inserted into the petroleum coker, and the basis for this proposed exclusion is discussed at length below. Materials inserted elsewhere into the refining process are likely to already be recovered oil, and hence to be excluded, or to so closely resemble recovered oil as to fit the rationale of the existing rule, if not its exact literal language. Thus, with respect to insertion into parts of the refining process other than coking, extending the exclusion to all oil-bearing materials largely avoids unproductive disputes about what is and is not recovered oil, and leaves refineries with maximum flexibility as to the best part of the process to reinsert oil-rich residuals.

(2) Proposed Exclusion for Oil-Bearing Materials Inserted into Petroleum Coking. *Role of the Petroleum Coker in the Petroleum Refining Process.* EPA decided in the July 1994 rule not to exclude hazardous oil-bearing secondary materials that are inserted into the coking process until the Agency studied further whether the coker may be functioning, at least in part, as a waste management unit in these cases (59 FR 38542, July 28, 1994). A more detailed review of the coking process has since convinced EPA that the coker is in fact an integral part of the petroleum refining process and is similar to other refining processes such as distillation and catalytic cracking. The coker is normally located on-site and typically processes oil-bearing materials that are generated on-site. The petroleum coker contributes significant revenue to the refinery primarily through upgrading of lower value hydrocarbons into light ends that are used to produce more valuable product fuels. While coke is a co-product of the coking process, the primary purpose of the coker is, in fact, to thermally convert longer-chain hydrocarbons to recover the more valuable middle and light end hydrocarbons that are used to produce high grade fuels (e.g., gasoline, kerosene, jet fuel, etc.). The typical

coker yield is about 25%–30% petroleum coke and 70% light hydrocarbons that are returned to the refining process to produce high grade fuels. The importance of the coker to the refining process is illustrated by the fact that the coking operation may determine the economic viability of the refinery. Given that the coker is a crucial unit in the refining process, industry representatives assert and the Agency believes that it is highly unlikely that refinery owners or operators would allow any incompatible materials to be inserted into the coker for fear of interfering with proper operation of the coker. It is also significant that, consistent with EPA's finding that cokers are considered process units for purposes of today's proposed exclusion, cokers are also viewed as process units under recently issued Clean Air Act (CAA) regulations and that emissions from cokers are subject to regulations under the National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries (40 CFR 63 Subpart CC; 60 FR 43244, August 18, 1995).

Hazardous Oil-bearing Residuals Compared to Normal Coker Feed. EPA also initially decided not to exclude recovered oil and other oil-bearing hazardous materials used to produce petroleum coke because of concerns that toxic metals contained in these materials are being disposed of by incorporation into a coke product. At the time the recovered oil rule was published, the Agency had only limited data indicating that oil-bearing hazardous residuals do not contain significantly different amounts of toxic constituents from the heavy petroleum residuals that are normally fed to the petroleum coker, but was uncertain of the representativeness of the information. The Agency has since received some additional data on the composition of oil-bearing hazardous sludges relative to crude oil residuals that are typically fed to the coker which supports industry's claim that oil-bearing sludges generated during the refining process are substantially similar to normal coker feedstock material.² At this time, all of the data in EPA's possession indicates that the recycling of oil-bearing residuals can be accomplished without raising hazardous constituent (e.g., heavy metal) concentrations to levels of concern in the final coke product. To guard against this possibility, the Agency is limiting this exclusion to the production of coke which does not exhibit the

characteristics of a hazardous waste. This is consistent with the thrust of RCRA § 3004(q)(2)(A) which subjects certain petroleum refinery wastes converted into petroleum coke to regulation if the resulting coke exhibits a characteristic.

Another significant consideration bearing on today's proposal is the fact that hazardous oil-bearing sludges constitute only a very small fraction of the total residual materials that are generated by the petroleum refining process and inserted back into the refinery for further processing. Due to process limitations, hazardous oil-bearing materials comprise only about 1–3% of the total amount of refining residuals that are routinely fed to the coker according to industry representatives.

Additionally, EPA has found that hazardous oil-bearing refinery sludges are managed in much the same way as are non-regulated crude oil residuals prior to insertion into the petroleum coker. In a typical petroleum refinery operation, refinery residuals (e.g., K048–52) that are inserted into petroleum cokers are transferred from wastewater treatment tanks to the coker via a closed system. The wastewater treatment tanks in which the residuals are initially stored are exempt from Subtitle C regulation. (See 40 CFR 264.1(g)(6).) The residuals are typically transferred from exempt wastewater treatment tanks via hard pipe or tank trucks to stationary tanks or containers where oil is recovered and/or the secondary materials are prepared for insertion into the coker. Since the residuals are not ordinarily stored in stand alone storage tanks but are instead transferred directly to process tanks and containers (i.e., centrifuge systems, desorption units, etc.) EPA does not believe that storage of the residuals prior to reinsertion into the refining process poses hazards to human health or environment. In addition, American National Standard Institute (ANSI) standards governing design, construction, operation, maintenance and inspection of petroleum terminal and tank facilities help to ensure environmentally protective management storage of the in-process residuals prior to reinsertion into the coker or other parts of the refinery.

Furthermore, data on the composition of the coke product indicate that use of oil-bearing secondary materials has little, if any, impact on the quality and/or properties of the resulting coke. In particular, EPA has information which indicates that levels of toxic metals in coke produced from oil-bearing sludges are comparable to those found in coke

² See October 8, 1993 and October 13, 1993 letters from Mark A. Smith (Unocal) to James R. Berlow.

produced strictly from crude oil residuum.³

Finally, coke product is subject both to regulatory requirements and certain limited industry product specifications, a fact that serves to ensure the quality of the coke product. The statute and existing regulations provide that coke product derived from a hazardous waste which exhibits a hazardous characteristic (as determined by application of the Toxicity Characteristic Leaching Procedure) is subject to regulation as hazardous waste under RCRA. See RCRA § 3004(q)(2)(A) and 40 CFR 261.6(a)(3)(vii). EPA would retain this provision under today's proposal as a means of ensuring that reinsertion of these materials is not part of the waste disposal problem. See generally *AMC II, supra*. Coke is also subject to product standards established by the American Society for Testing of Materials' (ASTM) for volatile matter and ash content. Taken together, these controls help to ensure that coke product does not contain unsafe levels of toxic contaminants.

Restrictions on Land Placement and Speculative Accumulation. Today's proposed exclusions do not apply to oil-bearing hazardous secondary materials that are placed in land-based hazardous waste management units such as surface impoundments or land treatment units. The Agency considers materials placed in such units to be discarded, and hence solid wastes. Land-based units that contain hazardous oil-bearing residuals would remain subject to Subtitle C requirements under today's proposal. *AMC II*, 907 F. 2d at 1186-87. In addition, any material that spills from tanks and containers and is not expeditiously retrieved for reinsertion is a solid waste and, if listed or characteristic, a hazardous waste. See § 261.33(d) and 55 FR 22671, June 1, 1990.

Today's proposed exclusion also does not apply to oil-bearing secondary materials that are accumulated speculatively (as defined in § 261.1(c)(8)) before being recycled into a petroleum refining process. Under RCRA, secondary materials that are accumulated speculatively are considered to be discarded and hence solid waste. EPA applies this standard condition to otherwise excluded secondary materials to prevent risks from prolonged storage of the material before recycling. See 50 FR 634-635, 658-661, Jan. 4, 1985.

Restrictions on Petroleum Coke Produced From Hazardous Oil-Bearing

Secondary Materials. Under the current regulations, petroleum coke produced from hazardous oil-bearing refinery wastes is excluded from regulation under RCRA provided that the resulting coke product does not exceed one or more of the characteristics of hazardous waste in part 261, Subpart C (§ 261.6(a)(3)(vii)). Under today's proposal, EPA would continue to regulate coke that exhibits a characteristic as hazardous if the coke is produced from oil-bearing residuals that are excluded from regulation because they are reinserted into the refining process, but are otherwise regulated as hazardous waste. In addition, EPA is proposing to condition the exclusion for oil-bearing residuals that are inserted into the coker on the requirement that coke produced from these materials *not* exceed characteristic levels. In other words, the exclusion would not apply to secondary materials that, if recycled, would result in coke that exhibits a characteristic. To do otherwise, as noted, would lead to situations where management of oil-bearing residues becomes part of the waste management problem by tainting the coke. EPA thus is proposing these conditions to ensure that coke produced from otherwise excluded oil-bearing secondary materials will not contain toxic constituents in quantities that could be harmful to human health and the environment when the coke is burned so as to assure that the proposed exclusion does not undermine RCRA's cradle-to-grave purpose. *API*, 906 F.2d at 741; RCRA § 3004(q)(2)(A). EPA requests comment on the adequacy of the TCLP for this purpose.

Materials That Are Deemed To Be Inherently Waste-Like. The existing regulations provide EPA with authority to designate as solid wastes materials that are inherently waste-like regardless of the mode of recycling. (See § 261.2(d).) Under current regulations, the Agency may designate materials as inherently waste-like either because they are typically disposed of or incinerated on an industry-wide basis or they contain toxic constituents not normally found in the raw materials or products for which they are being substituted (50 FR 637, January 4, 1985). Therefore, while EPA is proposing to generally exclude hazardous oil-bearing refinery residuals that are returned to the petroleum refining process, the Agency retains the authority to regulate specific waste-streams as "inherently waste-like" if it finds that particular petroleum refining residuals contain high levels of toxic constituents that are not ordinarily found in the normal coker

feed and do not contribute to the product.

Regulatory Status of Petroleum Refinery Wastewater and Wastewater Treatment Operations. Under today's proposal petroleum refining wastewaters would continue to be subject to regulation as solid wastes under RCRA. Petroleum industry representatives have argued in public comments submitted in response to both the January 8, 1988 proposal and the July 28, 1994 final recovered oil rule, that plant wastewaters containing oil are not solid wastes. Industry representatives contend that primary wastewater treatment operations in which oil is skimmed and oil-bearing sludges are separated from plant waters are part of the ongoing refining process.

EPA has considered this argument but does not agree for the following reasons. First, petroleum refining wastewaters differ from both recovered oil and oily sludges that are separated from the wastewaters in that, unlike these secondary materials, the wastewaters themselves are not analogous in composition to normal petroleum refining feedstock material and consequently are not reinserted into the petroleum refining process to produce petroleum products. Instead, petroleum refining wastewaters from which oily materials have been removed are discharged, and are thus not eligible for exclusion as a petroleum refining process feed.

Second, as explained in the preamble to the recovered oil rule, primary wastewater treatment operations exist to treat plant wastewater. The main purpose of wastewater treatment is to purify discarded wastewaters from the refining process so that they can ultimately be discharged pursuant to Clean Water Act requirements, not to recover secondary materials for recycling back into an ongoing manufacturing or industrial process. See 59 FR 38539, July 28, 1994.

A final and equally important consideration in EPA's decision not to exclude refinery wastewaters from regulation is that regulation of these wastewaters ensures treatment of hazardous constituents in characteristic wastestreams that are managed in wastewater treatment impoundments (e.g., impoundments in which biological treatment occurs) in accordance with the land disposal restriction (LDR) requirements of Part 268. See 59 FR 38540.

Recovered Oil From Co-Located Petroleum Refineries and Petrochemical Facilities. EPA is also today proposing to add an exclusion at § 261.12(a)(13) for recovered oil that is generated by certain

³ See February 2, 1993 data submission from Mobil Oil Corporation.

organic chemical industry operations and inserted into petroleum refining processes provided that the conditions discussed above are met (i.e., provided that the recovered oil is not stored in a manner involving placement on the land, or accumulated speculatively before being recycled and that (if insertion is into the coker) coke product does not exceed characteristically hazardous levels).

The final recovered oil exclusion does not currently apply to recovered oil from organic chemical industry operations except in cases where petrochemical and petroleum refining operations share a common wastewater treatment system (where wastewater from petrochemical processing units typically comprises only small percentage of the total refinery wastewater volume). In these cases, given the predominance of petroleum refining wastewater, the Agency believes that the recovered oil exclusion appropriately applies to oil recovered from shared petrochemical/petroleum refining wastewater treatment systems.⁴ The Agency did not more broadly exclude recovered oil from organic chemical operations in its final recovered oil rule because of concerns about additional toxic constituents that may be present in oil recovered from petrochemical processing residuals (i.e., the exclusion is provided on the premise that the oil-rich materials in question contain the same constituents as normal refining process streams).

EPA is aware, however, that some petrochemical facilities recover oil separately from their process streams and send it to petroleum refineries for insertion into the refining process. This practice typically occurs between petroleum refineries and chemical operations that are either co-located or owned by the same company. The oil recovered from petrochemical operations typically comes from "dry" process streams, i.e., hydrocarbon streams with little or no water content that are recovered outside of wastewater treatment systems. It is generally composed of hydrocarbons that originate from, or are derived from, feedstocks supplied by the petroleum industry.

Since promulgation of the final recovered oil rule in July 1994, the Agency has received compelling information from the chemical manufacturing industry indicating that the recovered oil from these organic chemical industry operations is comparable to oil recovered from

petroleum refining operations.⁵ Based on this information, which is described in detail below, the Agency is proposing to exclude oil that is recovered from petrochemical operations and inserted into co-located or commonly owned petroleum refining operations.

The specific reasons for the proposed petrochemical exclusion are as follows. First, chemical industry representatives have argued and EPA agrees that the need to closely control petroleum product quality makes it unlikely that the recovered oil from the dry organic chemical plant streams covered by the proposed exclusion would contain toxic contaminants not otherwise found in petroleum feedstock. The presence of non-hydrocarbon contaminants in the recovered oil can jeopardize the integrity of the refined product. Product quality problems (e.g., solids or potential gum-forming problems in automobile fuel injection or carburetor systems) can, in turn, have a widespread impact both on customers and the refiners because of the extensive distribution network in the industry. In addition, quality of the recovered oil feedstock is important to the integrity of the refining process itself (e.g., some chemicals and metals can cause equipment fouling and costly downtime at refineries).

Precautions are therefore taken to ensure that recovered oil from petrochemical plants does not contain contaminants that may adversely affect the quality of refinery products or cause equipment and catalyst fouling process unit downtime within refineries. Recovered oil from organic chemical operations is segregated from other by-product or waste streams generated by petrochemical plants. In addition, the petrochemical recovered oil streams, which are generally aggregated on-site, are routinely analyzed before being sent to the petroleum refinery for use as a feedstock to ensure that the recovered oil does not include toxic contaminants beyond those found in normal petroleum refining process streams. Recovered oil quality parameters include bulk solids and water content, bromine number (an indicator of olefin content and potential fouling due to polymerization) and specific gravity.

Second, the Agency has received sampling and analytical data that supports industry's premise that recovered oil from petrochemical and petroleum refining operations is similar

in composition and that, consequently, petrochemical recovered oil is suitable for insertion into the petroleum refining process. The data provides a comparison between recovered oil samples from co-owned petrochemical and petroleum refining operations on key parameters including specific gravity, distillation temperature ranges, flash point, hydrocarbon type, and sulfur, ash, and total chlorine content. The analysis indicates that the petrochemical recovered oil is comprised essentially of hydrocarbons that are within a refinery's distillation range and hydrocarbon type. The refinery and chemical plant recovered oil samples were also compared against the Agency's used oil fuel specification. The used oil specification includes levels for arsenic, cadmium, chromium, lead, and flash point. Used oil that is within the specified limits is considered by EPA to be comparable to crude oil for regulatory purposes. The analysis of all recovered oil samples indicates that arsenic, cadmium, chromium, lead and total halogen levels are well below the used oil fuel specification. The petrochemical recovered oil samples were below detection limits for the specified contaminants. Flash points of both types of recovered oil were also well below the used oil specification minimum.

EPA requests comment on today's proposed exclusion for recovered oil that is generated by organic chemical plants and inserted into co-located or commonly owned petroleum refining processes along with normal refining process streams. Today's proposal is based on a very limited set of data. To ensure that the data are representative of the industry, the Agency is soliciting additional data on the composition of recovered oil from petrochemical operations that is typically sent to petroleum refineries. Additionally, EPA may consider broadening the proposed exclusion to include recovered oil from plastic materials and resins manufacturers (SIC Code 2821), synthetic rubber manufacturers (SIC Code 2822), and cyclic crude and intermediate producers (SIC Code 2865) if the Agency receives sufficient analytical data to support such an extension. Finally, EPA also solicits additional information on refinery limitations that serve to preclude introduction of toxic constituents from recovered oil from chemical manufacturing operations.

F. Description of Health and Risk Assessments

In determining whether wastes generated from petroleum refining

⁴May 3, 1995 letter from Michael Shapiro (EPA) to Ralph J. Colleli, Jr. (API).

⁵September 13, 1995 letter to Becky Daiss (Office of Solid Waste) from Michael W. Steinberg (Morgan, Lewis & Bockius and July 31, 1995 letter to Steven E. Silverman (U.S. EPA, Office of General Counsel) from Michael W. Steinberg (Morgan, Lewis & Bockius).

operations meet the criteria for listing a waste as hazardous as set out at 40 CFR 261.11, the Agency evaluated the potential toxicity and intrinsic hazard of constituents present in the wastes, the fate and mobility of these chemicals, the likely exposure routes, and the current waste management practices. A quantitative risk assessment was conducted for those wastes where the available information made such an assessment possible.

1. Human Health Criteria and Effects

The Agency uses health-based levels, or HBLs, as a means for evaluating the level of concern of toxic constituents in various media. In the development of HBLs, EPA first must determine exposure levels that are protective of human health and the environment, then apply standard exposure assumptions to develop media-specific levels. EPA uses the following hierarchy for evaluating human health effects data and health-based standards in establishing chemical specific HBLs:

- The Maximum Contaminant Level (MCL) is used as the HBL for the ingestion of the constituent in water, when it exists. MCLs are promulgated under the Safe Drinking Water Act (SDWA) of 1974, as amended in 1986, and consider technology and economic feasibility as well as health effects.

- Agency-verified Reference Doses (RfDs) or Reference Concentrations (RfCs) are used in calculating HBLs for noncarcinogens and verified carcinogenic slope factors (CSFs) in calculating HBLs for carcinogens. Agency-verified RfDs, RfCs, and CSFs and the bases for these values are presented in the EPA's Integrated Risk Information System (IRIS).

- RfDs, RfCs, or CSFs are used which are calculated by standard methods but not verified by the Agency. These values can be found in a number of different types of Agency documents and EPA used the following hierarchy when reviewing these documents: Health Effects Assessment Tables (HEAST); Human Health Assessment Group for Carcinogens; Health Assessment Summaries (HEAs) and Health and Environmental Effects Profiles (HEEPs); and Health and Environmental Effects Documents (HEEDs).

- Use RfDs or CSFs that are calculated by alternative methods, such as surrogate analyses, including structure activity analysis, and toxicity equivalency.

a. 1,3,5-Trimethylbenzene. 1,3,5-Trimethylbenzene was identified in the record samples. EPA has adequate toxicological information to develop a provisional health benchmark (i.e., RfD).

The Agency has developed a provisional RfD of 0.05 mg/kg/day for 1,3,5-trimethylbenzene using a subchronic oral rat study, along with other toxicological studies. In addition, the Agency has determined that the provisional RfD developed for 1,3,5-trimethylbenzene is an appropriate benchmark for 1,2,4-trimethylbenzene. These studies and the Agency's supporting analysis for the provisional RfD can be found in the docket supporting this rule. The Agency has conducted limited external peer review of the provisional RfD and it is therefore subject to change.

A number of assumptions and extrapolations are used to derive the provisional RfD, including extrapolating from short-term animal studies to a chronic human exposure, and the selection of the critical study on which to develop a health benchmark. The Agency requests comments on the appropriateness of the provisional RfD and requests any additional data on the toxicity of 1,3,5-trimethylbenzene.

b. Use of Structure-Activity Relationships. There are 15 constituents identified in the record samples for which EPA has found no reliable health effects data to calculate health benchmarks for carcinogenic and noncarcinogenic chemicals. Because of the lack of health effects data on these constituents, the Agency used a structure-activity analysis to identify surrogate chemicals, where possible, that have reliable health benchmarks for use in the risk assessment. The approach involves identifying a surrogate chemical that has similar chemical structure, physical properties, and health effects information as that of the constituent for which human health data and animal data are either lacking or inadequate. The Agency used the surrogate health benchmarks in the risk analysis to assess the potential impacts of the constituents without benchmarks found in the wastestreams for the following five constituents: 1-methylnaphthalene; t-butylbenzene; butylbenzene; sec-butylbenzene; and 2-hexanone. The risk analysis did not include an evaluation of potential impacts from the following constituents because no appropriate surrogates with health benchmarks could be found: indene; 2-methylnaphthalene; n-propylbenzene; bromobenzene; dibenzofuran; aluminum (+3); cobalt; magnesium hydroxide; magnesium oxide; and iron oxide. Based on this assessment none of these constituents were of concern in any of the listing decisions in today's proposal. Further discussion of this approach can be found in the docket supporting this rule.

The Agency is planning to conduct a peer review of the surrogate analysis and, therefore, the health benchmark is subject to change. See **ADDRESSES** section. The Agency requests comment on this approach, and any additional toxicity information on these compounds.

c. Use of Relative Potencies for Polynuclear Aromatic Hydrocarbons (PAHs). The Agency has a verified cancer slope factor available for only one PAH, benzo(a)pyrene. For the remaining PAHs evaluated in the risk assessment supporting this rule, the Agency used two methods to quantitatively estimate the relative potencies of other PAHs. The first method, developed by EPA's Office of Health and Environmental Assessment, is interim guidance for the quantitative risk assessment of six PAHs. This guidance uses data from mouse studies to develop relative carcinogenic potency estimates relative to benzo(a)pyrene. A detailed description of the methodology and resulting rankings can be found in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," included in the docket supporting today's rule. The second method the Agency used for the risk assessment is a semi-quantitative scoring exercise organized by the Office of Pesticides, Pollution Prevention and Toxic Substances. In this method, experts independently reviewed available data and reached consensus scoring on an additional 101 PAHs in terms of the compound's relative potency using benzo(a)pyrene as the reference compound. The Agency seeks comments on the uncertainties and limitations of both methods. A more detailed discussion of the two methods can be found in the docket supporting today's rule.

All HBLs and their bases for this listing determination are provided in a document entitled "Assessments of Risks from the Management of Petroleum Refining Waste: Background Document," which can be found in the RCRA docket for this rule at EPA Headquarters (see **ADDRESSES** section).

2. Risk Analysis

a. Risk Characterization Approach. The risk characterization approach follows the EPA Guidance on Risk Characterization (Habicht, 1992), and Guidance for Risk Assessment (EPA Risk Assessment Council, 1991), and Guidance for Risk Characterization (EPA Science Policy Council, 1995). These guidance documents specify that EPA risk assessments will be expected to include (1) the central tendency and high-end portions of the risk

distribution, and (2) important subgroups of the populations such as highly susceptible groups or individuals, if known, and (3) population risk. In addition to the presentation of results, these guidance documents also specifies that the results portray a reasonable picture of the actual or projected exposures with a discussion of uncertainties. These documents are available in the public docket for this action (see **ADDRESSES** section).

b. Individual Risk. Individual risk descriptors are intended to convey information about the risk borne by individuals within a specified population and subpopulations. These risk descriptors are used to answer questions concerning the affected population, and the risk for individuals within a population of interest. The approach used in this analysis for characterizing baseline individual risk included: (1) identifying and describing the population of concern for an exposure route; (2) determining the sensitivity of the model parameters used in the risk estimation; (3) estimating central tendency and high-end values for the most sensitive parameters in the risk estimation procedures; and (4) calculating individual risk for likely exposure pathways that provides a characterization of the central tendency and high-end risk descriptor.

Descriptors of population risk are intended to convey information about the risk borne by the population or population segment being studied. These risk descriptors are used to answer questions concerning the number of cases of a particular health effect that could occur within the population during a given time period, the number of persons or percent of the population above a certain risk level or health benchmark (e.g., RfD or RfC), and risk for a particular population segment.

The Agency performed a population risk analysis for impacts to the affected community surrounding the refineries across the country. The results of the analysis are discussed in Section VI.C.

c. Risk Assessment. The results of the risk assessment are presented in waste-specific risk tables in each of the basis for listing sections (Section III.G). The risk tables include the following information: constituents of concern; estimated human health central tendency and high-end risk for each constituent of concern associated with the management scenarios; high, low, and average concentrations of constituents found in this waste; the number of samples in which the constituent was detected; and notes regarding potential sources of

uncertainty. In addition to assessing the risks associated with the individual constituents found in the waste, the Agency presents the combined potential risk of constituents that coexist in the waste, as described in "The Risk Assessment Guidelines of 1986," found in the docket supporting today's rule. However, where sampling data or the exposure analysis show compelling evidence that the constituents cannot or do not occur together in the waste stream or at the receptor, the Agency considered only the risk associated with the individual constituent.

In addition to those compounds presented in the waste-specific risk tables, the Agency's characterization data include other constituents found in these wastes. The risk tables presented in this preamble contain only those constituents which had adequate data for quantitative risk assessment and which were found to present a risk of concern. The complete list of constituents found in each of the wastes generated from petroleum refining operations, an explanation of the risk analysis process, and an explanation of EPA's development of the target analyte list are presented in the background documents for this rule, which are located in the RCRA Docket for this rulemaking (see **ADDRESSES** section).

(1) Selection of Waste Management Scenarios. EPA's regulations at 261.11(a)(3)(vii) require the Agency to consider the risk associated with "the plausible types of improper management to which the waste could be subjected" because exposures to wastes (and therefore the risks involved) will vary by waste management practice. The choice of which "plausible management scenario" (or scenarios) to use in a listing determination depends on a combination of factors which are discussed in general terms in EPA's general policy statement on hazardous waste listing determinations (59 FR 24530, December 22, 1994). EPA generally employed the elements of the policy in this listing determination.

The following discussion explains the selection of plausible management scenarios for the petroleum listing determination. The Agency requests comment on its choice of plausible management scenarios and on the possibility of using alternative plausible management scenarios.

EPA's basic approach to selecting which waste management scenarios to model for risk analysis in listing determinations is to examine current management practices and assess whether or not other practices are available and are reasonably expected to be used. Where a practice is actually

reported used, that practice is generally considered "plausible" and may be considered for potential risk. EPA then evaluates which of these current or projected management practices for each wastestream are likely to pose significant risk based on an assessment of exposure pathways of concern associated with those practices. There are common waste management practices, such as landfilling, which the Agency generally presumes are universally plausible for solid wastes and will assess it for risk. There are other practices which are less common, such as land treatment, where EPA will consider them plausible only where the disposal methods have been reported to be practiced. In some situations, potential trends in waste management for a specific industry suggest the Agency will need to project "plausible" mismanagement even if it is not currently in use in order to be protective of potential changes in management and therefore in potential risk. Finally, there may be situations where analysis shows no need to model any scenarios because, although considered plausible management, no exposure potential exists.

In its study of the petroleum refining industry, EPA was able to develop a comprehensive database of existing waste management practices. All U.S. refineries that EPA was aware of were sent a RCRA section 3007 questionnaire and all the active ones responded. This allowed the Agency to conduct a careful analysis of how wastestreams were managed in 1992. Based on discussions with industry, the Agency also was able to project potential changes in these practices and thus determine whether or not to include unused or little used practices in the risk assessment.

Overall, the Agency found the reported waste management practices for the industry to be numerous and varied. This required an assessment of the existing (and potential) management of each wastestream to determine which of those practices should be modeled for that particular residual. Some wastestreams had special considerations (e.g., rarity of practice, volumes managed, existing regulatory coverage) associated with their management that had to be included in the decision-making process. The description of such considerations is included in the listing determination section for that wastestream.

Given the extensive amount of data collected for this industry, EPA did not find it necessary to quantitatively model all currently used waste management practices. Furthermore, for the reported management practices that were

assessed for risk, EPA conducted risk analysis based on the volumes of wastes reported to be managed by those practices in 1992. This is a modification of EPA's general policy to consider plausible (and model) all reported waste management practices. The reasons for the modification, discussed in more detail later in this section, are:

1. Some practices involve very small volumes or very few generators with a correspondingly low potential to cause unacceptable risk.

2. Some practices have proved in past listing determinations to pose less risk than those more common practices (e.g., landfilling) that were modeled. Therefore the modeled practices act as surrogates to the less common, less risky alternatives.

3. Most of the reported management practices selected for modeling are less expensive than other plausible alternatives (industry will usually select and continue to use the less costly option) and therefore there was no need to assess practices not currently used or only rarely used.

4. The Agency was unable to model every reported management practice for every metric ton of waste due to time and resource constraints. However, EPA believes it has evaluated the practices likely to be of most concern.

EPA's data show that the overwhelming volume of the wastestreams that were actually disposed of (as opposed to being recycled or reclaimed) involved three specific waste management practices: discharge to a wastewater treatment plant, landfilling, and land treatment. Each of these was reported to be currently in use by a number of refineries.

(2) *Disposal in Wastewater Treatment Plants.* Exposure pathways and potential risks associated with disposal of wastes to wastewater treatment plants, which in this industry generally represents combined wastestream treatment in tanks, are largely covered by regulation under the NPDES or air permit programs. Furthermore, sludges generated by refinery wastewater treatment systems, which could be affected by the discharge of the wastestreams of concern in this listing, are already listed hazardous wastes F037, F038, K048, and K051. The exception is activated biological treatment (ABT) sludge and sludges generated downstream of ABT units. These sludges can be disposed of in various ways, including surface impoundments. However, activated biological treatment sludge is not one of the residuals under consideration in this listing. In addition, the volumes

managed in the wastewater treatment system of the residuals under consideration in this listing are relatively small in comparison to the volumes typically handled in refinery wastewater treatment systems. In addition, unlike most refinery process wastewaters, these volumes are generated on an intermittent (e.g., once a year) basis. The wastestreams of concern for this listing would be considerably diluted by the other wastestreams sent to the plant. Further, EPA has proposed that the risk associated with disposal of these ABT and downstream sludges be covered by the Phase IV Land Disposal Restrictions treatment requirements (60 FR 43654, August 22, 1995). For these reasons, discharge of wastes covered by the consent decree to wastewater treatment systems, although a practiced management scenario, was not modeled for risk.

(3) *Disposal in Landfills and Land Treatment Units.* The principal waste management practices chosen for modeling the residuals in this listing determination were off-site and on-site Subtitle D landfilling and treatment in off-site and on-site land treatment units (LTUs). These disposal practices were reported in the Section 3007 questionnaire survey to be in use by a large percentage of refineries and for a large proportion of the total volume discarded. Therefore, EPA modeled both direct and indirect exposure pathways associated with these two waste management practices.

For on-site landfills and LTUs, the Agency used the data submitted by industry in the Section 3007 questionnaire to characterize the units in terms of the waste quantities disposed, surface area of disposal units, and distances to receptors. For off-site landfills and LTUs, the Agency used characteristics based on a statistical analysis of existing Subtitle D land treatment facilities, from the Agency's "Industrial Subtitle D Facility Study" (October 20, 1986).

The Agency modeled the releases from the disposal of wastes in on-site and off-site land treatment units by partitioning the constituents of concern between several fate and transport processes. These releases include the following: volatilization to the air, leaching to ground water, erosion of soil and runoff of dissolved constituents to nearby land and surface water bodies, and biodegradation. For the screening or bounding estimates, the Agency assumed that no partitioning or biodegradation occurred, thus maximizing releases to all media; for example, for the groundwater pathway's

bounding analysis, TCLP results were used as model inputs. For the central and high-end estimates of risk, the Agency modeled the partitioning of these releases from the land treatment units to derive annual concentrations in the media. Biodegradation losses were calculated using data on constituent half-life in the environment. The Agency's groundwater risk analysis used the estimated leaching concentrations from this analysis, instead of TCLP data, as the starting concentration in which to estimate groundwater concentrations at a receptor well. The TCLP data that the Agency collected estimate the concentration of the constituents leaching from the waste samples in a landfill management scenario. The Agency evaluated the land treatment scenario on a soil/waste mixture for which the Agency did not have TCLP data and, therefore, relied on the results of the partitioning analysis. A more detailed discussion of the release processes for land treatment units is presented in the "Assessment of Risks From the Management of Petroleum Refining Wastes: Background Document" in the docket supporting today's proposal.

(4) *Other Disposal Practices Reported.* There were other, less commonly employed waste management practices reported in the petroleum refining industry. Several residuals had ten or more different management practices reported as "in use." For most of them, EPA has concluded that although they are used in the petroleum refining industry, they are not management scenarios that need to be assessed for risk. For example, there were ten reported management practices for HF alkylation sludge. Four of these (representing 75% of the reported waste volume) involved land treatment or disposal in a landfill and were modeled for risk. One practice was on-site recovery in the coking unit (12% of reported waste volume), two others involved practices since terminated (10% of reported waste volume), and the remainder of management practices involved discharge to the wastewater treatment plant. These latter practices were not modeled. The factors the Agency considered in deciding whether or not the less common disposal practices should be modeled are:

i. Coverage of the characterization program. The comprehensive nature of EPA's petroleum refining database allowed the Agency to develop an in depth knowledge of the amounts of waste generated and the final management practices employed by the petroleum refining industry. In

particular, a very high percentage (more than 80 percent of the total volume) of these wastestreams either were reused, reclaimed, or recycled or were disposed of using landfilling or land treatment (more than 50 percent of the remaining volume), suggesting that there are financial and practical incentives to handle wastes using the methods reported. These incentives were assumed to be constraints.

Moreover, the information indicated that aside from recycling, landfilling, and land treatment, most reported management practices involved low volumes of waste that would be of significantly less concern in terms of risk. If possible given the potential risks involved, EPA tries not to base listing determinations on disposal practices employed by a very small segment of an industry producing low volumes of waste as this can penalize unnecessarily, without a concomitant benefit in actual risk reduction, the vast majority of generators who dispose of the bulk of the wastes generated in less risky ways. For example, if one plant reported one metric ton of a wastestream as used as dust suppressant, but thousands of tons of that wastestream were reported as landfilled by a number of other plants, EPA would likely conclude that dust suppression, although nominally in use, is not a practice that should be assessed for risk. In fact, EPA was unable, due to resource and time constraints, to cover all waste volumes reported with the plausible management scenarios selected for modeling. Therefore, there are some reported management practices that were not formally evaluated using predictive risk assessment models after EPA judged them unlikely to be significant. Less formal projections of potential risk were made for some management scenarios. Also, experience in previous listings has indicated some waste management practices show more risk than others. Therefore, if EPA calculates risk for the usually more risky management scenario, the risk from other scenarios will probably be lower.

ii. Effect of other regulatory programs. For some wastestreams and their reported waste management practices, EPA concluded that existing regulatory programs provided a level of regulatory coverage that rendered further assessment of risk unnecessary. Many of these wastestreams are often characteristically hazardous. In fact, the Agency concluded that many of the wastestreams that were disposed of in Subtitle C management facilities were sent there specifically because they were characteristically hazardous

wastes. Therefore, EPA believes that the volumes sent to Subtitle C facilities would continue to be handled in that way.

iii. Management costs. Where one management practice is generally more expensive than another, cost becomes a factor in EPA's assessment of whether or not that practice should be considered plausible. In this industry, the Agency generally found that the lower cost management option was currently the one employed and that factor further suggested existing management practices would not change. The principal example is incineration, which is a higher cost option than landfilling or land treating. Little direct incineration of wastestreams was reported by the industry. EPA concluded there was a negative cost incentive for the industry to switch to incineration of these wastestreams. Additionally, the petroleum refining industry reported little disposal of these wastestreams in surface impoundments. Due to the industry's heavy investment in wastewater treatment tanks, there appears to be little incentive to switch to surface impoundments to treat and dispose of wastestreams. Therefore, EPA only modeled surface impoundments in its risk assessment for one wastestream.

Because of all of these factors, EPA determined it was unnecessary either to project unreported management scenarios or to model many of the infrequently reported management practices for this listing determination. Instead, EPA determined it more appropriate to estimate risk based on the most plausible, highest risk management practices and therefore focused risk assessment modeling on landfilling and land treatment.

During EPA's information collection process, it was pointed out to the Agency that leaking tanks and refinery piping have been problems for the petroleum industry and that exposures from such sources should be modeled. Although such unintentional spills are not management per se, exposures from such sources could be a concern. For the major liquid wastestreams evaluated in today's proposal (e.g., spent sulfuric acid and spent caustic), spills and leaks already fall under the hazardous waste management system because these wastes are typically characteristically hazardous. This obviates the need for conducting a risk assessment for such pathways. For other wastestreams, EPA concluded that the selection of unlined landfilling as a plausible management scenario could serve as a surrogate for such sources because the exposure scenario would be roughly similar. Leaks and spills of wastestreams would

cause exposures similar to those caused by landfills (for potential groundwater contamination) or land treatment units (for runoff or windblown dust). Because EPA modeled those management scenarios, the Agency concluded additional modeling of leaks and spills is unnecessary. Furthermore, such leaks and spills are typically intermittent and should not present the long-term exposure potential presented by land disposal.

The Agency evaluated each of the residuals of concern to determine whether it was appropriate to model interim storage methods (e.g., tanks, containers, etc.) that are typically employed prior to final management (e.g., landfilling). In most cases, the Agency determined that the predominant exposure risks were expected to be associated with long-term final management methods and that it was unnecessary to model short-term interim storage. For example, many of the residuals of concern are generated infrequently: the typical generation frequency for tank sludges is once every ten years per tank and the catalyst residuals are only generated every 2 to 5 years. For these types of infrequently generated residuals, the residuals are typically stored on-site for a period of time comparable to the tank or unit turnaround. The Agency observed that these turnaround periods are often only 4 to 6 weeks in duration. Several factors contribute to the refineries' motivation to move the residuals out of short-term storage: (1) the residuals are often staged in the immediate vicinity of the process area, impeding movement for continued operations; (2) the containers used to transport the residuals (e.g., flo-bins, dumpsters, roll-off bins) are often rented and incur substantial cost during usage; and (3) turnarounds are often contracted out and the refineries are financially motivated to minimize the length of time that they must pay for contractor services and equipment, including storage units.

Because the on-site storage period is so short for many of the infrequently generated residuals of concern, the Agency felt that it was more appropriate to focus on assessing risk from long-term management of these types of residuals. For those residuals, however, that are generated on a more frequent basis, the Agency did model certain storage practices. For example, spent caustic is generated on a continual or frequent basis and is generally stored in tanks prior to further management. These tanks are in continual usage. The Agency modeled potential air releases from these spent caustic storage tanks because of the potential for continual

toxicant releases. Similarly, sludge from sulfur complex operations can be generated on a regular basis (e.g., weekly) and the Agency observed facilities that maintain storage areas in the process units for dumpsters used to accumulate filter cartridges. This practice also poses the potential for ongoing air emissions and was modeled in EPA's risk assessment.

Finally, the Agency notes that residuals from refining are, due to their very nature, often reusable. They can be recycled, sold, or transferred to other facilities. The disposition of these reusable wastes is described in Section III.E. of this preamble. Because these residuals are currently exempt or are proposed to be excluded from the hazardous waste management system, exposures associated with their management were not modeled in this listing determination. However, for the wastestreams managed in an exempt manner that were assessed in this listing determination, EPA has done qualitative risk analysis. Those qualitative risk evaluations are described in the listing decision rationales for the appropriate individual wastestream. Additionally, the Agency did model air pathways for certain wastestreams when on-site storage tanks were projected to be a potential source of air risk.

(5) *Exposure Scenarios.* The scenarios (i.e., receptors) included in the risk assessment include adult resident, child resident, subsistence fisher, recreational fisher, subsistence farmer, home gardener, and consumers of ground water.

Adult Resident Applicable exposure pathways for the adult resident include incidental ingestion of contaminated soil and direct inhalation of vapors and particulates.

Child Resident Exposure pathways for the child resident are identical to those for the adult resident. The rate of incidental soil ingestion for the child, however, is twice that for an adult.

Recreational Fisher Applicable exposure pathways for the recreational fisher include ingestion of contaminated fish, in addition to exposure pathways of an adult resident (i.e., incidental ingestion of contaminated soil, and direct inhalation of vapors and particulates). Risks calculated for the recreational fisher were found to be predominantly driven by the incidental ingestion of contaminated soil; risks estimated through the ingestion of contaminated fish were negligible by comparison. While the results for the recreational fisher are presented in the risk assessment background document, they are not presented in the preamble. The Agency is not using the subsistence

fisher scenario to support the listing determination proposed today.

Subsistence Fisher Applicable exposure pathways for the subsistence fisher include ingestion of contaminated fish, in addition to exposure pathways of an adult resident (i.e., incidental ingestion of contaminated soil, and direct inhalation of vapors and particulates). The rate of ingestion of fish for the subsistence fisher is twice that for the recreational fisher. Risks calculated for the subsistence fisher were also found to be predominantly driven by the incidental ingestion of contaminated soil. The subsistence fisher risk assessment results are available in the risk assessment background document in the docket for this rule and are not presented in this preamble. The Agency is not using the subsistence fisher scenario to support the listing determination proposed today.

Subsistence Farmer Applicable exposure pathways for the subsistence farmer include ingestion of home-grown beef and milk, ingestion of home-grown fruits and vegetables, incidental ingestion of soil, and direct inhalation of vapors and particulates. The total amount of beef, milk, fruit, and vegetables that the subsistence farmer consumes is assumed to be contaminated.

In conducting the subsistence farmer risk assessment, the Agency determined that there is high uncertainty in the calculated plant-to-animal (primarily beef and dairy cattle) bioconcentration factors for the key constituents of concern, polynuclear aromatic hydrocarbons (PAHs). No empirical data were found for bioaccumulation of PAHs in mammals by this route; the model uses physical properties of constituents (K_{ow}) to predict transfer factors. For fish, empirical data show that using K_{ow} to predict bioconcentration overestimates fish tissue concentrations by several orders of magnitude. Based on these very high predicted bioconcentration factors, the beef and dairy product ingestion pathways are major contributors to cancer risk estimates for subsistence farmers. Because of the high uncertainty associated with these bioconcentration factors, the Agency is not using the subsistence farmer scenario to support the listing determinations proposed today. The subsistence farmer scenario risk assessment results are presented in the risk assessment background document in the docket for this proposal but are not presented in the preamble; the Agency requests comment and data regarding the uncertainty

associated with the bioconcentration factors of concern.

Home Gardener Applicable exposure pathways for the home gardener include incidental ingestion of soil, direct inhalation of vapors and particulates, and ingestion of fruits and vegetables. Forty percent of the total amount of fruits and vegetables that the home gardener consumes is assumed to come from their home garden which is assumed to be contaminated.

Consumers of Ground Water These receptors are exposed only from ingestion of untreated ground water contaminated by the leaching of toxic constituents in the wastes being managed in land disposal units. The Agency used a ground water fate and transport model, the EPACMTP (EPA's Composite Model for Leachate Migration with Transformation Products), to project the concentrations reaching the receptor well. The EPACMTP is described in the background documents available in the docket for today's proposal. See **ADDRESSES** section.

Chemicals in the subsurface may be subject to a variety of biochemical transformation processes. EPACMTP accounts for transformations due to hydrolysis, however, none of the organic constituents considered in the present analysis are subject to breakdown by hydrolysis. Biodegradation may be a significant removal process for some of the constituents considered in the analysis. However, the data and parameters associated with biodegradation are subject to much greater uncertainty, vary over a wide range, and may be highly site-specific. For these reasons, the Agency developed a protocol for the determination of nationwide biodegradation rates, which was published on June 15, 1988 (53 FR 22300). The protocol requires biodegradation data from six sites that represent different regions of the country. To date, the Agency has not received a complete set of biodegradation rates for the constituents of concern (particularly benzene). Therefore, biodegradation is not considered directly in the groundwater pathway analysis. However, EPA evaluated the potential effect of biodegradation using the available information and best estimates.

Using the limited data available, EPA estimates that the benzene concentration in well water is reduced by less than a factor of two (reduction varies from 2 to 44 percent). Details of effects of benzene biodegradation rates on modeling results for the different waste streams are presented in

“Background Document for Groundwater Pathway Analysis” available in the docket. The Agency is soliciting comments on these rates and requesting any biodegradation data, consistent with our protocol, which can be used for nationwide modeling analyses.

3. Consideration of Uncertainty in Listing Determinations

One of the potential exposures of significant concern for this rulemaking is erosion of soil from a land treatment unit onto adjacent areas, including possible vegetable gardens. This type of exposure is what the Agency refers to as “indirect” exposure, meaning that the receptor (in this case a home gardener) is exposed to contaminants in the waste after these contaminants have been transported from the waste management area and have entered another environmental media (in this case soil and vegetables) at the receptor site.

The Agency has used indirect exposure assessments in a number of programs over the last several years. Some examples include the development of the sewage sludge regulations, the development of proposed standards for land application of paper mill sludge, and the development of pesticide standards. In the hazardous waste listing program, the Agency has considered indirect exposures for several proposed regulations (wood surface protection, carbamate pesticides, dyes and pigments) but has not based any final listing determinations on risks from indirect exposures. These examples apply to national regulations; in addition, the Agency has used indirect

exposure analyses on a site-specific basis in the Superfund program and to develop hazardous waste combustion permit limits.

Despite its considerable experience with indirect exposure assessments, the Agency recognizes that there are still significant uncertainties associated with estimating the risks associated with some exposure routes. Therefore, the Agency requests comment on how it should factor in uncertainty in its listing determinations.

For example, if a risk estimate has a high degree of uncertainty associated with it, should the Agency consider listing the waste in question only if the calculated risk is near the high end of the risk range of 10⁻⁶ to 10⁻⁴? Should the calculated risk estimate be even higher? These questions imply that greater uncertainty generally results in making a risk assessment more conservative. Is that implication accurate? The Agency solicits comment on these questions and this issue in general.

4. Peer Review

A peer review of the risk assessment for non-ground water pathways has been performed. (The groundwater model was previously reviewed by the Agency’s Science Advisory Board.) Particular emphasis was placed on the components that follow:

- (1) Confidence in data on biotransfer factors for PAHs;
- (2) Assumptions regarding design and operation of land treatment units, including methods used to prevent excess build-up of constituents in land treatment units;
- (3) Methods used to predict soil concentrations at receptor locations, with

particular emphasis on the contribution of soil run-off from land treatment units in which residuals are disposed and the maintenance of a mass balance of constituents at the receptor location; and

- (4) Overall maintenance of mass balance of constituents among multiple exposure pathways.

Three academic experts on risk assessment issues such as these were selected to review the risk assessment for non-ground water pathways. Comments have been received from these peer reviewers and will be addressed concurrently with public comments on this proposed rule.

G. Waste-specific Listing Determination Rationales

1. Crude Oil Storage Tank Sediment

a. Summary. EPA is proposing to not list as hazardous tank sediment from the storage of crude oil at petroleum refineries. This wastestream does not meet the criteria set out at 40 CFR 261.11(a)(3) for listing a waste as hazardous, because it does not pose a substantial or potential hazard to human health and the environment. The Agency identified limited risks to consumers of groundwater associated with releases from off-site Subtitle D landfilling due solely to a single constituent, benzene, which is already regulated under the Toxicity Characteristic (TC). Home gardeners and adult residents show low risks from polynuclear aromatic hydrocarbons (PAHs) potentially released from land treatment operations. The risk assessment results are summarized in Table III-2.

TABLE III-2.—WASTE CHARACTERIZATION AND RISK ESTIMATES—CRUDE OIL STORAGE TANK SEDIMENT

Constituents of concern	On-site land treatment*		Off-site land treatment*		Waste characterization				
	Central tendency	High end	Central tendency	High end	Avg. conc.	High conc.	Low conc.	# of pts.	Notes
Home Gardener									
Benzo (a) pyrene	2E-9	9E-7	2E-9	1E-7	12.3	26.0	6.6	3 of 6	J(2), 1
Dibenz (a,h), anthracene	9E-10	3E-7	7E-10	3E-8	2.1	3.7	.....	1 of 6	J(1), 1
Benzo (a) anthracene	4E-10	7E-8	3E-10	9E-9	11.5	31.0	.....	1 of 6	1
Indeno (1, 2, 3-cd) pyrene	2E-10	7E-8	1E-10	8E-9	15.0	15.0	3.0	2 of 6	J(1)
Benzo (b) fluoranthene	3E-10	1E-7	3E-10	1E-8	11.4	29.0	5.9	2 of 6	J(1), 1, 2
Total Carcinogen Risk***	4E-9	1E-6	3E-9	2E-7	.....	.....	.....
Adult Resident									
Benzo (a) pyrene	4E-9	7E-7	3E-9	9E-8	12.3	26.0	6.6	3 of 6	J(2), 1
Dibenz (a, h) anthracene	2E-9	5E-7	2E-9	6E-8	2.1	3.7	.....	1 of 6	J(1), 1
Total Carcinogen Risk***	8E-9	1E-6	6E-9	2E-7	.....	.....	.....

Notes:

- 1. Detection limits greater than the highest detected concentration are excluded from the average concentration calculations.
- 2. Concentration for combined benzo(b)fluoranthene and benzo(k)fluoranthene. J(#) Samples were estimated concentrations below quantitation limits, “#” indicates number of samples that are “J” values.

Only the combination of high-end factors resulting in the greatest overall carcinogen risk are presented:

* Scenario: high-end factors of quantity, duration of exposure for all scenarios.

** Scenario: high-end factors of small area, duration of exposure for all scenarios.

*** Total carcinogen risk includes risks from other PAHs not tabulated. The risks for the PAHs not presented in this table are lower than those that are presented.

All concentrations are in mg/kg.

WASTE CHARACTERIZATION AND RISK ESTIMATES, CRUDE OIL STORAGE TANK SEDIMENT

Constituents of concern	On-site land treatment		Off-site land treatment		Off-site landfill		Waste characterization				
	Central tendency	High end	Central tendency	High end	Central tendency	High end	Avg. conc.	High conc.	Low conc.	# of pts	Notes
Groundwater											
Benzene	<1E-6	<1E-6	<1E-6	<1E-6	4E-7	3E-5	0.68	1.7	0.032	5 of 6	J(1)

Notes:

J(#) Samples were estimated concentrations below quantitation limits, “#” indicates number of samples that are “J” values. All concentrations are TCLP leachate values in mg/L.

b. Discussion. Crude oil storage tank sediment is generated from the storage of crude oil where heavy hydrocarbons when basic sediment and water (BS&W) and entrapped oils settle in the bottom of storage tanks. A storage tank is drained for inspection and sediment removal on average once every 10 years. The results of the 1992 § 3007 petroleum refining survey showed that approximately 22,017 metric tons of crude oil storage tank sediment were generated.

The management scenarios selected for risk assessment included on-site land treatment units (12.1 percent of the sediment volume), off-site land treatment units (0.9 percent), and off-site Subtitle D landfills (10.5 percent). Other major management practices used included discharge to the wastewater treatment plant (9.5 percent), Subtitle C landfilling (17.1 percent), or on-site recovery in the crude unit, coker or catalytic cracker (43.5 percent).

The Agency collected six randomly selected samples of crude oil storage tank sediment. These samples are believed to be representative of typical sediments generated throughout the industry and the range of oil recovery techniques employed for crude oil storage tank sediment.

The risks given in Table III-2 show a high-end cancer risk of 3E-5 (3 x 10⁻⁵) due to benzene for an adult consuming groundwater contaminated from an off-site landfill. The high-end carcinogenic risks from PAHs in the home gardener and adult resident pathways were 1E-6 for the on-site land treatment scenario. The central tendency estimates did not show significant risk for any exposure scenario.

The Agency conducted another level of analysis of its risk results to further evaluate the PAH risks that were

identified for land treatment. One of the major assumptions in the Agency’s run-off models for releases from land treatment units (LTUs) is that the unit does not have controls for run-on and run-off waters from precipitation. A significant portion of the predicted risk for the PAHs is associated with contaminated soils washing off of the LTU into residential areas. PAH risks are reduced below listing levels of concern if no run-on/run-off is assumed (i.e., the refinery diverts all run-on and collects all run-off). EPA’s data collection effort showed most LTUs reported run-on/run-off controls to be in place. A survey of some state programs, however, showed that non-hazardous waste LTUs run-on/run-off controls were voluntary.⁶ Permits were not required, nor were management standards (where developed) mandatory. The Agency believes that an assumption of complete run-on/run-off control would overstate reality in that existing controls for Subtitle D land treatment units may be inadequate to control all releases, including dike failures during severe storm events, and, more routinely, tracking wastes from the unit on trucks and earthmoving equipment. While the Agency does not have information on the actual effectiveness of land treatment units at controlling releases associated with run-on/run-off, the Agency believes the risks may lie somewhere between those posed by scenarios with and without controls. For crude oil storage tank sediment, LTU controls that reduced off-site run-off to nearby residential areas (e.g., by about 50%) would reduce

the high-end risk from land treatment to below the 10⁻⁶ level.

The Agency believes the management practices of most concern (land treatment and landfills) were assessed, and that the other management practices would not serve as a basis for listing. The wastes being disposed of in Subtitle C landfills are already handled as hazardous and should not present significant risk. As described in Section II.F.2 (“Risk Analysis”), EPA believes that potential risks associated with disposal of wastes to wastewater treatment plants are largely covered by existing regulations. In addition to the existing NPDES or air programs: (1) Refinery sludges generated by wastewater treatment systems are already listed hazardous wastes (K048, K051, F037, F038); (2) the volumes of the crude oil storage tank residuals are relatively small compared to volumes in refinery wastewater treatment systems; and (3) residual risk associated with treatment would be covered by the proposed Phase IV Land Disposal Restrictions treatment requirements. Concerning on-site recovery for this waste, nearly all of this material is currently excluded from the definition of solid waste because it is reinserted into the refining process prior to distillation and catalytic cracking. See § 262.4(a)(12). A proposed expansion of this exclusion and its rationale are discussed in Section III.E. of this notice.

Today’s listing determination is limited in scope to crude oil storage tank sediment that is generated from storage tanks associated with petroleum refineries, either on-site or at affiliated tank farms (e.g., tank storage areas owned or under contract to the refinery). The Agency is not attempting to evaluate sediments generated from the storage of crude oil at exploration

⁶ See “Communications with State Authorities on Requirements for Land Treatment Units,” U.S. EPA 1995.

and production sites or associated with pipelines or other crude oil transportation conveyances. The Agency has not collected data necessary to support a risk characterization of these non-refinery sediments and is not, at this time, making a determination whether to list these materials. Furthermore, these non-refinery materials are governed by special statutory provisions (i.e., the "Bevill" provisions), and are currently exempt from regulation as hazardous waste.

Under today's proposal, hazardous oil-bearing wastes that are inserted into the petroleum refining process (including the coker) would be excluded from the definition of solid waste, and thus from regulation, as a petroleum refining process feed under amended § 261.4(a)(12). This exemption allows refineries to continue a practice currently in use where crude oil storage tank sediment or oil recovered from crude oil storage tank sediment are returned to the refinery operations, whether or not the Agency lists this waste as hazardous. The Agency believes this is appropriate for many reasons (see Section III.E for the Agency's detailed rationale for this exemption), and also reasonable given the inherent similarity between crude oil feedstock, crude oil storage tank sediment, and recovered oil from crude oil storage tank sediments.

Based on an analysis of the risks associated with current management practices, EPA is proposing not to list crude oil storage tank sediment from petroleum refining operations as a hazardous waste. The Agency found essentially no significant risks arising from land treatment. The only risk of possible concern arises from management in landfills. However, even the landfill risks are within EPA's discretionary range for listing, and EPA believes that a number of additional factors argue for not listing this residual.

First, the only constituent of significant concern for this waste is benzene, and this constituent is already regulated under the Toxicity Characteristic (TC). Wastes which contain levels of mobile benzene above

0.5 mg/L (as measured by the TCLP) are already subject to regulation as D018. Therefore, the Agency believes that the TC captures as hazardous the crude oil storage tank sediment that contains benzene levels of concern.

For this waste, EPA is confident that constituents of most concern were identified, and that the risks are unlikely to be significantly higher. Several factors are compelling. First, the Agency compiled a comprehensive database on constituents found in crude oil storage tank sediments and concluded risks would be posed only by benzene. Uncertainty in potential risk levels from other toxicants or from unknown toxicants is low. Second, the Agency has employed a more accurate, realistic risk assessment approach, which the Agency believes accurately projects actual risks posed. Uncertainty in exposure analysis for crude oil storage tank sediments is also low. Finally, while the Agency did not factor biodegradation of benzene directly into its risk assessment, model runs using preliminary data suggest that the levels of benzene reaching a drinking water well will be reduced to some extent due to biodegradation. See Section III.F.2.c for further discussion of this point.

EPA considers the listing decision for this waste to be a case in which the decision on whether or not to list crude oil storage tank sediments was difficult to make. The risk levels projected for the single constituent of concern, benzene, are above the Agency's initial risk level of concern (10^{-5}). However, other factors can and were considered, which suggest the actual risk posed is not of concern. The Agency requests comment on the decision not to list crude oil storage tank sediments, and on other factors that may affect the final decision. EPA seeks comment on whether the TC effectively captures wastes of concern, whether the Agency adequately characterized the risk for this waste, and whether any other factors should be considered.

If comments on this proposal provide sufficient information to show that the TC is not effective in regulating the wastes of concern, or that the risks from

this waste have not be adequately characterized by the Agency's analysis, EPA would consider making a final decision to list this residual. If listed, this waste would be identified as EPA Hazardous Waste Number K169—Crude oil storage tank sediment from petroleum refining operations, and benzene would be added to Appendix VII to Part 261—Basis for Listing for the K169 wastestream. In today's notice, the Agency is also including treatment standards, the CERCLA reportable quantity, and exemptions that would apply to this waste stream if the waste were to be listed. Certain background documents in the docket for this rule present elements involving costs and treatment standards EPA would use were this waste to be listed. Thus, final action may not be delayed by the need for additional proposals. If the waste were to be listed, the Agency also seeks comments on whether the listing description might be narrowed to exempt crude oil storage tank sediments that are treated or disposed of in certain ways (e.g., if deoiled). See Section III.H, "Request for Comment on Options for Conditional Exemptions," for a general discussion of possible approaches.

2. Clarified Slurry Oil (CSO) Tank Sediment and/or In-line Filter/ Separation Solids

a. Summary. EPA is proposing to list as hazardous sediment from the storage of clarified slurry oil and/or in-line filter/separation solids from the filtration of clarified slurry oil. This wastestream meets the criteria set out at 40 CFR 261.11(a)(3) for listing a waste as hazardous and is capable of posing a substantial present or potential hazard to human health or the environment when mismanaged. The Agency has identified risks of concern associated with two of four selected management practices: on-site land treatment, and off-site land treatment. The home gardener and adult resident receptors showed potential risks of concerns, and the contaminants of concern are polynuclear aromatic hydrocarbons (PAHs). The risk assessment results are summarized in Table III-3.

TABLE III-3.—WASTE CHARACTERIZATION AND RISK ESTIMATES: K170—CLARIFIED SLURRY OIL TANK SEDIMENT AND/OR IN-LINE FILTER/SEPARATION SOLIDS

[Assumes no run-off controls]

Constituents of concern	On-site land treatment*		Off-site land treatment**		Waste characterization				
	Central tendency	High end	Central tendency	High end	Avg. conc.	High conc.	Low conc.	# of pts.	Notes
HOME GARDENER									
Benzo(a) pyrene	1E-7	1E-5	5E-7	7E-6	132.0	230.0	52.0	4 of 4	J(1).
Dibenz(a,h)anthracene	8E-8	6E-6	3E-7	3E-6	37.0	49.0	.....	1 of 4	1.
3-Methylcholanthrene	2E-7	1E-5	7E-7	6E-6	23.8	27.0	.....	1 of 4	J(1), 1.
Benzo(a)anthracene	3E-8	2E-6	1E-7	1E-6	203.0	390.0	360.0	2 of 4	2 of 4
7, 12-Dimethylbenz (a)anthracene.	3E-7	3E-5	1E-6	4E-5	331.0	1,200.0	.....	1 of 4	1 of 4
Benzo(b)fluoranthene /Benzo(k)fluoranthene (total).	1E-8	1E-6	5E-8	5E-7	76.8	110.0	27.0	4 of 4	J(3),2.
Total Carcinogen Risk***	7E-7	6E-5	3E-6	5E-5	.....	.....	.....	.....	.....
ADULT RESIDENT									
Benzo(a)pyrene	2E-7	1E-5	9E-7	6E-6	132.0	230.0	52.0	4 of 4	J(1).
Dibenz(a,h)anthracene	2E-7	1E-5	7E-7	5E-6	37.0	49.0	.....	1 of 4	1.
3-Methylcholanthrene	3E-7	1E-5	1E-5	6E-6	23.8	27.0	.....	1 of 4	J(1),1.
7, 12-Dimethylbenz (a)anthracene.	7E-7	5E-5	3E-6	6E-5	331.0	1,200.0	.....	1 of 4	1 of 4
Benzo(b)fluoranthene	2E-8	1E-6	6E-8	4E-7	76.8	110.0	27.0	4 of 4	J(3)2.
Total Carcinogen Risk***	2E-6	9E-5	6E-6	8E-5	.....	.....	.....	.....	.....

Notes:

1. Detection limits greater than the highest detected concentration are excluded from the average concentration calculations.
 2. Concentration for combined benzo(b)fluoranthene and benzo(k)fluoranthene.
 - J(#): Samples were estimated concentrations below quantitation limits, “#” indicates number of samples that are “J” values.
- Only the combination of high-end factors resulting in the greatest overall carcinogen risk are presented:
 * Scenario: high-end factors of quantity, duration of exposure.
 ** Scenario: high-end factors of distance to receptor, duration of exposure.
 *** Total carcinogen risk includes risks from other PAHs not tabulated. The risks for the PAHs not presented in this table are lower than those that are presented.
 All concentrations are in mg/kg.

b. Discussion. Clarified slurry oil wastes are generated from process unit residuals, and the storage or filtration of clarified slurry oil, which is the bottom distillation fraction from the Fluidized Catalytic Cracker (FCC) fractionator. CSO tank sediment is generated every 5 to 10 years during storage tank cleanout. Some refineries use in-line filters or separators to remove solids from CSO prior to storage. For example, cartridge filters can be used to remove catalyst fines entrained in the product CSO. Filter/separation solids may be generated once or twice a year depending on product volume.

The results of the 1992 § 3007 petroleum refining survey showed that approximately 24,010 metric tons of clarified slurry oil tank sediment and filter/separation solids were generated. The management scenarios selected for risk assessment focussed on known Subtitle D land disposal activities, which included on-site land treatment (12.1 percent of the CSO tank sediment and filter/separation solid volume), off-site land treatment (9.9 percent), on-site Subtitle D landfilling (2.8 percent), and

off-site Subtitle D landfilling (47.2 percent). Other major management practices included Subtitle C landfilling (14.8 percent), on-site recovery or reuse (2.3 percent), discharge to the wastewater treatment plant (1.04 percent), transfer for use as fuel (7.7 percent), and on-site road material (1.7 percent).

For this infrequently generated waste, the Agency was able to collect four samples, including 3 tank sediment samples and 1 CSO filter solid. These randomly selected samples are believed to be representative of typical residuals generated throughout the industry.

The risks described in Table III-3 are significant for a variety of exposure routes and management scenarios. The high-end cancer risk arising from the home gardener exposure for on-site was 6E-5, and the central tendency risk was 7E-7. For off-site land treatment, the high-end risk for the home gardener was 5E-5, with a central tendency risks of 3E-6. The adult resident scenario also showed a significant high-end risk of 9E-5 for on-site land treatment, and a central tendency risk of 2E-6. For off-site land treatment, the high-end risk for

the adult resident was 8E-5, and the central tendency risk was 6E-6.

Similar to the analysis conducted for crude oil storage tank sediment, the Agency conducted another level of analysis of the CSO tank sediment and filter/separation solids risk results to further evaluate the impacts of run-on/run-off controls. While the Agency does not have information on the actual effectiveness of land treatment units at controlling releases associated with run-on/run-off, the Agency believes the risks lie somewhere between those posed by scenarios with and without controls. EPA believes that these results continue to warrant listing of the CSO wastes. In order for the high-end risks to be reduced to a 10-6 level, the Agency estimates that for both on-site and off-site LTUs, controls would need to be more than 90 percent effective in controlling releases to nearby fields.

The Agency believes the management practices of most concern (land treatment and landfills) were assessed for this residual, and that the other management practices would not serve as a basis for listing. EPA did not

attempt to model wastes discharged to the wastewater treatment system, disposed of in Subtitle C units, or recovered for use on-site, because wastewater treatment sludges are already listed as hazardous wastes (K048, K051, F037, and F037), and Subtitle C management and reuse activities are viewed as protective. The on-site road use scenario for this residual was not assessed because of the small volume and the small number of facilities using this practice. Additionally, the potential risks posed by the road use management scenario are likely to be less than those calculated for the land treatment scenario (using a much larger volume of >2,000 MT), which considered similar environmental pathways.

Today's listing is limited in scope to clarified slurry oil tank sediment and filter/separation solids that are generated from CSO filtration/separation and storage tanks associated with petroleum refineries, either on-site or at affiliated tank farms. The Agency is not attempting to include sludges generated from the storage of clarified slurry oil at carbon black manufacturing facilities using clarified slurry oil as raw materials, or associated with transportation conveyances or other off-site storage of clarified slurry oil. The Agency has not collected data necessary to support a risk characterization of these non-refinery sludges and is not, at this time, making a determination

regarding whether to list these materials.

Under today's proposal, hazardous oil-bearing clarified slurry oil tank sediment or filter/separation solids that is inserted into the petroleum refining process (including the coker) would be excluded from regulation as a petroleum refining process feed under amended §261.4(a)(12). This exemption allows refineries to continue a practice currently in use where clarified slurry oil laded wastes or oil recovered from clarified slurry oil tank sediment or filter/separation solids are returned to the refinery operations. The Agency believes this is appropriate for the reasons described in Section III.E. of this preamble, and also reasonable given the inherent similarity between refinery feedstocks, clarified slurry oil tank sediment or filter/separation solids, and recovered oils from clarified slurry oil sediment or filter/separation solids.

Based on an analysis of the risks associated with current management practices, i.e., land treatment, EPA is proposing to list clarified slurry oil storage tank sediment and filter/separation solids from petroleum refining operations as a hazardous waste, designated as EPA Hazardous Waste Number K170. However, the disposal of CSO storage tank sediment and in-line filter/separation solids in landfills was not associated with significant risks. Therefore, EPA is also proposing two alternative listing descriptions that either limit the listing to CSO residuals managed in land

treatment units, or specifically exclude from the listing waste managed in a landfill. These proposals and other options are discussed in Section III.H, "Request for Comment on Options for Conditional Exemptions."

Due to the risks described above, the Agency is proposing to add the following constituents to Appendix VII to Part 261—Basis for Listing: benzo(a)pyrene, dibenz(a,h)anthracene, 3-methylcholanthrene, benzo(a)anthracene, 7,12-dimethylbenz(a)anthracene, benzo(b)fluoranthene, and benzo(k)fluoranthene.

3. Catalyst from Hydrotreating

a. *Summary.* EPA is proposing to list as hazardous spent catalysts from hydrotreating operations. This wastestream meets the criteria set out at 40 CFR 261.11(a)(3) for listing a waste as hazardous and is capable of posing a substantial present or potential hazard to human health or the environment when mismanaged. The Agency has identified risks of concern associated with: off-site and on-site Subtitle D landfilling. Health risks are associated with benzene and arsenic releases to groundwater. The risk assessment results are summarized in Table III-4. In addition, this material presents a hazard because it has pyrophoric and self-heating properties, and is sometimes characteristically hazardous due to its ignitability, or benzene and/or arsenic leachability.

TABLE III-4.—WASTE CHARACTERIZATION AND RISK ESTIMATES—K171—SPENT CATALYST FROM HYDROTREATING

Constituents of concern	On-site landfill		Off-site landfill		Waste characterization				
	Central tendency	High end	Central tendency	High end	Avg. conc.	High conc.	Low conc.	# of pts	Notes
GROUNDWATER									
Benzene	9E-7	9E-6	2E-7	1E-5	7.9	39.0	0.05	6 of 6	J(1).
Arsenic	8E-7	8E-6	2E-7	1E-5	1.1	4.9	1.5	2 of 6.	

Notes:

J(#) Samples were estimated concentrations below quantitation limits, “#” indicates number of samples that are “J” values. All concentrations are TCLP leachate values in mg/L.

b. *Discussion.* Spent catalysts from hydrotreating are generated every 2 to 7 years during hydrotreater turnarounds and topping activities. Hydrotreating is used to remove sulfur and nitrogen compounds and to saturate olefins in naphthas, lube oils, and some middle distillates. The catalyst is typically nickel and molybdenum or cobalt and molybdenum on an alumina base. The catalyst is removed from the unit because its activity has been reduced below acceptable levels due to coking,

metals poisoning, and/or particle degradation. As described further in the listing background document in the docket to this proposal, the Agency is defining hydrotreating to be hydroprocessing applied to lighter boiling stocks and to not include those catalysts with precious metals as their active catalytic metals. Note that in this notice the Agency is also proposing to list hydrorefining catalysts, which is one of two other major types of hydroprocessing catalysts used by the

industry. Today's listing determinations, however, do not address catalysts from hydrocracking operations which the Agency is studying separately under the consent decree and which will not be addressed in this notice.⁷

⁷The Agency recognizes that the terms hydrotreating and hydroprocessing are used somewhat loosely within the industry and that various definitions have been posed by different sources of authority. One widely used set of definitions is used in the Oil and Gas Journal's

In 1992, the petroleum refining industry reported generating 5,640 metric tons of spent hydrotreating catalyst. Of this total 2,236 metric tons were identified as hazardous, because the wastes were in most cases D018-benzene, D001-ignitable, or D004-arsenic. The management scenarios selected for risk assessment focussed on known Subtitle D landfilling activities, which included off-site Subtitle D landfilling (11.3 percent), and on-site landfilling (0.2 percent). Other major spent hydrotreating catalyst management practices included transfer for metals reclamation or regeneration (75.8 percent), or Subtitle C landfilling (11.3 percent).

The Agency collected six samples of spent hydrotreating catalysts. These samples are believed to be representative of the various types of applications and active metals used by the industry. The Agency observed that many refineries take great care to remove this residual from the process units under an inert atmosphere due to the potential for this residual to ignite spontaneously. On two occasions during sampling, the refineries determined that the risk associated with collecting catalyst samples from inert gas blanketed catalyst storage bins was too great to allow EPA to collect the samples directly. Specially trained refinery personnel collected these samples while being observed by EPA representatives. A third refinery also requested that EPA not collect a sample of their residual due to the risks presented by the spent catalyst.

When sufficient quantities of spent hydrotreating catalysts are stockpiled and exposed to air to allow self heating and self ignition to occur, harmful quantities of toxic sulfur dioxide, carbon monoxide, and other toxic constituents such as nickel carbonyl may be formed. The Agency has received reports of fires, building evacuations, and metals reclamation process disturbances attributed to the ignition of these spent catalysts.⁸

Due to the self-heating or self-ignition characteristics of spent hydrotreating catalysts, the spent catalysts frequently meet the Department of Transportation's (DOT) 49 CFR 173.124(b) definition of

spontaneously combustible material, and must be shipped accordingly. A self-heating material is a material that once in contact with air and without an energy supply, is liable to self-heat. A material of this type may be classified as spontaneously combustible if the temperature of a test sample exceeds 200°C (392°F) during the 24-hour test period when tested in accordance with the DOT test in 49 CFR 173 Appendix E—Guidelines for the Classification and Packing Group Assignment of Class 4 Materials. Test data obtained by the Agency indicate that up to 60 percent of these spent hydrotreating catalysts reclaimed at one site are self-heating solids.⁹ Furthermore, from the data collected by EPA in the § 3007 questionnaire, about 40 percent of this wastestream is characteristically hazardous, and a significant portion is classified as ignitable under RCRA.

The risk assessment results showed that the primary toxicants of concern for spent hydrotreating catalysts are benzene and arsenic. On-site landfilling results in a high-end cancer risk of 9E-6, and a central tendency risk of 9E-7 for benzene, and arsenic risks of 8E-6 and 8E-7 for high-end risk and central tendency risk, respectively. Off-site landfilling shows high-end modeled risks of 1E-5, and central tendency risks of 2E-7 for each constituent. The on-site groundwater risk is 18 times the MCL for benzene; the off-site risk is 30 times the MCL for benzene.

The Agency believes the management practices of most concern (off-site and on-site landfills) were assessed, and that the other management practices would not serve as a basis for listing. The wastes being disposed of in Subtitle C landfills are already handled as hazardous and should not present significant risk. As described in Section III.J. ("Third Party Regeneration/Reclamation of Spent Petroleum Catalysts"), EPA believes that the regeneration and reclamation of spent hydrotreating/hydrorefining catalysts is an environmentally sound alternative to disposal, and is also proposing that these units be excluded from regulation as Boilers and Industrial Furnaces (BIFs). In summary, EPA does not believe that these off-site recycling

activities present significant risk because: (1) much of the waste going to recycling is characteristically hazardous, and EPA has found that recycling facilities typically handle nominally nonhazardous waste in a protective manner due to its pyrophoric properties; and (2) a preliminary survey of reclaimers/regenerators showed that these units are already equipped with pollution control devices.¹⁰ Therefore, EPA believes that any potential risks associated with regeneration and reclamation are unlikely to be significant, and would be less than the risks found to exist for the management practices modeled.

Based on an analysis of the risks associated with current management practices and the characteristically hazardous properties of the waste, EPA is proposing to list spent catalysts from hydrotreating from petroleum refining operations as a hazardous waste, designated as EPA Hazardous Waste Number K171. Note that as described further in Section III.J. of this preamble that this listing does not include ceramic support media that is separated from the spent catalyst prior to catalyst disposal or recycling.

For the reasons stated above, the Agency is proposing to add benzene and arsenic to Appendix VII to Part 261—Basis for Listing.

4. Catalyst from Hydrorefining

a. Summary. EPA is proposing to list as hazardous spent catalysts from hydrorefining operations. This wastestream meets the criteria set out at 40 CFR 261.11(a)(3) for listing a waste as hazardous and is capable of posing a substantial present or potential hazard to human health or the environment when mismanaged. The Agency has identified risks of concern associated with: off-site and on-site Subtitle D landfilling. Health risks are associated with benzene and arsenic releases to groundwater. The risk assessment results are summarized in Table III-5. In addition, this material presents a hazard because it has pyrophoric and self-heating properties, and is sometimes characteristically hazardous due to its ignitability, or benzene and/or arsenic leachability.

annual report on worldwide refining, which establishes that hydrotreating includes processes where essentially no reduction in the molecular size of the feed occurs, that hydrorefining includes processes where 10 percent of the feed or less is

reduced in molecular size, and that hydrocracking includes processes where 50 percent of the feed or more is reduced in molecular size. The Listing Background Document for this proposal discusses these definitions further.

⁸ Ibid.

⁹ See May 19, 1995 letter from John N. Glover (CRI-MET) to William F. Brandes (EPA).

¹⁰ See "Survey of Spent Petroleum Catalyst Regenerators and Reclaimers," U.S. EPA 1995.

TABLE III-5.—WASTE CHARACTERIZATION AND RISK ESTIMATES—K172—SPENT CATALYST FROM HYDROREFINING

Constituents of concern	On-site landfill		Off-site landfill		Waste characterization				
	Central tendency	High end	Central tendency	High end	Avg. conc.	High conc.	Low conc.	No. of pts	Notes
GROUNDWATER									
Benzene	1E-6	1E-5	2E-7	2E-5	1.5	4.2	0.1	3 of 3.	
Arsenic	4E-6	4E-5	8E-7	6E-5	13.7	34.0	0.2	3 of 3.	

All concentrations are TCLP leachate values in mg/L.

b. Discussion. Spent catalysts from hydrorefining are generated every 2 to 7 years during hydrorefiner turnarounds and topping activities. Hydrorefining is used to remove sulfur and nitrogen compounds and to saturate olefins in gas oil, residual oil, and some middle distillates. The catalyst is typically nickel and molybdenum or nickel and cobalt on an alumina base. The catalyst is removed from the unit because its activity has been reduced below acceptable levels due to coking, metals poisoning, and/or particle degradation. The Agency observed that many refineries take great care to remove this residual from the process units under an inert atmosphere due to the exposure hazards associated with this residual. Similar to hydrotreating catalysts, these hydrorefining catalysts also frequently exhibit the properties of spontaneously combustible materials. Two of the three refineries sampled insisted that refinery personnel collect the Agency's record samples due to potential risks. Similar to spent hydrotreating catalyst, the spent hydrorefining catalyst exhibits self-heating and spontaneously combustible properties (see discussion in Section III.G.3). Also like the hydrotreating residual, data collected by EPA in the § 3007 questionnaire showed that much of this wastestream (nearly 30 percent) is characteristically hazardous, and approximately 9 percent is classified as ignitable under RCRA.

In 1992, the petroleum refining industry reported generating 18,630 metric tons of spent hydrorefining catalyst. Approximately 5,028 metric tons (27 percent) were identified as hazardous because the waste exhibited a hazardous characteristic, primarily D018-benzene, D001-ignitable, or D004-arsenic. The management scenarios selected for risk assessment focussed on known Subtitle D landfilling activities, which included off-site Subtitle D landfilling (12.6 percent), and on-site land filling (3.8 percent). Other major spent hydrorefining catalyst management practices included transfer for metals reclamation or regeneration (82.4 percent), or Subtitle C landfilling (1.1 percent).

Due to sample availability, the Agency was only able to obtain three samples of spent hydrorefining catalysts during its data collection effort. These samples are believed to be representative of the various types of applications and active metals used by the industry.

In this notice, the Agency is also proposing to list hydrotreating catalysts, which is one of two other major types of hydroprocessing catalysts used by the industry. Today's listing determinations, however, do not address catalysts from hydrocracking operations which the Agency is studying separately under the consent decree and which will not be addressed in this notice. Note that as described further in Section III.J of this preamble, this listing also does not include ceramic support median that is separated from the spent catalyst prior to catalyst disposal or recycling.

The risk assessment results showed that the primary toxicants of concern for spent hydrorefining catalysts are arsenic and benzene. On-site landfilling results in a high-end cancer risk of 4E-5, and a central tendency risk of 4E-6. Off-site landfilling shows a modeled high-end risk of 6E-5 and central tendency risk of 8E-7.

The Agency believes the management practices of most concern (off-site and on-site landfills) were assessed, and that the other management practices would not serve as a basis for listing. See Section III.G.3. for a discussion explaining why EPA did not attempt to model disposal in Subtitle C units or regeneration and reclamation processes.

Based on an analysis of the risks associated with current management practices and the characteristically hazardous properties of the waste, EPA is proposing to list spent catalysts from hydrorefining from petroleum refining operations as a hazardous waste, designated as EPA Hazardous Waste Number K172.

For the reasons stated above, the Agency is proposing to add benzene and arsenic to Appendix VII to Part 261—Basis for Listing.

5. Catalyst From Sulfuric Acid Alkylation

a. Summary. The Agency is proposing not to list spent catalysts from sulfuric acid alkylation. This residual is currently managed almost entirely under an existing exemption from the definition of solid waste. In addition, this residual consistently exhibits the characteristic of corrosivity and already is subject to regulatory control if not returned to the production of virgin sulfuric acid.

b. Discussion. The sulfuric acid alkylation process contacts olefin and isobutane gases over concentrated sulfuric acid catalyst to synthesize alkylates for octane boosting. A portion of the acid catalyst is continuously bled from the reactor and replaced with fresh acid to maintain the reactor acid concentration at around 90 percent. The acid bleed stream is the spent catalyst of concern for this category. The industry reported the generation of almost 1,760,100 metric tons of spent catalyst in 1992. This residual consistently exhibits the characteristic of corrosivity.

The Agency previously has exempted from the definition of solid wastes (40 CFR 261.4(a)(7)) spent sulfuric acid used to produce virgin sulfuric acid, unless it is accumulated speculatively (50 FR 614, January 4, 1985). In 1992, more than 99 percent of spent sulfuric acid generated was used to produce virgin sulfuric acid or reused on-site, and less than 1 percent was used to neutralize wastewaters prior to biological treatment. The Agency has reexamined the contaminants found in such spent acids and has found no materials which would likely be carried through production to the virgin acid. As noted in the preamble to the January 4, 1985, final rule on the definition of solid waste, the spent sulfuric acid recycling process more closely resembles a manufacturing operation than a reclamation process. (50 FR 642, January 4, 1985). Spent sulfuric acid is a hazardous waste if disposed (assuming it is corrosive or exhibits other hazardous waste characteristics), and could be a hazardous waste if recycled

in some other manner (such as burning for energy recovery). The Agency finds no reason to change the existing regulatory structure for spent sulfuric acid used to produce virgin sulfuric acid and is taking no action in this area.

Waste survey data indicate that 155 metric tons of spent acid from spills were discharged to wastewater treatment units in 1992. The Agency believes that this small volume is unlikely to cause any significant risk, especially due to the existing regulation of primary treatment sludge as hazardous. Furthermore, spent acids which are used to neutralize other waste characteristics, forming a mixture which no longer exhibits a characteristic, remain subject to land disposal restrictions. The Agency has proposed in the Phase Three Land Disposal Restrictions Rule (60 FR 11702, March 2, 1995) that treatment is required not only to remove the characteristic, but also to treat any underlying hazardous constituents which may be present in the wastes, even though they are not what causes the characteristic property. EPA proposes to continue the current regulation of spent acids, which are not used to produce virgin acid, as characteristically hazardous waste when discarded. The Agency requests comment on this proposed decision.

6. Spent Caustic From Liquid Treating

a. Summary. The Agency is proposing not to list spent caustic from liquid treating as a hazardous waste. After analyzing potential exposure pathways, EPA concluded that with the exception of air exposure pathways from open tank storage, there were no potential risk pathways that needed to be modeled. This residual, however, will frequently exhibit the characteristic of corrosivity and/or toxicity due to cresol leachability (and sometimes ignitability) and is subject to all applicable regulatory controls when any of the hazardous waste characteristics are present. The Agency has identified certain management practices used for spent caustics for which the Agency is clarifying the application of the definition of solid waste, and in one case proposes a modification to the definition.

b. Discussion. Caustic is used to remove certain acidic compounds like mercaptans from liquid petroleum streams to reduce product odor and corrosivity as well as to meet product sulfur specifications. In 1992, the industry reported the generation of approximately 918,000 metric tons of spent caustic. Twenty-one separate management practices, most involving relatively small volumes, were

employed. EPA's survey showed, however, that more than 99 percent of this wastestream is managed as follows: reused as an ingredient or substitute for virgin caustic (51 percent of the total volume or 470,400 metric tons); sent to wastewater treatment systems (29 percent or 266,200 metric tons); or used as a feedstock to production processes from which cresylic or naphthenic acids are obtained (17 percent or 153,000 metric tons). A much smaller volume is injected into underground wells.

The Agency collected six samples of spent caustic. The samples are considered representative because the sample profile reflected the distribution of the different categories of caustics in use and because spent caustics perform essentially the same function in refining processes. The samples collected by the Agency were found to consistently exhibit one or more of the characteristics of hazardous waste: corrosivity (D002) and/or toxicity for one or more cresols (D023, D024, D025, or D026).

Under current rules, spent materials are solid wastes whether reclaimed or abandoned, and, because they are characteristically hazardous, spent caustics from liquid treating are hazardous wastes under existing regulations. Today's proposal does not change the regulatory status of liquid treating caustic managed in this manner except as discussed in section (3.) below.

The Agency examined the various management techniques before concluding that, aside from tank storage, no exposure pathways needed to be modeled and therefore the residual should not be listed as hazardous. The analysis and conclusion are based on the following management practices reported.

1. Use as Ingredients or Substitutes. Spent caustics that are used as ingredients or reagent substitutes (e.g., use in pH control; sulfidic caustic used in the making of paper) are eligible for exclusion from the definition of solid waste under (§ 261.2(e)). This exclusion provides that secondary materials that are used or reused directly (i.e., without reclamation) as ingredients in an industrial process to make a product are not subject to regulation under RCRA and therefore not subject to any listing determination. EPA notes that characteristically hazardous spent materials that are reclaimed prior to reuse would still be hazardous wastes subject to pertinent management requirements.

2. Sent to Wastewater Treatment. The Agency considered whether there was a need to conduct a risk assessment of the

wastewater treatment system but determined that the combination of the existing F and K sludge listings, the benzene NESHAP, the planned MACT standards for volatile organics emissions (assuming such standards would apply), and the proposed LDR Phase III (60 FR 11702, March 2, 1995) and Phase IV (60 FR 43654, August 22, 1995) rulemakings (if promulgated) would address any residual risk associated with spent caustics, mixed with other refinery wastewaters.

Wastewaters discharged under NPDES permits are generally excluded from RCRA at the point they are discharged to surface waters so the exposure pathways associated with discharge were not modeled. For wastewater treatment plant sludges, only the aggressive biological treatment (ABT) sludges and sludges generated downstream from ABT units are not already listed hazardous wastes. While these sludges could be contaminated by toxicants carried in spent caustics, in fact the majority of the toxicants would either be removed by biotreatment or fall out in the listed sludges upstream from the biotreatment units. The Agency also concluded that dilution with other refinery wastewaters would significantly reduce the concentrations involved. EPA estimates that spent caustic wastestreams receive significant dilution upon discharge to wastewater systems (to less than 3 percent of original concentration). Further, it would be virtually impossible to trace contaminants in ABT sludges to a spent caustic wastestream because the contaminants are common to many different influent streams. For these reasons, EPA did not model risk associated with sludge disposal.

Air exposure pathways from wastewater treatment systems treating spent caustics were not modeled because the Benzene NESHAP (55 FR 8292, March 7, 1990) and the MACT standards (60 FR 43244, August 18, 1995) for volatile organics emissions were considered to be the pertinent regulatory mechanisms for potential air emission sources. Furthermore, the Agency notes that bounding estimates for air emissions from storage tanks managing spent caustic show no significant risk from volatile emissions. The Agency specifically requests comment on this determination with regard to potential lapses in coverage due to emission volume cutoffs in CAA air rules and the adequacy of technology-based controls to control specific volatile organics from spent caustics that are discharged to wastewater treatment systems.

3. Use as a Feedstock. Some 153,000 metric tons/year of spent caustics are sold as feedstock to produce naphthenic and cresylic acid products (16.8 percent of reported 1992 generation). One reading of the existing regulations is that, because this production process arguably involves reclamation of the spent caustics, the spent caustics would be regulated as hazardous wastes. However, as an early finding in our effort to redefine "solid waste," EPA has concluded that spent caustic from liquid treating is not a waste when recycled in this manner even though it does have an element of reclamation associated with it. Rather, the spent caustic constitutes a valuable commercial feedstock which is used in the manufacture of commercial chemical products. The caustic in this case has been used to isolate an acidic cresylic or naphthenic fraction during the refining of petroleum crude oil. Spent caustic meeting the appropriate specifications is purchased from petroleum refineries (i.e., it has a positive economic value and is not accepted indiscriminately) and is managed as a valuable commodity (i.e., feedstock) to prevent loss en route to its use in the manufacturing process. The caustic solutions are individually shipped by the refiners like other petroleum products. They move to the plant in barges, railroad cars and tank trucks. Because this feedstock is corrosive, the transportation conveyances used are subject to applicable Coast Guard, Federal Railroad Administration, and Department of Transportation regulations. Consequently, the human health and environmental risk posed by the transportation of these products is expected to be comparable to risks posed by similar raw materials. The spent caustic which is currently used as a feedstock is managed in the following manner. Upon arrival at the production facility, the caustic solutions are directly loaded into storage tanks. The storage tanks are constructed of steel and are built with diked concrete containment systems for spill control and equipped closed vent headers that are tied into a fume incinerator. These factors would mitigate air emissions concerns presented by the handling of caustics in this manner. The storage tanks meet all applicable Federal and State air pollution regulations. From the storage tanks, the caustic is directly pumped into the plant's chemical manufacturing process. The facility in question has been in operation for close to 50 years. A review of recent release history indicates that there have been no reportable spills or releases associated

with the handling and receipt of caustics used in this manner over the past ten years. Based on the manner in which these materials are routinely handled and processed, this recycling practice more closely resembles a manufacturing operation than a reclamation process.

EPA is therefore proposing to amend the regulations at 40 CFR 261.4(a)(14) to provide an exclusion from the definition of solid waste, clarifying that spent liquid treating caustics from petroleum refineries used as feedstock in the manufacture of naphthenic and cresylic acid products are not solid wastes. EPA may identify additional "commodity-like" materials as we proceed with other Agency efforts to redefine the definition of solid waste and revise the existing RCRA regulations.

4. Storage of Spent Caustic.

Approximately 534,000 metric tons of spent caustic were reported stored on-site prior to further management. Storage is typically in covered tanks, however, EPA conducted a risk analysis of uncovered tanks under the assumption that uncovered tanks would pose the highest potential risk. A bounding maximum estimated risk assessment resulted in risk estimates of less than one additional cancer case in a population of one million (1E-6) and hazard quotients¹¹ less than one for the toxicants detected in this residual.

While RCRA hazardous wastes are subject to either 40 CFR 264 or 265 Subpart AA, BB, and CC Air Emission Standards, storage vessels associated with petroleum refining process units are subject to the recently promulgated 40 CFR 63 Subpart CC—National Emission Standards for Organic Hazardous Air Pollutants from Petroleum Refineries (60 FR 43244, August 18, 1995). Therefore (assuming such standards' enforceability), regardless of whether this secondary material is considered waste or feedstocks, regulations in place prohibit the open storage of these materials. The Agency does not believe the management of the spent caustics at the petroleum refinery (prior to transportation and use as a feedstock) poses a risk to human health and the environment.

5. Deep Well Injection. As noted above, this wastestream is typically characteristically hazardous. Spent caustics that are underground injected that are characteristic will be subject to LDR treatment requirements prior to injection. Furthermore, the spent caustic

is usually neutralized and diluted before injection, further reducing any associated risks. Therefore, the Agency did not model this disposal practice.

7. Off-Specification Product and Fines from Thermal Processes

a. Summary. EPA is proposing not to list as hazardous off-spec product and fines from thermal processes. The Agency assessed the potential risks associated with two selected management practices: on-site Subtitle D landfilling and off-site Subtitle D landfilling. No risks of concern were identified.

b. Discussion. Thermal processes include all processes where feed is cracked solely by a thermal, rather than a catalytic, reaction mechanism. These processes convert heavy stocks to light hydrocarbon products. The most common thermal process is delayed coking; other typical thermal processes include visbreaking, fluid coking, thermal cracking and coke calcining. Only two generate residuals of concern for this listing, delayed coking and fluid coking; the other processes do not generate product coke. (See the Listing Background Document in the Docket for this proposal for additional details. See ADDRESSES section.)

The residual of concern for thermal processes consists of (1) off-spec products (e.g., non-salable products generated during process upsets, start ups, shut downs, turnarounds, or other conditions); and (2) fines (e.g., coke fines generated during coke drum drilling). The petroleum refining industry reported generation of almost 194,300 metric tons of off-spec product and fines. Approximately 87 percent of this material is collected and combined with product inventory to be sold.

Some cokers have been retrofitted to allow the refineries to process certain waste materials, including the listed refinery wastewater treatment sludges, as coker feeds. Hazardous waste-derived petroleum coke or coke fines which exhibit any of the characteristics of a hazardous waste are currently subject to RCRA requirements (see 40 CFR 261.6(a)(3)(vii)).

Coke fines are generated on a daily basis. Although most off-spec product and fines are sold with the refinery coke product, more than 7,250 metric tons (3.7 percent) are landfilled in on-site or off-site Subtitle D landfills. The Agency conducted its risk assessment on these disposal practices. Other management practices included recovery in the coker (4.8 percent), discharge to wastewater treatment (2.6 percent), and treatment in on-site boilers (1.1 percent). Smaller volumes went to Subtitle C units (0.5

¹¹ The hazard quotient is a ratio of exposure to the RFC or RfD, and is used as a measure of noncancer risk.

percent) and land treatment (0.03 percent). The volume reported disposed of in land treatment units (almost 50 metric tons) is small in comparison to the volumes modeled for landfills, and was assumed to be of insignificant risk.

The Agency collected six samples of off-spec products and fines from thermal processes. Five were from the delayed coker, and one from a fluid coker; this corresponds to the dominance of delayed cokers in the industry. These samples are believed to be representative of the residual category as generated by the industry.

The Agency believes the management practices of most concern (off site and on-site landfills) were assessed, and that the other management practices would not serve as a basis for listing. Fines sent to wastewater treatment are insoluble and will be incorporated in the primary treatment sludges; these are already listed (K048, K051, F037 and F038). The volume reported going to an on-site boiler was somewhat misleading because this material was not isolated from the coking process. Rather, this volume is associated with fines entrained in off-gases from fluid cokers, which were sent directly to carbon monoxide boilers for air pollution control. Furthermore, this process was only relevant to fluid cokers, which are present at only 3 of the 76 facilities.

EPA did not model storage of fines from thermal processes (i.e., coke fines). The majority of coke fines are managed with coke product as product and thus are not within the jurisdiction of this rulemaking. The Agency did assess the potential for air releases during landfilling as a result of the frequent generation frequency and small particle size associated with this residual and believes that this assessment would be comparable to any potential risks associated with on-site storage prior to final management.

Based on an analysis of the risks associated with current management practices, EPA is proposing not to list off-spec products and fines from thermal processes from petroleum refining operations as a hazardous waste. Furthermore, EPA notes that most of the coke fines are sold with product coke, and that the coke product is statutorily exempt from regulation as hazardous, unless the material exhibits a hazardous waste characteristic (see RCRA § 3004(q)(2)(A)).

8. Catalyst and Fines From Catalytic Cracking

a. Summary. The Agency proposes not to list Fluidized Catalytic Cracking (FCC) catalyst and fines as hazardous wastes. The Agency characterized FCC

catalysts and fines and modeled the risk associated with management in an on-site monofill. For the direct and indirect exposures from volatile and particulate emissions from monofills, bounding estimates showed no significant risk. The Agency also found no significant risk from the high-end analysis for the groundwater pathway.

b. Discussion. The Agency's evaluation of this category considered two subcategories: spent equilibrium catalyst and catalyst fines. The FCC reactor is a fluidized bed through which catalyst circulates and is regenerated. Equilibrium catalysts are removed from the unit on a routine basis (daily or weekly) and replaced with fresh catalysts to maintain a target activity and metals level. Catalyst fines are collected in the FCC off-gas air pollution control devices (which may include dry systems such as cyclones and electrostatic precipitators or wet scrubbers). Physically, the two subcategories differ primarily in their particle size. More than 70 percent of the equilibrium catalyst is reused or otherwise recycled, while 15 percent of the catalyst fines are recycled.

EPA chose to model the monofill and surface impoundment scenarios for these residuals because units dedicated to these materials were observed during the Agency's engineering site visits; in addition, these residuals are produced frequently and in sufficient quantities by numerous facilities to make a monofill or dedicated surface impoundment possible. The Agency observed several monofills and a dedicated surface impoundment during the 20 site visits performed as part of the listing determination; some of these monofills were referred to as "catalyst landfills" by facility personnel. EPA believes that this type of management will show greater risk than other plausible management practices that could have been modeled for these residuals (e.g., landfills that accept other non-hazardous waste), because the residual will not be mixed or diluted with other material in an unlined monofill.

The Agency did not model storage of FCC catalysts and fines, even though these residuals are generated frequently. FCC catalyst and fines are typically managed in pneumatic containers and hoppers prior to final management due to their particle size and large volumes generated. These storage vessels are designed to minimize dust emissions and control material losses. The Agency did model potential air releases in the modeled monofill scenario for FCC residuals. Thus, interim storage was not modeled because of the nature of the

storage vessels typically used and the consideration of air pathway releases during long-term final management.

EPA collected six samples of catalysts and fines: two FCC catalyst samples, two dry samples of fines, and two samples of fines from wet scrubbers. Due to limited variation in feedstocks, catalyst-type, and use practices across the industry, EPA believes that these samples are representative of the different forms of FCC catalysts and fines.

1. FCC Catalyst. The industry reported the generation of more than 124,000 metric tons of spent FCC catalyst in 1992. Seventy percent of this volume was recycled to other FCC units or cement plants. Almost 19 percent was managed in off-site Subtitle D landfills and 2.3 percent was managed in on-site Subtitle D landfills. Less than 1 percent was managed in on- or off-site land treatment units. About 3 percent was managed in on-site Subtitle C landfills, however, facilities did not report these as characteristically hazardous, so the reason for Subtitle C management is unclear.

Bounding estimates for the direct and indirect exposures from volatile and particulate releases from monofills showed no risks of concern for the equilibrium catalyst. These bounding estimates were run under worst-case assumptions using multiple high-end assumptions for critical parameters. (More plausible high-end analyses would be expected to give even lower risks.) For the groundwater pathway, high-end analyses also showed no significant risks from the monofill scenario. The results are available in the Risk Assessment Background Document in the docket for today's proposal (see ADDRESSES section).

Spent FCC catalysts contain primarily silica, aluminum, iron, sodium, calcium, and some other trace metals. The constituents of concern found in other petroleum residuals evaluated in this listing determination (e.g., carcinogenic PAHs and benzene) were not detected in spent FCC catalysts. EPA did not pursue modeling for the relatively small volumes (less than 1 percent) of catalysts that were reported to go to land treatment. If the much larger volumes evaluated for monofills do not present a risk, it was considered highly unlikely that the land treatment risks will be significant.

2. FCC Fines. More than 67,500 metric tons of FCC fines were reported to be generated in 1992. Over 48 percent of this volume was managed in off-site Subtitle D landfills, 20 percent was recycled (primarily by cement plants), 12.6 percent was managed in on-site

Subtitle D landfills, and 1.1 percent was managed in Subtitle C landfills. 10.4 percent of the volume was reported to be managed in surface impoundments, and almost 10 percent reportedly was not collected, but vented into the atmosphere in states where aggressive emissions controls were not required. 0.6 percent of the volume was managed in land treatment units.

Bounding estimates for the direct and indirect exposures from releases from monofills showed no risks of concern for FCC fines. For the groundwater pathway, high-end analyses also showed no significant risks from the monofill or surface impoundment scenarios. The results are available in the Risk Assessment Background Document in the docket for today's proposal (see ADDRESSES section).

Similar to FCC catalysts, EPA did not pursue modeling for the relatively small volumes (less than 1 percent) of fines that were reported to go to land treatment because the much larger volumes evaluated for monofills and surface impoundments were not found to present a risk above the level of concern.

3. Definition of Solid Waste Issues. A large fraction of the recycled FCC catalyst (over one-third) is only partially deactivated and may be reused without further reclamation in another FCC unit (generally at another refinery) that can utilize catalysts with the reduced

activity. Because these materials are continuing to be used for their intended purpose, (i.e., as catalysts) they are not considered to be "spent materials" within the RCRA definition (50 FR 624, January 4, 1985). "Spent materials" as defined under RCRA do not include materials that are reused for their original purpose, provided that the materials do not undergo reclamation or reprocessing prior to their reuse. Therefore, as long as the partially deactivated catalyst does not undergo reclamation prior to its reuse as a catalyst, it would be considered a product excluded from jurisdiction under RCRA.

Some of the spent FCC material is legitimately recycled in cement plants, because the silica-alumina matrix, among other things, is useful as an ingredient in cement production. EPA did not attempt to model risks specifically from the recycling of FCC catalysts and fines in cement plants. However, given the low levels of any hazardous constituents in spent FCC catalysts and fines, the Agency does not believe the practice should present significant risks. Furthermore, the residuals are blended with other materials at the cement plant (typically up to 5% of the feed material), and the ultimate product (concrete) would tend to immobilize any trace metals present. While generators did not report that the catalyst or fines exhibited a

characteristic, it should be noted that cement manufactured using a characteristically hazardous waste as an ingredient would result in regulation of the kiln as a BIF (56 FR 7185, February 21, 1991). Furthermore, cement produced from FCC catalysts that exhibit a hazardous characteristic would be considered a waste-derived product (see 40 CFR 266.20). Under RCRA, products that are derived from hazardous wastes and are used in a manner constituting disposal (e.g., cement) may be marketed for the general public's use and used without further regulation, if they meet applicable LDR standards and if the hazardous constituents undergo a chemical change so as to be inseparable by physical means (50 FR 629, January 4, 1985).

9. Sludge From Hydrofluoric Acid Alkylation

a. Summary. EPA is proposing not to list as hazardous sludge from hydrofluoric acid alkylation processes. The Agency assessed the potential risks associated with: on-site Subtitle D landfilling, off-site Subtitle D landfilling, on-site land treatment, and off-site land treatment. Only marginal risk was identified for the ground-water ingestion exposure pathway in the modeled off-site landfill. The marginal risks identified in the Agency's risk assessment are summarized in Table III-7.

TABLE III-7.—WASTE CHARACTERIZATION AND RISK ESTIMATES: HF ALKYLATION SLUDGE

Constituents of concern	On-site land treatment		Off-site land treatment		On-site landfill	High end	Off-site landfill		Waste characterization				
	Central tendency	High end	Central tendency	High end	Central tendency		Central tendency	High end	Avg. con.	High conc.	Low conc.	# of pts	Notes
GROUNDWATER													
Benzene	<1E-6	<1E-6	<1E-6	<1E-6	1E-7	6E-7	5E-8	3E-6	0.08	0.2	.....	1 of 5	

All concentrations are TCLP leachate values in mg/L.

b. Discussion. The hydrofluoric acid (HF) alkylation process contacts olefin and isobutane gases over a hydrofluoric acid catalyst to synthesize alkylates for octane boosting. The hydrofluoric acid is managed in a closed-loop process, without leaving the unit for replacement or regeneration. As a result of neutralization of trace HF levels in product streams and certain process residuals, many refineries generate a calcium fluoride sludge. (See the Listing Background Document in the Docket for this proposal for additional details. See ADDRESSES section.) This sludge is the residual of concern for this category.

Sludge from hydrofluoric acid alkylation is generated every 3 to 6 months. The sludge is generally

dewatered prior to final management and managed with other alkylation process unit wastewaters. The Agency collected five samples of sludge from hydrofluoric alkylation. These samples are believed to be representative of the sludges generated by the industry.

In 1992, the petroleum refining industry reported generating 11,288 metric tons of sludge from hydrofluoric acid alkylation. The management scenarios selected for risk assessment focussed on known Subtitle D land disposal activities, which included on-site land treatment (4.9 percent), off-site land treatment (6.1 percent), on-site landfilling (0.4 percent), and off-site Subtitle D landfilling (65.3 percent). Other major hydrofluoric acid sludge

management practices reported in 1992 included on-site recovery in a coker (11.6 percent), off-site industrial furnace (7.3 percent), disposal in surface impoundment (2 percent), and discharge to wastewater (0.7 percent).

The Agency's risk assessment of HF alkylation sludge showed only marginal risk for one of the four management scenarios modeled—off-site landfilling. The exposure route of concern was limited to ground-water ingestion. The contaminant of marginal concern was benzene, with a high-end cancer risk of 3E-6 and a central tendency risk of 5E-8. EPA believes that this risk is not significant enough to warrant a listing because it is near the presumptive no-list level of 10-6, and the actual risk

may be lower than the results indicate due to the possible biodegradation of benzene prior to reaching receptors. In addition, the frequency of detection in TCLP samples (one out of five) was low, further indicating that the risk attributed to this parameter would generally be lower.

The Agency did not attempt to model the volume of HF alkylation sludge going to an off-site industrial furnace because: (1) EPA determined the furnace was a cement kiln that was already subject to regulation (the kiln had applied for a permit as a Boiler and Industrial Furnace (BIF)), and (2) this was reported to occur by only one facility, and the refinery has since closed. Therefore, EPA believes treatment of this waste in a furnace is extremely rare and, considering the existing regulatory controls in place for BIFs, this management practice is not of concern.

EPA did not model the small volume (221 metric tons) reportedly disposed of in a surface impoundment, because this practice was rare (one facility). Furthermore, EPA determined that this facility has since ceased this practice entirely and closed the impoundment. Therefore, EPA believes that disposal in a surface impoundment is not a plausible management practice of concern for this waste.

Some refineries reported the discharge of their HF alkylation sludge to wastewater treatment. The Agency believes any hazardous materials contained therein would be largely removed during oil/water/solids separation as already listed hazardous waste (F037, F038, K048, and K051), or significantly diluted by other wastewaters. Therefore, the Agency did not model this management practice. Refineries also reported the transfer of this residual for processing in an on-site coker. The Agency did not model the risk associated with on-site coker recovery because the residual is managed in closed systems (i.e., vacuum trucks, tanks, and piping) which eliminate environmental pathways of concern. In addition, the HF alkylation sludge residuals processed in an on-site coker typically are oil-bearing materials which are being proposed for exclusion from the definition of solid waste in this rulemaking. See Section III.F.

Based on an analysis of the risks associated with current management practices, EPA is proposing not to list sludge from hydrofluoric acid alkylation from petroleum refining operations as a hazardous waste. The Agency requests comment on this proposed decision.

10. Sludge From Sulfur Complex and H₂S Removal Facilities

a. Summary. EPA is proposing to not list as hazardous sludge from sulfur complex and H₂S removal facilities. None of the plausible management practices identified and modeled by the Agency pose significant risk to human health and the environment.

b. Discussion. Virtually all crude oil contains sulfur which must be removed at various points in the refining process. A common method for treating light petroleum gases is amine scrubbing, followed by recovery of elemental sulfur, and tail gas treating. The Agency has defined the category of sludge from sulfur complex and H₂S removal facilities to capture sludge generated during amine scrubbing and recover.¹² Sludges accumulate in amine systems due to the formation of heat stable salts and other inert process system impurities. Control methods to remove these impurities include particulate filters, activated carbon, diatomaceous earth, regeneration, and/or caustic addition, depending on the type of amine used and petroleum stream being treated. These control methods (with the exception of caustic addition) generate sludge that meets the Agency's definition of sludge from sulfur complex and H₂S removal facilities.

More than 8,500 metric tons of sludge from sulfur complex and H₂S removal facilities were reported by the petroleum refining industry in 1992. Over 47 percent was managed in off-site Subtitle D landfills, and about 2 percent was managed in on-site Subtitle D landfills. Less than 2 percent was disposed of in on-site or off-site land treatment units. In addition, the Agency believes that a significant portion (almost 50 percent) of this residual is managed on-site intermediately in storage containers such as dumpsters prior to shipment or final disposal. The Agency conducted its risk assessment on these management practices. Other major management practices included discharge to wastewater treatment (40 percent), on-site incineration (0.1 percent), Subtitle C landfilling (2 percent), off-site carbon regeneration (1.2 percent), and miscellaneous recycling methods (3.0 percent).

The Agency collected five samples of this sludge. The samples represent sludges, sorbents, and filter media generated from amine systems. These

¹² Other residuals of interest to the Agency from the H₂S removal and sulfur complex include several residuals described elsewhere in today's notice (catalyst from Claus sulfur recovery, catalyst from SCOT tail gas treating), and several residuals to be addressed in the consent decree study (off-spec sulfur, off-spec treating solution).

samples are believed to be representative of the residual category as generated by the industry.

The Agency found no significant risks for any exposure pathway for this waste when disposed of in on-site or off-site landfills and land treatment units. Furthermore, no significant risks were found from potential air releases from storage in dumpsters.

EPA did not model the volumes of waste that were discharged to the wastewater treatment system, because the solids would be captured in the API separator or primary treatment sludge, which are already listed hazardous wastes (K048, K051, F037, F038). Incineration was also not modeled, because the volume was 197 metric tons, and nearly all of this volume (192 metric tons) was treated in a Subtitle C permitted incinerator. Therefore, neither scenario was expected to cause significant risk.

Based on an analysis of the risks associated with current management practices, EPA is proposing not to list sludge from sulfur complex and H₂S removal facilities as a hazardous waste.

11. Catalyst From Sulfur Complex and H₂S Removal Facilities

a. Summary. The Agency is not proposing to list any of the spent catalysts generated from H₂S removal and sulfur complex operations. The plausible management scenarios used for the two major subcategories of catalysts were modeled and found to pose no significant risk.

b. Discussion. The Agency subdivided this category into two distinct residuals of concern: spent Claus unit catalyst and spent SCOT[®] like tail gas catalyst. A Claus unit converts H₂S generated from the refinery sulfur removal system into elemental sulfur through the use of heat and an alumina catalyst. The SCOT[®] unit converts sulfur dioxide in exhaust gas from the Claus unit to H₂S using a cobalt/molybdenum catalyst. The H₂S either is concentrated using amine solutions and sent back to the Claus unit, or is converted directly into elemental sulfur. The Agency has evaluated Claus and SCOT[®] like catalysts separately because they differ in the point of generation and their composition also differs somewhat (the Claus catalyst is alumina, while the SCOT[®] catalyst's active metals are cobalt and molybdenum).

1. Claus Catalyst. The alumina Claus catalyst is generated during unit turnarounds every 1 to 3 years. The industry reported generation of over 3,800 metric tons in 1992. Almost 60 percent was reported to be managed in off-site Subtitle D landfills, and another

10 percent was managed in on-site Subtitle D landfills. These management practices were evaluated in the Agency's risk assessment. Other management practices included recycling in cement plants (18.9 percent), disposal in Subtitle C landfills (7 percent), and off-site reclamation (3.5 percent); these practices were not evaluated for the same reasons discussed for the FCC catalyst and fines in Section III.G.8.

EPA was able to collect three samples of spent Claus catalysts. These are expected to be representative, because there are essentially no process variations with the Claus process; all units use alumina catalysts and all treat a purified stream of hydrogen sulfide.

For the direct and indirect pathways of volatile emissions and particulate emissions, as well as for the groundwater leachate pathway, the Agency found no significant risk from bounding estimates. Therefore, the Agency proposes not to designate spent Claus catalyst as a listed hazardous waste.

2. Tail Gas Treating Catalyst. Spent catalysts from tail gas treating are generated every 2 to 7 years during tail gas treater turnarounds and topping activities. Tail gas treating, as typified by the SCOT® process, is used to remove sulfur dioxide from Claus unit off-gases. The catalyst is typically cobalt

and molybdenum on an alumina base. The catalyst is removed from the unit because its activity has been reduced below acceptable levels due to coking and/or particle degradation. This residual is similar to hydrotreating catalyst in its general composition and purpose in sulfur removal. However, tail gas treating catalysts are generally much less contaminated than hydrotreating catalysts because they are exposed to off-gases rather than hydrocarbon streams; thus, the tail gas catalysts are not subjected to metals deposition. Twenty three percent of the SCOT® catalyst volume generated in 1992 was reported to be managed as characteristically hazardous, primarily due to ignitability.

In 1992, the petroleum refining industry reported generating 361 metric tons of spent tail gas treating (e.g., SCOT®) catalyst. The management scenarios selected for assessment focussed on known Subtitle D landfilling activities, which included on-site (2.7 percent), and off-site Subtitle D landfills (13.8 percent). Other major management practices included transfer for metals reclamation or regeneration (52 percent), or Subtitle C landfilling (28.8 percent); these practices were not evaluated for the same reasons discussed for the hydrotreating catalyst in Section III.G.3.

The Agency was able to collect three samples of spent tail gas treating catalysts. These samples are believed to be representative of the SCOT® catalysts used by the industry, because there are essentially no process variations in the treating of tail gas.

The Agency found no significant risks associated with the disposal of this waste in landfills. The potential risks from ingestion of groundwater were below levels of concern. Furthermore, the extremely small volumes disposed of in landfills (60 metric tons total, average of 12 metric tons per facility), suggest that spent tail gas treating catalysts should not present any significant risks. Therefore, the Agency is proposing not to list this waste.

12. Unleaded Gasoline Storage Tank Sediment

a. Summary. EPA is proposing not to list as hazardous sediment from the storage of unleaded gasoline. The Agency assessed the potential risks associated with four selected management practices: on-site Subtitle D landfilling, off-site Subtitle D landfilling, on-site land treatment, and off-site land treatment. Only marginal risk was identified for the groundwater ingestion exposure pathway. The marginal risks identified in the Agency's risk assessment are summarized in Table III-8.

TABLE III-8.—WASTE CHARACTERIZATION AND RISK ESTIMATES: UNLEADED GASOLINE STORAGE TANK SEDIMENT

Constituents of concern	On-site land treatment		Off-site land treatment		On-site landfill		Off-site landfill		Waste characterization				
	Central tendency	High end	Central tendency	High end	Central tendency	High end	Central tendency	High end	Avg. conc.	High conc.	Low conc.	# of pts	Notes
GROUNDWATER													
Benzene	3E-8	<1E-6	3E-8	<1E-6	3E-8	<1E-6	3E-8	2E-6	0.75	1.6	0.06	3 of 3	J(1)

Notes:
J(#) Samples were estimated concentrations below quantitation limits, “#” indicates number of samples that are “J” values.
All concentrations are TCLP leachate values in mg/L.

b. Discussion. Unleaded gasoline tank sediment is generated from the storage of unleaded gasoline and consists of tank scale and rust. The storage tanks are drained for inspection on average once every 10 years during which time sediment removal occurs. An integral part of unleaded tank turnarounds includes extensive water washing to reduce volatile organic concentrations to achieve a concentration less than the lower explosive limit in preparation for safe tank entry. This tank washing results in significant sediment scouring to the wastewater treatment plant. The results of the 1992 § 3007 petroleum refining survey showed that approximately 3,600 metric tons of unleaded gasoline tank sediment were generated.

The management scenarios selected for risk assessment focussed on known Subtitle D land disposal activities, which included on-site land treatment (3.1 percent of the total unleaded gasoline tank sediment volume), off-site land treatment (2.6 percent), on-site Subtitle D landfilling (0.2 percent), and off-site Subtitle D landfilling (17.4 percent). Other major unleaded gasoline tank sediment management practices included discharge to the wastewater treatment plant (58.4 percent), Subtitle C landfilling (3.0 percent), off-site incineration (4.9 percent), and other on-site disposal (0.5 percent). The remaining 7.6 percent was recovered on-site or transferred for use as fuel.

The Agency was able to collect three samples of unleaded gasoline storage

tank sediment. These samples are believed to be representative of typical sediments generated throughout the industry. The Agency attempted to collect additional samples, but was unable to because several tank turnarounds were observed where little or no sediment to be sampled remained in the tanks following tank washing to reduce occupational benzene concentrations.

The Agency's risk assessment showed only marginal levels of concern for this residual. The Agency's models showed risk only for ground-water ingestion associated with off-site landfilling. The off-site landfill scenario showed high-end risk due to benzene levels at a cancer risk of 2E-6 and a central tendency risk of 3E-8. EPA believes that

this risk is not significant enough to warrant a listing because it is very close to the presumptive no-list level of 10-6, and the actual risk may be lower than the results indicate due to the possible biodegradation of benzene prior to reaching receptors. The Agency also notes that the total volume of unleaded gasoline tank sediment is moderately small (<4,000 metric tons), and that the portion actually disposed of in landfills is even smaller (about 600 metric tons total, or an average of 28 metric tons per facility) due to the intermittent generation of this waste. Therefore, EPA believes that the small waste volumes disposed of, and the infrequent generation of this waste are other factors that support a decision not to list this waste.

The Agency notes that the industry reported that approximately 25 percent of these sediments are managed as hazardous for benzene under the toxicity characteristic (TC). In this case, the Agency believes that the TC will effectively capture wastes with high benzene levels, i.e., the only constituent that exhibited even marginal concern in this waste. The Agency requests comment on whether this factor should be used to support a positive listing determination.

EPA did not pursue modeling for the volume of sediment that was reportedly discharged to the wastewater treatment plant, because of the volumes concerned are small compared to other discharges and will have minimal impact of the treatment process. Furthermore, these waste solids would be incorporated in the API separator or primary treatment sludges, and these are already listed (K048, K051, F037 and F038). The Agency also did not try to assess risks associated with off-site incineration, because the practice was relatively rare and the volume was small (177 metric tons from 4 of 81 facilities). In addition, the off-site incinerators were reported to be hazardous waste incinerators that are already subject to regulatory control. Similarly, wastes disposed of in a Subtitle C landfill are already regulated as hazardous and should not present significant risk.

13. Catalyst From Reforming

a. Summary. EPA is proposing not to list spent catalysts from reforming operations as a hazardous waste. A principal component of reforming catalyst is platinum and the spent catalyst itself is extremely valuable. Ninety four percent of it is recycled due to its platinum content. The remaining 6 percent consists primarily of other materials generated during catalyst replacement (e.g., ceramic support

media). The strict inventory controls the industry uses with spent platinum catalysts limit potential routes of exposure resulting from the management of these materials.

The only exposure pathway EPA examined was the air pathway from the combustion of the reforming catalyst prior to reclamation. EPA data show the presence of dioxins and furans in spent reforming catalysts that are believed to be generated during regeneration of the catalyst within the reforming reactor. A screening risk analysis of potential air release pathways for dioxins and furans at recycling facilities failed to show any significant risk.

b. Discussion. The purpose of the reforming process is to upgrade the octane value of naphtha feedstocks by the conversion of the naphtha to aromatics. The process is catalyzed by platinum chloride or a platinum/rhenium chloride combination. Agency survey data indicate that 94% of the approximately 3,600 metric tons of spent precious metal bearing reforming catalyst reported as generated in 1992 are currently recycled for their precious metal content. Because of the value of these materials (each drum of it is estimated to be worth several thousand dollars), the spent catalysts are controlled and tracked between the refinery and metals reclamation facilities to prevent loss. The Agency can foresee no generator site environmental release pathway for spent catalysts other than potential *de minimis* spills.

There are two separate management activities for reforming catalyst the Agency assessed in this listing determination: in-situ regeneration and off-site recycling.

Regeneration

Spent reforming catalysts are regenerated in-situ either on a cyclic, semi-regenerative, or continuous basis. Part of the purpose of regeneration is to redistribute the platinum into the catalyst. This involves the addition of chlorine or chlorinated compounds. Data collected by EPA shows that this regeneration step leads to the generation of dioxins and furans and the potential dioxin contamination of air pollution control scrubber waters as well as the release of these contaminants to the air. The EPA's Office of Water has collected limited data from five refineries and received addition voluntary data submissions from three refineries indicating that low levels of dioxins and furans are found in scrubber waters during the in-situ catalyst regeneration process. These scrubber waters are commonly discharged to the oil

recovery sewer for transfer to wastewater treatment. Sludge data was obtained for three of the facilities. Two of the three samples were found to contain dioxins and furans. (The third sample was analyzed by two laboratories, and dioxins/furans were found by one of the laboratories; however, the presence of dioxins/furans could not be verified by EPA because the laboratory information was not complete.) Based on these limited data, the dioxins and furans appear to concentrate in wastewater treatment sludges generated during the regeneration process. (See Petroleum Refining Industry-Presence of Dioxins and Furans in Wastewater Generated by Reforming Operations, EPA, May 1994.) The primary oil/water/solids sludges are already listed hazardous wastes (K048, K051, F037, and F038).

The Agency is seeking data on API separator sludge and other oil-bearing wastes that have come into contact with discarded caustic scrubber waters from the regeneration of precious metal catalysts in the reforming process. In-situ regeneration of these catalysts typically occurs for a two to three day period from one to three times a year. EPA notes that the sampling was limited and that it is still unclear whether the samples would represent typical refinery operations. Therefore, EPA requests additional data on the dioxin/furan content of similar sludges, especially sludges generated during normal operations when regeneration is not occurring, and those sludges generated by facilities using a continuous reforming process that does not produce caustic scrubber waters. The Agency also requests comment on: (1) Opportunities for removing dioxin prior to discharge of scrubber water into WWT system, (2) opportunities to segregate this wastestream, and (3) potential health risk associated with insertion of dioxin-contaminated media back into the refining process (such as the coker).

Petroleum refining reformer units are specifically cited in the CAA for MACT standards, scheduled for proposal in 1996 (57 FR 44156, September 24, 1992). 2,3,7,8-Tetrachlorodibenzodioxin is a Hazardous Air Pollutant and would be assessed for potential controls under the air program. EPA may rely on the air program to protect human health and the environment from air emissions during the regeneration process. EPA currently lacks an adequate record to propose further regulation of the spent air pollution control caustic and sludge. Therefore, EPA is making no determination of the "listability" of

these spent caustic residuals at this time.

Recycling

Once spent reformer catalysts reach the recycler, EPA believes that the environmental pathways of potential significance are air emissions during the recycling process and any subsequent disposal of small quantities of support media separated from the spent catalyst. However, the support media is only a very small portion of the overall waste volume and, since it consists of inert ceramic material, it was not considered for risk assessment. Air emissions are scrubbed to capture and return precious metals to the process.

A variety of polychlorinated dioxins and furans were detected in samples of spent reformer catalyst. While the dioxin isomer of most concern 2,3,7,8-tertachlorodibenzodioxin (2,3,7,8-TCDD) was not detected, other 2,3,7,8-homologs of dibenzodioxin and dibenzofuran were detected in samples of the spent reformer catalyst at levels ranging from 0.03 to 9.8 ppt when expressed in terms of the 2,3,7,8-TCDD toxic equivalent value (TEQ). The median concentration was 0.12 ppt TEQ. A screening risk assessment was conducted to see if the concentrations of these toxicants in spent catalysts would produce possibly unacceptable risk from air releases during reclamation. The analysis showed the concentrations of dioxins and furans in spent reformer catalysts were below levels of concern.

Residuals from recycling processes were found to be considered by recyclers to still have precious metals value and are shipped to smelters for further metals recovery. As such, they would be eligible for a case-by-case variance from certain RCRA hazardous waste management requirements (notification and manifesting requirements) even if the catalyst were listed as hazardous. See 40 CFR 260.31(c).

Overall, the Agency's assessment of current management practices associated with recycling reforming catalyst fails to find any significant risks to human health or the environment.

The results of the Agency's analysis of 6 spent reformer catalyst samples, as well as further description of the reforming process and catalyst management are provided in the Listing Background Document in the public docket for this rule (see ADDRESSES section).

The Agency concludes that risk from the solid waste management of spent reformer catalysts are negligible because of the lack of release and exposure pathways associated with off-site

precious metals recovery operations. Therefore, the Agency proposes not to designate spent reformer catalysts as a listed hazardous waste.

14. Sludge From Sulfuric Acid Alkylation

a. Summary. EPA is proposing not to list sludge from sulfuric acid alkylation as a hazardous waste. The Agency evaluated the plausible management practices used by the industry to manage this residual and found no significant risk to human health or the environment.

b. Discussion. Some refineries use a neutralization tank or pit in their sulfuric acid alkylation process areas to control the pH of alkylation wastewaters released to their wastewater treatment plants. Discharges to the pit may include spills, acid leaks, acid samples, and runoff from the process area. Refineries typically use caustic for any necessary neutralization. Over time, some sludge accumulates in the neutralization pit and periodically is removed for disposal. In the past refineries used lime for neutralization which resulted in a buildup of unreacted lime, scale, polymer, tars, and insoluble salts.¹³ However, the current use of liquid caustics for neutralization produces largely soluble sulfates, minimizing sludge generation. The sludge is removed for disposal only once every three to five years.

Agency data indicate that 608 metric tons were generated in 1992 by 10 refineries. EPA selected the following practices for risk assessment modeling: on-site land treatment (46.0 percent of the residual volume generated), off-site land treatment (16.4 percent), and off-site landfilling (1.5 percent). 21.3 percent of this sludge is managed at the refinery wastewater treatment plant, 13.2 percent is transferred for reclamation, 1.2 percent is managed in Subtitle C landfills, and 0.2 percent is sent to off-site incineration.

Of the 45 facilities employing the H₂SO₄ alkylation process, the Agency was able to obtain only one sample of H₂SO₄ alkylation sludge during the sampling effort. This sample was found to be characteristically hazardous for chromium, but was derived from wastewaters from on-site acid

¹³ The consent decree identified sulfuric acid alkylation sludge as a residual requiring a listing determination based on consideration of the large amount of sludge reported in the Agency's 1983 database (61,338 metric tons). Upon subsequent review of the 1983 volumes, the Agency determined that its original volume estimation was significantly overstated due to the misidentification of three large volume spent sulfuric acid catalyst residuals as an alkylation sludge. The corrected volume for the 1983 database is 482 metric tons.

reclamation, as well as the alkylation unit. As a result, the sample may not be completely representative of sludges from sulfuric acid alkylation alone. The Agency requests any additional waste characterization data.

The Agency conducted a bounding risk assessment of the analytical data available, using on-site and off-site land treatment and off-site Subtitle D landfilling as the baseline management scenarios. No significant risk was indicated.

The Agency did not attempt to model the volumes reported to be discharged to wastewater treatment plants because the primary treatment and API separator sludges resulting from the treatment of the residual are already listed hazardous waste (K048, K051, F037, F038). Off-site incineration was not modeled because the volume was extremely small (1 metric ton) to pose any threat to human health and the environment.

The Agency also believes, based on its examination of the process chemistry and the available analytical data, that this infrequently generated waste may exhibit the hazardous characteristic of corrosivity. Given the relatively small volumes and infrequent generation of this waste, the Agency proposes to regulate H₂SO₄ alkylation sludge within the existing framework of characteristic wastes, and not to list this process residual specifically. The Agency requests comment on this proposed decision.

H. Request for Comment on Options for Conditional Exemptions

As EPA was preparing the risk assessments used for this rulemaking, the Agency became aware that there were risk scenarios (such as land treatment of a waste), or specific risk pathways (run-off to off-site receptors from land treatment) that may pose significantly higher risk than other scenarios or exposure pathways. If there were relatively simple, enforceable, means of assuring that those scenarios or exposure pathways would not occur, and if EPA could conclude it had identified the highest risk reasonable management scenarios, comparable protection of human health and the environment could be achieved at a significantly lower regulatory cost.

Many Subtitle C requirements were written generically to address all hazardous wastes and, consequently, provide protection for those wastes that pose the greatest risks. Some are either explicitly or implicitly technology-based rather than risk-based. Some of these requirements are statutory and cannot easily be adjusted to take risk into account. Nevertheless, EPA

generally believes that it would be desirable to tailor waste management requirements to more closely relate to risks. An initial significant step in this process would apply Subtitle C requirements only to those significant risk scenarios, leaving low risk scenarios subject only to less prescriptive federal and state controls for non-hazardous wastes.

EPA explored whether it would be possible to create additional exemptions from Subtitle C management standards to allow more flexible management of wastes found to be hazardous in one or more scenario, but not others, without compromising protection of human health and the environment. These options would be premised on the theory that a waste's risk is due not only to its chemical composition, but also the manner in which it is managed, which can greatly affect the amount of chemical constituents that ultimately reach a human or environmental receptor. The multipathway analysis prepared to support this listing determination shows that the risk to human health or the environment varies significantly with the type of management that a waste receives. The following discussion presents the legal framework for management-based or conditional listings, outlines the options EPA has begun to consider, and presents in more detail the options which EPA finds to be most promising.

1. Legal Basis for Conditional Exemptions

EPA's original approach to determining whether a waste should be listed as hazardous had been to focus on the inherent chemical composition of the waste and to assume that mismanagement would occur so that people or organisms would come into contact with the waste's constituents. See 45 FR 33113 (May 19, 1980). Based on more than a decade of experience with waste management, EPA questions whether it is appropriate to assume that worst-case mismanagement will occur, and EPA does not believe that such worst-case assumptions are compelled by the statute. Rather, in recent hazardous waste listing decisions, EPA has identified "mismanagement" scenarios that are reasonable, and looked at available data to then determine if any of these are unlikely for the specific wastes being considered, or if other scenarios are likely given available information about current waste management practices for the specific wastes. See the Carbamates Listing Determination (60 FR 7824, February 9, 1995) and the Dyes and Pigments Proposed Listing

Determination (59 FR 66072, December 22, 1994). As a further extension of that logic, EPA believes it may be more appropriate to find that, where a mismanagement scenario is not likely or has been adequately addressed by other programs, EPA need not consider risk from that scenario in deciding whether to classify the waste as hazardous.

EPA believes that the definition of "hazardous waste" in RCRA section 1004(5) permits this approach to classifying wastes as hazardous. Section 1004(5)(B) defines as "hazardous" any waste which may present a substantial present or potential hazard to human health or the environment "when improperly * * * managed." EPA reads this provision to allow it to determine the circumstances under which a waste may present a hazard and to regulate the waste only when those conditions occur. Support for this reading can be found by contrasting section 1004(5)(B) with section 1004(5)(A), which defines certain inherently dangerous wastes as "hazardous" no matter how they are managed. The legislative history of Subtitle C of RCRA also appears to support this interpretation, stating that "the basic thrust of this hazardous waste title is to identify what wastes are hazardous in what quantities, qualities and concentrations, and the methods of disposal which may make such wastes hazardous." H.Rep. No. 94-1491, 94th Cong., 2d Sess. 6 (1976), reprinted in *A Legislative History of the Solid Waste Disposal Act, as Amended*, Congressional Research Service, Vol. 1, 567 (1991) (emphasis added).

EPA also believes that section 3001 provides it with flexibility to consider the need to regulate those wastes that are not managed in an unsafe manner as hazardous. (Section 3001 requires that EPA, in determining whether to list or otherwise identify a waste as hazardous waste, decide whether a waste "should" be subject to the requirements of Subtitle C.) EPA's existing regulatory standards for listing hazardous wastes reflect that flexibility by allowing specific consideration of a waste's potential for mismanagement. See § 261.11(a)(3) (incorporating the language of RCRA section 1004(5)(B)) and § 261.11(c)(3)(vii) requiring EPA to consider plausible types of mismanagement. Where mismanagement of a waste is implausible, the listing regulations do not require EPA to classify a waste as hazardous based on that mismanagement scenario.

Decisions by the U.S. Court of Appeals for the District of Columbia Circuit provide support for considering management controls in deciding

whether a waste should be listed as hazardous waste. See, e.g., *Edison Electric Institute v. EPA*, 2 F.3d 438, (D.C. Cir. 1993) (remanding EPA's RCRA Toxicity Characteristic ("TC") as applied to certain mineral processing wastes because the TC was based on modeling of disposal in a municipal solid waste landfill, yet EPA had provided no evidence that such wastes were ever placed in municipal landfills or similar units).

2. Improvements in Risk Assessment Methodology

EPA's early regulations defining hazardous waste reached broadly to ensure that wastes presenting potential or actual hazards were quickly brought into the system. When EPA promulgated its first listings and characteristic rules in 1980, its knowledge of toxic constituents, constituent transport pathways, and waste management options was more limited than it is today.

Significant improvements in waste management have occurred since the early 1980's. Many states have established or strengthened industrial non-hazardous waste programs since that time. See EPA draft report "State Requirements for Industrial Non-Hazardous Waste Management Facilities," September 1994 in the docket. Industry has had more experience in managing wastes and has improved waste management under the incentives provided by factors such as the publicity from the implementation of the Emergency Preparedness and Community Right to Know Act, and the deterrent value of Superfund cleanups, RCRA corrective action and state cleanup programs.

EPA's ability to predict the risks that a waste may pose has also improved significantly. EPA has collected much more data on a variety of waste management units and other factors that impact the ability of waste constituents to reach a receptor. Models such as the EPACMTP and the models used in the multipathway analysis provide more sophisticated means of assessing the risks of a range of waste management options. As a result of all these changes, EPA is now in a position to begin to implement a more carefully tailored risk-based approach to regulating hazardous wastes.

3. Options for Conditional Exemptions

a. Conditional Exemption based on Specific Management Practice. Where EPA has characterized a specific waste, modeled the associated management practices and found specific management practices (and not others)

to present significant risks to human health or the environment, EPA could list as hazardous only those wastes managed in a manner that presents significant risk. Alternatively, EPA could list wastes unless they are managed by the method that does not exhibit significant risk. The Agency believes allowing use of exemptions tailored to waste management is a practical and appropriate way to allow waste to be exempt from Subtitle C without increasing risks, if the management practices identified are clear and very easily ascertainable (such as the difference between land treatment units and landfills), and the differences in risk presented by these practices are clearly defined.

Concerning the wastes examined in today's rule, EPA believes that an opportunity exists to fashion a conditional listing for CSO storage tank sediment and filter/separation solids (also referred to as CSO residuals). While disposal of CSO residuals in land treatment units was projected to pose significant risks (due to releases from run-off), the disposal in landfills was found to not result in significant risks (see discussion in Section III.G. "Waste-specific Listing Determination Rationales"). This arises because the constituents of most concern, PAHs, are relatively immobile in the groundwater pathway due to their low water solubility. Therefore, EPA believes a contingent management listing for this waste may be appropriate and is proposing three possible conditional listings for CSO storage tank sediment and filter/separation solids as alternatives to simply listing all CSO residuals generated. The Agency requests comments on these proposed alternatives to simply listing all CSO residuals. These alternatives have certain advantages and disadvantages, and EPA seeks comment on the relative merits of the different approaches.

Option (1)—The first option is to list CSO residuals as hazardous only if the waste is applied in a land treatment unit. Thus, the first alternative listing description would be:

K170—Clarified slurry oil storage tank sediment and/or in-line filter/separation solids from petroleum refining operations if the sediment and filter/separation solids are applied to the land in a land treatment unit.

Under this option, only the waste disposed of in the type of unit exhibiting unacceptable risk (land treatment) would be subject to Subtitle C regulation. EPA believes that the practical effect of this option would be that refineries would cease land

treatment for these wastes, thereby eliminating the practice that was found to pose significant risks. EPA seeks comment on whether other possible management methods might present risks that warrant Subtitle C control.

Option 2—The second option would list CSO residuals as hazardous unless the waste was managed in a landfill. Thus, the second alternative listing description would be as follows:

K170—Clarified slurry oil storage tank sediment and/or in-line filter/separation solids from petroleum refining operations unless the sediment and filter/separation solids are disposed of in a landfill licensed or permitted by the State.

Under this option, the waste would be hazardous if managed by any method, except for disposal in a landfill. EPA believes that the effect of this type of listing would be to encourage disposal in landfills, rather than land treatment units. (If data were submitted showing similarly low risks from other management methods, the Agency would consider expanding the list of permissible disposal practices.) EPA seeks comment on the impact of such changes in waste management might have on the risks associated with this waste.

CSO residuals that are exempt due to contingent management would be considered as nonhazardous from the point of generation. As a result, the qualifying waste would not be subject to RCRA Subtitle C rules for generation, storage, transport, or disposal (including land disposal restrictions), if the waste is destined for disposal in a unit that is excluded from the listing because it does not pose unacceptable risk. (Of course, should the waste not be disposed of in such a unit, then the exemption would no longer be effective and full Subtitle C would apply). This approach is analogous to the existing exclusions from the definition of solid waste for materials that are to be recycled (see § 261.2(e)(1)), or to special standards applicable to used oil destined for recycling; the exclusions or special standards apply at the point of generation, provided that certain conditions are met (e.g., no speculative accumulation). However, under such an approach, it would be necessary for the Agency to have the ability to easily determine whether or not the exempted wastes are disposed of in the proper manner. As a result, some kind of notification or certification process may be appropriate.

EPA requests comment on whether the internal records typically kept by solid waste generators would be adequate, whether the usual Subtitle C

recordkeeping and manifest requirements should apply, or if some other mechanism to document the destination of the waste would be desirable. Option 3 discussed below includes a specific mechanism that might be used.

Option 3—With regard to the second option in particular, EPA has considered what requirements would be appropriate to ensure proper disposal in accordance with the conditional exemption. EPA determined that CSO residuals present a hazard if applied on the land due to potential run-off to nearby residents. To be certain that the intermediate management of the waste would not cause a similar problem, EPA could put limits on the conditional exemption to ensure that the waste was handled properly until safely disposed of in a landfill. The generator could be required to maintain proof of disposal in an on-site landfill, or document what off-site landfill received the waste. In addition, to address concerns over the handling of the waste until it reaches the landfill, the generator could be required to store the waste in containers, or be restricted from placement on the ground. Therefore, Option 3 is similar to Option 2, except that it specifically requires certain conditions be met for the exemption to be effective.

One way to implement these restrictions would be to add conditions for the exemption directly to the listing description in § 261.32. Therefore, EPA seeks comment on adding conditions for the landfill exemption for CSO residuals to the listing definition for K170, as shown below, to promote proper disposal of the waste.

K170—Clarified slurry oil storage tank sediment and/or in-line filter/separation solids from petroleum refining operations unless the sediment and filter/separation solids meet the following conditions: (i) the waste does not exhibit any of the characteristics of a hazardous waste; (ii) the waste is stored in containers and disposed of in a Subtitle D or C landfill licensed or permitted by the state or federal government; and (iii) the generator maintains documentation showing that the waste was (A) disposed of in an on-site landfill, or (B) consigned to a transporter or disposal facility that has provided a written commitment to dispose of the waste in an off-site landfill identified by name and address. Persons claiming this exclusion in an enforcement action will have the burden of proving by clear and convincing evidence that the material meets all the exclusion requirements.

EPA seeks comment on whether the generator should also be required to file

a one-time notification with EPA or authorized state (and update this if practices change), whether maintaining the on-site documentation is sufficient, and whether a documentation and/or notification certifying the ultimate disposal of the waste is an adequate guarantee that the waste is actually managed in a landfill, particularly if the waste leaves the generator's control. Since historic approaches to relying on the intent of the generator have proven extremely difficult, EPA seeks comment on what the regulatory status of the waste should be between the point of generation and the ultimate disposal in a landfill. Finally, EPA requests comment on whether there should be a clear prohibition for placement on the land (prior to reaching the landfill), rather than the proposed language to require intermediate storage of the waste in containers.

Implementation of any of the above options also assumes that there is a clear understanding precisely how a landfill and a land treatment unit can be distinguished. EPA believes that the definitions incorporated into the RCRA regulations (see 40 CFR 260.10) should be adequate. According to that definition, for example, a land treatment facility is a facility at which waste is "applied onto or incorporated into the soil surface." Furthermore, States typically define nonhazardous waste landfills clearly into several categories (industrial, municipal, debris), and issue permits or licenses. Therefore, EPA believes that States would be able to easily distinguish between landfills and land treatment. EPA seeks comment on whether the difference between landfills and land treatment units needs to be further defined.

One of the drawbacks of contingent management listings that link regulatory status to particular management practices is that contingent regulation may reduce the incentive for generators to explore pollution prevention opportunities. Thus, allowing disposal in a Subtitle D landfill may result in more waste being placed in Subtitle D landfills, because it is less expensive than Subtitle C management or recycling, and easier than implementing process changes that would result in reduced or eliminated waste volumes. However, EPA is also proposing in today's rule to allow generators to reinsert oil-bearing wastes such as these back into the refining process. Thus, in the case of CSO residuals, generators will still have an incentive to deoil or reuse these residuals, if possible, thereby resulting in increased recycling.

b. Conditional Exemption Based on Specific Management Standards.

Another approach, but one about which EPA feels much more caution is required, is that EPA could use the multipathway methodology to determine whether imposing specific design or operating standards on particular unit types would result in adequate protection. In the case of the petroleum residuals evaluated in this rule, it might be possible to conclude that use of run-off controls would reduce releases sufficiently from land application units to warrant exemption. Failure to manage the waste in a unit meeting design and operating requirements would mean that the waste was not exempt.

Exemptions based on specific management standards could be used to more narrowly define listed waste. The listing for CSO residuals, for example, might apply only to wastes managed in a land treatment unit that does not have run-off controls approved by the State. Alternatively, CSO residuals might be listed, unless they are managed in a landfill or land treatment units with approved run-off controls.

However, as noted earlier in Section III.G.2. under the rationale for listing CSO residuals, the effectiveness of the run-on/run-off controls currently in place at land treatment units is unclear, and the level of control would have to be high to reduce risks to acceptable levels. EPA contacted the three States with the most land treatment units that receive CSO or crude oil tank residuals and found: none require permits for these nonhazardous waste units; run-off controls are usually voluntary; and that even voluntary controls appear variable. Therefore, more data are likely required before this approach could be implemented.

EPA requests comment on the general approach and on the run-off control measures most likely to have a significant impact on contaminant migration. EPA particularly asks for comments on whether there are unit design attributes that are easily ascertainable in a spot inspection versus those that require more detailed engineering review, or review or monitoring of operations. The more complex a judgement, the more appropriate EPA believes it may be that such determinations are made in the context of a permitting authority or prior approval rather than as a directly enforceable condition for a listing exemption.

I. Impacts on Idled Units

Many of the wastes proposed for listing in today's rule are normally generated on removal from the process unit during maintenance periods. These

wastes may also become subject to hazardous waste regulation during periods of process shut down. If the proposed listings are finalized, wastes associated with idled units would become subject to RCRA regulation 90 days after the process ceases operation.

Regulations at 40 CFR 261.4(c) state: "A hazardous waste which is generated in a raw material storage tank, a product or raw material transport vehicle or vessel, a product or raw material pipeline, or in a manufacturing process unit or an associated non-waste-treatment-manufacturing unit, is not subject to regulation under parts 262 through 265, 268, 270, 271, and 124 of this chapter or to the notification requirements of section 3010 of RCRA until it exits the unit in which it was generated, unless the unit is a surface impoundment, or unless the hazardous waste remains in the unit more than 90 days after the unit ceases to be operated for manufacturing, or for storage or transportation of product or raw materials."

EPA provided further clarification on this provision in the October 30, 1980 preamble to that rulemaking: "The 90-day accumulation period (§ 262.34) starts when the hazardous waste is removed from the tank, vessel, or unit, *except when in the case where a tank, vessel, or unit ceases to be operated for its primary purpose, in which case the period starts when operation ceases.*" 45 FR 72024 (Emphasis added.) Thus, the preamble states that for the owner/operator the accumulation period begins the day the manufacturing process unit is shut down.

It was not the Agency's intent to regulate wastes in these units unless the waste exits the unit or remains in the unit for more than 90 days after the unit is no longer in operation. Therefore, the Agency is changing its interpretation. The accumulation period for a tank, vessel, or unit that ceases to be operated for its primary purpose would begin either when the waste exits the unit, or if the waste remains in the unit for more than 90 days, the accumulation period would begin on day 91. Because the regulations delay application of Part 262 until 90 days after operation ceases, the Agency believes that the availability of the 90-day accumulation period in § 262.34 is more consistent with the plain language of the regulation. Thus, hazardous waste which is generated in a product or raw material storage tank, a product or raw material transport vehicle or vessel, a product or raw material pipeline, or in a manufacturing process unit or associated non-waste-treatment-manufacturing unit, may remain in the unit for up to ninety days

after the unit has been shut down, and may then be stored for an additional ninety days in a tank, container, drip pad, or containment building in the compliance with the requirements of 40 CFR 262.34, without an RCRA storage permit.

J. Third Party Regeneration/Reclamation of Spent Petroleum Catalysts

1. Exemption Under Section 266.100(b)

Spent hydrotreating and hydrorefining petroleum catalysts are typically recycled either by being regenerated for reuse as catalysts or through the reclamation of valuable metals or metal-bearing products. Catalyst regeneration is a process by which spent catalysts are treated with heat and air to drive off impurities which have been deposited on the catalyst during use in the petroleum refining process. Once regenerated, the catalysts are returned for reuse within the petroleum industry. In metals recovery, various thermal treatment technologies are employed to extract valuable metals from the spent catalysts. There are currently four catalyst regeneration and five metals recovery facilities known by the EPA to be operating in the United States.

Spent hydrotreating and hydrorefining catalysts that exhibit a hazardous characteristic for benzene and/or ignitability are currently subject to regulation as RCRA hazardous wastes (and, under today's proposal, would become listed hazardous wastes). Because reclamation of metals from and regeneration of spent hydrotreating and hydrorefining catalyst involves thermal processing of RCRA hazardous wastes, there has been confusion regarding whether these catalyst recovery furnaces are subject to regulation as a type of industrial furnace (as defined in § 260.10 of the RCRA regulations).

The Agency is today proposing to clarify the regulatory status of these units by specifically excluding them from regulation as industrial furnaces under RCRA for the following reasons. First, EPA did not consider these units specifically in developing regulations governing burning of hazardous waste in boilers and industrial furnaces (BIFs). They do not readily fit within the list of thermal processing units specifically designated as industrial furnaces subject to regulation under the BIF rules (40 CFR 266 Subpart H). They also differ from the types of furnaces specifically considered in the BIF rule in that the process involves burning of hazardous waste solely for materials recovery as opposed to destruction or energy recovery. In this sense, spent petroleum

catalyst recovery units are analogous to smelting, melting, and refining furnaces that process hazardous waste solely for metals recovery. Significantly, such smelting, melting, and refining furnaces are conditionally exempt from the Subpart H regulations because the process does not involve burning either partially or wholly for destruction or energy recovery. See 40 CFR 266.100(c).

In addition, EPA believes that spent catalyst regeneration and metals recovery operations provide an environmentally sound alternative to disposal of spent petroleum catalysts. Spent catalyst recycling has been practiced in the petroleum refining industry since the 1950's. According to 1992 Petroleum Refining Survey data, approximately 80% of spent petroleum catalysts are currently recycled. In developing today's proposal, the Agency solicited information on the extent to which petroleum catalyst recovery units are currently equipped with emission control devices and the adequacy/efficiency of existing controls. The Agency's preliminary findings indicate that these units are already equipped with pollution controls comparable to those required under the BIF rule such that further regulation may be unnecessary.

The Agency does not want to impose any unnecessary regulatory burden that may serve to discourage environmentally safe recycling of spent petroleum catalysts. Therefore, based on preliminary findings regarding existing emissions controls, and the fact that these units process spent catalyst solely for materials recovery, the Agency intends to formally exempt these units from regulation under the BIF rule and is proposing to amend the BIF regulations accordingly. However, the Agency has not yet fully evaluated the prevalence and adequacy of existing emission controls and the potential for uncontrolled emissions of toxic organic compounds, toxic metals, and particulate matter from spent hydrotreating and hydrorefining catalysts. EPA is therefore requesting additional information on control technologies currently being used to control toxic emissions from thermal treatment of spent petroleum catalysts. If, after further study, the Agency finds that emissions from these units pose a threat to human health and the environment, it will reconsider today's proposed exemption under § 266.100(b) and assess whether the BIF standards should instead be amended to specifically apply to spent petroleum catalyst recovery furnaces. In the interim, if necessary to protect human health and the environment, 3008(h)

authority can be used to address air emissions from particular catalyst processing facilities. (Availability of these authorities assumes that the catalyst recovery facility either has a permit for hazardous waste storage, or interim status as a hazardous waste storage facility.)

It is important to note that today's proposed exemption applies only to the petroleum catalyst recycling furnace. The catalyst itself, if listed or characteristically hazardous, is subject to RCRA transportation and storage controls before introduction into the furnace. (See § 261.6(c).) EPA is not proposing any changes to the management standards applicable to hazardous petroleum catalysts that are sent for recycling at this time. However, as explained in section III.E. above, the Agency is working to develop a simpler, more streamlined approach to regulating secondary materials recycling under RCRA.

2. Catalyst Support Media

Hydrotreating and hydrorefining catalyst beds are kept in place in part by the use of screens and inert ceramic support media, which make up typically 6 to 8 percent by weight of the catalyst bed. The support media also functions to provide a mixing area at the inlet and outlet of the reactor vessel to lessen the back-pressure created by the more densely packed catalyst bed. These support media are commonly separated from the spent catalyst by screening the catalyst as it is removed or as the first step in catalyst regeneration or metals reclamation. The larger support media is readily distinguished from spent catalysts, and commonly is either reused or sent for cleaning prior to reuse. Because of its largely inert ceramic composition, the Agency has not specifically characterized catalyst support media.

Because the support media is generally an inert ceramic, is separate from the catalyst, and is commonly managed separately, the Agency believes it is appropriate to specifically exclude these catalyst support media from the definition of hazardous waste. The Agency believes the screening separation of support media from the spent catalyst to be discarded or separately reclaimed is exempt recycling. Paragraph (E) would be added to 40 CFR 261.3(c)(2)(ii) to read as follows:

§ 261.3(c)(2)(ii) The following solid wastes are not hazardous even though they are generated from the treatment, storage, or disposal of a hazardous waste, unless they exhibit one or more

of the characteristics of hazardous waste:

* * * * *

(E) Ceramic support media separated from one of the following wastes listed in § 261.32—Spent hydrotreating catalyst used in the refining of petroleum (EPA Hazardous Waste No. K171), and Spent hydrorefining catalyst used in the refining of petroleum (EPA Hazardous Waste No. K172).

* * * * *

3. Residuals Generated from Petroleum Catalyst Regeneration/Reclamation

Residuals generated from the metals reclamation process are in some cases used as ingredients to produce cement because they contain alumina, a primary component in cement. Under existing regulations, residues from metal recovery of listed hazardous wastes are considered to be derived from the treatment of hazardous waste and thus hazardous themselves (40 CFR 261.3(c)). Therefore, if EPA finalizes today's proposal to list spent hydrotreating and hydrorefining catalysts, the residuals from the reclamation of metals from these wastes will also be considered RCRA hazardous wastes subject to transportation and storage controls prior to their insertion into the cement kiln.

Today's proposal also has potential regulatory implications for cement produced from such petroleum catalyst reclamation residuals. Under 40 CFR 266.20, cement produced from hazardous waste is subject to regulation as a waste-derived product. Under RCRA, products that are produced from legitimately recycled hazardous wastes and are used in a manner constituting disposal (e.g., cement) may be marketed and used without further regulation, provided that they meet applicable land disposal restriction treatment standards and if the incorporated hazardous constituents are inseparable from the product by physical means. EPA is not proposing any changes to the existing RCRA regulations as they apply to waste-derived products that are placed on the land at this time. However, the Agency may propose changes to the regulations pertaining to waste-derived products that are land applied as part of future revisions to the RCRA regulations.

a. Status of Partially Reclaimed Metals. Some petroleum catalyst reclaimers achieve only partial reclamation of metals from the spent catalyst (i.e., the reclaimed metals are not fit for end use as products without further reclamation through smelting and refining). Under RCRA, materials that are partially reclaimed from listed

hazardous wastes are themselves hazardous wastes (40 CFR 261.3(c)). Therefore, if today's proposal is finalized, metals that are partially reclaimed from hydrotreating and hydrorefining catalysts would be considered RCRA hazardous wastes subject to applicable transportation and storage controls until the reclamation process is complete or until a variance from the definition of solid waste is granted pursuant to 40 CFR 260.30. Under § 260.30(c), a partially-reclaimed hazardous waste that is more commodity-like than waste-like may be excluded from the definition of solid waste through a variance from the Administrator. This determination must be based on a series of factors set forth in 40 CFR 260.31(c). Variance considerations include: the degree of processing the material has undergone and the degree of further processing that is required; the value of the material after it has been reclaimed; the degree to which the reclaimed material is like an analogous raw material; the extent to which an end market for the reclaimed material is guaranteed; and the extent to which a material is managed to minimize loss.

The purpose of this variance is to allow partially-reclaimed recyclable materials that are more commodity-like than waste-like to be excluded from the definition of solid waste and applicable hazardous waste regulatory requirements. Because this is a variance, it is not self-implementing. Administrative approval by the appropriate regulatory authority (authorized State or EPA) is required to grant this variance.

Under existing regulations, variances for partially reclaimed materials must be granted on a case-by-case basis. However, the Agency would consider granting a generic exclusion for metals reclaimed from spent petroleum catalysts should it obtain data which indicates these partially reclaimed metals consistently meet the terms of the § 260.30(b) commodity-like variance. EPA is therefore requesting information relevant to determining the "commodity-like" nature of metals reclaimed from spent petroleum catalysts as defined under § 260.30(b) for possible use in developing a generic commodity-like exclusion, e.g., the typical composition and value of the reclaimed metals relative to analogous raw material, the manner in which the partially reclaimed materials are managed, etc.

K. Headworks Exemption

Because some refineries manage some of the residuals proposed for listing

today in their wastewater treatment facilities (i.e., CSO storage tank sediment), and because others may scour residual sludge proposed for listing during process vessel cleaning or tank washing into the refinery wastewater treatment system, a consequence of potentially listing certain residuals as hazardous waste would be to cause all wastewaters and wastewater treatment sludges to be derived from those wastes. The Agency believes those listed petroleum refining residuals carried into the wastewater system would be removed during primary treatment as sludges that are already regulated hazardous wastes (e.g., K048, K051, F037, or F038), provided they are discharged to the oil recovery sewer system. Therefore, the Agency proposes to modify the definition of hazardous waste to exclude when mixed with wastewaters as indicated in *italic*:

§ 261.3(a)(2)(iv) * * *

(C) One of the following wastes listed in § 261.32, *provided that the wastes are discharged to the refinery oil recovery sewer before primary oil/water/solids separation*—heat exchanger bundle cleaning sludge from the petroleum refining industry (EPA Hazardous Waste No. K050), *and clarified slurry oil storage tank sediment and/or in-line filter/separation solids* (EPA Hazardous Waste No. K170); or * * *

If the Agency makes a final decision to list crude oil tank sediment as hazardous waste (K169), this residual would also be added to this exemption.

IV. Waste Minimization

Over the past several years, EPA has emphasized pollution prevention as the preferred method of environmental protection over "end-of-pipe" treatment and disposal approaches. EPA seeks to avoid the generation of waste or environmental releases through pollution prevention by focusing on the relationship between air, land and water; viewing the environment as a whole, rather than individual segments. Finding opportunities to both reduce pollution at the source as well as recycle will result in more cost savings to industry and government, broader environmental protection, and more efficient implementation of the RCRA program as reflected in "The Waste Minimization National Plan," EPA530-R-94-045, November 1994.

Congress reinforced this approach by enacting the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13101, et seq., Pub. L. 101-508, November 5, 1990) establishing a national policy on pollution prevention. PPA reinforces EPA's waste management options

hierarchy which lists, in order of importance, source reduction, recycling, treatment and disposal. Source reduction, the highest priority, includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

The petroleum refining industry and others have been working with EPA for several years to explore pollution prevention opportunities as part of this listing determination and other Agency efforts (i.e., a multimedia permitting initiative to foster pollution prevention opportunities at the Amoco Corporation refinery in Yorktown, VA).

Due to the nature of the residuals of concern (e.g., high oil content, metals content), the residuals are well suited for source reduction and recycling. Many refineries have already done much to reduce, recycle and/or recover valuable hydrocarbons and other commodities from these wastes. EPA believes the impact of this rule will be offset by further source reduction and recycling efforts by industry through economical incentives and through waste minimization efforts in which EPA has not been made aware.

Of the approximately 3 million tons represented by all the 14 residuals of concern, 86 percent was reused, recycled or reclaimed either on-site or off site. Most of these activities will continue unaffected by the proposed listings because of the proposed exemptions designed to allow appropriate source reduction and environmentally sound recycling efforts as discussed in Section II. The following summarizes the source reduction and recycling findings from the 1992 RCRA § 3007 Survey. The industry's source reduction efforts were not quantified in the survey (i.e., refiners were not asked to report the volumes reduced) so the information will be presented as techniques reported. The recycling methods will be presented quantitatively with the percentage of the total quantity generated for that residual. However, the quantity generated is likely to be higher than the quantities reported because some facilities are not able to provide EPA with the volumes of residuals recycled back to the process.

A. Crude Oil Storage Tank Sediment

Refiners use in-tank mixers to suspend the solids in the crude oil decreasing the amount of sediment that deposits on the bottom of the tank. Approximately 68 percent of crude oil

storage tanks have mixers. Source reduction efforts for crude oil storage tank sediment were reported as equipment/technology modifications, process/procedure modifications and the installation of in-tank mixers.

Many refiners attempt to de-oil the tank sediment to recover additional hydrocarbons from the sediment prior to and after removal from the tank. De-oiling procedures include hot diesel washing or stream-stripping the sediment while in the tank, then filter-pressing or centrifuging any remaining oil from the sediment prior to final management. The Agency does, however, believe that sediment de-oiling is valuable and can be an important element of a refinery's waste minimization activities. De-oiling appears to reduce tank sediment volumes significantly; the average de-oiled sediment volume is approximately 65 percent lower than the average oily sediment volume. Approximately 30 percent of the crude oil storage tank sediment has gone through a de-oiling process prior to final management. Recovered oil is recycled to various points in the refinery process, increasing product yield and reducing waste volumes disposed. About 44 percent of the tank sediment was reported to be recycled to either the distillation unit, catalytic cracker, coker or asphalt production. De-oiling activities, whether in situ or ex situ, are considered recycling and thus are not subject to RCRA Subtitle C permitting requirements. The Agency anticipates that de-oiling usage will increase if this proposal is promulgated, reducing the cost of managing crude oil storage tank sediment as a listed waste.

B. Clarified Slurry Oil Tank Sediment and/or In-Line Filter/Separation Solids

Waste minimization efforts for CSO storage tank sediment were reported as equipment/technology modifications and the installation of in-tank mixers. Approximately 28 percent of CSO tanks have mixers.

Like the crude oil storage tank sediment, approximately 42 percent of the CSO storage tank sediment and filter/separation solid streams are de-oiled. Once removed from the tank, the sediment is filter-pressed or centrifuged with the recovered CSO being sent to the slop oil system or the catalytic cracking unit. Refiners reported recycling 2.4 percent to the catalytic cracker, coker, distillation unit, or asphalt production. CSO tank sediment was also used on-site as road material (2%) and transferred off-site for use as a fuel (8%).

C. Catalyst From Hydrotreating

Spent hydrotreating catalyst volumes were reported to be reduced through process/procedure modifications and by on-site regeneration and reuse. Refiners reported transferring approximately 77 percent off-site for metals reclamation or regeneration. Over 2 percent was reused on-site as replacement catalyst for another unit. Recycling choices for hydrotreating, hydrorefining, and SCOT®-like catalyst are affected by the metals' market.

D. Catalyst From Hydrorefining

The volume of spent hydrorefining catalysts was reported to be reduced through process/procedure modifications and by on-site regeneration and reuse. Refiners reported transferring approximately 83 percent off-site for metals reclamation or regeneration.

For source reduction and recycling information for the residuals of concern in which a no list decision was made, please refer to the "Listing Background Document for the 1992-1996 Petroleum Refining Listing Determination" available in the docket.

The Agency is soliciting any additional information on source reduction and recycling techniques for all of the residuals of concern. The types of waste minimization information the Agency desires includes process modifications, raw materials substitution, closed loop recycling, and commercially available alternative catalysts. Any information on the financial incentives for the implementation of these alternatives is also requested.

V. Applicability of the Land Disposal Restrictions Determinations

A. Request for Comment on the Agency's Approach to the Development of Land Disposal Restrictions

RCRA requires EPA to make a land disposal prohibition determination for any hazardous waste that is newly identified or listed in 40 CFR Part 261 after November 8, 1984, within six months of the date of identification or final listing (RCRA Section 3004(g)(4), 42 U.S.C. 6924(g)(4)). EPA is also required to set " * * * levels or methods of treatment, if any, which substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized" (RCRA Section 3004(m)(1), 42 U.S.C. 6924(m)(1)). Land disposal of wastes that meet treatment standards thus

established by EPA is not prohibited. Each waste being proposed for listing in this rule would be subject to all the land disposal requirements the same day their respective listing becomes effective.

A general overview of the Agency's approach in performing analysis of how to develop treatment standards for hazardous wastes can be found in greater detail in section III.A.1 of the preamble to the final rule that set land disposal restrictions (LDR's) for the Third Third wastes (55 FR 22535, June 1, 1990). The framework for the development of the entire Land Disposal Restrictions program was promulgated November 7, 1986 (51 FR 40572).

While the Agency prefers source reduction/pollution prevention and recycling/recovery over conventional treatment, inevitably, some wastes (such as residues from recycling and inadvertent spill residues) will be generated. Thus, standards based on treatment using Best Demonstrated Available Technology (BDAT) will be required to be developed for these wastes, if a final rule listing them as hazardous is promulgated.

Treatment standards typically are established based on the performance data from the treatment of the listed waste or wastes with similar chemical and physical characteristics or similar concentrations of hazardous constituents. Treatment standards are established for both wastewater and nonwastewater forms on a constituent-specific basis. The constituents selected for regulation under the Land Disposal Restrictions Program are not necessarily limited to those identified as present in the listings proposed in this action, but include those constituents or parameters that will ensure that the technologies are operated properly.

Data on waste characteristics and current management practices for wastes proposed in this action have been gathered as part of the administrative record for this rule. The Agency has completed its evaluation of these data for the purpose of developing specific Land Disposal Determinations.

B. Treatment Standards for the Proposed Newly Listed Petroleum Refining Wastes

EPA is proposing to apply universal treatment standards (UTS) to the Petroleum Refining Wastes proposed for listing in today's rulemaking. EPA is also proposing that 40 CFR 268.45 provisions apply to hazardous debris materials cross contaminated with these petroleum refining wastes.

1. Identification of Wastes

K170—Clarified slurry oil storage tank sediment and/or in-line filter/separation solids from petroleum refining operations.

K171—Spent hydrotreating catalysts from petroleum refining operations (This listing does not include ceramic support media).

K172—Spent hydrorefining catalysts from petroleum refining operations (This listing does not include ceramic support media).

EPA is proposing to regulate specific constituents from each of these hazardous wastes. A list of the hazardous constituents proposed for regulation and the proposed treatment limits or technology can be found in Table V-1 (limits), Table V-2 (limits) as well as Table V-3 (technology) at the end of this preamble discussion and the proposed regulatory Table 268.40. These wastes are generated during the management of clarified slurry oil storage tank sediment or in-line filter/separation solids (K170), and management of spent catalysts from catalytic hydroprocessing operations (K171-K172). If EPA makes a final decision to list crude oil storage tank sediment as hazardous (K169), the constituents and standards given in Table V-1 would apply to this waste.

2. Proposed Treatment Standards

After reviewing the available characterization data and the available information on waste management practices for those petroleum wastes proposed for listing, EPA has determined that it is technically feasible to apply UTS to these wastes. Available information show that these wastes can be managed in treatment and reclamation units that routinely manage similar or as difficult to treat hazardous wastes that are currently prohibited from land disposal practices. It is believed that those wastes proposed for listing can be commingled with similar hazardous wastes prior to treatment or reclamation. In addition, some of these wastes may show corrosive, ignitable, reactive, and toxicity characteristics that can be managed in combustion treatment units or deactivation units that routinely manage hazardous wastes that show similar characteristics. Like some petroleum wastes currently subject to the land disposal restrictions, some of these petroleum wastes proposed for listing have also been managed in reclamation units that enable the recovery oil or fuel values from these wastes prior to disposal. The BDAT background document provides information on EPA's rationale for applying UTS to these wastes. Also see

LDR Phase II final rule, 59 FR 47982, September 19, 1994, for further discussion of UTS.

EPA also requests comments on the performance of other thermal and non-thermal treatment or recovery technologies demonstrated on wastes similar to these petroleum refining wastes and the applicability of such technologies to these petroleum wastes. EPA has provided in the BDAT Background Document a review of other thermal and non-thermal technologies that could be optimized to meet the proposed UTS limits. Since EPA is proposing a concentration limit, the use of other technologies capable of achieving the proposed treatment standards is allowed except for those treatment or reclamation practices constituting land disposal or impermissible dilution.

In addition, EPA is proposing that the provisions in the 40 CFR 268.45 are also applicable for the treatment and disposal of hazardous debris cross-contaminated with K169 (if listed), K170, K171, and K172. Hazardous debris treated in accordance with the provisions of 40 CFR 268.45 may be allowed for land disposal in a Subtitle C or D facility, and waste residues will have to meet the applicable UTS limits proposed today. See 57 FR 37277, August 18, 1992, for additional information on the applicability, scope, and content of the hazardous debris provisions.

3. Determination of BDAT

a. Nonwastewaters. For nonwastewater forms of these petroleum wastes, the proposed treatment standards of each of the organic constituents are based on the combustion of wastes believed as difficult to treat as K170 (and K169, if listed). Table V-1, at the end of this section, provides a list of 13 organic constituents proposed for regulation.

Table V-1 shows that out of these 13 organic constituents proposed for regulation, there are 10 constituents that are routinely monitored as UTS constituents in specific petroleum refining wastes already prohibited from land disposal. The 10 specific UTS constituents are benz(a)anthracene, benzene, chrysene, ethylbenzene, fluorene (usually in wastewater forms of petroleum refining wastes), xylenes (measured as the sum of o-, m-, and p-isomers), naphthalene, phenanthrene, pyrene, and toluene. These constituents are also proposed for regulation in K170-K172 because EPA believe they can be found at concentrations of concern in each waste under listing

consideration and in K169, should EPA decide to list it as hazardous.

Like the 10 constituents identified above, EPA has also identified benzo(g,h,i)perylene, dibenz(a,h)anthracene, and ideno(1,2,3,-cd)pyrene at levels of regulatory concern. In addition, it appears that the regulation of just the 10 constituents may fail to ensure adequate treatment of benzo(g,h,i)perylene, dibenz(a,h)anthracene, and ideno(1,2,3,-cd)pyrene. For example, these three constituents often require higher temperatures to volatilize than the one required for the other 10 constituents proposed for regulation. These three constituents also show higher bond dissociation energies than needed for dissociating the other 10 hazardous compounds. As a result, EPA believes that the regulation of benzo(g,h,i)perylene, dibenz(g,h)anthracene, and ideno(1,2,3,-cd)pyrene is appropriate.

There were other UTS constituents present in K169-K172 that were above UTS limits, but EPA has determined that the 13 constituents proposed for regulation can ensure that they too are provided with adequate treatment. EPA believes that non-UTS constituents present in K169-K172 would also be regulated by the UTS constituents proposed for regulation in each one of the waste of concern.

EPA is requesting, however, comments on other appropriate indicator or surrogate constituents that would enable the regulation of non-UTS polynuclear aromatic and non-UTS aromatic hydrocarbons present in K172. Available data show that some non-UTS aromatic and non-UTS polynuclear aromatic constituents measured in K172 may have larger boiling points than the one of those constituents proposed for regulation. EPA examined the feasibility of setting one or various UTS polynuclear aromatic hydrocarbons as proposed constituents for regulation in K172 but none of the UTS polynuclear aromatic hydrocarbon constituents were above their applicable UTS limits. Other structural and functional UTS constituents such as phthalate and halogenated organics were also given consideration but EPA felt they may not serve as good performance indicator constituents for the destruction of non-UTS aromatics and non-UTS polynuclear aromatic hydrocarbons.

For metals in nonwastewater forms, EPA is proposing the regulation of arsenic, nickel, and vanadium in K171 and K172. EPA is also proposing to regulate antimony in K172. EPA has determined that High Temperature Metal Recovery (HTMR) and

stabilization are BDAT for nickel, vanadium, and antimony and that vitrification is BDAT for arsenic. Table V-2, at the end of this section, summarizes the metals proposed for regulation and the applicable UTS limits.

Catalysts are routinely cleaned of organic contaminants via physical and thermal processes in order to regenerate the activity of the catalyst. Spent catalysts are also sent off site for the reclamation of molybdenum, nickel, and vanadium. The reclamation techniques practiced on these spent materials are based on pyrometallurgical, hydrometallurgical, or combinations of these techniques. Generally, recovered metals such as vanadium, molybdenum, and nickel/cobalt solutes are sold as products. A by-product of alumina is also produced and it is sold to cement kilns as one of the main process feeds to formulate portland cement. Nickel oxides are also recovered and reclaimed further in a nickel specialty HTMR facility. Residues from hydrometallurgical practices should be able to meet the proposed levels by stabilization. EPA thus requests comments on the TCLP and total concentration of those post-reclamation spent catalyst residues. Combusted or thermally desorbed spent catalyst should also be amenable to stabilization.

Vanadium is a BDAT constituent that is present in the crude oil and it is deposited in the spent hydrotreating and hydrorefining catalysts as an impurity. Vanadium concentrations in K171 and K172 are above the UTS for vanadium. EPA is thus proposing the regulation of this constituent.

Like vanadium, the presence of arsenic, antimony, and nickel in the spent catalyst is likely the direct result of entrained impurities from the crude oil. However, nickel can also be present as one of two or more components of the catalyst. Except for arsenic in K171, the concentrations of these metals are greater than their UTS concentration limits and EPA is requesting comments on their regulation.

EPA is also proposing to regulate arsenic in K171. Available data show that arsenic may reach up to 4.9 mg/L, as measured by the TCLP, in untreated nonwastewater forms of K171. This concentration is below the UTS and the hazardous characteristic level of arsenic wastes (D004). EPA believes, however, that the total concentrations of arsenic may increase in residues from the regeneration and reclamation of K171. It is likely that reclamation practices that involve reducing conditions for the recovery of valuable metals can leave behind arsenic species that are more

mobile and thus, likely to exceed UTS and the characteristic limit for arsenic. EPA is thus proposing UTS limits for arsenic in K171. EPA is also requesting comments on the regulation of arsenic in K171 and in particular, data characterizing the residues from the reclamation and regeneration of hydrotreating and hydrorefining catalysts.

EPA also examined the need for regulating metals in K169, if it were listed as hazardous, and in K170. Based on the available data, EPA considered proposing the regulation of barium and chromium in K169, if listed, and the regulation of nickel in K170. However, EPA feels that regulation of metals in these two wastes may not be warranted at this time.

For instance, available data show that barium may be up to 2.4 ppm (as measured by the TCLP) in K169. This barium level is below barium's UTS limit of 7.6 ppm (as measured by the TCLP) as well as the TCLP hazardous characteristic limit of 100 ppm (as measured by the TCLP).

Chromium is another metal constituent present in K169 in concentrations up to 310 mg/kg (as measured by a total constituent analysis). K169 wastes did not have chromium concentrations above the UTS or characteristic levels. The total concentrations of barium and chromium are likely to increase, however, in combusted residues of K169. It is also likely that the mobility of chromium could increase above UTS limits in combusted K169 wastes. This premise is based on the observed behavior of chromium, and other metals, in K048-K052 treated by incineration and solvent extraction. EPA feels, however, that the regulation of barium and chromium may not be necessary at this time. Combusted residues of hazardous petroleum wastes currently prohibited from land disposal are routinely treated via stabilization in order to meet UTS levels for arsenic, chromium, and nickel prior to disposal. If K169 and K170 were promulgated as hazardous, these wastes will presumably be commingled with K048-K052, F037, and F038, and other characteristic wastes prior to treatment in combustion devices or prior to reclamation in recycling units. Therefore, the stabilization of petroleum refining wastes residues from the combustion or recycling of hazardous petroleum wastes should also provide metals in K169 and K170 with effective treatment. EPA requests comments on this determination and premise.

In addition, EPA has examined available data to assess the need for regulating other hazardous

characteristics in K169–K172. EPA believes that the ignitable and corrosive characteristics in K169, K170, K171, or K172 can be effectively controlled via the regulation of organics. These wastes are routinely managed in thermal processes that destroy organics and thus, leave behind residues free of the ignitable characteristic and other corrosive causing constituents. EPA has already proposed a list of organics that may provide these hazardous characteristics with effective treatment.

However, EPA is proposing to regulate the sulfide reactive characteristic in K171 and K172 via a treatment standard of deactivation to remove the reactive sulfide characteristic. First, these two wastes contain significant concentrations of reactive sulfides. The concentrations of iron sulfides and other metal sulfides complexes impart pyrophoric/self-heating properties to these two spent catalyst wastes. In addition to the D003 (reactivity), these wastes are also reported and managed as wastes that exhibit D001 (ignitability) and other hazardous constituent characteristics (primarily D004 and D018).

It appears that existing thermal processes that enable the regeneration and reclamation of spent catalysts may be effective in removing the reactive characteristic from these wastes. One thermal process, roasting, is designed to remove organic and sulfide impurities from these spent catalysts prior to the hydrometallurgical recovery of valuable metals. Another thermal process, calcination, reclaims molybdenum oxides from a byproduct of molybdenum triosulfides. Offgases from these thermal operations undergo further treatment and abatement prior to undergoing an environmental discharge. EPA requests comments that can support a determination that residues from HTMR, calciners, and roasters as well as other hydrometallurgical trains already meet the proposed deactivation standard for reactive iron/metal sulfides in K171 and K172.

Some residues from the regeneration and reclamation of K171 and K172 such as those from storage, feed processing, and other reclamation trains may still show the same sulfide reactive characteristic as the untreated wastes. These wastes can presumably be reclaimed on-site and available information suggests that this has been practiced. If not, EPA is proposing to regulate the sulfide reactivity in these wastes via a treatment standard expressed as Deactivation to Remove Reactive Sulfides. EPA is also requesting comments on whether the regulation of organics may also provide

with effective treatment the reactive sulfides in K171 and K172. Additional discussion on the deactivation standard to remove the reactive sulfide characteristic is provided in "Best Demonstrated Available Technology (BDAT) Background Document for Newly Listed or Identified Wastes from Petroleum Refining." Available in the docket for today's proposal. See also Table V-3 and 268.40.

b. Wastewaters. Today's proposal emphasizes, for the most part, the listing of nonwastewater forms of petroleum wastes. EPA thus lacks data on the characterization of wastewater forms of these wastes. EPA anticipates, however, that if the proposed listings were finalized; the generation of wastewater forms of these wastes can occur during the management of leachates and groundwaters resulting from RCRA Corrective Orders and from the management of residues from units that store, treat, or reclaim these wastes in tanks or land disposal units.

EPA is proposing that the existing UTS for wastewaters in 268.40, are also applied to those wastewater forms described above. In order to apply UTS, EPA is proposing that the same list of hazardous constituents proposed for regulation in nonwastewater forms of these petroleum wastes is also adopted for wastewater forms of these wastes. The proposed UTS for each organic constituent are based on treatment technologies such as biological (aerobic or anaerobic) treatment systems, steam stripping, wet air oxidation, carbon adsorption, chemical assisted clarification or by a train of two or more of these wastewater treatment technologies.

The proposed treatment standards for metals in wastewater forms are based on lime addition followed by sedimentation and filtration for arsenic and antimony; chemical precipitation followed by sedimentation for nickel; and in electrochemical treatment followed by chemically assisted clarification for vanadium. See Table V-1, Table V-2, and Table V-3 for a summary of the proposed regulated constituents and the applicable UTS limits.

C. Capacity Determination for the Proposed Newly Identified Petroleum Refining Process Wastes

1. Introduction

In the land disposal restrictions (LDR) determinations, the Agency must demonstrate that adequate commercial capacity exists to manage the waste with BDAT standards before it can restrict the listed waste from further land

disposal. The Agency performs capacity analyses to determine the effective date of the LDR treatment standards for the proposed listed wastes.

In general, EPA's capacity analysis methodology focuses on the amount of waste currently land disposed that will require alternative treatment as a result of the LDRs. The quantity of wastes that are not land disposed (e.g., discharges under NPDES or to a POTW, or treatment in an exempt tank) are not included in the quantities requiring additional treatment as a result of the LDRs. Also, land-disposed wastes that do not require alternative treatment (e.g., those that are currently treated using an appropriate technology) are excluded from the required capacity estimates. Land-disposed wastes requiring alternative treatment or recovery capacity that is available on-site or within the same company as the generator are also omitted from the required commercial capacity estimates. The resulting estimates of required commercial capacity are then compared to estimates of available commercial capacity. If adequate commercial capacity exists, the waste is restricted from further land disposal. If adequate capacity does not exist, RCRA section 3004(h) authorizes EPA to grant a national capacity variance for the waste for up to two years or until adequate alternative treatment capacity becomes available, whichever is sooner.

To perform capacity analyses, the Agency needs to determine the volumes of the listed wastes that will require treatment prior to land disposal. The volumes of waste requiring treatment depend, in turn, on the waste management practices employed by the listed waste generators. Data on waste management practices for these wastes were collected during the development of this proposed rule. However, as the regulatory process proceeds, generators may decide to minimize or recycle their wastes or otherwise alter their management practices. Thus, EPA will update and monitor changes in management practices because these changes will affect the final volumes of waste requiring commercial treatment capacity. Therefore, EPA needs information on current and future waste management practices for these wastes, including the volumes and types of wastes that are recycled, wastes that are mixed with or co-managed with other waste, and residuals that are generated by the various management practices applicable to newly listed and identified wastes (e.g., treatment residuals).

The availability of adequate commercial treatment capacity for these wastes determines whether or not a

waste is granted a capacity variance under RCRA § 3004(h). EPA continues to update and monitor changes in available commercial treatment capacity because the commercial hazardous waste management industry is extremely dynamic. For example, national commercial treatment capacity changes as new facilities come on-line and as new units and new technologies are added at existing facilities. The available capacity at commercial facilities also changes as facilities change their commercial status (e.g., changing from a fully commercial to a limited commercial or captive facility). To determine the availability of capacity for treating these wastes, the Agency needs to consider currently available data, as well as the timing of any future changes in available capacity.

Thus, to perform the necessary capacity analyses as a result of the LDR standards, the Agency needs reliable data on current waste generation, waste management practices, available alternative treatment capacity, and planned treatment capacity. Therefore, the Agency requests data on the annual generation volumes and characteristics of waste by each waste code, including wastewater and nonwastewater forms, soil or debris contaminated with these wastes, and waste that is stored, treated, recycled, or disposed due to any change of management practices. The Agency also requests data on the current treatment capacity of facilities capable of treating these wastes, facility and unit permit status related to treatment of the proposed listed wastes and any plans the facilities may have in the future to expand or reduce existing capacity. Furthermore, the Agency requests comments from companies that may be considering developing new hazardous waste treatment capacity. Specifically, the Agency requests information on the determining factors involved in making decisions to build new treatment capacity.

Of particular interest to the Agency are waste characteristics, such as pH level, BTU, anionic character, total organic carbon content, constituent concentrations, and physical form, that may limit the availability of certain treatment technologies. For these reasons, the Agency specifically requests data and comments on waste characteristics that might limit or preclude the use of any treatment technologies.

For previous LDR determinations, the Agency performed capacity analyses using data from national surveys including the 1987 National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (the

TSDR Survey), the 1987 National Survey of Hazardous Waste Generators (the Generator Survey), and the Biennial Reporting System (BRS). However, these surveys were not used or not the primary sources used to determine the volumes of proposed listed wastes requiring treatment, since these wastes were not included in the surveys. Additionally, these surveys may not contain adequate information on currently available capacity to treat newly identified wastes because the data do not reflect current capacity and do not include facility expansions or closures that have occurred since the data were obtained.

2. Capacity Analysis Results Summary

A brief summary of the capacity analysis performed to support this rule is presented below. For additional detailed information, please refer to the "Background Document for Capacity Analysis for Land Disposal Restrictions: Newly Identified Petroleum Refining Process Wastes (Proposed Rule)".

For this capacity analysis, EPA examined data on waste characteristics and management practices that have been gathered for the purpose of the petroleum refining hazardous waste listing determinations in the 1992 RCRA Section 3007 survey. The Agency has analyzed the capacity-related information from the survey responses and identified the following annualized quantities of newly identified wastes requiring commercial treatment: 11,100 tons of K170, 2,400 tons of K171, and 6,500 tons of K172; if the Agency decides to list crude oil storage tank sediment as hazardous (K169), the annualized volume of this waste requiring treatment would be 6,300 tons. The available data sources indicate that there are no quantities of K170–K172 (and K169, if listed) wastewaters that will require alternative commercial treatment, and therefore this volume is assumed to be zero. EPA estimates that 20,000 tons per year of K170–K172 will be managed off-site and require alternative commercial treatment (this would increase to 26,300 tons if K169 is listed). Also, the final affected waste volume requiring alternative commercial treatment may be subject to change due to the final listing determinations. The capacity analysis will be revised accordingly. This quantity may be smaller due to increased recycling activities. The Agency requests comments on current and future management practices and the volumes managed for K170–K172, and K169, if listed.

EPA is proposing to apply UTS to these wastes and the treatment

standards for nonwastewaters containing organic constituents are based on combustion. The Agency estimated that the commercially available sludge and solid combustion capacity is 91,000 tons per year and sufficient to treat the proposed listed wastes. The Agency recognizes that the treatment residuals from these wastes may require additional treatment capacity (e.g., stabilization) to achieve the UTS for metal constituents. The Agency estimated that there is more than one million tons per year of commercial stabilization capacity. EPA also identified several metal recovery technologies that are commercially available and some of these technologies are being used currently by the petroleum refining industry to recycle K171 and K172. Therefore, EPA is proposing to not grant a national capacity variance for these proposed listed wastes. EPA is soliciting any updated or additional information that is pertinent to this determination. Since EPA is proposing a treatment concentration level for these wastes, the Agency does not exclude the use of other technologies capable of meeting the proposed treatment standard. EPA also requests comments on other commercially available thermal and non-thermal treatment or recovery capacity to meet UTS for the proposed listings.

For soil and debris contaminated with the proposed listings, the vast majority of the soil is already in-place (e.g., soil contaminated as a result of spills, etc., which has not been moved and soil associated with land treatment units). EPA's promulgated final rule addressing corrective action management units (CAMUs) and temporary units (TUs) (58 FR 8658, February 16, 1993) is likely to reduce the volume of wastes and soil subject to the land disposal restrictions by reducing the volume of waste and soil excavated and also by reducing the volume of waste managed off-site. Therefore, EPA is proposing to not grant a national capacity variance to hazardous soil and debris contaminated with the newly listed wastes covered under this proposal. EPA is requesting comments and data on hazardous soil contaminated with K170–K172 (and K169, if listed) that may be managed off-site. Based on the questionnaire, there are no data showing the mixed radioactive wastes with the proposed listings. EPA is proposing to not grant a national capacity variance for mixed radioactive wastes, i.e., radioactive wastes mixed with K169 (if listed), K170, K171, or K172. EPA is soliciting

comments on any information pertinent to these determinations.

TABLE V-1.—PROPOSED BDAT STANDARDS FOR ORGANICS IN K169*, K170, K171, & K172
[Wastewaters and nonwastewaters]

Constituent	Wastewaters maximum for any 24 hr. composite	Nonwastewaters maximum for any grab sample	Constituents proposed for regulation			
	Total composition (mg/L)	Total composition (mg/kg)	K169 *	K170	K171	K172
Benz(a)anthracene	0.059	3.4	x	x	x	N/A
Benzene	0.14	10	x	x	x	x
Benzo(g,h,i)perylene	0.0055	1.8	x	x	N/A	N/A
Chrysene	0.059	3.4	x	x	x	N/A
Dibenz(a,h)anthracene	0.0055	8.2	N/A	x	N/A	N/A
Ethylbenzene	0.057	10	x	x	x	x
Fluorene	0.059	3.4	N/A	x	N/A	N/A
Indeno(1,2,3-cd)pyrene	0.0055	3.4	x	x	N/A	N/A
Naphthalene	0.059	5.6	x	x	x	N/A
Phenanthrene	0.059	5.6	x	x	x	N/A
Pyrene	0.067	8.2	x	x	x	N/A
Toluene	0.080	10	x	x	x	x
Xylenes (total)	0.32	30	x	x	x	x

N/A—Not Applicable

* The proposed regulated constituent and UTS limits will apply, if EPA decides to list K169 as a hazardous waste in the final rule.

TABLE V-2.—PROPOSED BDAT STANDARDS FOR METALS IN K171 & K172
[Wastewaters and nonwastewaters]

Constituent	Wastewaters maximum for any 24 hr. composite	Nonwastewaters maximum for any grab sample	Constituents proposed for regulation	
	Total composition (mg/L)	(TCLP) (mg/L)	K171	K172
Antimony	1.9	2.1	N/A	x
Arsenic	1.4	5.0	x	x
Nickel	3.98	5.0	x	x
Vanadium	4.3	0.23	x	x

TABLE V-3.—PROPOSED BDAT STANDARDS FOR REACTIVE SULFIDES IN K171 & K172
[Wastewaters and nonwastewaters]

DEACTIVATION (DEACT)* to remove reactive sulfide characteristic (iron sulfides and other metal sulfide metals/complexes).

* See section 268.40 for a list of applicable technologies that used alone or in combination can achieve this standard. See also in 268.42, Table 1—Technology Codes and Descriptions of Technology—Based Standards.

VI. Environmental Justice and Population Risk

A. Applicability of Executive Order 12898

EPA is committed to address environmental justice concerns and is

assuming a leadership role in environmental justice initiatives to enhance environmental quality for all residents of the United States. The Agency's goals are to ensure that no segment of the population, regardless of race, color, national origin, or income bears disproportionately high and adverse human health and environmental effects as a result of EPA's policies, programs, and activities, and all people live in clean and sustainable communities. In response to Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" and to concerns voiced by many groups outside the Agency, EPA's Office of Solid Waste and Emergency Response formed an Environmental Justice Task Force to analyze the array

of environmental justice issues specific to waste programs and to develop an overall strategy to identify and address these issues (OSWER Directive No. 9200.3-17).

Using 1990 U.S. Census Bureau data, the Agency created profiles of the populations surrounding petroleum refineries in the United States, as well as the smaller subset of facilities using land treatment or landfilling to manage the residuals proposed for listing in today's notice or estimated to have marginal risk. Statistics were generated regarding total population, population density (persons per square mile), white population, and population of color. Table VI-1 compares these population profiles with the overall national profile.

TABLE VI-1.—POPULATION PROFILES

	National population profile	Population profile surrounding U.S. petroleum refineries*	Population profile surrounding facilities landfilling or land treating proposed listing residuals*
Total population	249,402,000	651,757	195,693
White population	209,180,000	408,280	151,955
Percent white	83.9	62.6	77.6
Population of color	40,222,000	243,477	43,738
Percent people of color	16.1	37.4	22.3

* Population count does not double count persons living within 1 mile of more than one refinery.

The population profiles show that the populations in the vicinity of landfills and land treatment units that have been reported to manage the three residuals proposed for listing in today's notice are somewhat more likely to be minority populations than the National distribution. The effect of these listings, if finalized, will be to place these wastes under additional controls and reduce potential exposures to the surrounding populations.

B. Potential Effects

Today's proposed rule covers a number of wastes produced from petroleum refining facilities. The proposed rule involves not one particular site, but will possibly affect many facilities nationwide. Because of the locations of some of these facilities, the potential exists for impacts to minority or low-income communities. Today's rule is intended to reduce risks of hazardous and characteristic wastes as proposed, and to benefit all populations. As such, this rule is not expected to cause any disproportionately high and adverse impacts to minority or low-income communities versus non-minority or affluent communities.

The Agency is soliciting comment and input from all stakeholders, including members of the environmental justice community and members of the regulated community. The Agency encourages all interested parties to provide comments or further information that might be necessary on the data, analysis, and findings contained in this proposal. The Agency is interested in receiving additional information and/or comment on the following:

- Information on facilities that have evaluated potential ecological, human health (taking into account subsistence patterns and sensitive populations) impacts to minority or low-income communities.
- Information on facilities that have conducted human health analyses

identifying multiple and cumulative exposures (populations at risk) from leaks, emissions, and waste management.

- Information on releases (leaks, emissions) that have occurred in the community and their health and environmental effects; and possible effects of exposure to the chemicals in the community.
- Information on hazardous materials stored, used, and transported in the community.

C. Population Risk

The Agency calculated population risks for individuals living in the vicinity of sites at which each of the three residuals proposed for listing in today's rule are managed. The populations surrounding each of the refineries and off-site land treatment and landfill units were enumerated using Census Bureau summary data for radii of 1, 2, and 5 miles. Further description of the population identification is presented in the "Listing Background Document for the 1992-1996 Petroleum Refining Listing Determination" in the docket for today's rule (see ADDRESSES).

Population risks were estimated for the following subpopulations: (1) adult residents and home gardeners exposed to PAHs in crude oil storage tank sediments, or clarified slurry oil storage tank sediments and/or filter/separation solids that are land treated, (2) consumers of ground water exposed to benzene and arsenic in hydrotreating and hydrorefining catalysts that are landfilled, and (3) consumers of ground water exposed to benzene from crude oil storage tank sediments that are landfilled. In estimating population risks from exposure of home gardeners and adult residents to PAHs, EPA evaluated exposures in which effective run-off controls were in place and exposures in which no run-off occurs. Under circumstances with effective run-off controls, home gardeners were estimated to be exposed by inhaling

airborne particulates to which PAHs are adsorbed and ingesting soil, fruits, and vegetables contaminated by direct deposition of PAH-contaminated particulates; adult residents ingested only PAH-contaminated soil. Under circumstances where run-off occurs, additional contamination of soil, fruits, and vegetables with PAHs was estimated from erosion of PAH-contaminated soil from the land treatment site.

For the purpose of estimating population risks assuming effective run-off controls are in place at land treatment units, a radius of five miles from the land treatment unit was used as the distance within which concentrations of PAHs in air were averaged and exposed populations were enumerated. The Agency selected a radius of five miles for air pathways based on modeling results that indicated a dramatic decrease in concentrations of PAHs beyond this distance. For the purpose of estimating additional population risks assuming effective run-off controls are not in place, a distance of 300 meters from the land treatment unit was used as the distance within which populations were enumerated. This distance corresponds to the distance used for estimating central tendency individual risks from exposure of the home gardener and adult resident from all applicable exposure pathways.

For the purpose of estimating population risks for consumers of ground water, The Agency selected a one-mile radius down-gradient of the site to estimate 9-year average concentrations over the width of the plume. Exposures and risks to receptors located at distances greater than one mile were not considered because the exposure concentrations decrease as distance increases and there is a very long time period required for constituents to reach receptors outside a one-mile radius.

Steps for estimating non-ground water population risks assuming that no run-off occurs include: (1) Estimating the

total population within 5 miles of the waste management unit; (2) determining the percentage of the total population that is the exposed population (e.g., the percentage of the total population that practices home gardening); (3) estimating the average concentration of PAHs in air, soil, fruits, and vegetables within 5 miles; (4) estimating the total lifetime average individual cancer risk based on the average media concentrations within 5 miles; and (5) estimating the total lifetime cancer incidence based on the product of the exposed population within 5 miles and the total lifetime cancer risk.

Steps for estimating the non-groundwater population risks assuming that run-off occurs include: (1) Estimating average individual cancer risks to home gardeners and adult residents at a distance of 300 meters of the land treatment unit; (2) estimating the total population within a 300-meter downgradient of the land treatment unit based on the population density within a 1-mile radius and assuming uniform population density; (3) estimating the percentage of the total population within 300 meters that are home gardeners and adult residents; and (4) estimating the total lifetime cancer incidence based on the product of the exposed population within 300 meters and the total lifetime cancer risk. Additional details on estimating population risks for non-groundwater pathways are provided in "Assessments of Risks from the Management of Petroleum Refining Wastes: Background Document."

The steps used by the Agency to estimate population risks for consumers of ground water include: (1) Conducting ground water modeling to estimate 9-year average concentrations over the width of the plume up to one mile down-gradient of the waste management unit at 400-meter intervals; (2) calculating the corresponding average individual risk from this average concentration; and (3) calculating the population served by the plume in each 400-meter interval. Additional details are provided in the "Background Document for Groundwater Pathway Analysis."

1. Results

The Agency conducted analyses of population risks for non-groundwater pathways for crude oil tank sediment and CSO sediment/solids. EPA also conducted analyses of population risks for groundwater pathways in crude oil tank sediment, hydrotreating catalyst, and hydrorefining catalyst. For both non-groundwater and groundwater pathways, the results suggested that the

incremental risk in terms of cancer cases avoided would be near zero. However, the Agency believes that the high-end risks to individuals for these wastes support listing them as hazardous.

For non-groundwater exposure pathways to PAHs from land treatment units without run-off controls, the Agency estimated central tendency risks for crude oil tank sediment to be 3×10^{-9} for up to 274 home gardeners and 6×10^{-9} for up to 721 adult residents for off-site units. For the same scenario, the central tendency risks for CSO sediment/solids were 3×10^{-9} for up to 90 home gardeners, and 6×10^{-6} for up to 235 adult residents. For on-site land treatment, central tendency risks from PAHs in crude oil tank sediment were 4×10^{-9} for up to 120 home gardeners, and 8×10^{-9} for up to 316 adult residents. For on-site land treatment of CSO sediment/solids, central tendency risks from PAHs were 7×10^{-7} for up to 76 home gardeners, and 2×10^{-6} for up to 200 adult residents.

For the groundwater exposure pathway from landfills, the Agency estimated the total number of people exposed to constituent concentrations above health-based levels (at the 10^{-6} level) for off-site landfills. The number of individuals exposed above health-based levels for benzene in crude oil storage tank sediment, hydrotreating catalyst, and hydrorefining catalyst is 17, 300, and 3, respectively. The number of people exposed above health-based levels for arsenic in hydrotreating and hydrorefining catalyst is 12 and 25, respectively. For on-site landfills, the number of individuals exposed above health-based levels was less than one for all three wastes.

VII. Compliance Dates

A. Notification

Under the RCRA section 3010 any person generating, transporting, or managing a hazardous waste must notify EPA (or an authorized State) of its activities. Section 3010(a) allows EPA to waive, under certain circumstances, the notification requirement under section 3010 of RCRA. If these hazardous waste listings are promulgated, EPA is proposing to waive the notification requirement as unnecessary for persons already identified within the hazardous waste management universe (i.e., persons who have an EPA identification number under 40 CFR 262.12). EPA is not proposing to waive the notification requirement for waste handlers who have neither notified the Agency that they may manage hazardous wastes nor received an EPA identification number.

Such individuals will have to provide notification under § 3010.

B. Interim Status and Permitted Facilities

Because HSWA requirements are applicable in authorized States at the same time as in unauthorized States, EPA will regulate the newly identified wastes listed under HSWA until States are authorized to regulate these wastes. Thus, once this regulation becomes effective as a final rule, EPA will apply Federal regulations to these wastes and to their management in both authorized and unauthorized States.

VIII. State Authority

A. Applicability of Rule in Authorized States

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA program within the State. (See 40 CFR Part 271 for the standards and requirements for authorization.) Following authorization, EPA retains enforcement authority under sections 3007, 3008, 3013, and 7003 of RCRA, although authorized States have primary enforcement responsibility.

Before the Hazardous and Solid Waste Amendments of 1984 (HSWA) amended RCRA, a State with final authorization administered its hazardous waste program entirely in lieu of the Federal program in that State. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities located in the State with permitting authorization. When new, more stringent Federal requirements were promulgated or enacted, the State was obligated to enact equivalent authority within specified time-frames. New Federal requirements did not take effect in an authorized State until the State adopted the requirements as State law.

By contrast, under section 3006(g) of RCRA, 42 U.S.C. 6926(g), new requirements and prohibitions imposed by the HSWA (including the hazardous waste listings proposed in this notice) take effect in authorized States at the same time that they take effect in non-authorized States. EPA is directed to implement those requirements and prohibitions in authorized States, including the issuance of permits, until the State is granted authorization to do so. While States must still adopt HSWA-related provisions as State law to retain final authorization, the Federal HSWA requirements apply in authorized States in the interim.

B. Effect on State Authorizations

Because this proposal (with the exception of the actions proposed under CERCLA authority) will be promulgated pursuant to the HSWA, a State submitting a program modification is able to apply to receive either interim or final authorization under section 3006(g)(2) or 3006(b), respectively, on the basis of requirements that are substantially equivalent or equivalent to EPA's requirements. The procedures and schedule for State program modifications under 3006(b) are described in 40 CFR 271.21. It should be noted that all HSWA interim authorizations are currently scheduled to expire on January 1, 2003 (see 57 FR 60129, February 18, 1992).

Section 271.21(e)(2) of EPA's State authorization regulations (40 CFR Part 271) requires that states with final authorization modify their programs to reflect federal program changes and submit the modifications to EPA for approval. The deadline by which the States must modify their programs to adopt this proposed regulation, if it is adopted as a final rule, will be determined by the date of promulgation of a final rule in accordance with section 271.21(e)(2). If the proposal is adopted as a final rule, Table 1 at 40 CFR 271.1 will be amended accordingly. Once EPA approves the modification, the State requirements become RCRA Subtitle C requirements.

States with authorized RCRA programs already may have regulations similar to those in this proposed rule. These State regulations have not been assessed against the Federal regulations being proposed to determine whether they meet the tests for authorization. Thus, a State would not be authorized to implement these regulations as RCRA requirements until State program modifications are submitted to EPA and approved, pursuant to 40 CFR 271.21. Of course, States with existing regulations that are more stringent than or broader in scope than current Federal regulations may continue to administer and enforce their regulations as a matter of State law.

It should be noted that authorized States are required to modify their programs only when EPA promulgates Federal standards that are more stringent or broader in scope than existing Federal standards. Section 3009 of RCRA allows States to impose standards more stringent than those in the Federal program. For those Federal program changes that are less stringent or reduce the scope of the Federal program, States are not required to modify their programs. See 40 CFR

271.1(i). This proposed rule, if finalized, is neither less stringent than nor a reduction in the scope or the current Federal program and, therefore, states would be required to modify their programs to retain authorization to implement and enforce these regulations.

IX. CERCLA Designation and Reportable Quantities

All hazardous wastes listed under RCRA and codified in 40 CFR 261.31 through 261.33, as well as any solid waste that exhibits one or more of the characteristics of an RCRA hazardous waste (as defined in Sections 261.21 through 261.24), are hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. See CERCLA Section 101(14)(C). CERCLA hazardous substances are listed in Table 302.4 at 40 CFR 302.4 along with their reportable quantities (RQs). RQs are the minimum quantity of a hazardous substance that, if released, must be reported to the National Response Center (NRC) pursuant to CERCLA § 103.

The Agency is proposing to list the wastes in this action as CERCLA hazardous substances in Table 302.4 of 40 CFR 302.4. In addition, the Agency proposes two alternative methods to adjust their one-pound statutory RQs. The first method, one traditionally utilized by the Agency, adjusts the RQ based on the lowest RQ of the most toxic substance present in each waste. The second method, as a part of the Agency's effort to review and re-evaluate its methods for CERCLA designation and RQ adjustment, adjusts the one-pound statutory RQ based upon the Agency's characterization and physical properties of the complex mixtures which comprise the wastes to be designated as K169 (if listed), K170, K171 and K172. The Agency invites comment on both methods, and may, based upon these comments and further information, decide to go forward with either method.

A. Reporting Requirements

Under CERCLA section 103(a), the person in charge of a vessel or facility from which a hazardous substance has been released in a quantity that is equal to or exceeds its RQ must immediately notify the National Response Center of the release as soon as that person has knowledge thereof. The toll-free number of the NRC is 1-800-424-8802; in the Washington, D.C. metropolitan area, the number is (202) 267-2675. In addition to this reporting requirement under CERCLA, section 304 of the Emergency

Planning and Community Right-to-Know Act of 1986 (EPCRA) requires owners or operators of certain facilities to report releases of extremely hazardous substances and CERCLA hazardous substances to State and local authorities. EPCRA section 304 notification must be given immediately after the release of a RQ or more to the community emergency coordinator of the local emergency planning committee for any area likely to be affected by the release, and to the State emergency response commission of any State likely to be affected by the release.

Under section 102(b) of CERCLA, all hazardous wastes newly designated under RCRA will have a statutory RQ of one pound unless and until the RQ is adjusted by regulation under CERCLA. In order to coordinate the RCRA and CERCLA rulemakings with respect to new waste listings, the Agency is also proposing adjustments to the one-pound statutory RQs for these wastestreams.

B. Basis for RQs and Adjustments

EPA's methodology for adjusting the RQs of individual hazardous substances begins with an evaluation of the intrinsic physical, chemical, and toxic properties of each hazardous constituent. The intrinsic properties examined—called "primary criteria"—are aquatic toxicity, mammalian toxicity, ignitability, reactivity, chronic toxicity, and potential carcinogenicity.

Generally, for each intrinsic property, EPA ranks hazardous substances on a scale, associating a specific range of values on each scale with an RQ value of 1, 10, 100, 1,000, or 5,000 pounds. The data for each hazardous substance are evaluated using the various primary criteria; each hazardous substance may receive several tentative RQ values based on its particular intrinsic properties. The lowest of the tentative RQs becomes the "primary criteria RQ" for that substance.

After the primary criteria RQs are assigned, substances are further evaluated for their susceptibility to certain degradative processes, which are used as secondary adjustment criteria. These natural degradative processes are biodegradation, hydrolysis, and photolysis (BHP). If a hazardous substance, when released into the environment, degrades rapidly to a less hazardous form by one or more of the BHP processes, its RQ (as determined by the primary RQ adjustment criteria) is generally raised by one level. Conversely, if a hazardous substance degrades to a more hazardous product after its release, the original substance is assigned an RQ equal to the RQ for the more hazardous substance, which may

be one or more levels lower than the RQ of the constituents of concern in the for the original substance. Table IX-1 presents the reportable quantity of each wastes to be identified as hazardous.

TABLE IX-1.—REPORTABLE QUANTITIES OF CONSTITUENTS OF CONCERN

Hazardous waste No.	Constituent of concern	RQ pounds (Kg)
K169 *	Benzo(a)pyrene	1(0.454)
	Dibenzo(a,h)anthracene	1(0.454)
	Benzo(a)anthracene	10(4.54)
	Indeno(1,2,3-cd)pyrene	100(45.4)
	Benzo(b)fluoranthene	1(0.454)
	Chrysene	100(45.4)
K170	Benzene	10(4.54)
	Benzo(a)pyrene	1(0.454)
	Dibenz(a,h)anthracene	1(0.454)
	Benzo(a)anthracene	10(4.54)
	Benzo(b)fluoranthene	1(0.454)
	Benzo(k)fluoranthene	5000
		(2270)
	Chrysene	100(45.4)
	3-Methylcholanthrene	10(4.54)
	7,12-Dimethylbenz(a)anthracene	1(0.454)
K171	Indeno(1,2,3-cd)pyrene	100(45.4)
	Benzene	10(4.54)
K172	Arsenic	1(0.454)
	Benzene	10(4.54)
	Arsenic	1(0.454)

* If EPA makes a final decision to list crude oil storage tank sediment (K169) as hazardous, these RQs would apply.

The RQ adjustment methodology for mixtures of hazardous substances, used to adjust the RQs for RCRA hazardous wastestreams, differs somewhat from the methodology applied to individual hazardous substances. The procedure for assigning RQs is based on an analysis of the hazardous substance constituents of the wastestreams. The constituents of each RCRA hazardous wastestream are identified in 40 CFR 261, Appendix VII. The RQ of each constituent within the wastestream is determined, and the lowest RQ value of these constituents is established as the RQ for the wastestream. Because one or more of the constituents of concern in each waste has a final RQ of one pound, the Agency is proposing to assign one pound as the adjusted RQ for each of the newly designated wastestreams under this option.

The preceding discussion only describes the Agency's methodology for assigning RQs to the wastestreams. This discussion does not address whether particular releases of the wastestreams are reportable under various scenarios.

The person in charge of a facility from which a release of any of the wastestreams occurs may apply the mixture rule on a case-by-case basis to determine if a particular release of the wastestream must be reported under CERCLA section 103 and EPCRA section 304. Essentially, the Agency's mixture rule (see 40 CFR 302.6(b)) provides that, if the quantity of each of the hazardous constituents in a particular wastestream is known, reporting is required only when an RQ or more of a constituent is released.

It is important to note that this provision only applies to the individual wastestream for which the quantities of all the constituents are known. RCRA wastes may be treated as mixtures only if all hazardous components and their concentrations in the mixture are known. Knowledge that the average quantities of hazardous constituents in a wastestream with the same RCRA identification number (e.g., K170) are below their respective hazardous constituent RQs is not a sufficient basis for applying this provision of the

mixture rule to all wastestreams with that identification number. In addition, the Agency's mixture rule also provides that, if the quantity of one or more of the hazardous constituents is unknown, reporting is required where the total amount of the waste equals or exceeds the RQ for the hazardous constituent with the lowest RQ (CFR 302.6(b)(1)(ii)).

C. Alternative Method

The above proposal is for adjusting RQs utilizing the standard CERCLA methodology. In this rulemaking, the Agency also requests comment on the following alternative method for adjusting the RQs of the wastes in this proposal.

The Agency believes it has fully characterized the wastes to be identified as K169 (if listed), K170, K171 and K172, and based upon the maximum concentration observed, the Agency has calculated the amount of each waste necessary to contain the reportable quantity of each constituent of concern.

TABLE IX-2.—POUNDS REQUIRED TO CONTAIN RQ

Waste	Constituent	Max ppm	RQ (lb)	Pounds required to contain RQ	Adjusted RQ (lb)
K169 *	Benzo(a)pyrene	26	1	38,462	5000
	Dibenzo(a,h)anthracene	3.7	1	270,270	5000
	Benzo(a)anthracene	31	10	322,581	5000

TABLE IX-2.—POUNDS REQUIRED TO CONTAIN RQ—Continued

Waste	Constituent	Max ppm	RQ (lb)	Pounds required to contain RQ	Adjusted RQ (lb)
K170	Indeno(1,2,3-cd)pyrene	15	100	6,666,667	5000
	Benzo(b)fluoranthene	29	1	34,483	5000
	Chrysene	42	100	2,380,952	5000
	Benzene	220	10	45,455	5000
	Benzo(a)pyrene	230	1	4,348	1000
	Dibenzo(a,h)anthracene	49	1	20,408	5000
	Benzo(a)anthracene	390	10	25,641	5000
	Benzo(b)fluoranthene	110	1	9,090	5000
	Benzo(k)fluoranthene	110	5000	45,454,545	5000
	Chrysene	860	100	116,279	5000
	3-Methylcholanthrene	27	10	370,370	5000
	7,12-Dimethylbenz(a)anthracene	1200	1	833	100
K171	Indeno(1,2,3-cd)pyrene	26	100	38461.5	5000
	Benzene	500	10	20,000	5000
	Arsenic	1600	1	625	500
K172	Self-heating solid .....	.....	100	.....	100
	Benzene	100	10	100,000	5000
	Arsenic	730	1	1,370	5000
	Self-heating solid .....	.....	100	.....	100

* If EPA makes a final decision to list crude oil storage tank sediment (K169) as hazardous, these RQs would apply.

In this alternative method, the calculated amounts would determine the adjusted RQs. Specifically, for K169 wastes (if listed), over 5,000 pounds would be required to contain the RQ of any of the constituents of concern. Thus, under this alternative methodology, the Agency would adjust the RQ for K169 to 5,000 pounds, if K169 is finalized as a hazardous waste. For K170, over 800 pounds would be required to contain one pound of 7,12-dimethylbenz(a)anthracene (the constituent of concern with the highest concentration in this waste). Therefore, because 800 falls between the two possible RQ increments of 100 and 1000, under this alternative methodology, the Agency would adjust the RQ for K170 to 100 pounds. In the case of K171 and K172, quantities of these wastes in excess of 5000 pounds would also be required to contain the RQ of benzene or arsenic. However, these wastes frequently are spontaneously combustible materials. Because the RQ for wastes exhibiting the characteristic of ignitability is 100 pounds, the Agency would adjust the final RQ for K171 and K172 to 100 pounds.

X. Regulatory Requirements and Economic Analysis

The material covered in this section is described in detail in the background document entitled "Cost and Economic Impact of Listing Hazardous Wastes from the Petroleum Refining Industry", dated September 21, 1995, to be found in the EPA docket for this listing.

A. Regulatory Requirements

1. Executive Order 12866

E.O. 12866 requires that a determination be made as to whether this proposed regulatory action is "significant." While the proposal does not have an estimated annual effect of \$100 million on the economy, interfere with actions planned by another agency, or materially alter budgetary impacts on parties named in the E.O., it does raise novel legal and possibly policy issues. Therefore, the Agency considers the action "significant" under the Executive Order and has gone beyond the minimal requirements for economic analysis required for "non-significant" rules, as explained in the discussion of economic analysis (Section B, parts 3-5, below).

2. The Regulatory Flexibility Act of 1980

This Act requires federal agencies to give full consideration to the effect a proposed rulemaking may have on "small entities." Section 603 of the Act requires that a screening analysis be performed to determine whether "small businesses, organizations and governmental jurisdictions" are impacted.

For the economic analysis performed for the Petroleum Refinery NESHAP, it was determined (under Title IV, Section 410H of the Clean Air Act) that a petroleum refinery is classified as a small business if it has less than 1500 employees or if its production is less than 50,000 barrels of oil per day. Based upon this production criterion, 63 refineries were determined to be small businesses in 1992. For SIC 2911,

Petroleum Refining, Small Business Administration (SBA) rules define small businesses as those firms processing less than or equal to 75,000 barrels of crude oil per day. Based upon this SBA cutoff, 49 refineries or approximately 30% of all refineries operating at the close of 1992 are considered "small entities." Since either of the above measures denote a sizable percentage of "small entities," an industry impact analysis was conducted and the findings are presented in Section B.2. below.

3. The Paperwork Reduction Act (PRA)

Today's proposed rule may require reporting, notification or record keeping subject to OMB approval under Section 3504(b) of the PRA. Facilities will have to comply with Subtitle C recordkeeping with respect to the waste streams proposed for listing. Costs are included in compliance costs for this proposed listing insofar as they could be estimated by EPA.

4. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104-4, establishes requirements for federal agencies to assess the effects of regulatory actions on state, local, and tribal governments, and the private sector. Under Section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of \$100 million or more in any one year. Before promulgating an EPA rule for which a

written statement is needed, Section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of alternatives and adopt the least costly, most cost effective or least burdensome alternative that achieves the objective of the rule. The provisions of Section 205 do not apply when they are inconsistent with applicable law. Moreover, Section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under Section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that today's proposed rule does not contain a federal mandate that will result in an expenditure of \$100 million or more in any one year. The upper bound of the range of potential annual expenditure is well under \$100 annually, as shown in Section B, below. Thus, today's rule is not subject to the requirements of Sections 202 and 205 of the UMRA.

B. Economic Analysis

1. Costs of Compliance

EPA has assessed the costs associated with the regulation of each of the three waste streams proposed to the listed in today's proposal. These are: clarified slurry oil storage tank sediment and/or in-line filter/separation solids, hydrotreating catalyst and hydrorefining catalyst. EPA has examined four cost alternatives; (1) Subtitle C landfill costs alone, (2) off-site incineration of tank sediments/off-site incineration and vitrification of catalysts, (3) a combination of on- and off-site incineration depending on the specific refinery, together with recycling/reclamation of catalysts, and (4) a contingent management composite alternative involving Subtitle D landfill

for the CSO tank sediment and filter/separation solids together with recycling/reclaiming of catalysts.

The last named is clearly the least costly option of the options examined. It is important to note that the costs shown for all alternatives are not to be taken as precise. At the low end, especially, they are barely measurable in an industry of this size.

Each alternative is discussed below.
a. Alternative (1)—Subtitle C Landfill Costs Alone. After excluding the quantities exempt from regulation on the basis of the definition of solid waste, by ongoing reclamation, by headwaters exemption, and by the quantity already in compliance, as reported in the § 3007 survey previously referred to, the quantities impacted and the related Subtitle C annual costs of compliance are presented in Table X-1.

TABLE X-1.— ANNUAL COST OF COMPLIANCE
 [1992\$, millions]

	Costs (1992\$, millions)
Clarified Slurry Oil Storage Tank Sediment and In-line Filter/Separation Solids	2.8
Hydrotreating Catalyst	1.3
Hydrorefining Catalyst	1.5
Add: RCRA Administrative costs	0.5
Total Annual Costs¹	6.1

¹The additional annual cost of compliance for potentially listing crude oil storage tank sediments is \$2.2 million.

Costs per ton for Subtitle C compliance are also taken from the survey data as reported by the refineries. In that some uncertainty existed both for costs and for quantities, EPA tested the significance of variation in cost and in quantity by calculating the effect of a +/- 25% adjustment in estimated costs, and a +/- 50% adjustment in quantities, as reasonable bounding values. The range of total annual compliance costs using these worst case limits was \$3.3 to \$12.1 million in '92 dollars. ('92 dollars are used in that this was the date of the industry survey. Escalation to '95 or '96 dollars is of course possible, but would not change anything in the analysis.)

b. Alternatives (2) and (3)—Costs Including On- and Off-Site LDR Costs. If the costs associated with land disposal restrictions are included, the figures are as given below. The off-site alternative may be considered an unlikely upper bound in that those refiners finding it economical to continue on-site incineration of tank sediments in combination with recycling and

reclaiming of catalysts will continue to do so, unless forced to off-site incineration and vitrification of the catalysts by added permitting costs.

TABLE X-2.—ANNUALIZED COSTS FOR PROPOSED REFINERY WASTE LISTINGS UNDER TWO LDR SCENARIOS

[1992\$, millions]

	Off site incineration	On-site incineration
Clarified Slurry Oil Storage Tank Sediment and In-line Filter/Separation Solids	22.5	16.8
Hydrotreating Catalyst	5.0	2.4
Hydrorefining Catalyst	11.6	3.9
RCRA Administrative Costs	0.5	0.8
Total Annual Costs with LDR¹	39.7	23.9

¹The additional annual costs with LDR for potentially listing crude oil storage tank sediments is \$21.6 million for off site incineration and \$16.7 million for on-site incineration.

c. Alternative (4), Contingent Management—Subtitle D Landfill for the Storage Tank Sediments and CSO Filter/Separation Solids, and Recycling/Reclaiming of Catalysts. The costs shown include a credit for the revenues that would derive from waste minimization and reentry as added feedstocks for the two tank sediments, and the far lower (than Subtitle C) Subtitle D landfill costs. The negative number for the CSO tank sediment and filter/separation solids reflects the added net revenues in context of no added disposal costs.

It is important to reiterate that for an industry of this size, costs at this low level are difficult to measure. These costs should not be taken to be precise; they are estimates only and are small compared to the revenue/cost stream for the industry as a whole.

TABLE X-3.—ANNUALIZED COSTS FOR ALTERNATIVE (4)
 [1992\$, millions]

	Annualized costs (1992\$, millions)
CSO Storage Tank Sediment and In-line Filter/Separation Solids	(0.5)
Hydrotreating Catalyst	2.3
Hydrorefining Catalyst	3.9
RCRA Administrative Costs	0.6
Total Alternative 4	6.3

¹The additional annual costs of option 4 for potentially listing crude oil storage tank sediments is \$17.4 million.

d. The Cost Reducing Potential of Offsetting Savings. As noted in Section 5, below, ("Other Benefits Considered,"

Subsection 5.e), EPA estimated the revenue impact of recycling previously listed waste into cokers, in accordance with the changes to the current recycling exemptions described elsewhere in this preamble.

These wastes include primary separation sludge (F038), secondary separation sludge (F039), dissolved air flotation float (K048), slop oil emulsion solids (K049), and API separator sludge (K051). As described in Section 5, such a practice is estimated to generate between \$13 million and \$26 million annually, depending on the volume not currently being recycled and other factors. Refineries would have to be individually evaluated to more accurately calculate this effect. Also, the costs associated with temporary on-site storage and processing, and transportation to a coker if a given refinery did not have a coker, would reduce this savings.

EPA has not directly applied this potential offset to any of the alternatives costed above, but it is important to note that this recycling practice, if directly associated with this proposed rulemaking, could combine to make the

estimated cost of the rule as a whole approach zero under the contingent management option.

2. Economic Impact Analysis

EPA used a partial equilibrium model of the petroleum refining industry to estimate the effects of compliance on refiners. The model is the same as was used for the EPA NESHAP air contaminant analysis, for consistency. The major analytical variables are: market demand and supply (pre- and post compliance) for both domestic and foreign markets, market supply shifts, trade relationships as a function of elasticities, plant closures and other impacts, changes in economic welfare (consumer and producer surplus) and labor and energy effects. Baseline (pre-compliance) inputs and a complete model description may be found in the EPA docket for this proposed listing.

It is important to note that the use of this model represents a very sophisticated approach to the measurement of what are not high compliance costs relative to the size of this industry. More simplified approaches were considered, including

analysis of standard financial ratios pre- and post compliance. EPA's judgement is that the use of a model as a computational device has three major advantages: (1) comparability with the NESHAP analysis, (2) comprehensiveness as measured against all known effects as compared to the simpler approaches and (3) a built in ability to sensitivity test quickly and easily as desired. The only disadvantage is one shared with the simpler approaches; a possible inability to measure small impacts on a large industry. The results are not to be construed as precise, but rather as approximate indicators of impact.

As shown in Table X-4, impacts on major variables are all less than one tenth of one percent, with almost no measurable impact on plant operations. As shown, plant closure potential is estimated as minimal. Hence, pursuant to section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), "the Administrator certifies that this rule will not have a significant economic impact on a substantial number of entities."

TABLE X-4.—IMPACTS ON MAJOR VARIABLES

	Lower bound	Midpoint	Upper bound
Average Price Increase (All products)	0.03%	0.08%	0.076%
Annual Production Decrease	0.03%	0.06%	0.59%
Plant Closures—Estimated	0-2	0-2	0-2
Jobs Lost	0.03%	0.06%	0.59%

3. Cost Effectiveness of Individual Risk Reduction

a. *Crude Oil Storage Tank Sediment.* Benzene groundwater risks for this waste exceed 10^{-5} (all risks referred to in this section are discussed in detail in other sections of this preamble) and total 10^{-6} for some pathways for polynuclear aromatic hydrocarbons (PAHs). At a cost of approximately \$17.5 million under Alternative (4) these risks will be reduced if not eliminated. (Note: EPA has not translated these risk reductions into illness avoidance equivalents and monetary streams—see "Other Benefits Considered," below.)

b. *Clarified Slurry Oil Storage Tank Sediment and In-Line Filter/Separation Solids.* EPA is estimating significant indirect individual risks for PAHs in land treatment. The high-end adult resident individual lifetime cancer risks attributed to PAHs total 9×10^{-5} and 8×10^{-5} for on-site and off-site land treatment, respectively. These are very high individual environmental risks. At essentially zero cost for the contingent

management option (or \$16.8 million with reasonable LDR costs included) these major risks will be reduced if not eliminated.

c. *Spent Hydrotreating and Hydrorefining Catalysts.* Risks for these catalysts are due to benzene at the 10^{-5} lifetime cancer level. Again, the total annual cost to reduce or eliminate this risk is \$6.2 million for all refineries under either the LDR or the contingent management scenario. This material is reused after treatment and there are no significant LDR costs. (Note: the practice of reclaiming is common now. The proposed listing would affect only amounts not now being reclaimed.)

4. Cost Effectiveness of Population Risk Reduction

EPA evaluated several approaches to measuring population risk as a function of multi-path exposure analysis. This is discussed in section VI.C. of this preamble. As with the individual risks, the exposed population risks would be minimized or disappear altogether if the

relatively low cost measures specified above are taken.

EPA did not attempt to transform these cost effectiveness comparisons into monetary or commensurable measures both because of the uncertainties in such transformations and the absence of a statutory requirement to do so under either Executive Order 12866 or the UMRA (See Section A, above) as a function of the annual costs associated with the proposed listing. See also the discussion of other benefits, following.

5. Other Benefits Considered

As the analysis for today's proposed rule progressed, the Agency began to consider certain of the traditional benefits associated with RCRA rulemaking. It is well established that quantification of these benefits, in a manner acceptable to stakeholders and to the scientific community as a whole, is very difficult. In fact, for the most part, there is no agreement on the utility of quantification of these benefits in a decision making sense, especially with

respect to long lasting soil and ground water contamination.

Still, because of the high visibility of the refinery industry and the potential for stakeholder reaction on both sides of this issue, EPA examined a range of benefits beyond the straightforward cost/effectiveness tradeoffs noted above, but did not attempt to transform these (as with the cost effectiveness measures noted above) into commensurable or monetary measures both because of the uncertainties involved and the absence of a clear statutory requirement to do so. (The UMRA does not require it and while Executive Order 12866 may be interpreted to do so, the Agency elected to not undertake such analysis at this time due to the relatively low cost of the proposed rule.)

Thus it is important to consider, given this relatively low cost, that the benefit factors enumerated below may have special relevance.

a. Additional Potential Benefits and Tradeoffs. (1) Jobs and Transaction Costs. The regulation of the cited waste streams may serve to encourage further reclaiming activity. To the extent this occurs, the capacity of this industry may increase, with concurrent increases in employment. Economic multiplier effects should be added in, as a function of plant locations. Further, refineries may be able to save tipping fees in some cases, and may even be paid something for wastes now disposed of at a cost to the refinery. Further recycling (e.g., de-oiling) of the nonmetallic-bearing wastes may also be considered both for economic reasons (product yield enhancement) and for waste minimization reasons.

(2) Landfill Cost Tradeoffs. Reclaiming and recycling may decrease landfill costs, but land disposal restrictions relating to the fraction of the waste stream that cannot be recycled or reclaimed may offset these.

(3) Land Value Benefits. While it is indisputable that land values are an inverse function of contamination, no clear cut rules for measuring these effects have been derived. Notions of contingent valuation, particularly in marginal cases, continue to be researched in the scientific community. For today's proposed listing, no analysis of this was conducted. This would be of relevance both to residential and commercial property in the vicinity of refineries. If this were done, it would be necessary to attempt to differentiate between effects attributable to these wastes and effects attributable to other causes.

(4) Ecological and Natural Resource Benefits. Ecological benefits will derive from the proposed listing. EPA has

attempted to define and measure such benefits often over the years, most recently in the Hazardous Waste Identification Rule (HWIR) proposal. For HWIR, linkages between effect levels (human health as well as ecological) and exposure concentrations were developed (for air, soil, surface water, plants and animal products). The methodology embodied a "back-calculation" to determine permissible concentrations of contaminants at a predetermined risk level. As difficult as this is, a variant might be attempted for today's proposed rule, given adequate time and resources.

(5) Benefit From Extracting Oil Content From Prior Listings. EPA is proposing to expand the ability of petroleum refineries to recycle back into the process certain currently listed wastestreams: F037, F038, K048, K049, and K051. In each case, the oiled component of wastewater sludge could be fed back to a coker. A detailed analysis of the potential for savings (more accurately put, the potential for added feedstock resulting in revenue and for waste management cost avoided) was not possible in the time available given the mandated schedule, but EPA believes these benefits may be significant relative to the cost of the proposed listings. Offsetting these savings would be any cost associated with on-site storage and handling, and the cost associated with transport to cokers for refineries without cokers.

A survey of refineries would have to be undertaken to determine how widespread this practice is now. However, in general terms and based upon quantities taken from the 1993 Biennial Report System for the five wastes, at \$18.00 per barrel nominal value, EPA estimates that the benefit of this practice is between \$13 million and \$26 million. This could substantially offset any cost associated with this proposed listing.

However, the Agency based these estimates on a number of assumptions that would need further assessment. EPA notes that there are uncertainties associated with such estimates and requests comment on the benefits associated with this action.

XI. Paperwork Reduction Act

This rule does not contain any new information collection requirements subject to OMB review under the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* Facilities will have to comply with the existing Subtitle C recordkeeping and reporting requirements for newly listed wastestreams.

To the extent that this rule imposes any information collection requirements under existing RCRA regulations promulgated in previous rulemakings, those requirements have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, and have been assigned OMB control numbers 2050-120 (ICR no. 1573, Part B Permit Application and Modification); 2050-120 (ICR 1571, General Facility Standards); 2050-0028 (ICR 261, Notification of Regulated Waste Activity); 2050-0034 (ICR 262, Part A Permit Application); 2050-0039 (ICR 801, Hazardous Waste Manifest); 2050-0035 (ICR 820, Generator Standards); and 2050-0024 (ICR 976, Biennial Report).

Release reporting required as a result of listing wastes as hazardous substances under CERCLA and adjusting the reportable quantities (RQs) has been approved under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, and has been assigned OMB control number 2050-0046 (ICR 1049, Notification of Episodic Release of Oil and Hazardous Substances).

List of Subjects

40 CFR Part 261

Environmental protection, Hazardous materials, Waste treatment and disposal, Recycling.

40 CFR Part 266

Environmental protection, Hazardous materials, Waste management, Boilers and industrial furnaces.

40 CFR Part 268

Environmental protection, Hazardous materials, Waste management, Reporting and recordkeeping requirements, Land Disposal Restrictions, Treatment Standards.

40 CFR Part 271

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous material transportation, Hazardous waste, Indians-lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Water pollution control, Water supply.

40 CFR Part 302

Environmental protection, Air pollution control, Chemicals, Emergency Planning and Community Right-to-Know Act, Extremely hazardous substances, Hazardous chemicals, Hazardous materials, Hazardous materials transportation,

Hazardous substances, Hazardous wastes, Intergovernmental relations, Natural resources, Reporting and recordkeeping requirements, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Dated: October 31, 1995.

Carol M. Browner, Administrator.

For the reasons set out in the preamble, it is proposed to amend Chapter I of title 40 of the Code of Federal Regulations as follows:

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

1. The authority citation for part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, and 6938.

2. Section 261.3 is amended by revising paragraph (a)(2)(iv)(C), and adding paragraph (c)(2)(ii)(E) to read as follows.

§ 261.3 Definition of hazardous waste.

- (a) * * *
(2) * * *
(iv) * * *

(C) One of the following wastes listed in § 261.32, provided that the wastes are discharged to the refinery oil recovery sewer before primary oil/water/solids separation— heat exchanger bundle

cleaning sludge from the petroleum refining industry (EPA Hazardous Waste No. K050), and clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations (EPA Hazardous Waste No. K170); or

- * * * * *
(c) * * *
(2) * * *
(ii) * * *

(E) Ceramic support media separated from one of the following wastes listed in § 261.32—Spent hydrotreating catalyst (EPA Hazardous Waste No. K171), and Spent hydrorefining catalyst (EPA Hazardous Waste No. K172).

3. Section 261.4 is amended to revise paragraph (a)(12) and to add paragraphs (a)(13) and (a)(14) to read as follows:

§ 261.4 Exclusions.

(a) * * *
(12) Any hazardous oil-bearing secondary materials that are generated by SIC codes: 1311, 1321, 1381, 1382, 1389, 2911, 4612, 4613, 4922, 4923, 4789, 5171 and 5172 and are inserted into the petroleum refining process (SIC Code 2911) (including, but not limited to, distillation, catalytic cracking, fractionation, or thermal cracking units (i.e., cokers)) along with normal process streams, unless the material is placed on the land, or speculatively accumulated before being so recycled. Such

secondary materials inserted into thermal cracking units are excluded provided that the coke product also does not exhibit a characteristic of hazardous waste.

(13) Recovered oil from an associated organic chemical manufacturing facility which is to be inserted into the petroleum refining process (SIC Code 2911) along with normal process streams, unless the material is placed on the land, or speculatively accumulated before being so recycled. An "associated organic chemical manufacturing facility (SIC Code 2869) is either a physically co-located facility or a facility under common ownership with the refinery at which the recovered oil is inserted into the petroleum refining process.

(14) Spent caustic solutions from petroleum refining liquid treating processes used as a feedstock to produce cresylic or naphthenic acid unless the material is accumulated speculatively as defined in § 261.1(c).

* * * * *

4. Section 261.32 is amended by adding in alphanumeric order (by the first column) the following wastestreams to the subgroup 'Petroleum refining' to read as follows.

§ 261.32 Hazardous waste from specific sources.

* * * * *

Table with 3 columns: Industry and EPA hazardous waste No., Hazardous waste, Hazard code. Rows include K170, K171, and K172 with descriptions and codes (T, I, T).

5. Appendix VII to part 261 is amended by adding the following

wastestreams in alphanumeric order (by the first column) to read as follows.

Appendix VII to Part 261—Basis for Listing Hazardous Waste

Table with 3 columns: EPA hazardous waste No., Hazardous constituents for which listed, and a third column. Rows include K170, K171, and K172 with chemical names and a code '3-'.

* * * * *

PART 266—STANDARDS FOR THE MANAGEMENT OF SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

6. The authority citation for part 266 continues to read as follows:

Authority: Secs. 1006, 2002(a), 3004, and 3014 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), 6924, and 6934).

7. Section 266.100 is amended by adding paragraph (b)(5) to read as follows:

§ 266.100 Applicability.

(b) * * *

(5) Catalyst recovery furnaces if the only hazardous wastes burned are spent hydrotreating catalyst from petroleum refining operations (EPA Hazardous waste No. K171), and/or spent hydrorefining catalyst from petroleum refining operations (EPA Hazardous waste No. K172).

* * * * *

PART 268—LAND DISPOSAL RESTRICTIONS

8. The authority citation for part 268 continues to read as follows:

Authority: 42 U. S. C. 6905, 6912 (a), 6921, and 6924.

9. Section 268.31 is revised to read as follows:

* * * * *

Subpart C—Prohibitions on Land Disposal

§ 268.31 Waste specific prohibitions—petroleum refining wastes.

(a) Effective [Date of Six Months from the Publication Date of the Final Rule

for Listing as hazardous one or more of the proposed petroleum refining wastes in this rule.], the waste specified in 40 CFR 261 as EPA Hazardous Wastes Numbers K170, K171, and K172, soils and debris contaminated with these wastes, and radioactive wastes mixed with these hazardous wastes, are prohibited from land disposal.

(b) Between [Date of Six Months from the Publication of the Final Rule for Listing as hazardous one or more of the proposed petroleum refining wastes in this rule.], hazardous wastes K170, K171, and K172; radioactive wastes mixed with EPA Hazardous waste numbers K170, K171, and K172, and soil and debris contaminated with these wastes, may be disposed in a landfill or surface impoundment only if such unit is in compliance with the requirements specified in § 268.5(h)(2).

(c) The requirements of paragraph (a) of this section do not apply if:

(1) The waste meet the applicable treatment standards specified in subpart D of this part;

(2) Persons have been granted an exemption from a prohibition pursuant to a petition under § 268.6, with respect to those wastes and units covered by the petition;

(3) The waste meet the applicable treatment standards established pursuant to a petition granted under § 268.44;

(4) Hazardous debris that have met treatment standards in § 268.40 or in the alternative treatment standards in § 268.45; or

(5) Persons have been granted an extension to the effective date of a prohibition pursuant to § 268.5, with respect to these wastes covered by the extension.

(d) To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards

specified in § 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentrations in the waste extract or the waste, or the generator may use knowledge of the waste. If the waste contains constituents (including underlying hazardous constituents in characteristic wastes that have been diluted to remove the characteristic) in excess of the applicable Universal Treatment Standard levels of § 268.48, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.

Subpart D—Treatment Standards

10. Section 268.40 is amended by revising paragraph (e), and in the Table of Treatment Standards adding in alphanumerical order entries for K170, K171, and K172 to read as follows. The appropriate footnotes to the Table of Treatment Standards are republished without change.

§ 268.40 Applicability of treatment standards.

* * * * *

(e) For characteristic wastes subject to treatment standards in the following table "Treatment Standards for Hazardous Wastes," all underlying hazardous constituents (as defined in § 268.2(i)) must meet Universal Treatment Standards, found in § 268.40, Table UTS, prior to land disposal.

* * * * *

TREATMENT STANDARDS FOR HAZARDOUS WASTES

Waste code	Waste description and treatment/regulatory subcategory ¹	Regulated hazardous constituent		Wastewaters: concentration in mg/L ³ ; or technology code ⁴	Nonwastewaters: concentration in mg/kg ⁵ unless noted as "mg/L TCLP" or technology code
		Common name	CAS ² No.		
*	* Clarified slurry oil sludge from petroleum refining operations.	* Benz(a)anthracene	* 56-55-3	* 0.059	* 3.4
		Benzene	71-43-2	0.14	10
		Benzo(g,h,i)perylene	191-24-2	0.0055	1.8
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.0055	8.2
		Ethyl benzene	100-41-4	0.057	10
		Fluorene	86-73-7	0.059	3.4
		Indeno(1,2,3-cd)pyrene	193-39-5	0.0055	3.4
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	81-05-8	0.059	5.6

TREATMENT STANDARDS FOR HAZARDOUS WASTES—Continued

Waste code	Waste description and treatment/regulatory subcategory ¹	Regulated hazardous constituent		Wastewaters: concentration in mg/L ³ ; or technology code ⁴	Nonwastewaters: concentration in mg/kg ⁵ unless noted as "mg/L TCLP" or technology code
		Common name	CAS ² No.		
K171	Spent hydrotreating catalyst from petroleum refining operations (This listing does not include ceramic support media).	Pyrene	129-00-0	0.067	8.2
		Toluene (Methyl Benzene)	108-88-3	0.080	10
		Xylene(s) (Total)	1330-20-7	0.32	30
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzene	71-43-2	0.14	10
		Chrysene	218-01-9	0.059	3.4
		Ethyl benzene	100-41-4	0.057	10
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	81-05-8	0.059	5.6
		Pyrene	129-00-0	0.067	8.2
		Toluene (Methyl Benzene)	108-88-3	0.080	10
K172	Spent hydrorefining catalyst from petroleum refining operations (This listing does not include ceramic support media).	Xylene(s) (Total)	1330-20-7	0.32	30
		Arsenic	7740-38-2	1.4	5 mg/L (TCLP)
		Nickel	7440-02-0	3.98	5.0 mg/L (TCLP)
		Vanadium	7440-62-2	4.3	0.23 mg/L (TCLP)
		Reactive sulfides	N/A	DEACT	DEACT
		Benzene	71-43-2	0.14	10
		Ethyl benzene	100-41-4	0.057	10
		Toluene (Methyl Benzene)	108-88-3	0.080	10
		Xylene(s) (Total)	1330-20-7	0.32	30
		Antimony	7740-36-0	1.9	2.1 mg/L (TCLP)
		Arsenic	7740-38-2	1.4	5 mg/L (TCLP)
Nickel	7440-02-0	3.98	5.0 mg/L (TCLP)		
Vanadium	7440-62-2	4.3	0.23 mg/L (TCLP)		
Reactive Sulfides	N/A	DEACT	DEACT		

¹ The waste descriptions provided in this table do not replace waste descriptions in 40 CFR part 261. Descriptions of Treatment/Regulatory Subcategories are provided, as needed, to distinguish between applicability of different standards.

² CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with its salts and/or esters, the CAS number is given for the parent compound only.

³ Concentration standards for wastewaters are expressed in mg/L are based on analysis of composite samples.

⁴ All treatment standards expressed as a Technology Code or combination of Technology Codes are explained in detail in 40 CFR 268.42 Table 1—Technology Codes and Descriptions of Technology-Based Standards.

⁵ Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements of 40 CFR part 264, subpart O or part 265 subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

NOTE: NA means not applicable.

* * * * *

12. Appendix VI to Part 268 is amended by revising the text preceding the table to read as follows:

Appendix VI to Part 268—Recommended Technologies To Achieve Deactivation of Characteristics in § 268.40

The treatment standard for many subcategories of D001, D002, D003, and D011–D043 wastes as well as for K044, K045, K047, K171, and K172 wastes is listed in § 268.40 as “Deactivation and meet UTS.” EPA has determined that many technologies, when used alone or

in combination, can achieve the deactivation portion of the treatment standard. Characteristic wastes that also contain underlying hazardous constituents (see § 268.2) must be treated not only by a “deactivating” technology to remove the characteristic, but also to achieve the universal treatment standards (UTS) for underlying hazardous constituents. The following appendix presents a partial list of technologies, utilizing the five letter technology codes established in 40 CFR 268.42, Table 1, that may be useful in meeting the treatment standard. Use of these specific technologies is not mandatory and does not preclude direct

reuse, recovery, and/or the use of other pretreatment technologies, provided deactivation is achieved and, if applicable, underlying hazardous constituents are treated to achieve the UTS.

* * * * *

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

13. The authority citation for part 271 continues to read as follows:

Authority: 42 U.S.C. 9602; 33 U.S.C. 1321 and 1361.

Subpart A—Requirements for Final Authorization

14. Section 271.1(j) is amended by adding the following entry to Table 1 in chronological order by date of

publication in the Federal Register, and by adding the following entries to Table 2 in chronological order by effective date in the Federal Register, to read as follows:

§ 271.1 Purpose and scope.
* * * * *
(j) * * *

TABLE 1.—REGULATIONS IMPLEMENTING THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Promulgation date	Title of regulation	Federal Register reference	Effective date
[Insert date of publication of final rule in the Federal Register].	Listing Wastes from the Petroleum Refining Processes, Land Disposal Restrictions for Newly Identified Wastes.	[Insert Federal Register page numbers].	[Insert effective date of final rule]

* * * * *

TABLE 2.—SELF-IMPLEMENTING PROVISIONS OF THE SOLID WASTE AMENDMENTS OF 1984

Effective date	Self-implementing provision	RCRA citation	Federal Register reference
[Insert date 90 days from date of publication of final rule].	Prohibition on land disposal of newly listed and identified wastes.	3004(g)(4) (C) and 3004 (m).	[Insert date of publication of final rule]. [Insert FR page numbers].
[Insert date 2 years from date of publication of final rule].	Prohibition on land disposal of radioactive waste mixed with the newly listed or identified wastes, including soil and debris.	3004(m) 3004(g)(4) (C) and 3004(m)	Do. Do. Do.

* * * * *

PART 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

Authority: 42 U.S.C. 9602, 9603, and 9604; 33 U.S.C. 1321 and 1361.

17. The authority citation for part 302 continues to read as follows:

Option 1

§ 302.4 [Amended]

18. Table 302.4 in §302.4 is amended by adding the following new entries to read as follows under option 1. The appropriate footnotes to Table 302.4 are republished without change.

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste No.	Category	Pounds (Kg)
K170 Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations.	1*	4	K170	X	1(0.454)
K171 Spent hydrotreating catalyst from petroleum refining operations.	1*	4	K171	X	1(0.454)
K172 Spent hydrorefining catalyst from petroleum refining operations.	1*	4	K172	X	1(0.454)

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste No.	Category	Pounds (Kg)
†—Indicates the statutory source as defined by 1, 2, 3, and 4 below.							
4—Indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA Section 3001.							
1*—Indicates that the 1-pound RQ is a CERCLA statutory RQ.							

Option 2

19. Table 302.4 in §302.4 is amended by adding the following new entries to read as follows under option 2. The appropriate footnotes to Table 302.4 are republished without change.

TABLE 302.4.—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste No.	Category	Pounds (Kg)
K170 Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations.			1*	4	K170	B	100 (45.4)
K171 Spent hydrotreating catalyst from petroleum refining operations.			1*	4	K171	B	100 (45.4)
K172 Spent hydrorefining catalyst from petroleum refining operations.			1*	4	K172	B	B100 (45.4)
†—Indicates the statutory source as defined by 1, 2, 3, and 4 below.							
4—indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA Section 3001.							
1*—indicates that the 1-pound RQ is a CERCLA statutory RQ.							

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