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Lynette Weyman

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SUBJECT: GUIDANCE ON THE DEFINITION AND IDENTIFICATION OF COMMERCIAL MIXED LOW-LEVEL RADIOACTIVE AND HAZARDOUS WASTE AND ANSWERS TO ANTICIPATED QUESTIONS

The U.S. Environmental Protection Agency (EPA) has jurisdiction under the Resource Conservation and Recovery Act (RCRA) over the management of wastes with the exception of radioactive wastes subject to the Atomic Energy Act (AEA). Accordingly, commercial use and disposal of source, byproduct and special nuclear material wastes are regulated by the U.S. Nuclear Regulatory Commission (NRC) to meet EPA environmental standards. Under the AEA Low-Level Radioactive Wastes (LLW) contain source, byproduct, or special nuclear material, but they may also contain chemical constituents which are hazardous under EPA regulations in 40 CFR Part 261. Such wastes are commonly referred to as Mixed Low-Level Radioactive and Hazardous Waste (Mixed LLW).

NRC regulations exist to control the byproduct, source, and special nuclear material components of commercial Mixed LLW; EPA has the authority and continues to develop regulations to control the non-radioactive component of the Mixed LLW. Thus, the individual constituents of commercial Mixed LLW are subject to either NRC or EPA regulations. However, when the components are combined to become Mixed LLW, neither statute has exclusive jurisdiction. This has resulted in a situation of dual regulation where both NRC and EPA may regulate the same waste.

Enclosed is the revised guidance document entitled, "Guidance on the Definition and Identification of Commercial Mixed Low-Level Radioactive and Hazardous Waste." This document was developed jointly by the NRC and EPA to aid commercial LLW generators in assessing whether they are currently generating Mixed LLW. It is based on NRC and EPA regulations in effect on December 31, 1988.

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Notice of availability of the guidance document and request for comments were published in the Federal Register on April 7, 1987, and comments were subsequently received. We have addressed public comment in the question and answer section of the guidance document to provide clarification of those major issues which were raised.

Sincerely,

Jonathan Z. Cannon, Acting
Assistant Administrator
Office of Solid Waste and
Emergency Response
U.S. Environmental Protection
Agency

Robert Bernero, Director
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory
Commission

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GUIDANCE ON THE DEFINITION AND IDENTIFICATION OF COMMERCIAL MIXED LOW-LEVEL RADIOACTIVE AND HAZARDOUS WASTE

Definition

Mixed Low-Level Radioactive and Hazardous Waste (Mixed LLW) is defined as waste that satisfies the definition of low-level radioactive waste (LLW) in the Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPAA) and contains hazardous waste that either (1) is listed as a hazardous waste in Subpart D of 40 CFR Part 261 or (2) cause the LLW to exhibit any of the hazardous waste characteristics identified in Subpart C of 40 CFR Part 261.

Identification

The policy provided in this guidance was developed jointly by the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Environmental Protection Agency (EPA). LLW that contains hazardous wastes defined under the Resource Conservation and Recovery Act (RCRA) is Mixed LLW. Under current Federal law, such waste is subject to regulation by NRC under the Atomic Energy Act (AEA), as amended, and by EPA under RCRA, as amended. In the absence of legislation to the contrary, management and disposal of this waste must be conducted in compliance with NRC and EPA or equivalent state regulations.

This guidance presents a methodology (Figure 1) that may be used by generators of commercial LLW to identify Mixed LLW. Implementation of the methodology should identify Mixed LLW and aid generators in assessing whether they are currently generating Mixed LLW. Generators are cautioned, however, that application of the methodology does not affect the need to comply with applicable NRC and EPA regulations. Because EPA's regulations for hazardous waste are currently changing, generators should use applicable regulations that are in effect at the time of implementation of the methodology. This guidance has been prepared based on NRC and EPA regulations in effect on December 31, 1988.

Application of this methodology to identify Mixed LLW will reveal the complexities of the definition of Mixed LLW. If generators have specific questions about whether LLW is Mixed LLW, they should promptly contact the agencies by writing to the persons listed below.

For questions about whether the waste is low-level radioactive waste, contact:

Regis R. Boyle
Division of Low-Level Waste
Management and Decommissioning
U.S. Nuclear Regulatory Commission
Mail Stop WF5E4
Washington, D.C. 20555

For questions about whether the waste is hazardous waste, contact:

Suzanne Rudzinski, Chief
State Programs Branch
Permits and State
Programs Division
Mail Code OS-342
U.S. Environmental
Protection Agency
401 M St., S.W.
Washington, D.C. 20460

Methodology

Step 1. Identify LLW

Step 1 in the methodology requires that the generator determine whether the waste is LLW as defined in the LLRWPAA. This Act defines LLW as radioactive material that (A) is not high-level radioactive waste, spent nuclear fuel, or byproduct material as defined in section 11e(2) of the AEA (i.e., uranium or thorium mill tailings) and (B) the NRC classifies as LLW consistent with existing law and in accordance with (A). If the generator determines that the waste is LLW, the generator should proceed to step 2. If the determination is negative, then the waste cannot be Mixed LLW because it is not LLW. However, the waste may be another radioactive or hazardous waste regulated under AEA, RCRA, or both statutes.

Step 2. Identify Listed Hazardous Waste

In step 2, the generator determines whether the LLW contains any hazardous wastes listed in Subpart D of 40 CFR Part 261. Subpart D of Part 261 is reproduced in Appendix I of this guidance. LLW is Mixed LLW if it contains any hazardous wastes specifically listed in Subpart D of 40 CFR Part 261. Listed hazardous wastes include hazardous waste streams from specific and non-specific sources listed in 40 CFR Parts 261.31 and 261.32 and discarded commercial chemical products listed in 40 CFR Part 261.33. The generator is responsible for determining whether LLW contains listed hazardous wastes. The determination should be based on knowledge of the process that generates the waste. For example, if a process produces LLW that contains spent solvents that are specifically listed in the tables of Subpart D of Part 261, the generator should suspect that the waste is Mixed LLW.

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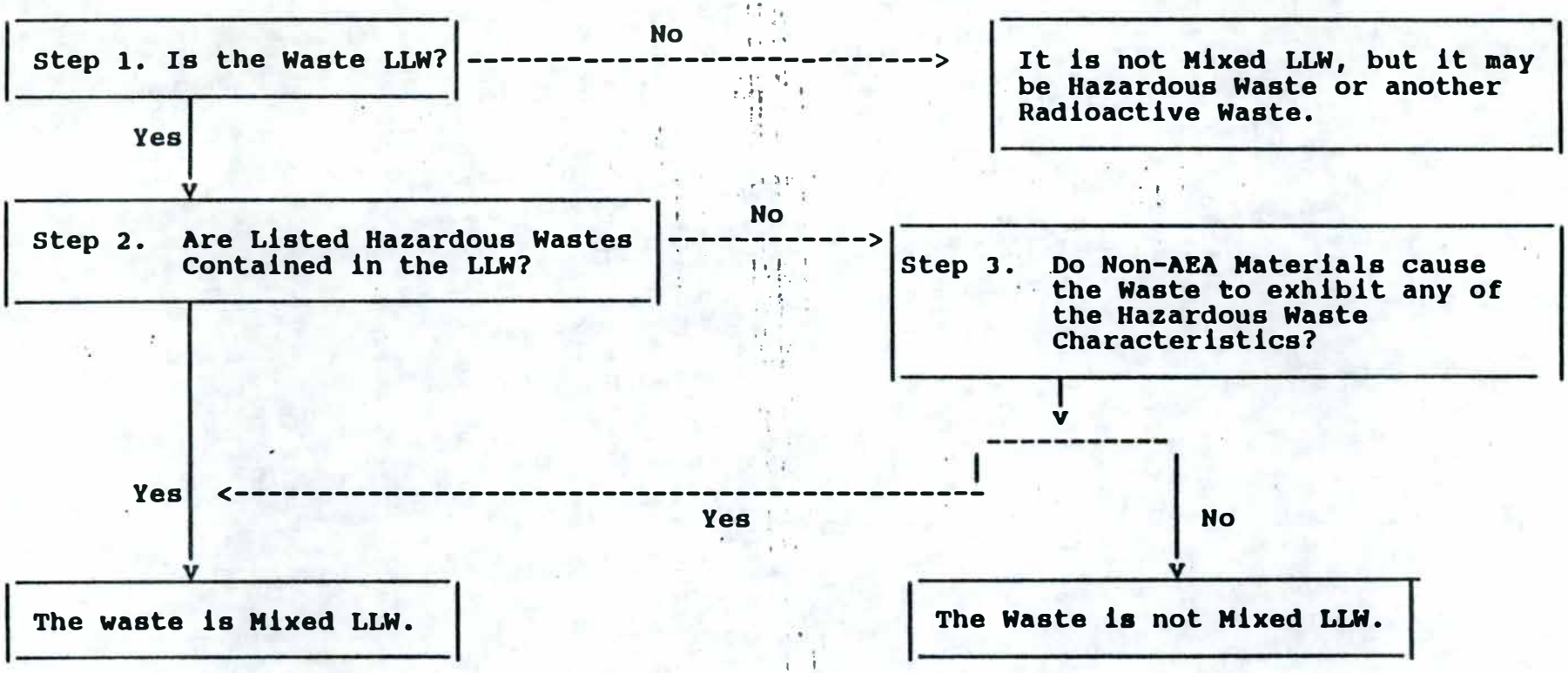

Figure 1. Identification of Mixed LLW.

Step 3. Identify Hazardous Characteristics

If the LLW does not contain a listed hazardous waste, Step 3 of the methodology requires the generator to determine whether the LLW contains hazardous wastes that cause the LLW to exhibit any of the hazardous waste characteristics identified in Subpart C of 40 CFR Part 261. This determination can be based on either (1) an assessment of whether the LLW exhibits one or more of the hazardous waste characteristics because it contains non-AEA materials (i.e., materials other than source, special nuclear, and byproduct materials) based on the generator's knowledge of the materials or processes used in generating the LLW or (2) testing of the LLW in accordance with the methods identified in Subpart C of Part 261. Except for certain ores containing source material, which are defined as source material in 10 CFR 40.4(h), and uranium and thorium mill tailings or wastes, NRC and EPA interpret the definitions of source, special nuclear, and byproduct materials to include only the radioactive elements themselves. Generators should identify non-AEA materials contained in the LLW by examining the process that generates the waste. For example, if the process mixes byproduct material (an AEA material) with a volatile organic solvent (a non-AEA material), the generator would determine either through his knowledge or testing of representative samples of the LLW that contain the solvent waste whether the waste exhibits any of the hazardous waste characteristics because it contains the solvent.

If the wastes are tested, the generator should collect and test representative samples of the LLW to determine if the waste exhibits any of the characteristics identified in Subpart C because it contains the non-AEA materials. These characteristics include ignitability (Section 261.21), corrosivity (Section 261.22), reactivity (Section 261.23), and Extraction Procedure (EP) toxicity (Section 261.24). Waste testing should be conducted in a manner that is consistent with the worker protection requirements in 10 CFR Part 20. The purpose of the characteristics tests is to identify hazardous wastes that are not specifically listed in Subpart D of 40 CFR Part 261. Test methods to collect representative samples of wastes are described in Appendix I of 40 CFR Part 261. The samples should then be tested using the referenced testing protocols (e.g., ASTM Standard D-93-79 or D-93-80 for the Pensky-Martens Closed Cup Ignitability Test). EPA's testing requirements are reproduced in Appendix II of this guidance. It should be noted that on June 13, 1986, EPA proposed a modification to the EP Toxicity testing requirements to include organic constituents.

If LLW contains a listed hazardous waste or non-AEA materials that cause the LLW to exhibit any of the hazardous waste characteristics, the waste is Mixed LLW and must, therefore, be managed and disposed of in compliance with EPA's Subtitle C hazardous waste regulations in 40 CFR Parts 124, and 260 through 270, and NRC's regulations in 10 CFR Parts 20, 30, 40, 61, and 70.

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Management and disposal of Mixed LLW must be conducted in compliance with state requirements in states with EPA-authorized regulatory programs for the hazardous components of such waste and NRC agreement state radiation control programs for LLW.

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Questions and Answers

As a supplement to the Guidance on the Definition and Identification of Commercial Mixed Low-Level Radioactive and Hazardous Waste (Mixed LLW), answers to anticipated questions are included to clarify obscure points and to respond to public comments.

1. Are my low-level radioactive wastes exempt from RCRA because they are source, special nuclear, or byproduct materials as defined under the AEA?

Except for certain ores containing source material, which are defined as source material in 10 CFR 40.4(h), and uranium and thorium mill tailings or wastes, NRC and EPA consider that only the radionuclides themselves are exempt from RCRA. Section 1004(27) of RCRA excludes source, special nuclear, and byproduct material from the definition of "solid waste." RCRA defines solid waste as:

> "any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, or from community activities, <u>but does not include</u> solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Waster Pollution Control Act, as amended (86 Stat. 880), or <u>source, special nuclear,</u> or <u>byproduct material</u> as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923)." [emphasis added]

Since "hazardous waste" is a subset of "solid waste," RCRA also excludes source, special nuclear, and byproduct materials from the definition of hazardous waste and, therefore, from regulation under EPA's RCRA Subtitle C program. Section 11 of the Atomic Energy Act, as amended, defines these radioactive materials as follows:

> Source material means (1) uranium, thorium, or any other material which is determined by the Atomic Energy Commission (AEC) pursuant to the provisions of section 61 of the AEA to be source material, or (2) ores containing one or more of the foregoing materials, in such concentration as the AEC may by regulation determine from time to time.
>
> Special nuclear material means (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the AEC, pursuant to the provisions of Section 51 of the AEA, determines to be special nuclear material; or (2) any material artificially enriched by any of the foregoing, but does not include source material.

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> Byproduct material means (1) any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to radiation incident to the process of producing or utilizing special nuclear material, and (2) the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

Source, special nuclear, and byproduct materials, however, may be mixed with other radioactive or non-radioactive materials that are not source, special nuclear, or byproduct materials. For example, tritium may be contained in toluene, a nonhalogenated aromatic solvent. Consistent with the definition of byproduct material, the tritium may be considered a byproduct material, while the toluene that contains the tritium would not be byproduct material. Mixtures of toluene and tritium could satisfy the definition of Mixed LLW because they contain listed hazardous waste (spent toluene) and tritium that may qualify as LLW if it has been produced by activities regulated by NRC under the AEA.

2. What are some examples of Mixed LLW?

A preliminary survey performed for the NRC identified two potential types of Mixed LLW:

- o LLW containing organic liquids, such as scintillation liquids and vials; organic lab liquids; sludges; and cleaning, degreasing, and miscellaneous solvents.

- o LLW containing heavy metals, such as discarded lead shielding, discarded lined containers, and lead oxide dross containing uranium oxide; light water reactor (LWR) process wastes containing chromate and LWR decontamination resins containing chromium; and mercury amalgam in trash.

The preliminary survey concluded that potential Mixed LLW comprises a small percentage of all LLW. For example, LLW containing organic liquids accounted for approximately 2.3% by volume of LLW reported in the preliminary survey (Bowerman, et al., 1985).

An earlier survey identified a more diverse universe of potential Mixed LLW including wastes that contained aldehydes, aliphatic halogenated hydrocarbons, alkanes, alkenes, amino acids, aromatic hydrocarbons, chelating agents, esters, ethers, ketones, nitrosamines, nucleotides, pesticides, phenolic compounds, purines, resins, steroids, and vitamins (General Research Corporation, 1980). NRC also anticipates that additional LLW may be identified as Mixed LLW in the future, as generators implement the definition of Mixed LLW and as EPA revises the definition of hazardous waste.

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3. Could some "below regulatory concern" wastes be considered Mixed LLW?

A determination that radioactive wastes are below regulatory concern (BRC) for radioactivity may affect how the wastes are managed or discarded, but it does not affect the legal status of the wastes. Specifically, their status with respect to the definition of Mixed LLW does not change. BRC waste is still LLW because it satisfies the definition of LLW in the LLRWPAA and is within the NRC's jurisdictional authority under the AEA.

When radioactive waste contains sufficiently low concentrations or quantities of radionuclides, NRC may find that they do not need to be managed or disposed of as radioactive wastes. For NRC to make such a finding, management and disposal of the waste must not pose an undue radiological risk to the public and the environment. However, NRC's determination that the radioactive content of the wastes is below NRC regulatory concern does not relieve licensees from compliance with applicable rules of other agencies governing non-radiological hazards (e.g., regulations of EPA or the Department of Transportation).

Therefore, some BRC wastes may still be considered Mixed LLW if they contain hazardous wastes that have been listed in Subpart D of 40 CFR Part 261 or that cause the LLW to exhibit any of the hazardous characteristics described in Subpart C of 40 CFR Part 261. BRC Mixed LLW may be managed without regard to its radioactivity (but it must still be managed as a hazardous waste in compliance with EPA's regulations for hazardous waste generation, storage, transportation, treatment, and disposal (cf. 40 CFR Parts 262 through 266)).

4. If I use chemicals in my process that are identified by EPA as hazardous constituents, should I assume that my LLW is Mixed LLW?

No. Low-level radioactive waste that contains hazardous constituents may not necessarily be Mixed LLW. As defined above, Mixed LLW is LLW that contains a known hazardous waste (i.e., a listed hazardous waste) or that exhibits one or more of the hazardous characteristics because it contains non-AEA materials. For wastes that are not listed in Subpart D of 40 CFR Part 261, testing is not necessarily required to "determine" whether the LLW exhibits any of the hazardous characteristics. A generator may be able to determine whether the LLW is Mixed LLW based on knowledge of the waste characteristics or the process that generates the LLW.

Furthermore, if the generator normally segregates LLW from hazardous and other types of wastes, there is no need to assume that hazardous wastes may have been inadvertently mixed with LLW or to inspect each container or receptacle to ensure that inadvertent mixing has not occurred. Although the generator is subject to RCRA inspections and must follow the manifest, pre-transport, and other requirements of

40 CFR Part 262, the generator is not required to demonstrate that every LLW container does not contain hazardous waste.

5. How can I obtain representative samples of heterogeneous trash included in LLW to perform the hazardous characteristics tests?

Before discussing the collection of representative samples of waste, generators are reminded that they are not required to test LLW to determine if the waste contains hazardous wastes. Generators and handlers of mixed waste and hazardous waste can declare their wastes hazardous or nonhazardous based on knowledge of the process/production of the waste, in lieu of testing for a characteristic.

Representative samples of waste should be collected for testing in accordance with EPA's regulations in 40 CFR 261.20(c), which state that waste samples collected using applicable methods specified in Appendix I of Part 261 will be considered as representative samples for hazardous characteristics testing. This appendix has been included in its entirety in Appendix II of this guidance. The sampling techniques described in Appendix I of Part 261 apply to extremely viscous liquids, fly ash-like material, containerized liquid wastes, and liquid wastes in pits, ponds, lagoons, and similar reservoirs. In the absence of guidance about sampling heterogeneous wastes, generators should use appropriate portions of the sampling methods described in Appendix I of Part 261 and EPA's manual entitled "Test Methods for Evaluating Solid Waste, Third Edition (i.e., SW-846) in combination with other methods to collect, to the maximum extent practicable, representative samples of the waste to be tested.

6. Are lead containers whose primary use is for shielding in disposal operations, hazardous waste under RCRA?

No. While lead containers and lead container liners may exhibit the hazardous characteristic for lead, those containers whose primary use is for shielding in low-level waste disposal operations are not considered wastes and thus, are not subject to the hazardous waste rules. These same containers and liners if disposed of or discarded would be considered wastes and if they exhibit the hazardous characteristic, would be subject to the hazardous waste rules.

It should be noted that EPA recognizes that all lead containers and liners may be equally hazardous to human health and the environment when placed in the ground independent of its legal classification as a waste or container. Therefore, EPA recommends that all lead containers and lead liners be managed in an environmentally safe manner (e.g., managed in a permitted hazardous waste facility or treated such that it no longer exhibits its characteristic).

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Encapsulation may be a viable mechanism to mitigate lead migration from these containers and liners. The EPA has not evaluated specific containers or encapsulation methodologies using the EP Toxicity test.

7. If a waste contains any of the constituents listed on Appendix VIII of Part 261, is it a hazardous under RCRA?

No. Under RCRA, a waste is hazardous if it is a "listed" waste or it exhibits a hazardous characteristic. Wastes are listed by EPA if they contain significant amounts of toxic constituents identified in Appendix VIII, and the Agency has determined that these toxic constituents are persistent and mobile to some degree such that they pose a potential and substantial threat to human health and the environment. (Factors outlined in 40 CFR 261.11(a)(3)(i)-(xi), which include nature of the toxicity present and potential degradation products, may be considered when determining whether or not a waste should be listed). However, until the Agency lists the wastes in Subpart D of Part 261, they would not be considered hazardous by EPA (even if the waste contains one or more of the hazardous constituents listed on Appendix VIII) unless the waste would exhibit one or more of the hazardous waste characteristics.

References

Bowerman, B. S., Kempf, C. R., MacKenzie, D. R., Siskind, B. and P. L. Piciulo, 1985, "An Analysis of Low-Level Wastes: Review of Hazardous Waste Regulations and Identification of Radioactive Mixed Wastes," NUREG/CR-4406, U.S. Nuclear Regulatory Commission.

General Research Corporation, 1980, "Study of Chemical Toxicity of Low-Level Wastes," NUREG/CR-1793, U.S. Nuclear Regulatory Commission.

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Appendix I

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Subpart D—Lists of Hazardous Wastes

§ 261.30 General.

(a) A solid waste is a hazardous waste if it is listed in this subpart, unless it has been excluded from this list under §§ 260.20 and 260.22.

(b) The Administrator will indicate his basis for listing the classes or types of wastes listed in this Subpart by employing one or more of the following Hazard Codes:

[illegible] Waste	[illegible]
Corrosive Waste	
Reactive Waste	
EP Toxic Waste	
Acute Hazardous Waste	
Toxic Waste	

Appendix VII identifies the constituent which caused the Administrator to list the waste as an EP Toxic Waste (E) or Toxic Waste (T) in §§ 261.31 and 261.32.

(c) Each hazardous waste listed in this subpart is assigned an EPA Hazardous Waste Number which precedes the name of the waste. This number must be used in complying with the notification requirements of Section 3010 of the Act and certain recordkeeping and reporting requirements under Parts 262 through 265 and Part 270 of this chapter.

(d) The following hazardous wastes listed in § 261.31 or § 261.32 are subject to the exclusion limits for acutely hazardous wastes established in § 261.5: EPA Hazardous Wastes Nos. FO20, FO21, FO22, FO23, FO26, and FO27.

[45 FR 33119, May 19, 1980, as amended at 46 FR 14294, Apr. 1, 1982; 50 FR 2000, Jan. 14, 1985]

§ 261.31 Hazardous wastes from non-specific sources.

The following solid wastes are listed hazardous wastes from non-specific sources unless they are excluded under §§ 260.20 and 260.22 and listed in Appendix IX.

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
General		
F001*	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and all spent solvents from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002*	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and all spent solvents from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003*	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004 and F005; and all spent solvents from the recovery of these spent solvents and spent solvent mixtures.	(T)
F004*	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and all spent solvents from the recovery of these spent solvents and spent solvent mixtures.	(T)
F005*	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and all spent solvents from the recovery of these spent solvents and spent solvent mixtures.	(T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	(T)
F007	Plating bath sludges from the bottom of plating baths from electroplating operations where cyanides are used in the process.	(R,T)
F008	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	(R,T)
F009	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	(R,T)
F010	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	(R,T)
F024	Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor clean-out wastes from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing the free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent desiccants, wastewater wastewater treatment sludges, spent catalysts and wastes listed in § 261.32.)	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)	(T)
F021*	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	(T)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(T)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.)	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment that would usually be used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(T)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenols or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.)	(T)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA hazardous waste nos. F020, F021, F022, F023, F026, and F027.	(T)

*(T) chemical abstracts name is used to identify mixtures containing xylenes and cresol isomers.

[46 FR 4617, Jan. 16, 1981, as amended at 46 FR 27477, May 20, 1981; 49 FR 5312, Feb. 10, 1984; 49 FR 37070, Sept. 21, 1984; 50 FR 665, Jan. 4, 1985; 50 FR 2000, Jan. 14, 1985; 50 FR 53319, Dec. 31, 1985; 51 FR 2702, Jan. 21, 1986; 51 FR 6541, Feb. 26, 1986]

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§ 261.32 Hazardous wastes from specific sources.

The following solid wastes are listed hazardous wastes from specific sources unless they are excluded under §§ 260.20 and 260.22 and listed in Appendix IX.

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
Wood preservation: K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.	C T
Inorganic pigments:		
K002	Wastewater treatment sludge from the production of chrome yellow and orange pigments.	T
K003	Wastewater treatment sludge from the production of molybdate orange pigments.	T
K004	Wastewater treatment sludge from the production of zinc yellow pigments.	T
K005	Wastewater treatment sludge from the production of chrome green pigments.	T
K006	Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).	T
K007	Wastewater treatment sludge from the production of iron blue pigments.	T
K008	Oven residue from the production of chrome oxide green pigments.	T
Organic chemicals:		
K009	Distillation bottoms from the production of acetaldehyde from ethylene.	T
K010	Distillation side cuts from the production of acetaldehyde from ethylene.	T
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile.	R T
K013	Bottom stream from the acetonitrile column in the production of acrylonitrile.	R T
K014	Bottoms from the acetonitrile purification column in the production of acrylonitrile.	T
K015	Still bottoms from the distillation of benzyl chloride.	T
K016	Heavy ends or distillation residues from the production of carbon tetrachloride.	T
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin.	T
K018	Heavy ends from the fractionation column in ethyl chloride production.	T
K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.	T
K020	Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.	T
K021	Aqueous spent antimony catalyst waste from fluorocarbon production.	T
K022	Distillation tower bottoms from the production of phenol/acetone from cumene.	T
K023	Distillation light ends from the production of phthalic anhydride from naphthalene.	T
K024	Distillation bottoms from the production of phthalic anhydride from naphthalene.	T
K025	Distillation light ends from the production of phthalic anhydride from ortho-xylene.	T
K026	Distillation bottoms from the production of phthalic anhydride from ortho-xylene.	T
K027	Distillation tar residues from the production of methylethylpyridines by the reaction of acetaldehyde and ammonia.	T
K028	Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.	T
K029	Waste from the product stream stripper in the production of 1,1,1-trichloroethane.	T
K030	Distillation bottoms from the production of 1,1,1-trichloroethane.	T
K083	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.	T
K084	Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.	T
K085	Distillation bottoms from aniline production.	T
K093	Distillation residues from phthalic anhydride production from the production of phthalic anhydride.	T
K094	Distillation residues from the production of phenol/acetone from cumene.	T
K095	Distillation residues from the production of 1,1,1-trichloroethane.	T
K096	Heavy ends or distillation residues from the production of 1,1,1-trichloroethane.	T
Inorganic chemicals:		
K071	Brine purification muds from the mercury cell process in chlorine production, where hydrogen peroxide is not used.	T
K073	Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.	T
K106	Wastewater treatment sludge from the mercury cell process in chlorine production.	T
Pesticides:		
K031	By-product salts generated in the production of MSMA and cacodylic acid.	T
K032	Wastewater treatment sludge from the production of chlordane.	T
K033	Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.	T
K034	Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.	T
K097	Vinyl chloride sludge from the carbon adsorber in the production of chlordane.	T
K098	Hexachlorophene synthesis prepurified in the production of chlorinated phenols.	T
K099	Untreated process wastewater from the production of 2,4-D.	T
K035	Wastewater treatment sludge from the production of creosote.	T
K036	Still bottoms from toluene reclamation distillation in the production of disulfoton.	T
K037	Wastewater treatment sludge from the production of disulfoton.	T
K038	Wastewater from the washing and stripping of phorate production.	T
K039	Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.	T
K040	Wastewater treatment sludge from the production of phorate.	T
K041	Wastewater treatment sludge from the production of toxaphene.	T
K042	Untreated process wastewater from the production of toxaphene.	T

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	T
K043	2,6-Dichlorophenol waste from the production of 2,4-D.	T
K099	Untreated wastewater from the production of 2,4-D.	T
[illegible]		
K044	Wastewater treatment sludges from the manufacturing and processing of explosives.	R
K045	Spent carbon from the treatment of wastewater containing explosives.	R
K046	Wastewater treatment sludges from the manufacturing, formulation and loading of lead based initiating compounds.	T
K047	Pink/red water from TNT operations.	R
Pesticides industry		
K048	Dissolved air flotation (DAF) float from the petroleum refining industry.	T
K049	Slop oil emulsion solids from the petroleum refining industry.	T
K050	Heat exchanger bundle cleaning sludge from the petroleum refining industry.	T
K051	API separator sludge from the petroleum refining industry.	T
K052	Tank bottoms (leaded) from the petroleum refining industry.	T
Iron and steel		
K061	Emission control dust/sludge from the primary production of steel in electric furnaces.	T
K062	Spent pickle liquor generated by steel finishing operations of plants that produce iron or steel.	C,T
Secondary lead		
K069	Emission control dust/sludge from secondary lead smelting.	T
K100	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.	T
Veterinary pharmaceuticals		
K084	Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	T
K101	Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	T
K102	Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	T
[illegible], K086	Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and metallic soaps and used.	T
Coking		
K060	Ammonia still lime sludge from coking operations.	T
K087	Decanter tank tar sludge from coking operations.	T

[46 FR 4618, Jan. 16, 1981, as amended at 46 FR 27476-27477, May 20, 1981; 49 FR 37070, Sept. 21, 1984; 50 FR 42942, Oct. 23, 1985; 51 FR 5330, Feb. 13, 1986; 51 FR 18322, May 28, 1986]

EFFECTIVE DATE NOTE: At 51 FR 5330, Feb. 13, 1986, in § 261.32, waste streams "K117, K118, and K136" in the subgroup "Organic Chemicals" were added, effective August 13, 1986.

§ 261.33 Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof.

The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded, when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, or when, in lieu of their original intended use, they are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel.

(a) Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in paragraph (e) or (f) of this section.

(b) Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) or (f) of this section.

(c) Any container or inner liner removed from a container that has been used to hold any commercial chemical product or manufacturing chemical intermediate having the generic names listed in paragraph (e) of this section, or any container or inner liner removed from a container that has been

used to hold any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) of this section, unless the container is empty as defined in § 261.7(b)(3) of this chapter.

[Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, EPA considers the residue to be intended for discard, and thus a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commerical chemical product or manufacturing chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

(d) Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in paragraph (e) or (f) of this section, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill, into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) or (f) of this section.

[Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in . . ." refers to a chemical substance which is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in paragraph (e) or (f). Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in paragraph (e) or (f), such waste will be listed in either § 261.31 or § 261.32 or will be identified as a hazardous waste by the characteristics set forth in Subpart C of this part.]

(e) The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in paragraphs (a) through (d) of this section, are identified as acute hazardous wastes (H) and are subject to be the small quantity exclusion defined in § 261.5(e).

[Comment: For the convenience of the regulated community the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound only is listed for acute toxicity.]

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste No.	Substance
P023	Acetaldehyde, chloro-
P002	Acetamide, [illegible]
P057	Acetamide, 2-fluoro-
P058	Acetic acid, fluoro-, sodium salt
P066	Acetimidic acid, [illegible]
P001	3-(alpha-Acetonylbenzyl)-4-hydroxycoumarin and salts, when present at concentrations greater than 0.3%
P002	1-Acetyl-2-thiourea
P003	Acrolein
P070	Aldicarb
P004	Aldrin
P005	Allyl alcohol
P006	Aluminum phosphide
P007	5-(Aminomethyl)-3-isoxazolol
P008	4-Aminopyridine
P009	Ammonium picrate (R)
P119	Ammonium vanadate
P010	Arsenic acid
P012	Arsenic (III) oxide
P011	Arsenic (V) oxide
P011	Arsenic pentoxide
P012	Arsenic trioxide
P038	Arsine, diethyl-
P054	Aziridine
P013	Barium cyanide
P024	Benzenamine, 4-chloro-
P077	Benzenamine, 4-nitro-
P028	Benzene, (chloromethyl)-
P042	1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-
P014	Benzenethiol
P028	Benzyl chloride
P015	Beryllium dust
P016	Bis(chloromethyl) ether
P017	Bromoacetone
P018	Brucine
P021	Calcium cyanide
P123	Camphene, [illegible]
P103	Carbamodiazoimidic acid
P022	Carbon bisulfide
P022	Carbon disulfide
P095	Carbonyl chloride

Hazardous waste No	Substance
P023	[illegible]
P022	[illegible]
P024	[illegible]
P025	[illegible]
P027	[illegible]
P029	[illegible]
P030	[illegible]
P031	[illegible]
P033	[illegible]
P036	[illegible]
P037	[illegible]
P038	[illegible]
P039	[illegible]
P041	[illegible]
P040	[illegible]
P043	[illegible]
P044	[illegible]
P046	[illegible]
P071	[illegible]
P042	[illegible]
P047	[illegible]
P034	[illegible]
P044	[illegible]
P070	[illegible]
P084	[illegible]
P078	[illegible]
P049	[illegible]
P109	[illegible]
P050	[illegible]
P088	[illegible]
P051	[illegible]
P042	[illegible]
P046	[illegible]
P084	[illegible]
P101	[illegible]
P084	[illegible]
P087	[illegible]
P088	[illegible]
P057	[illegible]
P058	[illegible]
P065	[illegible]
P059	[illegible]
P051	[illegible]
P037	[illegible]
P060	[illegible]
P084	[illegible]
P060	[illegible]
P062	[illegible]
P116	[illegible]
P068	[illegible]
P063	Hydrocyanic acid
P063	Hydrogen cyanide
P096	Hydrogen phosphide
P064	Isocyanic acid, methyl ester
P007	3(2H)-Isoxazolone, 5-(aminomethyl)-
P092	Mercury, (acetato-O)phenyl-
P065	Mercury fulminate (R,T)
P016	Methane, oxybis[chloro-

Hazardous waste No	Substance
P112	[illegible] (R)
P118	[illegible]
P089	[illegible] 1,4,5,8,7,8,9-[illegible] 4,7,7-[illegible]
P066	[illegible]
P067	[illegible]
P069	[illegible]
P084	[illegible]
P069	[illegible]
P071	[illegible]
P072	[illegible]
P073	[illegible]
P074	[illegible]
P074	[illegible]
P072	[illegible]
P075	[illegible]
P076	[illegible]
P077	[illegible]
P078	[illegible]
—	[illegible]
P075	[illegible]
P081	[illegible] (R)
P082	[illegible]
P084	[illegible]
P089	[illegible] 1,4,5,8,7,7-[illegible]
P085	[illegible]
P087	[illegible]
P087	[illegible]
P088	7-[illegible](2.2.1)[illegible]-2,3-[illegible]carboxylic acid
P089	[illegible]
P034	[illegible]
P048	[illegible]
P047	[illegible]
P020	[illegible]
P009	[illegible] (R)
P036	[illegible]
P092	[illegible]
P093	[illegible]
P094	[illegible]
P095	[illegible]
P096	[illegible]
P041	[illegible]
P044	[illegible]
P043	[illegible]
P094	[illegible]
P095	[illegible]
P096	[illegible]
P097	[illegible]
P110	[illegible]
P098	[illegible]
P099	[illegible]
P070	[illegible]
P101	[illegible]
P027	[illegible]
P099	[illegible]
P081	[illegible] (R)
P017	[illegible]
P102	[illegible]
P003	[illegible]
P005	[illegible]
P067	[illegible]
P102	[illegible]
P003	[illegible]

Hazardous Waste No.	Substance
P075	[illegible]
P111	[illegible]
P103	[illegible]
P104	[illegible]
P106	[illegible]
P108	[illegible]
P107	[illegible]
P108	[illegible]
P110	[illegible]
P115	[illegible]
P109	[illegible]
P110	[illegible]
P111	[illegible]
P112	[illegible]
P062	[illegible]
P113	[illegible]
P113	[illegible]
P114	[illegible]
P115	[illegible]
P049	[illegible]
P049	[illegible]
P014	[illegible]
P116	[illegible]
P026	[illegible]
P072	[illegible]
P093	[illegible]
P123	[illegible]
P118	[illegible]
P119	[illegible]
P120	[illegible]
P120	[illegible]
P001	[illegible]
P121	Zinc cyanide
P122	Zinc phosphide (R,T)
P122	Zinc phosphide, when present at concentrations greater than 10%

(f) The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in paragraphs (a) through (d) of this section, are identified as toxic wastes (T), unless otherwise designated and are subject to the small quantity generator exclusion defined in § 261.5 (a) and (g).

[*Comment:* For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), R (Reactivity), I (Ignitability) and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous Waste No.	Substance
U001	[illegible]
U004	[illegible]
U187	[illegible]
U006	[illegible]
U112	[illegible]
U144	[illegible]
U214	[illegible]
U002	[illegible]
U003	[illegible]
U045	[illegible]
U004	[illegible]
U005	[illegible]
U006	[illegible]
U007	[illegible]
U008	[illegible]
U009	[illegible]
U180	[illegible]
U026	[illegible]
U063	[illegible]
U011	[illegible]
U012	[illegible]
U014	[illegible]
U015	[illegible]
U010	[illegible]
U167	[illegible]
U016	[illegible]
U018	[illegible]
U017	[illegible]
U018	[illegible]
U019	[illegible]
U064	[illegible]
U012	[illegible]
U014	[illegible]
U049	[illegible]
U063	[illegible]
U158	[illegible]
U222	[illegible]
U181	[illegible]
U019	[illegible]
U038	[illegible]
U039	[illegible]
U027	[illegible]
U160	[illegible]
U028	[illegible]
U066	[illegible]
U068	[illegible]
U163	[illegible]
U197	[illegible]
U070	[illegible]
U071	[illegible]
U072	[illegible]
U017	[illegible]
U023	[illegible]
U030	[illegible]
U031	[illegible]
U127	[illegible]
U085	[illegible]
U160	[illegible]
U029	[illegible]
U105	[illegible]
U106	[illegible]
U203	[illegible]
U141	[illegible]

[illegible]	[illegible]
U060	[illegible]
U065	[illegible]
U169	[illegible] (I,T)
U183	[illegible]
U186	[illegible]
U020	[illegible] (C,R)
U020	[illegible] (C,R)
U207	[illegible]
U022	[illegible] (C,R,T)
U234	[illegible] (R,T)
U031	[illegible]
U002	[illegible]
U120	[illegible]
U022	[illegible]
U022	[illegible]
U197	[illegible]
U023	[illegible] (C,R,T)
U060	[illegible]
U085	[illegible] (I,T)
U031	[illegible]
U073	[illegible]
U091	[illegible]
U095	[illegible]
U024	[illegible]
U027	[illegible]
U044	[illegible]
U025	[illegible]
U046	[illegible]
U028	[illegible]
U030	[illegible]
U129	[illegible]
U172	[illegible]
U035	[illegible]
U031	[illegible]
U159	[illegible] (I,T)
U160	[illegible] (R,T)
U053	[illegible]
U074	[illegible] (I,T)
U031	[illegible]
U136	[illegible]
U032	[illegible]
U238	[illegible]
U178	[illegible]
U176	[illegible]
U177	[illegible]
U219	[illegible]
U097	[illegible]
U215	[illegible]
U156	[illegible] (I,T)
U032	[illegible] (R,T)
U211	[illegible]
U033	[illegible] (R,T)
U034	[illegible]
U035	[illegible]
U036	[illegible]
U026	[illegible]
U037	[illegible]
U039	[illegible]
U041	[illegible]
U042	[illegible]
U044	[illegible]
U045	[illegible]
U047	[illegible]
U048	[illegible]
U049	[illegible]
U032	[illegible]
U050	[illegible]
U051	[illegible]
U052	[illegible]
U052	[illegible]
U053	[illegible]

[illegible]	[illegible]
U055	[illegible]
U246	[illegible]
U197	[illegible]
U056	[illegible]
U057	[illegible]
U130	[illegible]
U058	[illegible]
U240	[illegible]
U059	[illegible]
U060	DDD
U061	DDT
U142	[illegible]
U063	[illegible]
U133	[illegible] (R,T)
U021	[illegible]
U063	[illegible]
U063	[illegible]
U064	[illegible]
U064	[illegible]
U066	[illegible]
U068	[illegible]
U062	[illegible]
U070	[illegible]
U071	[illegible]
U072	[illegible]
U073	[illegible]
U074	[illegible] (I,T)
U075	[illegible]
U108	[illegible]
U080	[illegible]
U081	[illegible]
U078	[illegible]
U078	[illegible]
U025	[illegible]
U081	[illegible]
U082	[illegible]
U240	[illegible]
U083	[illegible]
U084	[illegible]
U092	[illegible] (I,T)
U105	[illegible]
U086	[illegible]
U087	[illegible]
U088	[illegible]
U089	[illegible]
U148	[illegible]
U090	[illegible]
U091	[illegible]
U092	[illegible]
U093	[illegible]
U094	[illegible]
U095	[illegible]
U096	[illegible]
U097	[illegible]
U098	[illegible]
U099	[illegible]
U101	[illegible]
U102	[illegible]
U103	[illegible]
U106	[illegible]
U108	[illegible]
U107	[illegible]
U108	[illegible]
U109	[illegible]
U110	[illegible]
U111	[illegible]
U001	[illegible]
U174	[illegible]
U067	[illegible]

9 1 1 1 8 8 6 0 0 9 3

[illegible] Waste No.	Substance
U076	Ethane, 1,1-[illegible]
U077	Ethane, 1,2-[illegible]
U114	1,2-[illegible]
U131	Ethane, 1,1,1,2,2,2-[illegible]
U024	Ethane, 1,1'-[illegible]
U003	Ethanamine (I, T)
U117	Ethane, 1,1'-[illegible] (I)
U025	Ethane, 1,1'-[illegible]
U184	Ethane, [illegible]
U208	Ethane, 1,1,1,2-[illegible]
U209	Ethane, 1,1,2,2-[illegible]
U218	Ethanethioamide
U247	Ethane, 1,1,1,-[illegible]
U027	Ethane, 1,1,2-[illegible]
U043	Ethane, [illegible]
U042	Ethane, 2-[illegible]
U078	Ethane, 1,1-[illegible]
U079	Ethane, [illegible]
U210	Ethane, 1,1,2,2-[illegible]
U173	Ethane, 2,2'-[illegible]
U004	Ethanone, 1-[illegible]
U005	Ethanol [illegible] (C,R,T)
U009	2-Ethanol [illegible]
U112	Ethyl [illegible] (I)
U113	Ethyl [illegible] (I)
U238	Ethyl [illegible]
U039	Ethyl 4,4'-[illegible]
U366	Ethylene [illegible]
U114	Ethylenebis[illegible]
U067	Ethylene [illegible]
U077	Ethylene [illegible]
U115	Ethylene [illegible] (I,T)
U116	Ethylene [illegible]
U117	Ethyl [illegible] (I)
U076	Ethylene [illegible]
U118	Ethylmethacrylate
U119	Ethyl [illegible]
U139	Ferric [illegible]
U120	Fluoranthene
U122	Formaldehyde
U123	Formic acid (C,T)
U124	Furan (I)
U125	2-Furanaldehyde (I)
U147	2,5-Furandione
U213	Furan, [illegible] (I)
U125	Furfural (I)
U124	Furfuran (I)
U206	D-Glucose, [illegible]
U126	Glycidylaldehyde
U163	Guanidine, [illegible]
U127	Hexachlorobenzene
U128	Hexachlorobutadiene
U129	Hexachlorocyclohexane (gamma [illegible])
U130	Hexachlorocyclopentadiene
U131	Hexachloroethane
U132	Hexachlorophene
U243	Hexachlorophene
U133	Hydrazine (R,T)
U098	Hydrazine, 1,2-[illegible]
U099	Hydrazine, 1,1-[illegible]
U086	Hydrazine, 1,2-[illegible]
U100	Hydrazine, 1,2-[illegible]
U134	Hydrofluoric acid (C,T)
U134	Hydrogen fluoride (C,T)
U135	Hydrogen sulfide
U096	Hydroperoxide, 1-[illegible] (R)
U128	[illegible]
U116	2-[illegible]
U137	Indeno(1,2,3-cd)pyrene
U139	Iron [illegible]

[illegible] Waste No.	Substance
U140	Isobutyl [illegible] (I,T)
U141	[illegible]
U142	[illegible]
U143	Lasiocarpine
U144	Lead [illegible]
U145	Lead [illegible]
U146	Lead [illegible]
U129	Lindane
U147	Maleic [illegible]
U148	Maleic [illegible]
U149	Malononitrile
U150	[illegible]
U151	Mercury
U152	Methacrylonitrile (I,T)
U092	Methanamine, [illegible] (I)
U029	Methane, [illegible]
U045	Methane, [illegible] (I,T)
U046	Methane, [illegible]
U068	Methane, [illegible]
U080	Methane, [illegible]
U075	Methane, [illegible]
U138	Methane, [illegible]
U119	Methanesulfonic acid, ethyl ester
U211	Methane, [illegible]
U121	Methane, [illegible]
U153	Methanethiol (I,T)
U225	Methane, [illegible]
U044	Methane, [illegible]
U121	Methane, [illegible]
U123	Methanic acid (C,T)
U036	4,7-Methanoindene, 1,2,4,5,6,7,8,8-[illegible]
U154	[illegible] (I)
U155	Methanethiol
U047	Methanethiol
U154	Methyl [illegible] (I)
U029	Methyl [illegible]
U160	1-Methylbutadiene (I)
U046	Methyl [illegible] (I,T)
U158	Methyl [illegible] (I,T)
U226	Methylchloroform
U157	3-Methylcholanthrene
U158	4,4'-Methylenebis(2-chloroaniline)
U132	2,2'-Methylenebis(3,4,6-[illegible])
U069	Methylene [illegible]
U080	Methylene [illegible]
U122	Methylene [illegible]
U160	Methyl ethyl [illegible] (I,T)
U160	Methyl ethyl [illegible] (R,T)
U138	Methyl [illegible]
U161	Methyl [illegible] (I)
U162	Methyl [illegible] (I,T)
U163	[illegible]
U161	[illegible] (I)
U164	Methylthiouracil
U010	[illegible] C
U059	5,12-Naphthacenedione, [illegible]
U165	Naphthalene
U047	Naphthalene, 2-[illegible]
U166	1,4-Naphthalenedione
U236	2,7-Naphthalenedisulfonic acid, 3,3'-[illegible]
U166	1,4-Naphthalenedione
U167	1-Naphthylamine
U168	2-Naphthylamine
U167	[illegible]
U168	[illegible]

Hazardous waste No.	Substance
U098	2-[redacted], N,N'-[redacted]
U099	[redacted] (R,T)
U100	[redacted]
U171	2-[redacted] (R,T)
U172	[redacted]
U173	[redacted]
U174	[redacted]
U111	[redacted]
U178	[redacted]
U177	[redacted]
U178	N-[redacted]-N-[redacted]
U179	[redacted]
U180	[redacted]
U181	[redacted]
U183	1,2-[redacted], 2,3-[redacted]
U184	[redacted]
U116	[redacted] (R,T)
U041	[redacted], 2-[redacted]
U182	[redacted]
U183	[redacted]
U184	[redacted]
U185	[redacted]
Reserved	[redacted]
U186	1,3-[redacted] (R)
U187	[redacted]
U188	[redacted]
U048	[redacted], 2-[redacted]
U039	[redacted], [redacted]
U081	[redacted], 2,4-[redacted]
U082	[redacted], 2,6-[redacted]
U101	[redacted], 2,4-[redacted]
U170	[redacted], 4-[redacted]
Reserved	[redacted]
Do	[redacted], 2,3,4,6-[redacted]
Do	[redacted], 2,4,5-[redacted]
Do	[redacted], 2,4,6-[redacted]
U137	1,10-(1,2-[redacted])
U145	[redacted] acid, lead salt
U087	[redacted] acid, O,O-[redacted], O-[redacted] ester
U189	[redacted] sulfide (R)
U190	[redacted]
U191	2-[redacted]
U192	[redacted]
U194	1-[redacted] (R,T)
U110	[redacted], N-[redacted] (R)
U066	[redacted], 1,2-[redacted]
U149	[redacted]
U171	[redacted], 2-[redacted] (R,T)
U027	[redacted], 2,2'-[redacted](2-[redacted])
U193	1,2-[redacted] oxide
U025	[redacted], 2,2'-[redacted], [redacted] (R,T)
U128	[redacted], 2,3-[redacted]
U140	[redacted], 2-[redacted] (R,T)
U002	[redacted] (I)
U007	[redacted]
U094	[redacted], 1,2-[redacted]
U243	[redacted], 1,1,2,3,3,3-[redacted]
U009	[redacted]
U152	[redacted], 2-[redacted] (R,T)
U009	[redacted] acid (R)
U113	[redacted] acid, [redacted] ester (R)
U118	[redacted] acid, 2-[redacted], [redacted] ester
U162	[redacted] acid, 2-[redacted], [redacted] ester (R,T)
Reserved	[redacted] acid, 2-(2,4,5-[redacted])
U194	[redacted] (R,T)
U083	[redacted]
U196	[redacted]
U197	[redacted], 3-[redacted]
U179	[redacted]

Hazardous waste No.	Substance
U191	Pyridine, 2-methyl-
U194	1(2H)-Pyridinethione, 2,3-dihydro-6-methyl-2-thioxo-
U148	Pyridine, tetrahydro-N-nitroso-
U200	Reserpine
U201	Resorcinol
U202	Saccharin and salts
U203	Safrole
U204	Selenious acid
U204	Selenium dioxide
U205	Selenium disulfide (R,T)
U015	L-Serine, diazoacetate (ester)
Reserved	[redacted]
U206	[redacted]
U207	[redacted]
U208	[redacted]
U209	[redacted] acid
U210	[redacted] ester
U211	[redacted] (R)
U214	[redacted] (R,T)
Reserved	2,4,5-T
U207	1,2,4,5-T[redacted]
U208	1,1,1,2-T[redacted]
U209	1,1,2,2-T[redacted]
U210	T[redacted]
Reserved	2,3,4,6-T[redacted]
U213	T[redacted] (I)
U214	T[redacted] acetate
U215	T[redacted] carbonate
U216	T[redacted] chloride
U217	T[redacted] nitrate
U218	T[redacted]
U153	T[redacted] (R,T)
U219	T[redacted]
U220	T[redacted]
U221	T[redacted]
U223	T[redacted] (R,T)
U226	α-T[redacted]
U222	O-T[redacted] hydrochloride
U223	β-T[redacted]
U011	1H-1,2,4-T[redacted]
U228	1,1,1-T[redacted]
U227	1,1,2-T[redacted]
U228	T[redacted]
U229	T[redacted]
U121	T[redacted]
Reserved	2,4,5-T[redacted]
Do	2,4,6-T[redacted]
Do	2,4,5-T[redacted] acid
U234	sym-T[redacted] (R,T)
U182	1,3,5-T[redacted], 2,4,6-[redacted]
U235	T[redacted] phosphate
U236	Trypan blue
U237	Uracil, 5[redacted]-[redacted]-
U237	Uracil mustard
U043	Vinyl chloride
U248	Warfarin, when present at concentrations of 0.3% or less
U239	Xylene (I)
U200	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester
U249	Zinc phosphide, when present at concentrations of 10% or less

(Approved by the Office of Management and Budget under control number 2050-0047)

[45 FR 78529, 78541, Nov. 25, 1980, as amended at 46 FR 27477, May 20, 1981; 49

Appendix II

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Subpart C—Characteristics of Hazardous Waste

§ 261.20 General.

(a) A solid waste, as defined in § 261.2, which is not excluded from regulation as a hazardous waste under § 261.4(b), is a hazardous waste if it exhibits any of the characteristics identified in this subpart.

[*Comment:* § 262.11 of this chapter sets forth the generator's responsibility to determine whether his waste exhibits one or more of the characteristics identified in this subpart.]

(b) A hazardous waste which is identified by a characteristic in this subpart, but is not listed as a hazardous waste in Subpart D, is assigned the EPA Hazardous Waste Number set forth in the respective characteristic in this subpart. This number must be used in complying with the notification requirements of section 3010 of the Act and certain recordkeeping and reporting requirements under Parts 262 through 265 and Part 270 of this chapter.

(c) For purposes of this subpart, the Administrator will consider a sample obtained using any of the applicable sampling methods specified in Appendix I to be a representative sample within the meaning of Part 260 of this chapter.

[*Comment:* Since the Appendix I sampling methods are not being formally adopted by the Administrator, a person who desires to employ an alternative sampling method is not required to demonstrate the equivalency of his method under the procedures set forth in §§ 260.20 and 260.21.]

[45 FR 33119, May 19, 1980, as amended at 46 FR 14294, Apr. 1, 1983]

§ 261.21 Characteristic of ignitability.

(a) A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

(1) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D-93-79 or D-93-80 (incorporated by reference, see § 260.11), or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78 (incorporated by reference, see § 260.11), or as determined by an equivalent test method approved by the Administrator under procedures set forth in §§ 260.20 and 260.21.

(2) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

(3) It is an ignitable compressed gas as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or equivalent test methods approved by the Administrator under §§ 260.20 and 260.21.

(4) It is an oxidizer as defined in 49 CFR 173.151.

(b) A solid waste that exhibits the characteristic of ignitability, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D001.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981]

§ 261.22 Characteristic of corrosivity.

(a) A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

(1) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using either an EPA test method or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21. The EPA test method for pH is specified as Method 5.2 in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 260.11).

(2) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 260.11) or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(b) A solid waste that exhibits the characteristic of corrosivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D002.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981]

9 1 1 1 8 8 5 0 0 9 7

§ 261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D003.

§ 261.24 Characteristic of EP toxicity.

(a) A solid waste exhibits the characteristic of EP toxicity if, using the test methods described in Appendix II or equivalent methods approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21, the extract from a representative sample of the waste contains any of the contaminants listed in Table I at a concentration equal to or greater than the respective value given in that Table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering, is considered to be the extract for the purposes of this section.

(b) A solid waste that exhibits the characteristic of EP toxicity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number specified in Table I which corresponds to the toxic contaminant causing it to be hazardous.

TABLE I—MAXIMUM CONCENTRATION OF CONTAMINANTS FOR CHARACTERISTIC OF EP TOXICITY

EPA Hazardous Waste Number	Contaminant	Maximum concentration (mg/l)
D004	Arsenic	5.0
D005	Barium	100.0
D006	Cadmium	1.0
D007	Chromium	5.0
D008	Lead	5.0
D009	Mercury	0.2
D010	Selenium	1.0
D011	Silver	5.0

APPENDIX I—REPRESENTATIVE SAMPLING METHODS

The methods and equipment used for sampling waste materials will vary with the form and consistency of the waste materials to be sampled. Samples collected using the sampling protocols listed below, for sampling waste with properties similar to the indicated materials, will be considered by the Agency to be representative of the waste.

Extremely viscous liquid—ASTM Standard D140-70 Crushed or powdered material—ASTM Standard D346-75 Soil or rock-like material—ASTM Standard D420-69 Soil-like material—ASTM Standard D1452-65

Fly Ash-like material—ASTM Standard D2234-76 (ASTM Standards are available from ASTM, 1916 Race St., Philadelphia, PA 19103)

Contaminated liquid waste—"COLIWASA" described in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," * U.S. Environmental Protection Agency, Office of Solid Waste, Washington, D.C. 20460. (Copies may be obtained from Solid Waste Information, U.S. Environmental Protection Agency, 26 W. St. Clair St., Cincinnati, Ohio 45268)

Liquid waste in pits, ponds, lagoons, and similar reservoirs.—"Pond Sampler" described in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods." *

This manual also contains additional information on application of these protocols.

Appendix II—EP Toxicity Test Procedures

A. Extraction Procedure (EP)

1. A representative sample of the waste to be tested (minimum size 100 grams) shall be obtained using the methods specified in Appendix I or any other method capable of yielding a representative sample within the meaning of Part 260. (For detailed guidance on conducting the various aspects of the EP see "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 260.11).)

2. The sample shall be separated into its component liquid and solid phases using the method described in "Separation Procedure" below. If the solid residue * obtained using this method totals less than 0.5% of the original weight of the waste, the residue can be discarded and the operator shall treat the liquid phase as the extract and proceed immediately to Step 8.

3. The solid material obtained from the Separation Procedure shall be evaluated for its particle size. If the solid material has a surface area per gram of material equal to, or greater than, 3.1 cm^2 or passes through a 9.5 mm (0.375 inch) standard sieve, the operator shall proceed to Step 4. If the surface area is smaller or the particle size larger than specified above, the solid material shall be prepared for extraction by crushing, cutting or grinding the material so that it passes through a 9.5 mm (0.375 inch) sieve or, if the material is in a single piece, by subjecting the material to the "Structural Integrity Procedure" described below.

4. The solid material obtained in Step 3 shall be weighed and placed in an extractor with 16 times its weight of deionized water. Do not allow the material to dry prior to weighing. For purposes of this test, an acceptable extractor is one which will impart sufficient agitation to the mixture to not only prevent stratification of the sample and extraction fluid but also insure that all sample surfaces are continuously brought into contact with well mixed extraction fluid.

5. After the solid material and deionized water are placed in the extractor, the operator shall begin agitation and measure the pH of the solution in the extractor. If the pH is greater than 5.0, the pH of the solution shall be decreased to 5.0 ± 0.2 by adding 0.5 N acetic acid. If the pH is equal to or less than 5.0, no acetic acid should be added. The pH of the solution shall be monitored, as described below, during the course of the extraction and if the pH rises above 5.2, 0.5N acetic acid shall be added to bring the pH down to 5.0 ± 0.2. However, in no event shall the aggregate amount of acid added to the solution exceed 4 ml of acid per gram of solid. The mixture shall be agitated for 24 hours and maintained at 20°-40°C (68°-104°F) during this time. It is recommended that the operator monitor and adjust the pH during the course of the extraction with a device such as the Type 45-A pH Controller manufactured by Chemtrix Inc., Hillsboro, Oregon 97123 or its equivalent, in conjunction with a metering pump and reservoir of 0.5N acetic acid. If such a system is not available, the following manual procedure shall be employed:

(a) A pH meter shall be calibrated in accordance with the manufacturer's specifications.

(b) The pH of the solution shall be checked and, if necessary, 0.5N acetic acid shall be manually added to the extractor until the pH reaches 5.0 ± 0.2. The pH of the solution shall be adjusted at 15, 30 and 60 minute intervals, moving to the next longer interval if the pH does not have to be adjusted more than 0.5N pH units.

(c) The adjustment procedure shall be continued for at least 6 hours.

(d) If at the end of the 24-hour extraction period, the pH of the solution is not below 5.2 and the maximum amount of acid (4 ml per gram of solids) has not been added, the pH shall be adjusted to 5.0 ± 0.2 and the extraction continued for an additional four hours, during which the pH shall be adjusted at one hour intervals.

6. At the end of the 24 hour extraction period, deionized water shall be added to the extractor in an amount determined by the following equation:

$$V = (20 \times W) - 16(W) - A$$

V = ml deionized water to be added

W = weight in grams of solid charged to extractor

A = ml of 0.5N acetic acid added during extraction

7. The material in the extractor shall be separated into its component liquid and solid phases as described under "Separation Procedure."

8. The liquids resulting from Steps 2 and 7 shall be combined. This combined liquid (or the waste itself if it has less than ½ percent solids, as noted in Step 2) is the extract and shall be analyzed for the presence of any of the contaminants specified in Table I of § 261.24 using the Analytical Procedures designated below.

Separation Procedure

Equipment: A filter holder, designed for filtration media having a nominal pore size of 0.45 micrometers and capable of applying a 5.3 kg/cm^2 (75 psi) hydrostatic pressure to the solution being filtered, shall be used. For mixtures containing nonabsorptive solids, where separation can be effected without pressure, a 5.3 kg/cm^2 pressure differential vacuum filters employing a 0.45 micrometer filter media can be used. (For

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Hazardous Waste Streams." EPA 600/2-80-018, January 1980.

*The percent solids is determined by drying the filter pad at 80°C until it reaches constant weight and then calculating the percent solids using the following equation:

Percent solids =

$$\frac{\text{(weight of pad + solid} - \text{tare weight of pad)}}{\text{(tare weight of sample)}} \times 100$$

further guidance on filtration equipment or procedures see "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" incorporated by reference, see § 260.11). Procedure:[1]

(i) Following manufacturer's directions, the filter unit shall be assembled with a filter bed consisting of a 0.45 micrometer filter membrane. For difficult or slow to filter mixtures a prefilter bed consisting of the following prefilters in increasing pore size (0.65 micrometer membrane, fine glass fiber prefilter, and coarse glass fiber prefilter) can be used.

(ii) The waste shall be poured into the filtration unit.

(iii) The reservoir shall be slowly pressurized until liquid begins to flow from the filtrate outlet at which point the pressure in the filter shall be immediately lowered to 10–15 psig. Filtration shall be continued until liquid flow ceases.

(iv) The pressure shall be increased stepwise in 10 psi increments to 75 psig and filtration continued until flow ceases or the pressurizing gas begins to exit from the filtrate outlet.

(v) The filter unit shall be depressurized, the solid material removed and weighed and then transferred to the extraction apparatus, or, in the case of final filtration prior to analysis, discarded. Do not allow the material retained on the filter pad to dry prior to weighing.

(vi) The liquid phase shall be stored at 4°C for subsequent use in Step 8.

B. Structural Integrity Procedure

Equipment: A Structural Integrity Tester having a 3.18 cm (1.25 in.) diameter hammer weighing 8.23 kg (8.73 lbs.) and having a free fall of 15.24 cm (6 in.) shall be used. This device is available from Associated Design and Manufacturing Company, Alexandria, VA 22314, as Part No. 125, or it may be fabricated to meet the specifications shown in Figure 1.

Procedure

1. The sample holder shall be filled with the material to be tested. If the sample of waste is a large monolithic block, a portion shall be cut from the block having the dimensions of a 3.3 cm (1.3 in.) diameter x 7.1 cm (2.8 in.) cylinder. For a fixated waste, samples may be cast in the form of a 3.3 cm (1.3 in.) diameter x 7.1 cm (2.8 in.) cylinder for purposes of conducting this test. In such cases, the waste may be allowed to cure for 30 days prior to further testing.

2. The sample holder shall be placed into the Structural Integrity Tester, then the hammer shall be raised to its maximum height and dropped. This shall be repeated fifteen times.

3. The material shall be removed from the sample holder, weighed, and transferred to the extraction apparatus for extraction.

Analytical Procedures for Analyzing Extract Contaminants

The test methods for analyzing the extract are as follows:

1. For arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, endrin, lindane, methoxychlor, toxaphene, 2,4-D[2,4-dichlorophenoxyacetic acid] or 2,4,5-TP [2,4,5-trichlorophenoxypropionic acid]: "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 260.11).

2. [Reserved]

For all analyses, the methods of standard addition shall be used for quantification of species concentration.

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[1]This procedure is intended to result in separation of the "free" liquid portion of the waste from any solid matter having a particle size >0.45 μm. If the sample will not filter, various other separation techniques can be used to aid in the filtration. As described above, pressure filtration is employed to speed up the filtration process. This does not alter the nature of the separation. If liquid does not separate during filtration, the waste can be centrifuged. If separation occurs during centrifugation, the liquid portion (centrifugate) is filtered through the 0.45 μm filter prior to becoming mixed with the liquid portion of the waste obtained from the initial filtration. Any material that will not pass through the filter after centrifugation is considered a solid and is extracted.

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