



# A Superfund Guide to RCRA Hazardous Wastes

Office of Emergency and Remedial Response  
Emergency Response Division OS-220W

Quick Reference Fact Sheet

On-site CERCLA remedial actions must comply with (or waive) requirements of the Resource Conservation and Recovery Act (RCRA) that are determined to be applicable or relevant and appropriate requirements (ARARs). For RCRA Subtitle C hazardous waste requirements to be applicable, the CERCLA response action must constitute treatment, storage, transport, or disposal of a RCRA hazardous waste. Therefore, to determine when these RCRA requirements are applicable or relevant and appropriate, site managers must understand how to identify whether a CERCLA hazardous substance is a RCRA hazardous waste. **This guide defines RCRA hazardous wastes and describes how to determine when a CERCLA substance is also a RCRA listed or characteristic hazardous waste. EPA is currently developing rulemakings that may revise the regulatory status of solid and hazardous wastes, and therefore contaminated environmental media. EPA will publish fact sheets discussing the applicability of these rulemakings to CERCLA hazardous substances once these rules are finalized.**

The determination of whether a waste is a RCRA hazardous waste should occur as early as possible in the Superfund process. That is, site managers should begin to make this determination even prior to the Remedial Investigation/Feasibility Study (RI/FS) (i.e., during scoping), if possible. Site managers should keep in mind that in States where the RCRA program is delegated to the State, more wastes may be regulated than under Federal requirements. Site managers should consult Regional RCRA staff in making this determination.

To determine whether RCRA Subtitle C requirements are ARARs, site managers must answer the following questions:

- (1) (a) Is the CERCLA material a solid waste? (b) If so, is the solid waste excluded from regulation under RCRA? [If the material is not a solid waste, or is excluded, RCRA requirements are not applicable and, in almost all cases, will not be relevant and appropriate.]
- (2) (a) Is the solid waste also a RCRA hazardous waste? (b) If so, is the hazardous waste excluded from Subtitle C regulation? [Non-hazardous or excluded hazardous wastes are regulated under Subtitle D and therefore Subtitle C requirements are not applicable; however, Subtitle C requirements should be considered if they are relevant and appropriate.]

**[Note: Environmental media such as ground water and soil are not solid wastes; however, RCRA hazardous waste regulations may still apply if these media contain RCRA hazardous wastes. These “contained-in” wastes will be discussed in a forthcoming fact sheet.]**

## (1) IS THE CERCLA MATERIAL A SOLID WASTE?

A solid waste, which may be in solid, semi-solid, liquid, or contained gaseous form, is defined by 40 CFR 261.2 as a material that is discarded; that is, it is:

- # abandoned;
- # recycled (in certain ways); or
- # considered inherently waste-like.

Materials are solid wastes based on both their nature and how they are managed. Materials are solid wastes if they are abandoned by being (1) disposed of, (2) burned or incinerated, or (3) accumulated, stored, or treated before or in place of being abandoned. Determining if a material is a solid waste becomes more complicated when the material is to be recycled rather than disposed. **Highlight 1** explains when recycled materials are considered solid wastes, as well as when materials destined for recycling are excluded from regulation as solid wastes. Determining the regulatory status of recycled materials is an issue primarily for active facilities; nearly all wastes found at Superfund remedial sites generally will be considered solid wastes if they have been present at that site for some time. This is because

**Highlight 1: REGULATION OF RECYCLING PROCESSES AND RECYCLED MATERIALS**

Only certain materials that are recycled in certain ways are excluded from regulation as solid wastes under RCRA. There are for basic ways materials can be recycled and not be considered solid wastes. Three of the four ways are found in 40 CFR 261.2(e)(1). Note that 40 CFR 261.2(e)(2) sets limiting conditions on the recycling activity that may limit whether someone can claim the material is not a solid waste. The fourth way is in 40 CFR 261.4(a)(8), which includes limiting conditions directly in the text of the regulation.

In addition to these four basic ways, there are certain materials that, when recycled in certain ways, are not solid wastes. These materials and recycling activities are spelled out in 40 CFR 261.1(c). The table below summarizes these materials and the recycling activities. The table shows when materials are solid wastes, based on recycling activity. As shown in the table, only certain materials that are reclaimed or, in one case, accumulated speculatively are not solid wastes.

Secondary Material	Use Constituting Disposal	Burning for Energy Recovery or Use to Produce a Fuel	Reclamation	Speculative Accumulation
Spent materials (both listed and nonlisted/characteristic)	Yes	Yes	Yes	Yes
Sludges (listed in 40 CFR 261.31 or 261.32)	Yes	Yes	Yes	Yes
Sludges (nonlisted/characteristic)	Yes	Yes	No	Yes
Byproducts (listed in 40 CFR 261.31 or 261.32)	Yes	Yes	Yes	Yes
Byproducts (nonlisted/characteristic)	Yes	Yes	No	Yes
Commercial chemical products listed in 40 CFR 261.33 that are not ordinarily applied to the land or burned as fuels	Yes	Yes	No	No
Scrap metal	Yes	Yes	Yes	Yes

See 40 CFR Part 261 for regulations. “Yes” means the material is a solid waste.  
 Note: Used oil burned for energy recovery is regulated solely under 40 CFR Part 266.

most materials that have not been recycled within a certain timeframe are classified as “solid wastes.”

Certain materials are excluded from the definition of a solid waste regardless of how they are managed and the concentrations of toxic constituents they contain. By definition, these materials also can never be hazardous wastes. Materials excluded from the definition of a solid waste are listed in **Highlight 2**.

**(2) IS THE SOLID WASTE A HAZARDOUS WASTE?**

To be a RCRA hazardous waste, a CERCLA material must first be a solid waste. Once site managers have determined that they have a solid waste, they must next determine if that waste is hazardous based on one of the following conditions:

- (1) The material is a listed waste;
- (2) It exhibits a hazardous waste characteristic;
- (3) It is a mixture of a solid waste and a listed hazardous waste; or
- (4) It is derived from the treatment, storage, or disposal of a listed hazardous waste.
- (5) In addition, if a listed hazardous waste is contained in a non-solid-waste matrix, it may require management

**Highlight 2: RCRA SOLID WASTE EXCLUSIONS**

Certain categories of materials are not regulated as solid wastes under 40 CFR 261.4 (and, therefore, can never be hazardous wastes):

- # Domestic sewage;
- # Industrial wastewater discharges regulated under §402 of the Clean Water Act (i.e., those discharged under an NPDES permit);
- # Irrigation return flows;
- # Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (this does not exclude regulation of all radioactive material);
- # Materials subjected to in-situ mining techniques that are not removed from the ground as part of the extraction process;
- # Pulping liquors that are reclaimed in a pulping liquor furnace and then reused in the pulping process; and
- # Spent sulfuric acid used to produce virgin sulfuric acid.

as a hazardous waste as long as the matrix contains the hazardous waste.

A waste may be both a listed waste and a characteristic waste, and all applicable waste codes must be identified. Mixtures of solid wastes and listed hazardous wastes, wastes derived from listed hazardous wastes, and listed hazardous wastes contained in non-solid-waste matrices will be discussed in later fact sheets.

### Highlight 3: RCRA HAZARDOUS WASTE EXCLUSIONS

The following categories of solid wastes are excluded from Subtitle C standards and are never regulated as RCRA hazardous wastes (but remain subject to Subtitle D standards):

- # Wastes delisted under 40 CFR 260.20 or 260.22; and
- # Wastes given categorical exclusions, including:
  - Household wastes;
  - Trivalent-chromium wastes (e.g., wastes from the leather tanning industry);
  - Arsenical treated wood products; and
  - Specified large-volume/low toxicity wastes for which Subtitle C regulation is not appropriate (e.g., coal combustion wastes, oil and gas production wastes, and certain mining/mineral processing wastes).

Some categories of hazardous wastes are wholly excluded from Subtitle C regardless of their properties (see **Highlight 3**). In addition, if wastes are managed in certain ways, such as those shown in **Highlight 4**, they are exempt from RCRA hazardous waste regulation. Other wastes, such as used oil, may or may not be RCRA hazardous wastes, depending on their properties and how they are managed. **Highlight 5** discusses when used oil is regulated as a solid and hazardous waste. The different categories of hazardous wastes are discussed below.

### Listed Hazardous Wastes

Any waste listed in Subpart D of 40 CFR Part 261 is a RCRA listed hazardous waste, including:

- # Wastes from non-specific sources in Part 261.31 and identified by F waste codes;
- # Wastes from specific sources listed in Part 261.32 and identified by K waste codes;
- # Acutely hazardous commercial chemical products listed in Part 261.33(c) and identified by P waste codes; and
- # Toxic commercial chemical products listed in Part 261.33(f) and identified by U waste codes.

For a CERCLA response involving treatment, storage, or disposal, specific knowledge of the generation process of the waste is generally required for the waste to be considered a listed waste and for the corresponding RCRA requirements to be applicable. If this information is not available, RCRA requirements still may be relevant and appropriate (see Superfund Guide #7, Determining When Land Disposal Restrictions (LDRs) Are Relevant and Appropriate to CERCLA Response Actions, December 1989, Superfund Publication 9347.3-08FS). Listed hazardous wastes commonly found at Superfund sites include the following:

### Highlight 4: EXEMPTIONS UNDER RCRA FOR SOLID AND HAZARDOUS WASTES

Certain solid and hazardous wastes are exempt from regulation under RCRA, including the following:

- # Wastewaters, including treated ground or surface water, that are discharged to surface water under a NPDES permit or through a sewer system to a publicly owned treatment works (POTW) (40 CFR 261.4(a)(1)(ii)).
- # Wastewaters, including treated ground water or surface water, that are discharged to surface water under the substantive requirements of a National Pollutant Discharge Elimination System (NPDES) permit (40 CFR 261.4(a)(2)).
- # Wastewaters that are treated in exempt wastewater treatment units under 40 CFR 264.1(g)(6) or 265.1(c)(10) (although any sludges that are hazardous are subject to Subtitle C).
- # In addition, treated contaminated ground water that is reinjected into an aquifer during a CERCLA response action or RCRA corrective action is not subject to the RCRA land disposal restrictions (LDRs). (This waste is subject to RCRA §3020, which specifies three conditions that must be met for reinjection of treated contaminated ground water: (1) the injection is a CERCLA response action or RCRA corrective action; (2) the contaminated ground water is treated to substantially reduce hazardous constituents prior to such injection; and (3) the action is sufficient to protect human health and the environment upon completion.)

### F001-F005 Spent Solvent Wastes

The listings identify several of the most common spent industrial solvents as hazardous such as spent methanol, toluene, acetone, trichloroethylene, and methylene chloride. However, many materials that contain these constituents are not considered RCRA listed hazardous wastes because of the manner in which the spent solvents are defined. Site managers are not required to presume that a CERCLA hazardous substance is a RCRA hazardous waste unless there is affirmative evidence to support such a finding. Therefore, site managers generally must know specific information to determine that CERCLA wastes are F001-F005 listed wastes, including whether:

- # The wastes are spent (used) and cannot be reused without reclamation, regeneration, or other reprocessing;
- # The wastes were used specifically for their solvent properties (i.e., for their ability to dissolve or mobilize). Solvents are not covered by the listing if they were used as reagents or as ingredients in a formulation. If the wastes were used as both solvents and reagents or ingredients (e.g., paint), they are not regulated as RCRA listed wastes;

### Highlight 5: REGULATORY STATUS OF USED OIL

Used oil is defined in RCRA §1004 as any oil that has been (1) refined from crude oil; (2) used; and (3) as a result of such use, contaminated by physical or chemical impurities. Used oil may be regulated in various ways, including:

- # Used oil that is disposed of or incinerated without recovery of energy and that exhibits a characteristic (including the toxicity characteristic) of a hazardous waste or is mixed with a listed RCRA hazardous waste is considered a RCRA hazardous waste. This waste is subject to all RCRA hazardous waste standards. Used oil that contains greater than 1000 ppm total halogens is presumed to have been mixed with a listed hazardous waste.
- # Used oil that exhibits one or more of the characteristics of hazardous waste but is recycled in some manner other than being burned for energy recovery is exempt from Subtitle C, but is still regulated as a solid waste.
- # Used oil that is burned for energy recovery is regulated under 40 CFR Part 266 Subpart E as either on-specification or off-specification used oil fuel. Used oil that is mixed with listed hazardous waste or produced from hazardous waste by processing, blending, or other treatment and is burned for energy recovery is specifically regulated under 40 CFR Part 266 Subpart D as hazardous waste fuel.
- # Used oil that is hazardous by characteristic is prohibited from being used as a dust suppressant, unless it is hazardous solely for exhibiting the ignitability characteristic.

- # The wastes are spent solvent mixtures or blends. Site managers must know that the mixtures or blends contained -- before use -- a total of 10 percent or more (by volume) of one or more of the solvents listed in F001-F005. (Because the 10 percent cutoff applies to the solvent prior to use, the concentration of the solvent in the wastestream is not a factor in determining whether it meets an F001-F005 listing.) Site managers should note that wastes determined not to be spent solvent wastes may still be hazardous by exhibiting a characteristic (e.g., toxicity).

### F006-F009 Electroplating Wastes

Electroplating wastes, listed as waste codes F006-F009, generally contain cyanides and various metals, such as cadmium, chromium, lead, nickel, and silver. RCRA hazardous waste listings for these wastes are usually very chemical-specific (e.g., F009 is listed as “spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process”). (See 51 FR 43351.) Site managers generally must apply all of the information contained in the listing to the wastes in order to determine that the wastes are F006-F009 listed hazardous wastes.

### F020-F023 and F026-F028 Dioxin-Containing Wastes

The dioxin-containing wastes, F020-F023 and F026-F028, include RCRA hazardous constituents that are generated from specific operations, such as chlorinated dibenzo-p-dioxins (CDDs), chlorinated dibenzofurans (CDFs), and chlorophenols. For example, F027 is defined as discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulation containing compounds derived from these chlorophenols. Site managers must apply all the information in the listing of a particular dioxin-containing waste to determine if it is an F020-F023 or F026-F028 RCRA listed hazardous waste.

### K001 and F032, F034, and F035 Wood Preserving Wastes

Wood preserving wastes may include constituents such as naphthalene, pentachlorophenol, toluene, dioxins, and lead. One listing, K001, is very specific (i.e., “bottom sediment sludge[s] from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol”), and site managers generally must apply all of the information contained in the listing to the wastes to determine that the wastes meet the listing. EPA recently listed the following three wood preserving wastes as F wastes: F032, F034, and F035, which include wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes using chlorophenolic formulations, creosote formulations, or inorganic preservatives containing arsenic or chromium. This new listing likely will increase the amount of wastes regulated as RCRA hazardous wastes at wood preserving sites.

### F039 Multi-Source Leachate

EPA has given multi-source leachate, defined as leachate derived from the treatment, storage, disposal, or recovery of more than one listed hazardous waste, a new waste code, F039. (Leachate derived from the exclusive management of more than one of the listed dioxin-containing hazardous wastes (i.e., F020-F023 and F026-F028) is classified as a single-source dioxin waste and is not considered multi-source leachate.) Under the land disposal restrictions (LDRs), the Agency has established one set of wastewater treatment standards and one set of nonwastewater treatment standards for this code. These standards set concentration levels for the entire Best Demonstrated Available Technology (BDAT) list of constituents (approximately 200 in total) that may be found in multi-source leachate.

If a waste is F039, site managers must manage the waste for all of the BDAT constituents found. If wastes are determined to be F039 multi-source leachate, site managers must ensure that the appropriate LDR treatment levels for all constituents are achieved before disposing of the wastes.

Residuals from the treatment of the wastes would also be considered F039 under the existing derived-from rule and would have to be managed in accordance with Subtitle C regulations.

#### Other F and K Wastes

Other F-waste codes include metal heat-treating, aluminum coating, and chlorinated aliphatic hydrocarbon production wastes. Other wastes having a K code can include petroleum refining, steel production, organic chemical, and veterinary pharmaceutical production wastes. Because of the specificity of these listings, as shown above with the K001 wood preserving wastes, site managers may be required to know the following to determine if the waste is a RCRA hazardous waste:

- # Specific manufacturing process used in generating the wastes;
- # Feedstocks or catalysts used in a process (the change of a catalyst in a manufacturing process that formerly generated a RCRA hazardous waste may result in a waste not considered a RCRA listed hazardous waste); and/or
- # Specific process unit from which the wastes came.

If such information is not available, and it cannot be determined positively that a waste is a listed waste, RCRA requirements may still be relevant and appropriate.

#### P and U Wastes

The commercial chemical product listings, P and U wastes, are limited in their applicability and cover only unused and unmixed commercial chemical products, particularly off-specification (off-spec) products that are disposed of or abandoned. (Used or mixed commercial chemical products are not considered hazardous wastes under RCRA unless they are listed elsewhere in the regulations under the F- or K-waste listings or they exhibit a characteristic.) To determine that CERCLA wastes are P or U wastes, site managers generally must have evidence that the wastes were products that were not used; however, this likely will occur only at facilities that manufacture the listed substance, that have stored the substance, or that have a record of using such substances as product or an ingredient in a process. Site managers should know whether the wastes:

- # Are discarded (i.e., the wastes are abandoned, recycled, or considered inherently waste-like as described in 40 CFR 261.2(a)(2));
- # Are of a grade that is sold commercially, or are off-spec commercial products;
- # Have not been used. If wastes are found spilled onto

soil, site managers must know that they were not used before the spill to determine that they are P or U wastes; and

- # Were the sole active ingredient, if in a formulation (e.g., pesticide).

The P and U listings also provide that any residues or contaminated soil, water, or other debris resulting from the cleanup of a spill of any of the P and U wastes are themselves listed hazardous wastes (40 CFR 261.33(d)). Based on this regulatory provision, the “contained-in” policy (see note on page 1) would not apply for soil or debris contaminated with P or U wastes. Site managers would have to know, however, that the spill resulted clearly from P or U wastes. For example, it is not sufficient to know that benzene is in the soil; site managers must know that the benzene was a P or U waste before being spilled onto the soil.

If commercial chemical products in the P or U lists were mixed together as a multi-ingredient formula, the resulting mixture is not a P or U waste. Similarly, if the same mixture is dumped onto soil, the soil is not considered to contain listed wastes. However, if P and U wastes are dumped onto soil or discarded in a pit, the resulting contaminated soil is considered to be P or U hazardous wastes.

#### **Characteristic Hazardous Wastes**

According to 40 CFR Part 261, if a solid waste exhibits one of four characteristics, it is also a hazardous waste unless exempt from regulation under 40 CFR 261.4(b). The four characteristics of hazardous wastes are:

- # Ignitability. A liquid material is ignitable if it has a flash point lower than 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) or a Setaflash Closed Cup Tester (using the test method specified in ASTM Standard D-3278-78). Solid and gaseous materials may also be ignitable, but different standards apply to such materials. Solid materials are ignitable when they are capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes, and, when ignited, of causing a hazard from vigorous burning. An ignitable gas is determined to be hazardous according to the standards of 49 CFR 173.300.
- # Corrosivity. A liquid material is corrosive if (1) it has a pH less than 2; (2) it has a pH greater than 12.5; or (3) it is capable of corroding steel at a rate of more than a quarter of an inch per year, based on the test method specified in NACE Standard TM-01-69. Solid and gaseous materials are never considered corrosive.
- # Reactivity. A material is reactive if (1) it is explosive; (2) it reacts violently with water; or (3) it generates toxic gases when exposed to water or other liquids that

are moderately acidic or alkaline. There are not specific test methods that determine if a waste is reactive; as a rule of thumb, wastes that contain total cyanides below 250 mg/kg and total sulfides below 500 mg/kg are generally not reactive. Above these levels, the wastes may potentially be characteristically reactive.

- # **Toxicity.** A waste exhibits the toxicity characteristic if, according to the toxicity characteristic leaching procedure (TCLP) test, the extract of the waste exceeds the regulatory concentration level of any of 39 specified constituents.

The toxicity characteristic rule (55 FR 11798, March 29, 1990) requires use of the TCLP test in place of the extraction procedure (EP) test to determine whether wastes exhibit the characteristic of toxicity. The TC rule established regulatory levels for 25 organic chemicals that were not previously regulated (D018-D043) and retains the regulatory levels (based on the TCLP) for the 14 waste codes originally regulated under the EP (see **Highlight 6** for details on the TC levels). Because the new chemicals regulated are organic constituents commonly found at Superfund sites, it is likely that more wastes will exhibit the TC under the new rule than were hazardous under only the EP test. As with the EP, site managers are not required to test their wastes to determine if they exhibit the TC; knowledge of the wastes may be sufficient to make this determination. If specific knowledge of CERCLA wastes is not available at a site, however, testing will most likely be necessary. The 25 new organic constituents are designated as “newly identified” wastes and currently do not have treatment standards under the LDRs. However, these wastes must be disposed of in accordance with other Subtitle C requirements (e.g., in a regulated Subtitle C disposal unit). For more information on constituents that are regulated by the TC rule and compliance with the rule, see CERCLA Compliance with

the RCRA Toxicity Characteristics Rule: Part II, October 1990, Superfund Publication 9347.3-11FS.

### **Mineral Processing Wastes**

The 1980 mining waste exclusion (RCRA §3001(b)(3)(A)(ii)) excluded all solid wastes generated in the extraction, beneficiation, and processing of ores and minerals from regulation as hazardous wastes under Subtitle C. Recently, all mineral processing wastes were removed from the mining waste exclusion and are now regulated as hazardous wastes, except for twenty mineral processing wastes, which have been retained under the mining waste exclusion; see Superfund Guide to RCRA Management Requirements for Mineral Processing Wastes, 2nd Edition, Publication 9347.3-12FS).

Mineral processing wastes would have to exhibit the toxicity characteristic or one of the other three characteristics, or be listed as a RCRA hazardous waste to be regulated under Subtitle C. As with other CERCLA wastes, testing is only necessary if the site manager does not have sufficient knowledge of the waste. All mineral processing wastes that are considered RCRA hazardous wastes are designated as “newly identified” wastes and will not have treatment standards under the LDRs until EPA completes a separate rulemaking. However, these formerly excluded wastes that are now considered hazardous must be disposed of in accordance with other Subtitle C requirements (e.g., in a regulated Subtitle C disposal unit) unless they are delisted or treated to remove the characteristic(s) that makes them hazardous. Wastes that are still excluded from Subtitle C regulation, such as extraction or beneficiation wastes, or that do not exhibit a characteristic and are not listed, must be managed in accordance with Subtitle D of RCRA.

