Identification of Certain RCRA Wastes – the F-Spent Solvent, P, and U Listings

BACKGROUND: **Determining the proper categorization of specific hazardous wastes under the Resource Conservation and Recovery Act (RCRA) is crucial to identifying and complying with applicable recordkeeping, reporting, and land disposal restriction requirements. One of the more difficult determinations is whether a waste is properly categorized as an F-listed spent solvent or a P- or U-listed waste. This Information Brief provides an overview of some of the important elements in distinguishing these waste categories. State rules, however, may be more stringent, and interpretations may differ from those indicated here.**

STATUTE: **Resource Conservation and Recovery Act, Sect. 3001.**

REGULATION: **40 CFR 261.**

REFERENCES:

1. 50 FR 53316, December 31, 1985.

2. Letter from Devereaux Barnes, Director, Characterization and Assessment Division, EPA, to Shirlee Schiffman, New Jersey Department of Environmental Protection, July 21, 1989.

3. "Empty container rule," OSWER Directive 9441.34-84, November 28, 1984.

4. "Hazardous and Radioactive Mixed Waste Program," DOE 5400.3, February 22, 1989.

Why is there confusion over F-listed spent solvents and P- or U-listed wastes?

Many of the F-listed spent solvents, which are common hazardous wastes in the DOE system, contain constituents that are also regulated under the P and U listings. The primary difference is that the spent solvents have been used, while the P- and U-listed wastes have been discarded unused.

What are spent solvents?

The term "spent solvent" has no regulatory definition. The Environmental Protection Agency's (EPA) discussion in the preamble to the solvent mixture rule provides the best description of the term.[1] "Spent" means the material has been used for its intended purpose and can no longer be used without further reprocessing. A chemical is a "solvent" when it is used to solubilize or mobilize constituents. For example, solvents used in degreasing, cleaning, as diluents, extractants, and reaction and synthesis media are covered under the listings when spent. On the other hand, if that same chemical is used as a reactant to produce another chemical or as an ingredient to make a product it is not regulated under the F-spent solvent listings. For example, using trichlorotrifluoroethane as a chemical intermediate to produce other halogenated organics does not qualify as a solvent use. Using toluene as an ingredient in paint or to thin paint does not constitute a use resulting in a regulated spent solvent. However, wastes containing a solvent constituent that do not qualify for specific listings, such as discarded paint, may be hazardous based on characteristics such as ignitability and toxicity.

Common activities that generate spent solvents at DOE facilities are degreasing parts at vehicle maintenance and electroplating shops and scintillation counting at research facilities.

What are F001-F005 spent solvents?

The F001-F005 RCRA waste codes (40 CFR 261.31) encompass the common halogenated and non-halogenated industrial solvents that, as a result of their use in some process, are spent.

- The F001 code includes the following halogenated solvents that have become spent because of their use in degreasing activities: tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons. For example, 1,1,1-trichloroethane is sometimes used in vehicle maintenance shops to remove grease from parts. When spent, it would bear the F001 waste code.
- The F002 code includes some of the same solvents as F001, but these have become spent from activities other than degreasing (activities in which the chemicals were still used for their solvent properties). The following are constituents regulated under this category: tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane. Methylene chloride when spent because of use as a paint stripper would be an F002 waste.
- The F003 code includes common non-halogenated solvents. These solvents are listed as hazardous waste because of their ignitability. Regulated constituents include the following: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol. Using methanol to remove water from glassware is an example of an activity that produces an F003 solvent. The solvent becomes spent because of the water that contaminates it.
- The F004 code includes other non-halogenated solvents that have become spent. The following constituents are regulated under this listing because they are toxic: cresols, cresylic acid, and nitrobenzene.

- The F005 code includes other non-halogenated solvents that have become spent. The following constituents are regulated under this listing because they are ignitable and toxic: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane. A common F005 waste at some DOE facilities is scintillation fluid that contains toluene. The toluene (used because of its solvent properties) has become spent because of the additional constituents present in it that prevent its reuse as solvent.

Is the concentration of the solvent in mixtures important?

Yes. However, the F001, F002, F004, and F005 codes are dealt with differently than F003, which is listed only because of ignitability.

For the spent solvents other than F003, a solvent mixture containing, before use, a total of more than 10% by volume of any one or a combination of solvents listed under F001, F002, F004, and F005 codes is regulated (regardless of the composition of the remaining portion of the mixture, which could include a non-listed solvent, such as mineral spirits, or a contaminant, such as water or oil). For example, a solvent mixture containing 5% trichloroethylene and 6% toluene before use that is discarded because it is spent is regulated as an F002 waste and an F005 waste because the total of the regulated constituents, before use, exceeds 10%. If the solvent, before use, had contained 2% methylene chloride, 2% trichloroethylene, and 2% toluene, it would not be regulated as a spent solvent because the total is less than 10%. However, wastes not regulated as spent solvents still may be characteristically hazardous.

For the F003 code, solvent mixtures are regulated in two cases: (1) the solvent, before use, contained only (100%) F003 constituents or was a technical or commercial grade of an F003 constituent; or (2) the solvent, before use, contained one or more of the F003 constituents (in any amount) and a total of 10% or more by volume of constituents regulated under F001, F002, F004, and/or F005. (In the second case, the waste would carry the F003 ***and*** other applicable waste codes.)

Are dilute mixtures, such as wastewaters, regulated as hazardous wastes?

Under the mixture rule contained in 40 CFR 261.3(a)(2), mixtures of spent solvents and solid wastes are hazardous (unless the solvent is listed solely because of a characteristic and the mixture no longer exhibits the characteristic). There are, however, several commonly encountered exceptions:

- wastewaters containing specified solvents not exceeding specified concentrations at the headworks of the wastewater treatment or pre-treatment system that discharges through a point regulated under the Clean Water Act (CWA) [40 CFR 261.3(a)(iv)(A) and (B)],
- wastewaters from laboratory operations containing toxic wastes listed in Subpart D, provided the annual average flow of laboratory wastewater does not exceed 1% of the total wastewater flow into the headworks of the wastewater treatment facility whose discharge is regulated under CWA [40 CFR 261.3(a)(iv)(E)], and
- wastewaters generated from cleaning out ***empty*** containers that once held spent solvents.[2] (However, wastewaters generated from cleaning a container that was not empty are hazardous wastes according to the mixture rule.)

What if these same constituents are discarded unused?

Most chemicals in the F-listings are also in the P- or U-listings (plus many other chemicals). When these chemicals are discarded ***unused*** they are regulated as P- or U-listed wastes. The regulated constituent must be the "sole" active ingredient in the formulation. The formulation could contain other inert ingredients. The P- and U-listings include:

- commercial chemicals and manufacturing chemical intermediates;
- off-specification products or manufacturing chemical intermediates;
- residues in containers or container liners, unless the container is empty; and
- residues and contaminated soil, water, and debris from the cleanup of a spill of any P- or U-listed waste. This description essentially lists the spill residue itself as a hazardous waste. Consequently, spill residues of P- or U-listed chemicals listed solely because they are characteristically hazardous are regulated even if the spill residue no longer exhibits that hazardous characteristic.

How do the P and the U lists differ?

The P-listed chemicals are considered more toxic or more reactive than U-listed chemicals and, thus, are identified as "acute hazardous waste."

How does the management of P and U wastes differ?

Whether wastes are toxic or acutely hazardous can affect generator status and the applicable compliance requirements. To be conditionally exempt from RCRA requirements, a generator must not produce more than 1 kg of acute hazardous waste per month. Management of such wastes must comply with requirements in 40 CFR 261.5.

The P- and U-listings also affect the management of containers that held these chemicals. For acute hazardous (P-listed) wastes, containers must be triple rinsed with an appropriate solvent or the intact inner liner of the container removed for the container to be considered empty. The rinsate and liner must be disposed of as hazardous waste. For toxic (U-listed) wastes, containers are considered empty if they have been emptied by conventional means such as pouring or pumping and (1) not more than 1 inch of residue remains, (2) not more than 3% by weight of the total capacity remains (for containers with capacities ≤ 110 gallons), or (3) not more than 0.3% by weight remains in containers that are larger than 110 gallons. [40 CFR 261.7(b)] ***Note*****:** Removal to an inch or to a percentage weight remaining in the container is not sufficient to qualify as empty if additional conventional emptying procedures remove more hazardous waste.[3]

Questions of policy or questions requiring policy decisions will not be dealt with in EH-231 Information Briefs unless that policy has already been established through appropriate documentation. Please refer any questions concerning the subject material covered in this Information Brief to Jean Schumann, RCRA/CERCLA Division, EH-231, (202) 586-7769.