

## Waste Designation: Listed Hazardous Waste

The hazardous waste identification process is the crucial first step in a generator's hazardous waste management plan. Correctly determining whether a waste meets RCRA or Ecology's definition of hazardous/dangerous waste is essential to determine how the waste must be managed. Waste designation is critical in determining how waste produced either during and/or after a manufacturing process will be handled by the generator. The proper waste designation allows generators to apply the correct waste codes on shipping manifests and annual reports. Waste designation is also used to determine a business' regulatory status and responsibilities.

In the interest of keeping these presentations brief but still informative, the waste designation process will be covered in four segments. The first segment was designating characteristic waste; this second segment is designating federally listed waste, third will be designating Washington State dangerous waste using the book designation method, and fourth is designating Washington State dangerous waste using the bioassay designation method.

It is important to keep in mind that a waste generator is legally responsible for determining if a waste is a RCRA hazardous waste or state only dangerous waste [40CFR262.11 and WAC 173-303-070]. In fact, changes to the federal hazardous waste rules in 2016 require generators to keep documentation of how or why solid wastes that are spent materials, sludges, byproducts, or discarded commercial chemical products are determined to **not** be a hazardous waste. Under the federal rules this information must be retained for 3 years, but under Washington State's dangerous waste rules these documents must be retained for 5 years. Additionally, generators must have this confirmation of their waste's status at the point of its generation.

### How to Designate Listed Waste

When the Resource Conservation and Recovery Act (RCRA) was enacted EPA specifically identified and listed certain wastes that are known to be hazardous. Complete lists of these wastes are found in 40CFR261, Subpart D. Ecology has also included these listed wastes in the Dangerous Waste Regulations, and complete lists of these wastes are found in WAC 173-303-9903 and -9904. EPA identified these specific hazardous wastes by observing different industrial practices at numerous facilities, noting the common chemicals used, and assessing which wastes pose the greatest risk to human health and the environment. Listed wastes are always hazardous regardless of their chemical compositions; therefore, no testing is required to identify them. It is important to remember that even if your waste is included in one of these lists it must still be designated for its characteristics (ignitable, corrosive, or reactive). Listed wastes are divided into four categories, according to their origin:

- F List: Wastes from generic industrial processes. For example, certain spent solvents used for cleaning or degreasing.
- K List: Wastes from specific industry sectors. For example, certain petroleum refining wastes.
- P List: Commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or intermediates that have been identified as **acutely hazardous waste**. For example, potassium cyanide and arsenic trioxide.

- U List: Commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or intermediates that have been identified as **toxic hazardous waste**. For example, lead acetate and toluene.

## F Listed Wastes

[40CFR261.31 and WAC 173-303-9904]

The F listed wastes are from non-specific sources and refer to processes only rather than specific industries and includes wastes from common industrial and manufacturing operations. Because the F listed wastes aren't industry specific, they are often generated by large numbers of facilities. While the listing descriptions don't really designate these 28 wastes into specific groups, they can be placed into seven general categories. The complete list of F listed wastes under RCRA is provided in 40CFR261.31 and WAC 173-303-9904. The seven basic process groupings are:

1. Spent solvent wastes.
2. Electroplating and other metal finishing wastes.
3. Dioxin-containing wastes.
4. Chlorinated aliphatic hydrocarbons production wastes.
5. Wood preserving wastes.
6. Petroleum refinery wastewater treatment sludges.
7. Multi-source leachate.

### Spent Solvent Wastes.

Spent solvent wastes include hazardous waste codes F001 – F005, spent halogenated (F001 and F002) and non-halogenated solvents (F003-F005). Examples of solvents include benzene, toluene, methylene chloride, and methanol. All of the specific solvents that can designate as F001 – F005 are listed in 40CFR261.31 or WAC 173-303-9904.

There are three general criteria to be met for the solvent listings to apply. A solvent must meet all of these criteria in order to be considered an F listed hazardous waste.

1. The waste must be used for its solvent properties—that is to solubilize (dissolve) or mobilize other constituents.
2. The solvent must be spent—that is it has been used, and is no longer fit for use without being regenerated, reclaimed, or otherwise reprocessed.
3. It had a before-use concentration, meeting the following criteria:
  - For mixtures of F001, F002, F004, and F005 if the total of all solvent constituents **BEFORE USE** were greater than or equal to 10 % by volume. When this is true all appropriate listings apply to the spent solvent. This is **NOT** the concentration of solvent at disposal but before use.

- Mixtures containing F003 solvents are only covered under two conditions.
  - The mixture contains only F003 solvents (pure or technical grade).
  - The mixture contains one or more F003 solvents **and** 10 % or more of the other listed solvents prior to use.

The first condition for F003 constituents refers to both pure and technical grade mixtures. A pure mixture is simply 100 % solvent; whereas, the term technical grade refers to all grades of a chemical which are marketed or recognized for general usage by the chemical industry. Neither EPA nor Ecology has established specific percentages or other criteria for use in determining when a concentration is a technical grade.

For example, if a painter has purchased a 95 % xylene (which is an F003 constituent) solvent formulation for cleaning brushes and he is wondering whether he is within the cut-off range for technical grade, he should follow this general rule. If xylene is frequently marketed and sold at the 95% concentration, then this is considered to be a technical grade by EPA and Ecology, and will designate as F003 hazardous waste once spent.

It should be noted that the only reason why F003 solvents are listed is that they demonstrate the characteristic of ignitability. Therefore, if the concentration of the F003 solvent purchased is low enough to no longer have the characteristic of ignitability it could be argued that it should not be considered a hazardous/dangerous waste.

#### Electroplating and Other Metal Finishing Wastes

Electroplating is the production of a thin surface coating of one metal upon another. Electroplating operations include common and precious metal electroplating, anodizing, chemical etching and milling, and cleaning and stripping when associated with tin, zinc, and aluminum plating on carbon steel. The waste codes for electroplating wastes are F006, F008, F007, and F009, and are only applied if cyanides are used in the process.

Some metal finishing F listed wastes are generated from metal heat-treating operations. Metal heat-treating involves the modification of a metal's physical properties through the application of controlled heating and cooling cycles. These waste codes are F010, F011, and F012, and, as above, are only applied if cyanides are used in the process.

The final metal finishing operation covered is the chemical conversion coating process. Chemical conversion coating is a process of applying a coating to metal for increased corrosion protection, reduce the coefficient of friction, or preparation of the surface for additional coatings. Chemical conversion coating is not the same as electroplating; therefore, a separate waste code (F019) is assigned to waste generated from this process.

#### Dioxin-Containing Wastes

The F020-F023 and F26-F028 codes are for the dioxin wastes. Dioxins have the distinction of being highly toxic and persistent compounds. Making these wastes the type that both EPA and Ecology particularly want to see handled in an appropriate manner.

Dioxins are not chemicals that are produced for any commercial purpose, rather are found as unwanted contaminants in a variety of manufactured chemicals, process intermediates, and process wastes. Because they are not commercial products and do not have a characteristic listing there are not any waste codes specific to dioxins alone. To ensure wastes that are likely to contain dioxin are disposed of properly under RCRA F waste codes were created to address 3 sets of wastes that are likely to contain dioxins.

The first set, F020-F022 are wastes from the production and manufacturing use of tri-, or tetrachlorophenol (F020); pentachlorophenol (F021), and manufacturing that uses of tetra-, penta-, or hexachlorobenzenes (F022). Dioxins are known or expected to be present in the waste streams as a result of the production and manufacturing use of these compounds.

The second set addresses wastes on equipment previously used for the production or manufacturing use of the chemicals listed above. The waste code itself applies not to the actual equipment, but the waste generated using the equipment. For example, if you use the same equipment to produce different chemicals/products, the dioxins or other contaminants may still be present on the equipment and therefore, contaminate the new process. The codes for waste contaminants are F023 (tri-, and tetrachlorophenols) and F026 (tetra-, penta-, and hexachlorobenzene).

The third set is discarded unused formulations containing tri-, penta-, or tetrachlorophenols, or 2,4,5-trichlorophenoxypropionic acid (silvex) (F027). This listing is unique among the F listings because it is not a manufacturing process waste, but rather an unused multi-active ingredient formulation (a commercial chemical product) that is being discarded.

#### Chlorinated Aliphatic Hydrocarbons Production Wastes

The F024 and F025 hazardous waste codes apply to chlorinated aliphatic hydrocarbon production wastes. Chlorinated aliphatic hydrocarbons (CAHs) are a class of organic compounds commonly used as feed stock in producing polyvinyl chloride (PVC) and other chemicals such as pesticides and fire retardants. Examples of CAHs include vinyl chloride and carbon tetrachloride. CAHs have a structure limited to carbon chain lengths 1 to 5 with varying numbers of chlorine atoms. These wastes are also K listed wastes (K174 and K175) in the production of ethylene dichloride or vinyl chloride.

#### Wood Preserving Wastes

There have been three F listing codes assigned for wood preserving wastes. Wastewaters, process residuals, preservative drippage, and spent formulations from wood-preserving plants that use (or have previously used) chlorophenolic formulations are coded as F032, creosote formulations are F034, and inorganic preservatives containing arsenic and chromium are F035. Determining the applicable waste code depends on the preserving solution used.

## Petroleum Refinery Wastewater Treatment Sludges

The F037 and F038 hazardous waste codes apply to petroleum refinery wastewater treatment sludges that are not covered by K048 and K051 waste codes. Petroleum refining is the physical, thermal, and chemical separation of crude oil into its major distillation fractions, which are then further processed through a series of separation and conversion steps into finished petroleum products. The petroleum refining process produces large quantities of contaminated wastewater which consist of process wastewater and oily cooling wastewaters.

The F037 waste code is assigned to the primary oil/water/solids separation sludge from a petroleum refinery. This waste code will be used for any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters.

The F038 waste code is assigned to the secondary (emulsified) oil/water/solids separation sludge. This waste code will be used for any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries.

## Multi-Source Leachate

The last F listed waste is F039 that addresses leachates from the land disposal of more than one restricted waste classified as hazardous. Subtitle C land disposal facilities can dispose of all types of listed wastes in a unit. The minimum technical standards are designed to prevent leachate from escaping the unit, but in doing this the system must remove leachate from the unit to keep pressure from building on the liner.

This waste needs to be regulated; however, due to the multitude of different wastes the facility contains, it is very difficult for the owner/operator to know exactly all the waste codes that this leachate represents. It could be from hundreds of wastes. To facilitate treatment of residues derived from listed waste disposal and to streamline the hazardous waste identification process for leachate, EPA created the listing for multisource leachate from the disposal of listed hazardous waste, or F039.

It should be noted that the F039 waste code does not include leachate derived **exclusively** from F020-F023 and F026-F028 wastes. This type of leachate is considered single source leachate that is classified as F020-F023 and F026-F028.

## K Listed Wastes

[40CFR261.32 and WAC 173-303-9904]

The K listed wastes are hazardous wastes generated from specific industrial sources. To determine whether a waste will designate as a K listed waste, it must first be determined if the waste comes from one of the 13 different industries identified to produce K listed waste. Then you must determine if the waste is generated from a specific process within these industries that have been identified by EPA to produce one of these listed wastes. The 13 businesses that are sources of K listed waste codes are associated with the production of:

- Wood Preservation
- Inorganic pigments
- Organic chemicals
- Inorganic chemicals
- Pesticides
- Explosives
- Petroleum refining
- Iron and steel
- Primary aluminum reduction
- Secondary lead smelting
- Organo-arsenic veterinary pharmaceuticals
- Ink formulation
- Coking

The K001 waste code is assigned to the bottom sediment sludge associated with the treatment of wastewater from wood preserving process that use creosote and/or pentachlorophenol.

Codes K002-K007 are assigned to the wastewater treatment sludges from the production of inorganic yellow, orange, green, and blue pigments from various metals. The metals used to make these pigments that will trigger this listing are chrome and chrome oxides (yellow, orange, and green pigments), molybdate (orange pigments), zinc (yellow pigments), and iron (blue pigments). The K008 code is given to oven residue from the production of chrome oxide green pigments. Processes that produce hazardous waste associated with the production of organic pigments are listed in the organic chemical K waste codes.

The largest group of K wastes are assigned to wastes associated with the production of organic chemicals. Industries involved in the production of organic chemicals should check the K list in either 40CFR261.33 or WAC 173-303-9904 to determine if their waste products are considered a K waste, and if so, what the appropriate code for the waste is. This group also includes codes for waste produced in the manufacture of organic dyes and/or pigments.

The list of K waste codes associated with inorganic chemical production is much smaller than that for the production of organic chemicals. Codes K071, K073, and K106 are associated with wastes created in the production of chlorine. Codes K176 and K177 are assigned to the filters and slag created in the production of antimony oxides and any intermediates. Lastly, the code

K178 is assigned to residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmenite process.

Pesticides are the second largest group of K listed wastes. Companies producing, but not limited to, chlordane, phorate, toxaphene, 2,4-D, ethylenebisdithiocarbamic acid, and methyl bromide will likely produce K listed wastes.

The waste codes K044-K047 are associated with the production of explosives. Sludges and spent carbon for the treatment of wastewater produced in the manufacture of explosives are included in these waste codes.

There are K waste codes for a number of the sludges and solids associated with petroleum refining processes. Additionally, spent hydrotreating catalysts from petroleum refining operations are also potentially K listed waste.

Two K waste codes are associated with the iron and steel industries. The first, K061, is for emission control dust/sludge from the primary production of steel in electric furnaces. The other, K062, is given to spent pickle liquor generated by steel finishing operations.

Spent potliners from primary aluminum reduction are given the code K088. Emission control dust/sludge from secondary lead smelting is given the code K069, and K100 is the code for waste leaching solution from acid leaching of these control dust/sludges.

The production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds has three K listed wastes associated with this industry. K084 is assigned to wastewater treatment sludges; K101 is assigned to distillation tar residues, and waste code K102 is assigned to residues from the use of activated carbon in decolorization step.

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 stabilizers containing chromium and lead are given the waste code K086,

The final group of industrial source K waste codes are for wastes produced in the coking process. A number of sludges and residues are produced in the coking process, the recovery processes, and the storage of tars. Many of these wastes are given a K listed waste code.

## P-Listed Wastes

[40CFR261.33(e), WAC 173-303-081, and WAC 173-303-9903]

The P wastes are acutely hazardous commercial chemical products that have been either discarded, are off-specification, are container residues, and/or are spill residues. In 40CFR261.33(e) Subpart D there are two complete lists of the substances considered P listed waste; the first in alphabetical order and the second in numerical order based on the waste code. These two lists are also provided in WAC 173-303-9903.

These substances are hazardous waste if they are discarded or intended to be discarded as described in 40CFR261.2(a)(2)(i) and WAC 173-303-016. This includes if these chemicals are mixed with waste oil or used oil or other material and applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or 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.

Basically, unless a substance in the P list was produced specifically to be applied to the land or to be used as a component in fuel, you cannot put it on the land or mix it with fuel or oil. Doing so would be considered disposal. P listed waste must be disposed of as acutely hazardous or extremely hazardous waste.

Off-specification commercial chemical products or manufacturing chemical intermediates must be handled the same as the P listed waste they are associated with. If the generator cannot use the off-specification product for its intended purpose and therefore must dispose of it; the waste must be labeled with the appropriate P waste code.

Any container containing residue or an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate found on the P list must also be disposed of as a hazardous waste and labeled with the appropriate P waste code [40CFR261.33(c) and WAC 173-303-081(c)]. Unless the container can be declared empty as defined in 40CFR261.7(b) and WAC 173-303-160(2), then it must be disposed of as hazardous waste. The empty container rules regarding containers that have held acutely hazardous wastes are even more strenuous than those for other hazardous waste [40CFR261.7(b)(3) and WAC 173-303-160(2)(b)].

Any residue or contaminated soil, water, or other debris resulting from the cleanup of a spill of any chemical product or manufacturing chemical intermediate that is a P listed waste will also have to be managed and given the corresponding P list waste code [40CFR261.33(d) and WAC 173-303-081(d)].

## U Listed Waste

[40CFR261.33(g), WAC 173-303-081, and WAC 173-303-9904]

U listed wastes, like P listed wastes, are commercial chemical products, or off-specification commercial chemical products. However, U listed wastes only contain hazardous constituents and are not acutely toxic. Two complete lists of the substances considered U listed waste (the first in alphabetical order and the second in numerical order of the waste code) are presented in 40CFR261.33(g) in Subpart D and in WAC 173-303-9903.

Again, any container containing residue or an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed as a U waste in the above mentioned tables must also be disposed of as a hazardous waste and labeled with the appropriate U waste code [40CFR261.33(c) and WAC 173-303-081(c)]. Unless the container can be declared empty as defined in 40CFR261.7(b) and WAC 173-303-160(2), then it may be disposed of as solid waste.

Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill of any chemical product or manufacturing chemical intermediate that is a U listed waste will also have to be managed and given the corresponding U list waste code [40CFR261.33(d) and WAC 173-303-081(d)].

A special note regarding the phrases “commercial chemical product or manufacturing chemical intermediate” in the regulations. These terms refer to a chemical substance which is manufactured or formulated for a commercial or manufacturing use which consists of the commercially **pure grade** of the chemical, any **technical grades**, or a chemical that is 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, which contains any of the substances listed as a P or U listed wastes. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a P or U listed substance, such waste will be listed in either the F or K listed wastes or will be identified as a hazardous waste by its characteristics (I,C,R,T).

The three key terms from the definition above are a commercially pure grade, technical grade, or sole active ingredient. Pure grade means the product contains 100 % of the U or P listed chemical. There are no exact criteria for the term “technical grade”, such as percent purity. The technical purity of a substance will vary from compound to compound. As mentioned previously technical grade is often the concentration of the chemical found in the commercially marketed chemical product.

The term sole active ingredient means the chemical may be part of a mixture; however, it is the only compound that is performing the function of the product. The functionally inert component of the chemical product (mobilizing agents, preservatives, solvents, propellants ...etc.) do not prevent formulations containing P or U listed constituents that are the sole active ingredient from

being a P or U listed waste. However, if a formulation has more than one active ingredient this formulation would not be within the scope of the P or U listing when discarded.

Washington State's dangerous waste regulations also only require a waste to be designated a P or U listed waste when it is a commercially pure grade, technical grade, or sole active ingredient in the product. However, if a material meets the description of a P or U listed waste, but does contain more than one active ingredient the waste must further be designated as a state-only dangerous waste using the book designation procedure or bioassay testing methods outlined in WAC 173-303-100. In Washington State, formulations may have more than one active ingredient or a mixture of listed waste, and while not meet the federal listing description, they may still designate as a state-only dangerous waste.

This covers the basics of designating listed hazardous waste under the federal and state rules. The next presentation will discuss designating Washington State dangerous waste using the book designation method. If you are in need of waste management training Coulee Environmental Safety Training has four upcoming Waste Management for Washington State (Annual RCRA) trainings in the next few months. We are offering the one day refresher class October 18 and November 15 in Moses Lake. This class is for people who work at large and medium quantity generator facilities who have experience managing dangerous waste but need to maintain their annual training. This class is also good for small quantity generators who want to stay current on the regulations and how they may affect their operation. The class runs from 8:00 - 4:00 and costs \$395.

We are offering the full three day Waste Management for Washington State (Annual RCRA) training September 19-21 and December 5-7 in Moses Lake. This class is for people working for large and medium quantity generators who are new to dangerous waste management and would like an in depth training on both the federal and state waste management regulations. The classes run from 8:30-4:00 and costs \$995. If you are interested in finding out more about these trainings please go to <https://wasteandsafety.com/training-schedule> or email Angela, [angela.stenhouse@wasteandsafety.com](mailto:angela.stenhouse@wasteandsafety.com)