

## Waste Designation: Characteristic Hazardous Waste

Waste designation is a step-by-step process by which a generator determines if they have generated a waste and if that waste will need to be managed as hazardous/dangerous waste or simply as solid waste. This information is critical in determining how waste produced either during and/or after a manufacturing process will be handled by the generator. 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's 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 is designating characteristic waste, second designating federally listed waste, third designating Washington State dangerous waste using the book designation method, and fourth designating Washington State dangerous waste using the bioassay designation method.

Once a solid waste has been generated, waste designation will allow you as the generator not only to determine if that waste is a hazardous/dangerous waste, but also to determine if the waste may be excluded from regulation under 40CFR261.4 or (in Washington State) WAC 173-303-017 and WAC 173-303-071. If your waste is not excluded or exempt then it must be determined if it is hazardous due to characteristics (I,R,C,T) or being a listed waste (F,K,P,U) or if it is a state-only dangerous waste [WAC 173-303-100]. Lastly, the generator may want to determine if any treatment or recycling program may be employed to reduce or remove any state or federal regulations from their 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 the RCRA or WAC 173-303 definition of hazardous/dangerous waste is essential to the waste management process. The 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].

Under the 2016 changes to the federal hazardous waste rules, generators must keep documentation of how or why a solid waste was determined to not be a hazardous waste. The scope of this provision focuses only on those solid wastes found in 40CFR261.2 (spent materials, sludges, byproducts, and discarded commercial chemical products) that have the potential to be listed or characteristically hazardous wastes. Additionally, generators must have this confirmation of their waste at the point of its generation.

### How to Designate Characteristic Waste

All waste, including characteristic hazardous waste, can be designated using two methods. The first method is to use process knowledge and research and the second is by sampling and laboratory analysis. Either or both may be used as long as the information comes from a reliable source. However, one method may be more appropriate than the other depending on the characteristic you are assessing.

EPA has identified certain properties or characteristics that will result in a solid waste designating as hazardous. This list of specific hazardous waste characteristics has also been adopted by Ecology. Wastes that exhibit these characteristics are given corresponding D waste codes. It is important to

remember that even if a waste meets a listing description, you must determine if it also exhibits one of these hazard characteristics.

Washington State recognized these same waste characteristics and incorporated them into its waste regulations [WAC 173-303-090]. A waste is considered hazardous/dangerous and is regulated under RCRA and WAC 173-303 if it exhibits one of the following characteristics:

- Ignitability (I)
- Corrosivity (C)
- Reactivity (R)
- Toxicity (T)

### Ignitable Waste

[40CFR261.21 and WAC 173-303-090(5)]

A solid waste exhibits the characteristic of ignitability if the waste has any of the following properties:

- It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 140 degrees F (60 degrees C).
- It is not a liquid and is capable, at 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.
- It is an ignitable compressed gas. A compressed gas must be characterized as ignitable if any one of the following occurs:
  - A mixture of 13 percent or less (by volume) of the gas in air forms a flammable mixture.
  - The flame projects more than 18 inches beyond the ignition source with the valve opened fully or the flame flashes back and burns at the valve with any degree of valve opening.
  - There is any significant propagation of flame away from the ignition source.
- It is an oxidizer. The regulations consider an oxidizer a substance such as a chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter.
- An organic compound containing the bivalent -O-O- structure and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals must be classed as an organic peroxide unless:
  - It is a forbidden explosive as defined in 49 CFR 173.54, or a Class 1 explosive, Division 1.1, Division 1.2, Division 1.3, and Division 1.5, as defined in 49 CFR 173.50, in which case it must be classed as an explosive.
  - The material is forbidden to be offered for transportation according to 49CFR172.101 and 49CFR173.21.
  - It is determined that the predominant hazard of the material containing an organic peroxide is other than that of an organic peroxide.

- According to data on file with the Pipeline and Hazardous Materials Safety Administration in the U.S. Department of Transportation (DOT) (see Note 3), it has been determined that the material does not present a hazard in transportation.

Ignitable wastes are given the waste code D001 under RCRA. Under WAC 173-303-090, a solid waste that exhibits the characteristic of ignitability must be designated dangerous waste and assigned the dangerous waste number of D001.

Some common ignitable wastes are spent solvents (spent acetone, toluene, xylene, or methanol), solvent still bottoms, and ignitable paint wastes.

#### *Designating Ignitable Waste Using Generator Knowledge*

If you have a product or chemical you want to dispose of, a simple way to designate for ignitability is to check the safety data sheet (SDS). If the material is considered hazardous due to having a flashpoint under 140 degrees F, or it is a known oxidizer it will designate as D001. The SDS can also be helpful when disposing of a spent material. If the product met the ignitable waste criteria before its use, it may still have those same properties after it is spent. Likewise, when disposing of a sludge, spent material, or by-product if you know that it has properties that match those given in the regulations for ignitable waste you can designate it as D001. For example, a solid by-product that will catch on fire through friction has the characteristic for ignitability and is a D001.

#### *Designating Ignitable Waste Using Laboratory Analysis*

For some wastes, you may need to test to determine if the material will or will not designate as ignitable or if it should be considered an oxidizer. Designating a waste for ignitability can be done by the generator in their lab if they have one, or it can be sent to an independent laboratory. Testing must conform to the methods listed in the regulations [WAC 173-303-090(5)(a)(i), -090(5)(a)(iii)(B)(II), (III), and (IV)]. While lab testing can be expensive, it is less costly than incorrectly managing wastes. If you have an inconsistent waste stream which can have varying levels of potentially flammable constituents or oxidizers, you may need to test your waste for ignitability before disposing of it.

#### Corrosive Wastes

[40CFR261.22 and WAC 173-303-090(6)]

A solid waste exhibits the characteristic of corrosivity if the waste has any one or more of the following properties:

- 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.
- It is liquid and corrodes steel (SAE 1020) at a rate greater than 0.250 inches (6.35 mm) per year at a test temperature of 130 degrees F (55 degrees C).
- In Washington State, a solid or semisolid which, upon testing using appropriate methods, results in a pH less than or equal to 2, or greater than or equal to 12.5.

Corrosive wastes are given the waste code D002 under RCRA. Under WAC 173-303-90(6) liquids that exhibit corrosive characteristics described above are designated dangerous waste and assigned the waste code D002. Additionally, solids or semisolids that exhibit corrosive characteristics are designated dangerous waste and assigned the waste code WSC2 [WAC 173-303-090(6)(b)(ii)].

Some common corrosive wastes are often cleaning and sterilizing solutions as these often contain ammonia, caustic soda (sodium hydroxide) or other strong bases, or strong acids.

#### *Designating Corrosive Waste Using Generator Knowledge*

If you have a product or chemical you want to dispose of, a simple way to designate for the characteristic of corrosivity is to check the safety data sheet (SDS). If the material is an aqueous solution, section 9 of the SDS should provide a pH. Additionally, section 2 of the SDS will state if the material is considered corrosive. If you are disposing of a liquid sludge, spent material, or by-product and you have reason to believe the pH will be  $\leq 2$  or  $\geq 12.5$  based on the materials used in your process; you can take a pH reading with a calibrated pH meter. If you are disposing of a solid or semisolid that you suspect could be corrosive in the presence of water, a simple paste pH test can be conducted to make that determination.

#### *Designating Corrosive Waste Using Laboratory Analysis*

If you are unable to make a pH determination due to lack of a pH meter, ability to conduct a paste pH test, or perhaps you are sending the sample off for other analysis, a laboratory can conduct a pH test for you. If corrosivity is the only hazardous property you are concerned about for your waste, investing in a pH meter is worthwhile.

#### Reactive Wastes

[40CFR261.23 and WAC 173-303-090(7)]

Solid wastes that exhibit the characteristic of reactivity may have one or more of the following properties:

- It is normally unstable and readily undergoes violent change without detonating.
- It reacts violently with water.
- It forms potentially explosive mixtures with water.
- 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.
- 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.
- It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

- It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
- It is a forbidden explosive as defined in 49 CFR 173.54, or a Class 1 explosive, Division 1.1, Division 1.2, Division 1.3, and Division 1.5, as defined in 49 CFR 173.50.

Reactive wastes are given the waste code D003 under RCRA. In Washington State, a solid waste that exhibits the characteristic of reactivity must be designated dangerous waste and assigned the dangerous waste number D003 under WAC 173-303-090(7).

#### *Designating Reactive Waste Using Generator Knowledge*

Generator knowledge is the primary way reactive waste is designated. When disposing of a product or chemical you should check the safety data sheet (SDS) to see if the material is considered reactive. This information can be found in section 2 and section 10 of the SDS. If you are disposing of a sludge, spent material, or by-product and you know that it has properties that match those given in the regulations for reactive waste you must designate it as D003. For example, a solid by-product or sludge that will produce enough heat to create smoke or steam in the presence of air or water would designate as a D003.

#### *Designating Reactive Waste Using Laboratory Analysis*

Within the regulations, there is not a prescribed laboratory analysis to determine if a waste is considered reactive or not. Laboratory testing can be helpful to identify the specific chemicals that are causing the reaction, but if the waste produces heat, potentially hazardous fumes, or explosive energy in the presence of air, water, or liquids with a pH between 2 and 12.5, it will be assigned the waste code D003 when disposed of.

#### Toxic Wastes

[40CFR261.24 and WAC 173-303-090(8)]

A solid waste exhibits the characteristic of toxicity if, when tested using the *Toxicity Characteristic Leaching Procedure* (TCLP), the extract from a representative sample of the waste contains any of the contaminants or “toxins” listed in the toxicity characteristic list in 40CFR261.24(b) and WAC 173-303-90(8)(c), at concentrations equal to or greater than the respective value shown below in Table 1.

Table 1. Maximum Concentration of Contaminants for the Toxicity Characteristic

Dangerous/Hazardous Waste Number <sup>a</sup>	Contaminant	(Chemical Abstracts Services #)	DW (mg/L)
D004	Arsenic	(7440-38-2)	5.0
D005	Barium	(7440-39-3)	100.0
D018	Benzene	(71-43-2)	0.5
D006	Cadmium	(7440-43-9)	1.0
D019	Carbon tetrachloride	(56-23-5)	0.5
D020	Chlordane	(57-74-9)	0.03
D021	Chlorobenzene	(108-90-7)	100.0
D022	Chloroform	(67-66-3)	6.0
D007	Chromium	(7440-47-3)	5.0
D023	o-Cresol	(95-48-7) <sup>b</sup>	200.0
D024	m-Cresol	(108-39-4) <sup>b</sup>	200.0
D025	p-Cresol	(106-44-5) <sup>b</sup>	200.0
D026	Cresol	<sup>a</sup>	200.0
D016	2,4-D	(94-75-7)	10.0
D027	1,4-Dichlorobenzene	(106-46-7)	7.5
D028	1,2-Dichloroethane	(107-06-2)	0.5
D029	1,1-Dichloroethylene	(75-35-4)	0.7
D030	2,4-Dinitrotoluene	(121-14-2) <sup>c</sup>	0.13
D012	Endrin	(72-20-8)	0.02
D031	Heptachlor (and its epoxide)	(76-44-8)	0.008
D032	Hexachlorobenzene	(118-74-1) <sup>c</sup>	0.13
D033	Hexachlorobutadiene	(87-68-3)	0.5
D034	Hexachloroethane	(67-72-1)	3.0
D008	Lead	(7439-92-1)	5.0
D013	Lindane	(58-89-9)	0.4
D009	Mercury	(7439-97-6)	0.2
D014	Methoxychlor	(72-43-5)	10.0
D035	Methyl ethyl ketone	(78-93-3)	200.0
D036	Nitrobenzene	(98-95-3)	2.0
D037	Pentachlorophenol	(87-86-5)	100.0
D038	Pyridine	(110-86-1) <sup>c</sup>	5.0
D010	Selenium	(7782-49-2)	1.0
D011	Silver	(7440-22-4)	5.0
D039	Tetrachloroethylene	(127-18-4)	0.7

Dangerous/Hazardous Waste Number <sup>a</sup>	Contaminant	(Chemical Abstracts Services #)	DW (mg/L)
D015	Toxaphene	(8001-35-2)	0.5
D040	Trichloroethylene	(79-01-6)	0.5
D041	2,4,5-Trichlorophenol	(95-95-4)	400.0
D042	2,4,6-Trichlorophenol	(88-06-2)	2.0
D017	2,4,5-TP (Silvex)	(93-72-1)	1.0
D043	Vinyl chloride	(75-01-4)	0.2

DW = Dangerous Waste Threshold

<sup>a</sup> Dangerous Waste number for Ecology, Hazardous Waste number for RCRA

<sup>b</sup> If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used.

<sup>c</sup> At the time the TC (toxicity characteristic) rule was adopted, the quantitation limit was greater than the calculated regulatory level. The quantitation limit, therefore, became the regulatory level.

Under RCRA, wastes that are regulated due to the above toxicity characteristics are given the respective waste code presented in Table 1. In Washington State, WAC 173-303-090(8) wastes containing the above contaminants at or above the threshold concentrations in Table 1 are designated as dangerous waste and assigned the same corresponding waste codes.

#### *Designating Toxic Waste by Generator Knowledge*

Determining whether a waste will designate for the characteristic of toxicity will often have to be done using laboratory analysis. However, generator knowledge can be used in some cases, and will often be required to determine if a waste contains a chemical that is on the table of contaminants for the toxicity characteristics. If a generator possesses a thorough understanding of the materials and/or processes used in the manufacturing of their product, then their knowledge can be used to designate what potentially regulated constituents will be in their waste.

If you are disposing of a chemical or product a review of the SDS will provide you with information about the specific chemical(s) in the product. This information can be found in section 3. If one or more of the chemicals are on the table of contaminants for the toxicity characteristics, then the material should be tested to see if it will designate for the toxicity characteristic.

If your waste has been analyzed for a toxicity characteristic in the past you can use this information to continue to designate your waste over time. This is appropriate if your process has not changed and you know your waste's chemical properties are consistent. Also, if a generator is using a process that is known to produce a waste that will designate as toxic, this information can also be used as a means to designate the waste. For example, older paint can have extremely high levels of lead. When this paint is removed it can be designated as having the toxic characteristic for lead and disposed of as a D008 dangerous waste without retesting for the toxic characteristic.

## *Designating Toxic Waste by Sampling and Laboratory Analysis*

The TCLP test is used to test for the toxicity characteristic in wastes that are 99.5% or less liquid [40CFR261.24 and WAC 173-303-090(8)]. This test measures how likely it is that toxic chemicals will leach out of a waste under acidic landfill conditions. If the waste exceeds threshold TCLP levels for any of the characteristic chemicals, the waste designates as a hazardous waste. However, the TCLP test is only applicable to constituents that are regulated for the characteristic of toxicity. These are the D004 - D043 toxins. Other chemicals that are regulated as state-only dangerous waste for toxicity are regulated based on the **total** concentration of the contaminant and not the TCLP concentration. This is a subtle but important distinction.

Often you will need to test your waste to determine if it is going to designate for the toxic characteristic. This is especially true when you have an inconsistent waste stream which can have varying levels of chemicals. You may need to test for any relevant chemicals each time you designating your waste.

For wastes which will not have an SDS, it is advisable to test for any of the listed toxic constituents in the SDS(s) for the materials used in the manufacturing process, including any catalysts, and any intermediates materials that may form during the manufacturing process. Additionally, toxic constituents that could come from machinery or equipment used in the manufacturing process should be included in the analysis, for example, chromium from stainless steel equipment.

### Laboratory Sampling

Waste sampling can either be done by the generator or a testing service. Both EPA and Ecology require the same test methods to be used for the designation of waste. However, they do not strictly regulate the sampling method used to collect the sample. The method used to collect the sample must provide a sample that is representative of each waste to be tested. Due to the variety of physical characteristics solid wastes can have, the methods and equipment used for obtaining representative samples will vary with the type and form of the waste. Samples taken by the methods listed in the regulations [WAC 173-303-110 or Appendix I to 40CFR261] are considered representative samples of waste.

Once samples are collected, they will need to be sent to an accredited laboratory for analysis. Ecology does not rate laboratories as providing better or worse quality of work, nor does Ecology certify or give accreditation to laboratories to specifically perform dangerous waste designation analysis. Regardless of the lab selected to carry out the waste analysis, the lab must use the testing methods set forth in 40CFR261, Subpart C, or according to an equivalent method approved by the Administrator under 40CFR260.21 and WAC 173-303-110.

Once a waste has been designated, the generator must keep records of any test results, waste analyses, or other determinations made in accordance with WAC 173-303-170(1) used in designating the waste for at least five years from the date that the waste was last transferred for on-site or off-site treatment, storage, or disposal [WAC 173-303-210(3)(a)]. The test results used to designate the waste must at a minimum include the following information in addition to the analytical results [WAC 173-303-210(3)(a)]: the source of the sample, the sampling procedure used to collect it, the date the sample was collected, the date the sample was tested, the name of the laboratory performing the test, and the testing method the

laboratory used. The analytical results should also include the quantitative range or the testing method used for analytes that were not detected in the sample.

This covers the basics of designating characteristic hazardous/dangerous waste under the federal and state rules. The next presentation will deal with designating listed waste. 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 a large and medium quantity generator facilities who have experience managing dangerous waste but need to maintain their annual training. It 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).