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Defining Hazardous Waste

This section contains information on:

What is a Hazardous Waste?

Hazardous waste is a waste with properties that make it potentially dangerous or harmful to human health or the environment. The universe of hazardous wastes is large and diverse. Hazardous wastes can be liquids, solids, or contained gases. They can be the by-products of manufacturing processes, discarded used materials, or discarded unused commercial products, such as cleaning fluids (solvents) or pesticides. In regulatory terms, a hazardous waste is a waste that appears on one of the four RCRA[1] hazardous wastes lists (the F-list, K-list, P-list, or U-list) or that exhibits one of the four characteristics of a hazardous waste - ignitability, corrosivity, reactivity, or toxicity. However, materials can be hazardous wastes even if they are not specifically listed or don't exhibit any characteristic of a hazardous waste. For example, "used oil," products which contain materials on California's M-list, materials regulated pursuant to the mixture or derived-from rules, and contaminated soil generated from a "clean up" can also be hazardous wastes. To view the hazardous waste regulations and statutes, go to: http://www.dtsc.ca.gov/LawsRegsPolicies/index.cfm

Click below to take a self-paced internet course on hazardous waste identification
http://ccelearn.csus.edu/wasteclass/intro/intro_01.html

The following paragraphs provide an overview of the various ways that a waste may be identified as hazardous waste.

I. Listed Wastes

By regulation, some specific wastes are hazardous wastes. These wastes are incorporated into five lists.

These five lists are organized into four categories:

• **The F-list (non-specific source wastes):** This list identifies wastes from many common manufacturing and industrial processes, such as solvents that have been used for cleaning or degreasing. Since the processes producing these wastes occur in many different industry sectors, the F-listed wastes are known as wastes from non-specific sources. (Non-specific meaning they don't come from one specific industry or one specific industrial or manufacturing process.) The F-list appears in the hazardous waste regulations in 22CCR Section 66261.31.

• **The K-list (source-specific wastes):** This list includes certain wastes from specific

industries, such as petroleum refining or pesticide manufacturing. Also, certain sludges and wastewaters from treatment and production processes in these specific industries are examples of source-specific wastes. The K-list appears in the hazardous waste regulations in 22CCR Section 66261.32.

• **The P-list and the U-list (discarded commercial chemical products):** These lists include specific commercial chemical products that have not been used, but that will be (or have been) discarded. Industrial chemicals, pesticides, and pharmaceuticals are example of commercial chemical products that appear on these lists and become hazardous waste when discarded. The P- and U-lists appear in the hazardous waste regulations in 22CCR Subsections 66261.33(e) and (f).

• **M-listed Wastes (discarded mercury-containing products):** This list includes certain wastes known to contain mercury, such as fluorescent lamps, mercury switches and the products that house these switches, and mercury-containing novelties. For additional information see DTSC's mercury web page.

II. Characteristic Hazardous Wastes

Wastes may be hazardous wastes if they exhibit any of the four characteristics of a hazardous waste (ignitability, corrosivity, reactivity, and toxicity) as defined in Article 3 of Chapter 11 of the hazardous waste regulations (Sections 66261.21 to 66261.24).

These four characteristics are:

Ignitability – Ignitable wastes can create fires under certain conditions, undergo spontaneous combustion, or have a flash point less than 60°C (140°F). Examples include waste oil and used solvents. The characteristic of ignitability is defined in section 66261.21 of the hazardous waste regulations. Test methods that may be used to determine if a waste exhibits the characteristic of ignitability include the Pensky-Martens Closed-Cup Method for Determining Ignitability, the Setaflash Closed-Cup Method for Determining Ignitability, and the Ignitability of Solids (U.S. EPA Test Methods, SW-846 Methods: 1010, 1020, and 1030, respectively.). 22CCR 66261.21.

Corrosivity – Corrosive wastes are materials, including solids, that are acids or bases, or that produce acidic or alkaline solutions. Aqueous wastes with a pH less than or equal to 2.0 or greater than or equal to 12.5 are corrosive. A liquid waste may also be corrosive if it is able to corrode metal containers, such as storage tanks, drums, and barrels. Spent battery acid is an example. The characteristic of corrosivity is defined in section 66261.22 of the hazardous waste regulations. Test methods that may be used to determine if a waste exhibits the characteristic of corrosivity are pH Electronic Measurement and Corrosivity Towards Steel (U.S. EPA Test Methods, SW-846 Methods: 9040 and 1110 respectively.). 22CCR 66261.22.

Reactivity – Reactive wastes are unstable under normal conditions. They can cause explosions or release toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include lithium-sulfur batteries and unused explosives. The characteristic of reactivity is defined in section 66261.23 of the hazardous waste regulations. There are currently no test methods available for reactivity. Instead wastes are evaluated for reactivity using the narrative criteria set forth in the hazardous waste regulations. 22CCR 66261.23.

Toxicity – Toxic wastes are harmful or fatal when ingested or absorbed (e.g., wastes

containing mercury, lead, DDT, PCBs, etc.). When toxic wastes are disposed, the toxic constituents may leach from the waste and pollute ground water. The characteristic of toxicity is defined in section 66261.24 of the hazardous waste regulations. It contains eight subsections, as described below. A waste is a toxic hazardous waste if it is identified as being toxic by any one (or more) of the eight subsections of this characteristic.
22CCR 66261.24.

1. TCLP: Toxic as defined through application of a laboratory test procedure called the Toxicity Characteristic Leaching Procedure (TCLP - U.S. EPA Test Method 1311). The TCLP identifies wastes (as hazardous) that may leach hazardous concentrations of toxic substances into the environment. The result of the TCLP test is compared to the Regulatory Level (RL) in the table in subsection 66261.24(a)(1) of the hazardous waste regulations. This criterion does not apply to wastes that are excluded from regulation under the Resource Conservation and Recovery Act.

2. Totals and WET: Toxic as defined through application of laboratory test procedures called the "total digestion" and the "Waste Extraction Test" (commonly called the "WET"). The results of each of these laboratory tests are compared to their respective regulatory limits, the Total Threshold Limit Concentrations (TTLCs) and the Soluble Threshold Limit Concentrations (STLCs), which appear in subsection 66261.24(a)(2) of the hazardous waste regulations.

3. Acute Oral Toxicity: Toxic because the waste either is an acutely toxic substance or contains an acutely toxic substance, if ingested. As stated in subsection 66261.24(a)(3), a waste is identified as being toxic if it has an acute oral LD_{50} less than 2,500 mg/kg. A calculated oral LD_{50} may be used.

4. Acute Dermal Toxicity: Toxic because the waste either is an acutely toxic substance or contains an acutely toxic substance, if dermal exposure occurs. As stated in subsection 66261.24(a)(4), a waste is identified as being toxic if it has an dermal LC_{50} less than 4,300 mg/kg. A calculated dermal LD_{50} may be used.

5. Acute Inhalation Toxicity: Toxic because the waste either is an acutely toxic substance or contains an acutely toxic substance, if inhaled. As stated in subsection 66261.24(a)(5), a waste is identified as being toxic if it has an dermal LC_{50} less than 10,000 mg/kg. U.S. EPA Test Method, SW-846 Methods: 3810, Headspace (formerly Method 5020) may be used to "test out" (for volatile organic substances).

6. Acute Aquatic Toxicity: Toxic because the waste is toxic to fish. A waste is aquatically toxic if it produces an LC_{50} less than 500 mg/L when tested using the "Static Acute Bioassay Procedures for Hazardous Waste Samples". This test procedure is available at:
http://www.dtsc.ca.gov/HazardousWaste/upload/HWMP_bioassay_report.pdf

7. Carcinogenicity: Toxic because it contains one or more carcinogenic substances. As stated in subsection 66261.24(a)(7), a waste is identified as being toxic if it contains any of the specified carcinogens at a concentration of greater than or equal to 0.001 percent by weight.

8. Experience or Testing: Pursuant to subsection 66261.24(a)(8), a waste may be toxic (and therefore, a hazardous waste) even if it is not identified as toxic by any of the seven criteria above. At the present time, only wastes containing ethylene glycol (e.g.,

spent antifreeze solutions) have been identified as toxic by this subsection.

III. Used Oil: In California, waste oil and materials that contain or are contaminated with waste oil are usually regulated as hazardous wastes if they meet the definition of "Used Oil" even if they do not exhibit any of the characteristics of hazardous waste. The term "used oil" is a legal term which means any oil that has been refined from crude oil, or any synthetic oil that has been used and, as a result of use, is contaminated with physical or chemical impurities. Other materials that contain or are contaminated with used oil may also be subject to regulation as "used oil" under Part 279 of Title 40 of the Code of Federal Regulations. http://www.epa.gov/epahome/cfr40.htm

IV. Mixture & Derived-From Rules: When evaluating materials that are mixtures or that are residuals resulting from processing other materials, you should check to see if the hazardous waste mixture-rule or derived-from rule applies. The hazardous waste mixture and derived-from rules are located in 22CCR Section 66261.3. There are also additional mixture rules specifically for mining wastes and for used oil. These rules are intended to ensure that mixtures and residuals containing hazardous wastes are regulated in a manner that is protective of human health and the environment.

V. Contained-In Policy: Environmental media (soil, groundwater and surface water) are not normally considered wastes. However, when environmental media are excavated (and stored or transported) for disposal at another location, the environmental media may be regulated as hazardous waste if it contains hazardous waste, including both listed and characteristic hazardous wastes. For example, soil contaminated with lead is often a hazardous waste because the lead "contained-in" the soil is a hazardous waste.

Additional Information and Resources:

Hazardous Waste Determination: As described above, the hazardous waste regulations set forth criteria that identify wastes as hazardous wastes. Although they may meet the definition of hazardous waste, some wastes are specifically excluded or exempted from regulation as hazardous waste (e.g., chlorofluorocarbon refrigerants that are reclaimed for reuse). The process of determining if a waste is a hazardous waste is called the "hazardous waste determination". To ensure an exclusion or exemption is not overlooked, generators should always follow the Hazardous Waste Determination procedure provided in 22CCR Section 66262.11 of the hazardous waste regulations when evaluating their wastes.

Click below to take a self-paced, internet course on hazardous waste identification
http://ccelearn.csus.edu/wasteclass/intro/intro_01.html

Hazardous Waste Recycling: A material must be a "waste" in order to be a hazardous waste. Generally, a waste is any material that someone possesses, but does not have a use for. In regulatory terms, a waste is any discarded material that is not otherwise excluded. The process of determining if something is a waste is called "waste Identification." Materials may not be wastes if they are recycled in certain ways, i.e., they may be excluded from the definition of waste in 22CCR Section 66261.2 of the hazardous waste regulations. Besides 22CCR Section 66261.2, you will have to refer to Health and Safety Code Sections 25120.5, 25120.55, 25121.5, and 25143.2 (and perhaps others) when making a waste determination.

Click below to review the DTSC Hazardous Waste and Recycling Letters
http://www.dtsc.ca.gov/HazardousWaste/CSERFS/index.cfm

Test Methods: Sampling and analysis of materials and wastes for hazardous waste identification purposes shall be in accordance with U.S. EPA's publication: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, commonly referred to just as "SW-846." SW-846 is available online at:
http://www.epa.gov/epawaste/hazard/testmethods/sw846/index.htm

Additional Links:
DTSC Hazardous Waste and Recycling Letters
http://www.dtsc.ca.gov/HazardousWaste/CSERFS/index.cfm

Q&A for Specific Hazardous Waste and Hazardous Substances
http://www.dtsc.ca.gov/InformationResources/

Information for universal waste
http://www.dtsc.ca.gov/InformationResources/Regulatory_Assistance_Frequently_Asked_Questions.cfm#Is_it_a_Hazardous_Waste_or_Isn%27t_It

US EPA training module – Introduction to Hazardous Waste Identification
http://www.epa.gov/osw/inforesources/pubs/training/hwid05.pdf

RCRA online
http://www.epa.gov/epawaste/inforesources/online/index.htm

Click below to take a self-paced, internet course on hazardous waste identification
http://ccelearn.csus.edu/wasteclass/intro/intro_01.html

Comments or Questions:
If you still have questions about hazardous waste identification, or if you have suggestions to improve this document, call (916) 324-2428 or send email to rao@dtsc.ca.gov

[1] The Resource Conservation and Recovery Act. As used on this web page, "hazardous waste regulations" refers to Chapters 10 through 32 of Division 4.5 of Title 22 of the California Code of Regulations

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