

TIP No. 37-025-1120

HAZARDOUS WASTE IDENTIFICATION

PURPOSE. To provide an introduction on hazardous waste (HW) identification for medical treatment and research facilities. Not characterizing or incorrectly characterizing HW may result in monetary fines by state or federal regulators.

POINTS OF MAJOR INTEREST AND FACTS

Background

Medical research and medical treatment facilities (MTFs) generate a variety of wastes some of which are HW. This information paper assist facilities in determining whether they generate HWs. Hazardous waste has to be managed in accordance with federal and occasionally more stringent state regulatory requirements.

State specific HW regulatory requirements are outside the scope of this paper. Contact the installation environmental office or facility environmental officer for detailed information on state specific HW management requirements.

What is a Hazardous Waste?

Briefly stated, a HW is a waste with a chemical composition or property that is capable of causing illness, death, or other harm when improperly managed or released into the environment. Title 40 Code of Federal Regulations (CFR) Part 261, also known as the Resource Conservation and Recovery Act (RCRA) Subtitle C, specifies the criteria for an HW.

HAZARDOUS WASTE IDENTIFICATION PROCESS

RCRA requires that any person who produces or generates a waste must determine whether the waste is hazardous. Waste generators may identify a waste by either knowledge of the materials and processes that generate the waste, the manufacturer safety data sheet (SDS), or through laboratory analysis.

The U.S. Environmental Protection Agency (EPA) has assigned a specific EPA HW # for quick determination of why a waste material is a HW. Several HW #s are presented in the HW identification discussion for illustrative purposes only. The installation environmental office uses these HW #s for waste disposal purposes. There are four steps in the HW identification process:

- Is the waste a solid waste?
- Is the waste excluded from the RCRA regulations?
- Does the waste exhibit an HW characteristic?
- Is the waste a "listed" HW?

Is the Waste a Solid Waste?

Before a waste can be classified as a HW, it must first be a solid waste. A waste is a solid waste as soon as and at the time it is discarded, abandoned by being disposed of, burned or incinerated, recycled, or considered "waste-like." A solid waste can be in the form of a liquid, solid, gas, or sludge.

Under RCRA, expired products do not necessarily determine when a product becomes a solid waste as some products are still usable after they expire. On the other hand, a product that has not yet expired becomes a solid waste, under RCRA, as soon as decision has been that the product is no longer needed. An example of this would be a laboratory deciding not to use a certain chemical anymore. Unless any remaining stock of the chemical can be used in another section, the material becomes a waste and hence a solid waste.

Is the Waste Excluded or Exempt from RCRA Regulations?

Several solid wastes are excluded or exempt from RCRA for a variety of reasons. Determining whether a solid waste is excluded or exempted from HW regulations is the second step in the HW identification process. Examples of materials that are excluded are:

- Recovered oil that is recycled
- Radioactive materials subject to the Atomic Energy Act
- Used cathode ray tubes that are recycled
- Lead-acid batteries that are recycled

Is the Waste a Characteristic Waste?

The next step in the waste identification process is to determine whether the waste exhibits one or more HW characteristics. There are four HW characteristics—ignitability, corrosivity, reactivity, and toxicity. Product SDSs are the primary resource for determining HW characteristics. A laboratory analysis may need to be performed if the SDS does not provide enough information to determine whether a waste is a characteristic HW. Below is brief description of the four HW characteristics:

Ignitability: A waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

- Is a liquid, other than an aqueous solution containing less than 24% alcohol by volume and has a flashpoint less than 140 °Fahrenheit (60 °Celsius).
- Is a non-liquid and is capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes.
- Is an ignitable compressed gas.
- Is an oxidizer.
- A solid waste that exhibits the characteristic of ignitability has the EPA HW# D001.

Corrosivity: A waste exhibits the characteristic of corrosivity if a representative sample of the waste has any of the following properties:

- It is an aqueous solution and has a pH less than or equal to 2 or greater than or equal to 12.5.
- It is a liquid and corrodes steel at a rate greater than 6.35 millimeters per year.
- A solid waste that exhibits the characteristic of corrosivity has the EPA HW# D002.

Reactivity: A waste exhibits the characteristic of reactivity if a representative sample of the waste has any 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 generates toxic gases.
- It is capable of detonation or explosive reaction.
- It is a forbidden explosive.
- An HW that exhibits the characteristic of reactivity has the EPA HW# D003.

Toxicity: EPA HW# D004—D043

A material exhibits the characteristics of toxicity if a waste sample analyzed, with a toxicity characteristic leaching procedure (TCLP), contains any of the elements specified in Table 1 of Title 40 CFR 261.24 at a concentration equal to or greater than indicated. A waste that exhibits TCLP toxicity is assigned the EPA HW # that corresponds to the contaminant listed in the table. Examples of this type of characteristic are lotions and shampoos containing Lindane, used for the treatment of scabies and head lice, and mercury containing dental amalgam. Toxic wastes are harmful and may be fatal when ingested or absorbed.

Is the Waste a Listed Hazardous Waste?

The final step in the waste identification process is to determine whether the waste is a listed HW. The EPA established four types of HW lists, which are grouped into three categories—non-specific source wastes, specific source wastes, and commercial chemical products. These lists are found in Title 40 CFR 262.30. Below is a brief description of each of the four HW lists:

- **F-List.** The HWs on this list are from non-specific sources. Common wastes include used rags contaminated with F-listed solvents and thinners generated by facility or equipment maintenance operations.
- **K-List.** This list contains HWs that are generated by specific manufacturing operations.

Medical treatment facilities (MTFs) should not generate any K-listed HWs.

- **P-List.** This includes chemicals in pure form, in commercial grade form, or as the sole active ingredient in a chemical formulation. Products identified on this list are also known as acute HW because they are extremely hazardous. Examples include certain chemotherapy drugs, warfarin > 0.3%, and physostigmine.
- **U-List.** Just like the P-list, the U-list includes chemicals in pure form, in commercial grade form, or as the sole active ingredient in a chemical formulation. Examples include acetone, chloroform, and formaldehyde.

RECORDKEEPING

Small and large quantity of HW must maintain records supporting the HW determinations (40 CFR 262.11). Records must be maintained for at least 3 years after the waste is sent to a treatment facility. Records must include but are not limited to:

- Results of any tests, sampling, waste analyses or other determinations.
- Records documenting the tests, sampling, and analytics methods used to demonstrate the validity and relevance of such tests.
- Records consulted in order to determine the process by which the waste was generated, the composition of the waste, and the properties of the waste.
- Records which explain the knowledge basis of the generator's determination.

A discussion on the HW generator categories (very small, small, large quantity HW generator) is outside the scope of this paper. Contact the supporting installation environmental office for the applicable HW generator category.

WASTE CHANGES

The EPA has not formally specified how often a solid waste has to be recharacterized. However, as the burden of proof is on the waste generator, a generator will have to recharacterize a solid waste when:

- The raw materials, process, or operation that produces the waste changes.
- The EPA changes the waste identification rules.
- Questions are raised through an internal or external audit as to the regulatory status of the waste.
- The treatment facility requests new analytical data of the waste.

STATE REGULATIONS

State regulations may be stricter than Federal regulations and vary from state to state. Always check your state requirements, or contact your installation environmental office or facility environmental officer, for state specific HWs.

Table 1. Typical Hazardous Wastes Found in MTFs

Waste	Type	EPA HW#
Arsenic trioxide	chemotherapy drug	P012, D004
Azaserine	chemotherapy drug	U015
Chlorambucil	chemotherapy drug	U035
Chlornaphazine	chemotherapy drug	U026
Cyclophosphamide	chemotherapy drug	U058
Daunorubicin	chemotherapy drug	U059
Diethylstilbestrol	chemotherapy drug	U089
Melphalan	chemotherapy drug	U150
Mitomycin	chemotherapy drug	U010
Streptozotocin	chemotherapy drug	U206
Ammonia	inhalant	D001
Dental amalgam	mercury containing only	D009
Lindane	shampoo or cream	U129
Insulin injections	m-cresol containing only	D024
Erythromycin	containing \geq 24% alcohol	D001
Warfarin/Coumadin	0.3% or less	U248
Warfarin/Coumadin	> 0.3%	P001
Laboratory fixatives	containing \geq 0.2 ppm mercury	D009
Laboratory stains	containing \geq 24% alcohol	D001
Acetic acid	liquid	D001, D002
Methanol	liquid	D001
Xylene	solvent	F003
Chloroform	anesthetic	U044
Sphygmomanometers	mercury containing only	D009
Thermometers	mercury containing only	D009
Bleach	cleaning solution	D002
Cauterizing sticks	silver nitrate containing only	D011 and D001
Formaldehyde	solution	U122
Thin Prep	solution	D001
Salicylic acid	solution	D001
Vaccines	Thimerosal containing only	D009

CONCLUSION

Medical research facilities and MTFs generate a variety of wastes, some of which may be regulated as HW by Federal and state regulations. HWs may be found in laboratories, pharmacies, facility, and medical maintenance areas.

This information paper is only an introduction to waste identification and does not address all regulatory exemptions under RCRA. Contact the facility environmental officer or installation environmental office for assistance with identifying wastes and proper management procedures.

Another useful tool for identifying HW is the APHC Military Item Disposal Instruction (MIDI) system. It provides EPA HW disposal codes and methods of destruction for the disposal of hazardous and non-hazardous items used within the Department of Defense. The MIDI system is located at: <https://phc.amedd.army.mil/topics/envirohealth/wm/Pages/Military-Item-Disposal-Instructions.aspx>

ASSISTANCE

Contact U.S. Army Public Health Center, Environmental Health Sciences Division at 410-436-3651 or usarmy.apg.medcom-aphc.mbx.hmwp@mail.mil for additional assistance.

REFERENCES

Public Law 94-580, Resource Conservation and Recovery Act of 1976, October 21, 1976.

EPA. 2014. *RCRA Orientation Manual*. <https://www.epa.gov/sites/production/files/2015-07/documents/rom.pdf>

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