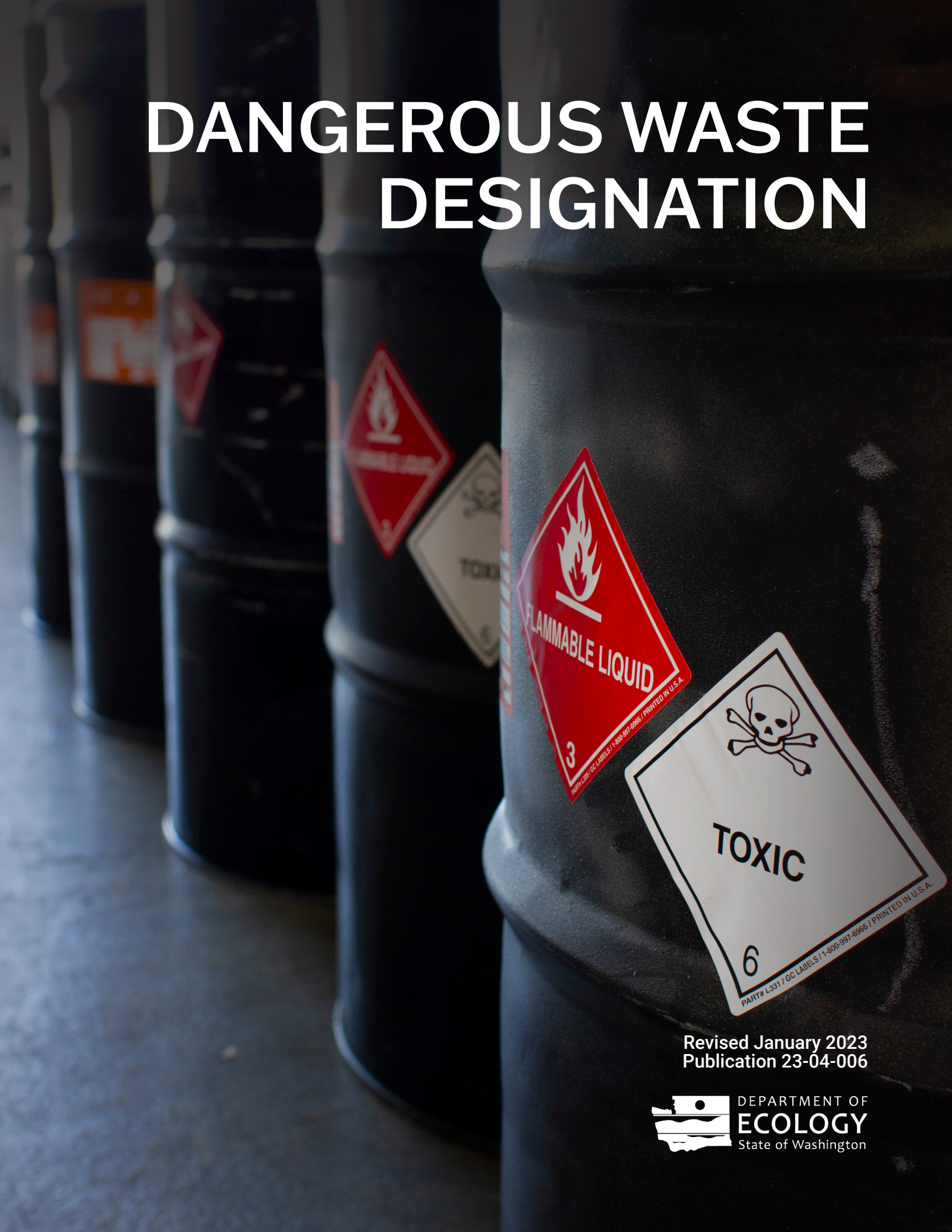
DANGEROUS WASTE DESIGNATION



Revised January 2023
Publication 23-04-006

DEPARTMENT OF ECOLOGY
State of Washington

PUBLICATION AND CONTACT INFORMATION

THIS PUBLICATION

This report is available on the Department of Ecology's website: https://apps.ecology.wa.gov/publications/SummaryPages/2304006.html

OUR LOCATION

Washington State Department of Ecology
Hazardous Waste and Toxics Reduction Program
300 Desmond Dr SE
Lacey, WA 98503

OUR WEBSITE

www.ecology.wa.gov

ADA ACCESSIBILITY

If you need this document in a format for the visually impaired, call the Hazardous Waste and Toxics Reduction Program at 360-407-6700. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

LINKS AND FOOTNOTES

If you are using the digital version of this publication, use the links found in this document. If you are using a paper copy, the web addresses for regulations and other references are listed in the footnotes.

FIND AN ECOLOGY OFFICE NEAR YOU:

HEADQUARTERS, LACEY
360-407-6000

NORTHWEST REGION OFFICE, SHORELINE
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SOUTHWEST REGION OFFICE, LACEY
360-407-6300

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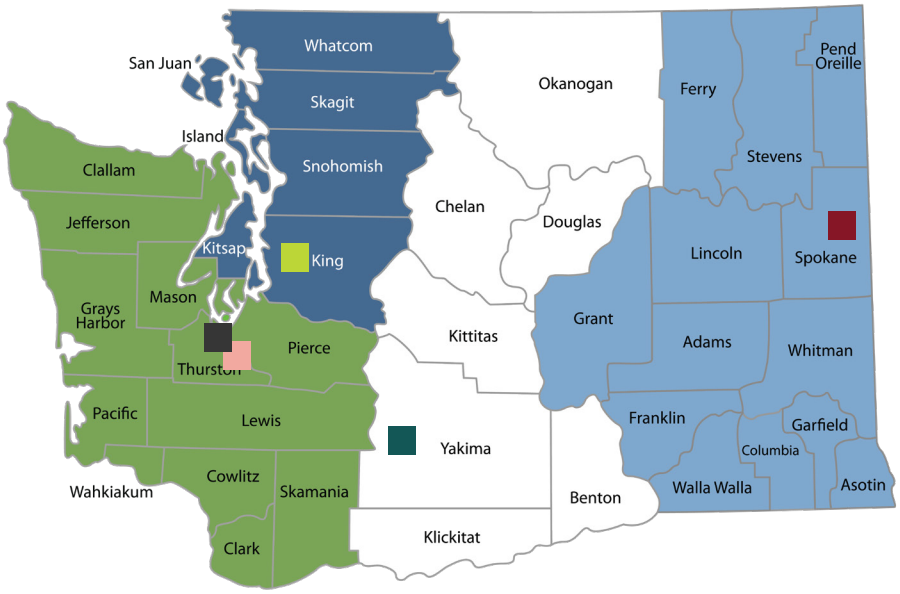

HOW TO USE THIS PUBLICATION

This guide will lead you through the steps for determining when your waste is subject to designation and if your waste is dangerous. Be sure to maintain your records when documenting this process.

The designation process identified in this guide is appropriate for most waste streams, but be aware that exclusions and exemptions exist for certain waste streams. This document doesn't address every exclusion or exemption. It also won't explain what's required of you based on the amount of waste you generate.

There's more to learn about how to manage your waste safely once you determine if it's dangerous, but this guide will help you get started with designation.

Use this Designation Checklist[1] as you work through this publication (see Appendix E). This can serve as your designation record.

1 https://apps.ecology.wa.gov/publications/SummaryPages/1604028.html

DANGEROUS WASTE DESIGNATION

CONTENTS

WHAT IS DESIGNATION?

HERE YOU'LL LEARN:

- How to get started designating your waste.
- Who can help you with waste designation.

LEARN MORE IN:

- WAC 173-303-040[1]
- WAC 173-303-070[2]

KEY TERMS:

DESIGNATION

POINT OF GENERATION

CRADLE TO GRAVE

DANGEROUS WASTE REGULATIONS

GENERATOR KNOWLEDGE

BOOK DESIGNATION

ANALYTICAL TESTING

QUANTITY EXCLUSION LIMIT (QEL)

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-040
2 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-070

DESIGNATION[3] is the process of determining if your waste is dangerous at the POINT OF GENERATION (the date and place where the material is first identified as a solid waste) or upon discovering a solid waste. It's an important part of running your business successfully and minimizing impacts to human health and the environment. It's also the law.

You must designate your waste to:

- Keep your workplace, community, and environment safe.
- Know the risks tied to your business's waste.
- Determine your generator category and on-site management requirements.
- Manage your waste properly from "cradle to grave."

Designating waste gives you codes that help you figure out what type of waste you have. Waste types are subject to QUANTITY EXCLUSION LIMITS (QELs). A QEL is a monthly weight limit that will determine your generator category (small, medium, or large quantity generator).

- Most dangerous wastes have a **QEL of 220 pounds**.
- Some dangerous wastes that are toxic in small amounts have a **QEL of 2.2 pounds**. This includes:
  - **Extremely hazardous** waste (WT01)
  - **Acutely hazardous P-listed** waste
  - **Acutely hazardous F-listed** waste (F020, F021, F022, F023, F026, F027)

Monthly generation limits by generator category:[4]

Generator category	220-lb QEL waste	2.2-lb QEL waste
Small quantity generator (**SQG**)	220 pounds or less	2.2 pounds or less
Medium quantity generator (**MQG**)	Between 220 and 2,200 pounds	2.2 pounds or less
Large quantity generator (**LQG**)	2,200 pounds or more	More than 2.2 pounds

Table 1. The difference between small, medium, and large quantity generators is the amount of waste they produce per month.

Watch our introductory video online: *Designate Your Waste—Is It Dangerous?*[3] It will help you understand the process and get started.

3 http://www.ecology.wa.gov/designation/
4 https://ecology.wa.gov/GeneratorCategory

DANGEROUS VS. HAZARDOUS

In Washington, we use the term dangerous waste, while federal rules use the term hazardous waste.

Our Dangerous Waste Regulations, Chapter 173-303 Washington Administrative Code (WAC) are based on the federal Resource Conservation and Recovery Act (RCRA). Washington's term dangerous waste includes more wastes than the federal definition, because Washington's rules are more protective than federal rules. Learn more about the rules that are specific to Washington in Step 5.

DANGEROUS WASTE REGULATIONS

The DANGEROUS WASTE REGULATIONS are in Title 173, Chapter 303 of the Washington Administrative Code (WAC).[5] We refer to these rules as Chapter 173-303 WAC. Additional numbers indicate sections or subsections of the chapter. For example, the rules for designating dangerous waste begin in Chapter 173-303-070 WAC. The steps for waste designation begin in Chapter 173-303-070(3) WAC.

Refer to the Dangerous Waste Regulations frequently. You can view them online or you can order a free paper copy of the Dangerous Waste Regulations by calling 360-407-6700 or emailing hwtrpubs@ecy.wa.gov.

CRADLE TO GRAVE

Under the Dangerous Waste Regulations, all generators are responsible for their dangerous waste from CRADLE TO GRAVE, even after it leaves the facility. This means you're legally and financially responsible for your dangerous waste from the time it's created, while it's transported, treated, and stored, and until it's disposed of. To be in compliance, keep manifest records in accordance with the regulations and thoroughly vet your waste vendors to ensure they're properly licensed, insured, and adequately experienced.

HOW TO DESIGNATE

If you generate waste or own property where waste is discovered, you are responsible for determining whether the waste is dangerous.

Designate your waste through:

- Generator knowledge
- Book designation
- Analytical testing

5 http://app.leg.wa.gov/WAC/default.aspx?cite=173-303

Figure 1. You can apply your knowledge of the waste to help properly designate it.

GENERATOR KNOWLEDGE

This method allows a generator to apply knowledge of the waste by taking into account the materials and processes used. Acceptable GENERATOR KNOWLEDGE includes but is not limited to:

- Knowledge of inputs to the production process.
- Knowledge of products, byproducts, and intermediates made in the production process.
- Characterization (chemical or physical) of the waste.
- Information gathered from Safety Data Sheets (SDSs) or other databases.

BOOK DESIGNATION

BOOK DESIGNATION is the process of determining the state-only toxicity of your waste (Chapter 173-303-100 WAC[6]). To book designate, you must know the chemical composition of your waste, including the percent concentration of each constituent and its toxicity.

ANALYTICAL TESTING

When you don't have enough information to make an accurate determination, you must send a sample of your waste to be analyzed using the test methods described in Chapter 173-

6 https://app.leg.wa.gov/WAC/default.aspx?cite=173-303-100

303-110 WAC.[7] This is known as ANALYTICAL TESTING. The methods and equipment used to obtain representative waste samples vary based on the type and form of your waste.

WHERE CAN YOU FIND HELP?

HAZARDOUS WASTE SERVICE PROVIDER

You can hire a hazardous waste service provider[8] to transport and dispose of dangerous waste. Some service providers help designate the wastes and provide waste labels with the applicable waste codes. However, you are still responsible for completing an accurate waste designation and knowing the rules that apply to your site. To avoid a costly mistake, make sure your waste profile matches your designation results.

ANALYTICAL LABORATORY

A laboratory[9] can provide information about your waste. When designating your waste, you may be instructed to send a sample to a lab for testing. In some cases, even though you're not required to test the waste, it may be beneficial to do so.

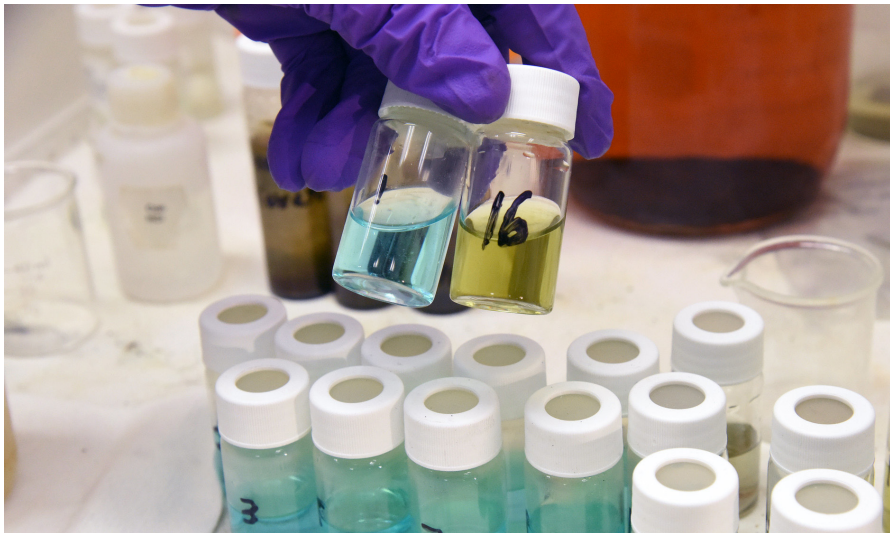

Figure 2. Sometimes you may need to send your waste to a laboratory to have it tested.

7 https://apps.leg.wa.gov/WAC/default.aspx?cite=173-303-110
8 https://ecology.wa.gov/DWContractors
9 https://ecology.wa.gov/LabAccreditation

ECOLOGY REGIONS

Designation can be tough, and you'll probably have questions along the way. Contact your local Ecology office if you need additional resources.

Department of Ecology Region Offices

Northwest Region Office, Shoreline	206-594-0000
Southwest Region Office, Lacey	360-407-6300
Central Region Office, Union Gap	509-575-2490
Eastern Region Office, Spokane	509-329-3400

STEP 1: WASTE DETERMINATION

IN THIS STEP, YOU'LL LEARN:

- Whether your waste is solid waste or dangerous waste.
- How to determine what's in your waste.

LEARN MORE IN:

- WAC 173-303-016[1]
- WAC 173-303-017[2]
- WAC 173-303-019[3]

KEY TERMS:

SOLID WASTE

SAFETY DATA SHEET (SDS)

CHEMICAL ABSTRACT SERVICE (CAS) NUMBERS

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-016
2 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-017
3 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-019

IS IT SOLID WASTE?

The first step is to know if your waste is SOLID WASTE. Solid waste is any material that is discarded and may include materials that are abandoned or recycled. Solid waste doesn't mean it's in a solid state—it might be solid, semi-solid, liquid, or compressed gas.

You must designate solid waste to determine if it's dangerous waste, but before determining if something is dangerous waste, consider if it's a waste at all.

SOLID WASTE EXAMPLES

Expired or unusable products:

- Lab chemicals that are past their shelf life
- Expired epi-pens or inhalers

Spent materials:

- Used oil
- Sandblast grit
- Solvent from parts washer

Wastewater:

- Rinse water from aqueous parts washers
- Mop water
- Dirty water from cleaning glassware in analytical labs

Sludge:

- Baghouse dust
- Spent carbon from wastewater treatment unit

NON-SOLID WASTE EXAMPLES

Products used for their intended purpose, such as dirty gasoline that can be reused.

Products that can be used by someone else, such as leftover paint that will be used for another job or off-spec materials that are unexpired.

WHAT'S IN YOUR WASTE?

When determining whether your waste is dangerous, consider the source of the waste:

- What processes created the waste?
- Were any other wastes mixed in?
- Did the waste get contaminated along the way?

Look at the safety data sheet for each product that went into your waste.

CHEMICAL ABSTRACTS SERVICE NUMBERS

The American Chemical Society identifies chemicals by their Chemical Abstracts Service[4] number, or CAS NUMBER. Many chemicals have multiple names. The CAS number helps avoid confusion between the various names of a chemical. You may want to refer to the CAS numbers for chemicals in your waste.

Even if the SDS says the product is not hazardous, you need to designate the waste to see if it's a dangerous waste. A waste may not have the same qualities or constituents as it did when it was a product.

Be aware that your SDS doesn't always show ingredients and concentrations as low as the regulatory limits. You might need to contact the product manufacturer to determine actual concentrations or ask about ingredients.

SAFETY DATA SHEETS

SAFETY DATA SHEETS (SDSs) can provide CAS numbers, pH, flashpoint, and other physical specifications. Some also include toxicological information.

Especially important SDS sections to look at when designating are:

Section 3: Composition/information on ingredients
Ingredients by CAS number and percentage

Section 9: Physical and chemical properties
Flash point, pH, and physical states

4 https://www.cas.org/content/chemical-substances/faqs

Section 10: Stability and reactivity
Hazardous reactions and incompatible materials

Section 11: Toxicological information
Toxicity to land animals

Section 12: Ecological information
Toxicity to aquatic animals

WHAT TO DO WITH AN UNKNOWN WASTE

If you do not have an SDS for your waste, you must designate it using generator knowledge or analytical testing.
To learn more about the requirements for testing and managing an unknown waste, see Focus on: Unknown wastes.[5]

5 https://apps.ecology.wa.gov/publications/SummaryPages/2004006.html

SDS SECTIONS AND DESCRIPTIONS

Table 2. A full list of the SDS sections as well as a description of what information is in each section.

Section	Title	Description
1	**Identification of the substance/ mixture**	Information about the product including identified uses of the product.
2	**Hazards identification**	Classification of the substance or mixture—provides information for hazard labeling.
3	**Composition/ information on ingredients**	List of the product ingredients by CAS and concentrations.
4	**First aid measures**	Exposure symptoms and necessary first aid measures/ medical treatment.
5	**Firefighting measures**	Extinguishing media and special hazards arising from the substance or mixture.
6	**Accidental release measure**	Personal precautions, protective equipment, and emergency procedures.
7	**Handling and storage**	Precautions for safe handling. Conditions for safe storage, including incompatibilities.
8	**Exposure controls/personal protection**	Exposure limits to keep yourself, employees, and the community safe.
9	**Physical and chemical properties**	Information on basic physical and chemical properties, such as pH and flashpoint.
10	**Stability and reactivity**	Information on reactivity, chemical stability, hazardous reactions, incompatible materials, and decomposition products.
11	**Toxicological information**	Information on toxicological effects to mammals, including acute toxicity data.

Section	Title	Description
12	**Ecological information**	Information on aquatic toxicity, persistence, and bio-accumulative potential.
13	**Disposal considerations**	Waste disposal considerations according to applicable regulations.
14	**Transport information**	Information to meet U.S. Department of Transportation requirements.
15	**Regulatory information**	Information on safety, health, and environmental regulations.
16	**Other information**	Date of the latest revision of the SDS.

STEP 2: EXCLUDED OR EXEMPT WASTE

IN THIS STEP, YOU'LL LEARN:

If your waste is excluded or exempt from the regulations.

LEARN MORE IN:

- WAC 173-303-071[1]
- WAC 173-303-073[2]
- WAC 173-303-016[3]
- WAC 173-303-019[4]

KEY TERMS:

EXCLUDED

EXEMPT

LEGITIMACY CRITERIA

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-071
2 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-073
3 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-016
4 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-019

EXCLUDED CATEGORIES OF WASTE

Certain categories of waste are EXCLUDED from many of the dangerous waste management requirements because they are:

- Generally not dangerous waste.
- Regulated under other state and federal programs.
- Recycled in ways that don't threaten public health and the environment.

Some common excluded wastes include household hazardous waste, samples, domestic sewage, and scrap metal (see Chapter 173-303-071 WAC[1]).

EXEMPT CATEGORIES OF WASTE

Certain categories of waste aren't fully regulated as dangerous waste. They're considered EXEMPT from some of the dangerous waste regulations if they are:

- Specifically listed in the regulations as exempt.
- Managed according to the requirements for exemption.

Some common exempted wastes include universal waste and recycled industrial ethyl alcohol.

LEGITIMATE DANGEROUS WASTE RECYCLING

Ecology encourages reuse, recycling, and reclamation of dangerous waste; however, these activities must be done responsibly and safely. If you recycle hazardous secondary materials for the purpose of an exemption or exclusion, you must meet the LEGITIMACY CRITERIA. Hazardous secondary materials must:

- Provide a useful contribution to the recycling process or to a product or intermediate of the recycling process.
- Be used to produce a valuable product or intermediate.
- Be managed as a valuable commodity when it is under the control of the generator and recycler.
- Produce a product during the recycling process that is analogous to a legitimate product or intermediate.

When the legitimacy criteria aren't met, Ecology considers the material to be discarded and a solid waste.

If claiming an exclusion or exemption from the dangerous waste requirements, you must maintain documentation to demonstrate the wastes meet the terms or conditions of the exemption, Chapter 173-303-016(7) WAC.

STEP 3: LISTED WASTE

IN THIS STEP, YOU'LL LEARN:

If your waste is dangerous because it's on P, U, F, or K lists in the regulations.

LEARN MORE IN:

- WAC 173-303-081[1]
- WAC 173-303-082[2]

KEY TERMS:

DISCARDED CHEMICAL PRODUCTS

NON-SPECIFIC SOURCES

SPENT SOLVENTS

SPECIFIC SOURCE

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-081
2 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-082

Specific chemicals and waste streams are dangerous wastes when they appear on **lists** within the regulations, which is why we call them "listed waste." There are four waste code letters for listed wastes—P, U, F, and K codes—and each have their own list.

DISCARDED CHEMICAL PRODUCTS (P OR U CODES)

The P and U lists are in Chapter 173-303-9903 WAC.[3] Unused DISCARDED CHEMICAL PRODUCTS can either be a pure chemical (like acetone, **U002**) or a mixture with one sole active ingredient (like nicotine vape product with added flavors, **P075**). If the product is a mixture of multiple active ingredients (for example, paint containing toluene and xylene), it wouldn't have a P or U waste code because there's more than one active ingredient.

P-listed chemicals are more acutely hazardous than U-listed chemicals and have a more stringent regulatory threshold with a QEL of 2.2 pounds per month..

DOES YOUR WASTE HAVE A **P** OR **U CODE**?

1. Look at the SDS. If the discarded chemical product has one ingredient or only one active ingredient, it may be a P- or U-listed waste.
2. Check the list of chemicals in Chapter 173-303-9903 WAC to determine if the ingredient or sole active ingredient is listed.

SPILL CLEANUP

If P- or U-listed wastes spill, you must manage materials used to clean up the spill as P- or U-listed waste. Learn more in Chapter 173-303-081 WAC.[4]

CONTAINERS

If a small amount of P- or U-listed waste remains in a container, you must manage the container as P- or U-listed waste—unless it meets the conditions for "empty" containers in Chapter 173-303-160(2)(b) WAC.[5]

3 http://app.leg.wa.gov/WAC/default.aspx?cite=173-303-9903
4 http://app.leg.wa.gov/wac/default.aspx?cite=173-303-081
5 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-160

NON-SPECIFIC SOURCES (F CODES)

F codes apply to wastes from manufacturing and industrial processes found in Chapter 173-303-9904 WAC.[6] They are called NON-SPECIFIC SOURCES because they come from a variety of industries.

Table 3. Chemical types and their corresponding F codes.

Chemical type	F codes
Spent solvents	F001–F005
Electroplating and metal-finishing wastewaster sludges	F006–F012, F019
Dioxin wastes from pesticides	F020–F023, F026–F028
Wastes from production of chlorinated aliphatic hydrocarbons	F024, F025
Wood-preserving wastes	F032, F034, F035
Petroleum-refining sludges	F037, F038
Multi-source leachates	F039

SPENT SOLVENTS

Many industrial processes use SPENT SOLVENTS. Spent solvents are in waste codes F001 through F005.

Spent material means any material that has been used and as a result of contamination can no longer serve the purpose for which it was produced without processing.

EXAMPLE: SPENT SOLVENT

Toluene is used to clean residue out of paint guns. Since the spent toluene is listed in F005, the solvent waste will have this code.

It may carry additional waste codes based on the paint residue and final characteristics.

6 https://app.leg.wa.gov/WAC/default.aspx?cite=173-303-9904

EXAMPLE: SOLVENT MIXTURE

A solvent mixture containing 8% methyl ethyl ketone (MEK), 8% toluene, and 5% xylene was used for stripping paint. MEK and toluene are listed on the F005 list. Xylene is listed on the F003 list.

The waste mixture would carry F003 and F005 waste codes. The F005 code applies because MEK and toluene make up more than 10% of the solvent mixture before use. The F003 applies because it contains xylene.

EXAMPLE: STILL BOTTOMS

MEK is used to flush a paint spray line. After it is too contaminated to use, it is recycled in a distillation unit. The reclaimed MEK is reused as product. The waste still bottoms from the recovery of spent F005-listed solvent carry the F005 waste code.

SPECIFIC SOURCES (K CODES)

K codes apply to wastes from SPECIFIC SOURCES from a process or industry. If your facility produces wastes from any of these industries, review Chapter 173-303-9904 WAC.[7]

Sources listed include:

- Wood preservation
- Inorganic pigments
- Organic chemicals
- Inorganic chemicals
- Pesticides
- Explosives
- Petroleum refining
- Iron and steel
- Primary aluminum
- Secondary lead processing
- Veterinary pharmaceuticals
- Ink formulation
- Coking

7 http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303-9904

MIXTURE RULE AND DERIVED-FROM RULE

Under the mixture rule, if a waste is mixed with a listed waste, the mixture becomes listed and must be managed as listed dangerous waste.

The derived-from rule states that any waste generated (or derived) from the treatment, storage, or disposal of a listed waste is also listed and must be managed as listed dangerous waste.

Exception: If the waste is listed solely for one or more characteristics of ignitability, corrosivity, or reactivity, and the waste mixture or the derived-from waste doesn't exhibit any of these characteristics, then the mixture or the derived-from waste is no longer a listed dangerous waste. This exception does not apply to mixing listed waste into used oil.

See Chapter 173-303-070(2) WAC.[8]

8 https://app.leg.wa.gov/WAC/default.aspx?cite=173-303-070

STEP 4: CHARACTERISTIC WASTE

IN THIS STEP, YOU'LL LEARN:

If your waste is characteristic dangerous waste because it is ignitable, reactive, corrosive, or toxic.

LEARN MORE IN:

- WAC 173-303-090[1]

KEY TERMS:

IGNITABLE
CORROSIVE
REACTIVE
TOXIC
TOXIC CHARACTERISTIC LEACHING PROCEDURE (TCLP)
RULE OF 20

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-090

You need to know what additional hazards your waste exhibits. These **characteristics** of your waste make it hazardous to human health and the environment.

IGNITABLE (D001)

Wastes that can easily catch fire and continue to burn are IGNITABLE dangerous wastes. They can be a liquid, solid, or compressed gas.

Types of ignitable waste can be found in WAC 173-303-090(5).

Note: Something that is flammable is not necessarily ignitable, like cotton or paper.

IGNITABLE LIQUIDS

The most common ignitable wastes are liquids with a flashpoint of less than 140°F.

Common examples of ignitable liquids are:

- Acetone
- Acetonitrile
- Methanol
- Isopropyl alcohol (IPA)
- Xylene

Alcohol Exclusion: WAC 173-303-090(5)(a)(i) explains that an aqueous solution containing less than 24% alcohol by volume with a flash point of less than 140°F doesn't carry the characteristic for ignitability, since it would not sustain combustion.

IGNITABLE SOLIDS

A solid is ignitable if it meets **both** of these conditions:

1. Under standard temperature and pressure, it can cause fire through:
    - Friction.
    - Moisture absorption.
    - Spontaneous chemical changes.

2. It will burn vigorously and persistently.

Ignitable solids aren't common. Some examples are:

- Metallic sodium
- Magnesium

COMPRESSED IGNITABLE GASES

Compressed gases are ignitable when they have one of the following:

- An absolute pressure of more than 40 pounds per square inch (psi) at 70°F.
- An absolute pressure of more than 104 psi at 130°F.
- A vapor pressure of more than 40 psi at 100°F.

A compressed gas must be characterized as ignitable if it meets the conditions in WAC 173-303-090(5)(a)(iii)(A) and (B).

Common examples of compressed ignitable gases include:

- Propane
- Butane
- Oxygen

OXIDIZERS

Oxidizers are also characterized as ignitable.

Common examples of oxidizers include:

- Chlorate
- Inorganic peroxide
- Permanganate

CORROSIVE (D002)

CORROSIVE wastes are acids or bases that are capable of corroding metal containers, such as storage tanks, drums, and barrels. They can seriously damage skin, lungs, and other tissue.

To be corrosive, wastes must meet **either** of the conditions below:

- They're water-based with a pH of:
  - Less than or equal to 2 (acidic)
  - Greater than or equal to 12.5 (basic)
- They're a liquid waste that corrodes steel at a rate greater

than 0.250 inches per year.[2]

Test your waste using a calibrated pH meter or pH paper at the point of generation. The best practice is to test in the field because variables such as temperature, storage, and handling during transport could affect the final measurement.

Common examples of corrosive waste include:

- Calcium hydroxide (basic)
- Hydrofluoric acid (acidic)
- Nitric acid (acidic)
- Sodium hypochlorite (basic)
- Sulfuric acid (acidic)

REACTIVE (D003)

REACTIVE wastes can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water.

A waste is reactive if it:

- Changes violently without detonating.
- Decomposes explosively.
- Detonates.
- Forms explosive mixtures.
- Generates toxic gases, vapors, or fumes.
- Reacts violently with water.
- Reacts explosively.

Forbidden explosives are also considered reactive. See the Code of Federal Regulations[3] for a list.

Refer to Chapter 173-303-090(7) WAC for more details on the characteristics of reactivity.

Common examples of reactive waste include:

- Lithium-sulfur batteries
- Peroxides
- Potassium metal
- Sodium metal
- Unused airbags

Testing is not an option for reactivity!

You must use your knowledge about the waste to determine if it's reactive.

2 Use EPA's SW-846 Test Method 1110A to determine the corrosion rate.

3 http://www.ecfr.gov/cgi-bin/text-idx?SID=fffbf38fa7bc492cf7714d67463de1ee&mc=true&node=pt49.2.173&rgn=div5%22%20\l%20%22se49.2.173_154%22%20\t%20%22_blank

TOXIC (D004–D043)

TOXIC wastes are harmful or fatal when ingested, absorbed through the skin, or inhaled.

There are 40 chemicals on the federal toxicity characteristic list found in Chapter 173-303-090(8)(c) WAC. These chemicals include heavy metals such as lead and mercury, as well as organic compounds such as pesticides and solvents.

TESTING TO DETERMINE TOXICITY

Liquid or oily waste

Analyze liquid or oily wastes (those containing less than 0.5% dry solid material) to determine the total concentration of each constituent. Liquid results are reported as milligrams per liter (mg/L) and directly compared to the regulatory thresholds in the toxicity characteristics list.

Solid-type waste

For wastes containing greater than or equal to 0.5% solids, you have two testing options:

1. **Analyze the waste using a** TOXIC CHARACTERISTIC LEACHING PROCEDURE (TCLP). This is a specific preparation method that creates a diluted extract. The extract mimics the leaching that would happen in the acidic conditions of a landfill. TCLP results can be directly compared to the regulatory thresholds that are provided in the toxicity characteristics list.
2. **Analyze the undiluted waste to determine the total concentrations of chemicals**. These results cannot be directly compared to the regulatory thresholds in the toxicity characteristics list. You can use the RULE OF 20 (see box below) to determine if the waste would not exceed the regulatory thresholds.

RULE OF 20

The Rule of 20 is a way to determine the maximum amount of metals that could leach from your waste in a landfill. When a lab prepares a TCLP sample, they use a 20:1 ratio of acid to sample, making the TCLP result 20 times less concentrated than the original sample. If you use total concentrations (not the dilute TCLP results), a "Rule of 20" can estimate the TCLP concentration. You can divide the total concentration for each chemical by 20 as if the sample had been diluted 20-to-1 and compare the result directly to the toxicity characteristic list. See the example using the Rule of 20 on page 35.

EXAMPLE: USING TCLP

Spent blast media is analyzed using TCLP. The TCLP analysis reported 7.8 mg/L of chromium in the waste extract.

Chromium (CAS number 7440-74-3) is in the toxicity characteristics list with a regulatory threshold of 5.0 mg/L. Since the blast media has a concentration of 7.8 mg/L, which is above the regulatory threshold, it is a toxic dangerous waste with a D007 code.

Table 4. An excerpt of the Toxicity Characteristic List from Chapter 173-303-090 WAC showing Chlorobenzene through m-Cresol and their regulatory thresholds in milligrams per liter.

Dangerous Waste Number	Contaminant	(Chemical Abstracts Services #)	DW (mg/L)
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) /1/	200.0
D024	m-Cresol	(108-39-4) 1/1	200.0

EXAMPLE: USING THE RULE OF 20 FOR TOTAL METALS ANALYSIS

A representative sample of spent blast media is analyzed using a total metals analysis.

The test results showed 120 mg/kg lead. Using the Rule of 20, you can divide the total lead concentration of 120 mg/kg by 20, resulting in 6 ppm. Because this estimate is above the regulatory threshold of 5 mg/L, the waste could be a characteristic dangerous waste with waste code D008. Your options are to assume that it would fail (the waste is above the regulatory limit), or to test it using TCLP.

If the test results showed 80 mg/kg lead, you can divide by 20 to approximate a TCLP result of 4 ppm. Because this estimate is below the regulatory threshold of 4 mg/L, the waste could not exceed the TCLP limit and would not be a characteristic dangerous waste with a waste code D008.

If the test results showed 100 mg/kg lead, you can divide by 20 to approximate a TCLP result of 5 ppm, which equals the regulatory threshold of 5 mg/L. In this case, the waste could be a characteristic dangerous waste with a waste code of D008. The best course of action is to perform a TCLP analysis.

Dangerous Waste Number	Contaminant	(Chemical Abstracts Services #)	DW (mg/L)
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

Table 5. An excerpt of the Toxicity Characteristic List from Chapter 173-303-090 WAC showing Hexachlorobutadiene through Methoxychlor.

STEP 5: WASHINGTON STATE-ONLY TOXIC WASTE

IN THIS STEP, YOU'LL LEARN:

If your waste is considered a Washington state toxic.

LEARN MORE IN:

- WAC 173-303-070(5)(a)[1]
- WAC 173-303-100(5)[2]

KEY TERMS:

BOOK DESIGNATION

FISH BIOASSAY, OR FISH TOXICITY TEST

EQUIVALENT CONCENTRATION

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-070
2 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-100

Washington has additional criteria to protect human health and the environment. You may have to designate for Washington state-only criteria.

ALL GENERATORS

Regardless of your generator category, if your waste **doesn't** have a P-, U-, F-, K-, or D-waste code, continue designation under state criteria.

SMALL QUANTITY GENERATORS

If you are a small quantity generator (SQG) and your waste **does** have a P-, U-, F-, K-, or D-waste code, continue designating for state toxicity criteria to determine if the waste is a WT01 state extremely hazardous waste.

MEDIUM QUANTITY GENERATORS AND LARGE QUANTITY GENERATORS

If you are a medium quantity generator (MQG) or large quantity generator (LQG) and your waste **does** have a P-, U-, F-, K-, or D-waste code, state criteria designation isn't necessary.

TOXIC CRITERIA WASTES

Toxic criteria wastes can be harmful to human health and the environment even though they may not be regulated federally or in other states. Depending on their toxicity, state-only toxic criteria wastes will be one of the following:

Dangerous (state waste code **WT02**). Examples include many over-the-counter pharmaceuticals, formalin, aldehydes used in high-level disinfectants, spent process filters, paint filters, alkaline cleaning solutions, and spent antifreeze that isn't recycled.

Extremely hazardous (state waste code **WT01**). Examples include high-level disinfectants, biocides, and pesticides.

If you are an SQG, you must determine if your waste is an extremely hazardous waste due to toxicity. Extremely hazardous waste has a regulatory threshold of 2.2 pounds per month. This is important because extremely hazardous

waste may change your generator category and increase your regulatory requirements.

DO I HAVE TOXIC CRITERIA WASTES?

Determine state-only toxicity with either:

- BOOK DESIGNATION, using published toxicity data, or
- FISH BIOASSAY, determining the lethal concentration using laboratory method 80-12.[3]

For more detailed information on how to designate for state-only toxicity, see Appendix A.

Book designation

If you know **all** the hazardous substances in your waste, you can designate for state-only toxicity using book designation.

To book designate your waste, you must determine:

- The concentration of each hazardous substance in your waste.
- The lethal dose (LD) and/or lethal concentration (LC) of each hazardous substance, as found in databases referenced in Chapter 173-303-100(5)(b)(i) WAC or in safety data sheets (SDSs).
- The toxic category of each hazardous substance using Ecology's toxic category table (Table 6).
- The EQUIVALENT CONCENTRATION (EC) of the waste using Ecology's formula (Table 7). This value is calculated based on the toxicity category of the waste's individual hazardous substances and will determine whether the waste is dangerous (WT02), extremely hazardous (WT01), or not a state-only toxic waste.

If a product has a percent concentration range, conservatively, you should use the highest concentration percentage in your criteria designation determination.

Note: Some SDSs don't provide detailed information about proprietary ingredients or even the names of ingredients with concentrations less than 1%. If this happens, contact your vendor or the manufacturer to get more information. Without this information about your waste, you may have to analyze the waste to determine if it's dangerous waste.

Toxic category table

Find the toxic category of each hazardous substance in your waste using Table 6. This toxic category table is also found

3 https://apps.ecology.wa.gov/publications/SummaryPages/8012.html

in Chapter 173-303-100(5)(b)(i) WAC. We use the following terminology to describe dose/concentrations that can kill at least 50% of a group of test animals (LD_{50} or LC_{50}):

- Rats by ingestion (LD_{50} oral rat) or inhalation (LC_{50} inhalation rat).
- Rabbits through dermal contact (LD_{50} dermal rabbit).
- Fish (LC_{50} fish) if they swim in water contaminated with the waste.

These are known as acute toxicity endpoints.

Toxic category	Fish LC_{50} (mg/L)	Oral rat LD_{50} (mg/kg)	Inhalation rat LC_{50} (mg/L)	Dermal rabbit LD_{50} (mg/kg)
X	Less than 0.01	Less than 0.5	Less than 0.02	Less than 2
A	0.01–less than 0.1	0.5–less than 5	0.02–less than 0.2	2–less than 20
B	0.1–less than 1	5–less than 50	0.2–less than 2	20–less than 200
C	1–less than 10	50–less than 500	2–less than 20	200–less than 2,000
D	10–100	500–5,000	20–200	2,000–20,000

Table 6. The toxic category table from Chapter 173-303-100 WAC.

Note: If there are multiple LD_{50} or LC_{50} values, use the most toxic value. For example:

- Formaldehyde has LD_{50} oral rat toxicity values of 100 mg/kg (Toxic Category C) and 500 mg/kg (Toxic Category D) published in the Registry of Toxic Effects of Chemical Substances (RTECS). Since 100 mg/kg is the most toxic value it must be considered a Toxic Category C.
- Toluene has an LD_{50} oral rat value of 636 mg/kg (Toxic Category D), an LC_{50} inhalation rat value of 49 mg/L (Toxic Category D), and an LC_{50} fish value of 0.917 mg/L (Toxic Category B). Therefore, toluene must be considered a Toxic Category B.

If you can't find toxicity data for a known substance in reasonably available sources (for example, RTECS), the toxic category for that substance doesn't need to be included in the calculation. In some cases, you may need to test your waste using a fish bioassay to complete your designation.

Equivalent concentration

If your waste is made up of multiple chemicals, you must calculate the equivalent concentration (EC). Determine the EC by using a formula that calculates the sum of all the concentration percentages for each toxic category. The formula below will help you determine the waste designation.

$$EC = \frac{\sum X\%}{1} + \frac{\sum A\%}{10} + \frac{\sum B\%}{100} + \frac{\sum C\%}{1{,}000} + \frac{\sum D\%}{10{,}000}$$

Table 7. Equivalent concentrations with their associated waste codes and designations.

EC	Waste code	Designation
< 0.001%	N/A	Not a dangerous waste
0.001% ≤ EQ < 1.0%	WT02	Dangerous waste
≥ 1.0%	WT01	Extremely hazardous waste

Note: Waste analysis is critical if you suspect contaminants are present in your waste. For example, if you use solvent to clean metal parts, it's reasonable to think some amount of metal might be cleaned off the part and mix into the waste solvent. The solvent product's SDS wouldn't define the concentration of metal in the waste.

ANALYTICAL TESTING

Analytical testing using a fish bioassay offers a more accurate determination of toxicity.

If you don't know the full composition of your waste, you must run a fish bioassay. You'll need to send a representative sample of your waste to an accredited lab and ask them to follow the procedures in Ecology publication 80-12, Biological Testing Methods for the Designation of Dangerous Waste.[2] You can use the results to determine if the waste is WT01, WT02, or not a state-only toxic waste.

The lab prepares and introduces your waste to a population of fish, then monitors how many fish survive over a period of at least 24 to 96 hours. In this manner, they can determine whether specific concentrations of the waste cause 50% of the fish population to die.

If the designation acquired from book designation and bioassay data don't agree, then bioassay data will be used to designate a waste.

Figure 3. Fish bioassay is a study that helps determine the toxicity of your waste by introducing the waste to a population of fish, then monitoring how many fish survive over a period of at least 24 to 96 hours.

STEP 6: WASHINGTON STATE-ONLY PERSISTENT WASTE

IN THIS STEP, YOU'LL LEARN:

If your waste is considered a Washington state persistent dangerous waste.

LEARN MORE IN:

- WAC 173-303-100(6)[1]

KEY TERMS:

PERSISTENCE

HOCS

PAHS

HALOGENATED POLYMER

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-100

Washington regulates persistent chemical wastes because they can cause health problems, including cancer, neurological damage, and immune system damage. These chemicals can linger for decades if they make their way into the environment.

Persistent wastes have the state waste code WP01, WP02, or WP03. PERSISTENCE is defined in Chapter 173-303-040 WAC[2] and and applies to materials that resist degradation in the environment.

Persistent compounds are:

- **Halogenated organic compounds** (HOCS)—state waste codes WP01 and WP02.
- **Polycyclic aromatic hydrocarbons** (PAHS)—state waste code WP03.

HALOGENATED ORGANIC COMPOUNDS

HOCs are organic (carbon-based) compounds with at least one atom of bromine, chlorine, fluorine, or iodine bonded directly to a carbon atom. Current test methods for persistence simply detect the presence of halogens in the waste, but these halogenated compounds may not meet the definition of persistence.

Figure 4. One example of common HOCs is refrigerants.

2 https://apps.leg.wa.gov/WAC/default.aspx?cite=173-303-040

Common HOCs include pharmaceuticals, dry-cleaning chemicals, flame retardants, and refrigerants.

For example, chlorofluorocarbon refrigerants are HOCs because they have chlorine and fluorine atoms connected to a carbon. Chlorine bleach would not be considered an HOC even though it's halogenated, because chlorine is not bonded directly to carbon.

Chlorodifluoromethane
HFC-22

Difluoromethane
HFC-32

Figure 5. Chlorofluorocarbon refrigerant (HFC-22 and HFC-32) molecular structure (organic).

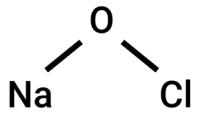

Figure 6. Sodium hypochlorite (chlorine bleach) molecular structure (inorganic).

POLYMER ALLOWANCE

Halogens may also be present as a polymer. Ecology does not regulate halogenated polymers as dangerous waste. Un-polymerized HOCs still require designation prior to disposal, such as unreacted chemicals used in the manufacturing of polymers.

Polyvinyl chloride (PVC) and neoprene are examples of halogenated polymers.

As defined in Chemical Test Methods,[3] a halogenated polymer must meet the following criteria for the polymer allowance:

- Consist of 100 or more repeating units (monomers) with at least one halogenated compound in the monomer combined together into a single chain.
- Have an average molecular weight of at least 5,000.

3 https://apps.ecology.wa.gov/publications/SummaryPages/97407.html

Generators must have documentation that a specific waste meets the polymer allowance. Ecology inspectors may ask for this documentation during compliance inspections as a part of the designation paperwork.

DETERMINE WASTE CODE

Chapter 173-303-100 WAC[4] provides guidance for determining if your waste is a regulated HOC in Washington. Your waste can have the following waste codes:

Dangerous (WP02 waste code):

- Greater than 100 parts per million (ppm) and less than 10,000 ppm (0.01% to 1.0%) total HOCs.
- Examples include waste resins and paint booth filters.
- WP02 may be considered a special waste (see Step 7).

Extremely hazardous:

- Greater than 10,000 ppm (1%) total HOCs (WP01 waste code).
  - Examples include chlorinated machine oil, halogenated paint, cleanup debris, and compressor and refrigerant oil.
- Greater than 10,000 ppm (1%) total PAHs (WP03 waste code).
  - Examples include pyrene, chrysene, and benzo(a)pyrene.

Table 8 summarizes persistent criteria wastes and codes.

If your waste contains	At a concentration of	It will have this waste code	And it is
HOCs	0.01% to 1.0%	WP02	Dangerous Waste
HOCs	More than 1.0%	WP01	Extremely hazardous waste
PAHs	More than 1.0%	WP03	Extremely hazardous waste

Table 8. How to determine your persistent criteria wastes and codes.

4 https://apps.leg.wa.gov/WAC/default.aspx?cite=173-303-100

To determine if your waste contains HOCs, first check your safety data sheet (SDS) and look for these chemicals (or their prefixes):

- Bromine (bromo-)
- Chlorine (chloro-)
- Fluorine (flouro-)
- Iodine (iodo-)

ANALYTICAL TESTING FOR HOCS

If the types of HOCs are unknown or you don't know the percent by weight of each known HOC, then we recommend using methods in our Chemical Test Methods[5] to determine halogen concentration. The choice of test method depends on the type of HOC in the waste. We recommend you use either SW-846 Method 9023 or Methods 5050 and 9056 to determine halogen concentration in a waste stream.

You may need to run multiple tests on a particular waste to identify individual organic halogen concentrations. Add up individual concentrations to get the total concentration.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

PAH wastes that contain more than 1% PAHs (10,000 ppm) are considered state-only dangerous waste, carrying state waste code WP03.

PAHs are often found in roofing tars and asphalt products. They're also used in the manufacture of medicines, dyes, plastics, and pesticides.

There are over 20 chemicals identified as PAHs in WAC 173-303-040.

5 https://apps.ecology.wa.gov/publications/SummaryPages/97407.html

STEP 7: WASHINGTON STATE-ONLY PCB OR SPECIAL WASTE

IN THIS STEP, YOU'LL LEARN:

If your waste is considered a state-only PCB or special waste.

LEARN MORE IN:

- WAC 173-303-9904[1]
- WAC 173-303-071(3)(k)[2]
- WAC 173-303-073[3]

KEY TERMS:

POLYCHLORINATED BIPHENYLS (PCBs)

SPECIAL WASTE

1 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-9904
2 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-071
3 https://app.leg.wa.gov/wac/default.aspx?cite=173-303-073

WASHINGTON POLYCHLORINATED BIPHENYLS

POLYCHLORINATED BIPHENYLS (PCBs) are organic compounds that were used in many industrial and commercial applications for their non-flammability, chemical stability, high boiling point, and electrical insulating properties. PCBs are very persistent, lasting for decades in the environment.

Typically, the federal Toxic Substances Control Act (TSCA) regulates wastes with PCBs greater than or equal to 50 ppm when they are derived from a known source. Waste with PCBs greater than or equal to 2 parts per million (ppm) and less than 50 ppm may be a Washington state-only dangerous waste (WPCB), depending on the source of the waste.

WPCBs are described in Chapter 173-303-9904 WAC as:

- Transformers, capacitors, or bushings that contain PCB fluids with concentrations greater than or equal to 2 ppm, unless they are drained of all free flowing liquid.
- All wastes (containing PCBs greater than or equal to 2 ppm) generated from salvaging, rebuilding, or discarding transformers, capacitors, or bushings.

Figure 5. One example of WPCBs is transformers that contain PCB fluids with concentrations greater than or equal to 2 ppm.

Some PCB-containing wastes are excluded from the regulations and don't have to be managed as dangerous waste, as explained in Chapter 173-303-071(3)(k) WAC. Refer to the PCB Dangerous Waste Guide[4] for more information on WPCBs and safe PCB waste management.

TOXIC SUBSTANCES CONTROL ACT EXCEPTIONS

The federal Toxic Substances Control Act (TSCA) regulates wastes with PCBs greater than or equal to 50 ppm when it is derived from a known source. However, there are caveats to that general rule of thumb. For example:

- Non-plastic PCB bulk product waste cannot be managed in a solid waste landfill if the material leaches ≥10 µg/L PCBs. See 40 CFR 761.62(b)(1)(ii).
- Soils being cleaned up from a spill of an unknown source of PCBs will be managed as PCB remediation waste at any detectable level of PCB concentration (40 CFR 761.61).

The TSCA statute can be found in Title 40 of the Code of Federal Regulations (CFR) in Part 761.[5] TSCA regulatory authority and program implementation rests predominantly with the U.S. Environmental Protection Agency (EPA). If you have questions about whether your PCB waste is subject to TSCA, contact EPA Region 10.[6]

4 https://apps.ecology.wa.gov/publications/SummaryPages/2104034.html
5 http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr761_main_02.tpl
6 https://www.epa.gov/aboutepa/forms/contact-epas-region-10-office-seattle

SPECIAL WASTE

Washington state-only dangerous wastes are SPECIAL WASTES if they meet **both** of these conditions:

- Are solid in form.
- Have one or more of the following waste codes:
  - WT02
  - WSC2
  - WP02
  - WPCB

Special wastes have less stringent management requirements. You may save money by disposing of them in some solid waste landfills. You may also ship them without the use of a dangerous waste hauler or hazardous waste manifest.

To take advantage of the conditional exclusion for special wastes, you must do one of the following:

- Dispose of your waste in hazardous waste or municipal solid waste landfills as specified in Chapter 173-303-073 WAC.
- Recycle the waste on or off site.
- Treat the waste in a way that is consistent with Ecology's treatment by generator guidance.[7]

Find specific conditions of the special waste exclusion—including storage, shipment, disposal options, and reporting—in Chapter 173-303-073 WAC.

In order for WT02 waste to qualify as special waste, the equivalent concentration must be less than or equal to 0.01%.

SOLID CORROSIVES

Solid corrosives have the state waste code WSC2. Wastes are considered "state-only corrosive dangerous wastes," if:

- They are corrosive because they have a low pH (less than or equal to 2) or high pH (greater than or equal to 12.5), **and**
- They are in a **solid** form (non-liquid, non-aqueous, non-gaseous).

Solid corrosives must be tested using EPA SW-846 Test Methods. Rules for solid corrosives are in WAC 173-303-090.[8]

7 https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Dangerous-waste-guidance/Dispose-recycle-or-treat/Treatment-by-generator

8 http://app.leg.wa.gov/WAC/default.aspx?cite=173-303-090

PUTTING IT ALL TOGETHER

Designation is the first step in managing dangerous waste. After designation, you should have either:

A list of all the waste codes that apply to each of your wastes and a description of how you determined those waste codes.

OR

Documentation explaining how your waste is not dangerous waste.

ADDITIONAL RESOURCES

If you'd like to learn more about managing your dangerous waste, visit our website[1] for more information, or check out these publications:

- Designation Checklist[2]
- Counting Dangerous Waste[3]
- Chemical Test Methods for Designating Dangerous Waste[4]
- Biological Testing Methods for the Designation of Dangerous Waste[5]
- Focus on: Special Waste Exclusion[6]

1 http://www.ecology.wa.gov/programs/hwtr/managewaste
2 https://apps.ecology.wa.gov/publications/SummaryPages/1604028.html
3 https://apps.ecology.wa.gov/publications/SummaryPages/2004010.html
4 https://apps.ecology.wa.gov/publications/SummaryPages/97407.html
5 https://apps.ecology.wa.gov/publications/SummaryPages/8012.html
6 https://apps.ecology.wa.gov/publications/SummaryPages/2104013.html

APPENDIX A: DESIGNATION EXAMPLES

EXAMPLE 1:
BOOK DESIGNATION USING A SAFETY DATA SHEET

You find a container of dried disinfectant wipes in a cabinet and decide you can no longer use them. Based on the information in the safety data sheet (SDS), you determine the wipes don't designate under any federal listing or characteristic, and you follow the book designation process to determine whether the wipes designate as a Washington state-only toxic.

STEP 1: MAKE A LIST

Create a table with a list of all the waste ingredients and their concentrations:

Name	CAS Number	Percentage
Ethylene glycol monohexyl ether	85409-23-0	0.1–0.2%*
Quaternary ammonium compounds	85409-23-0	0.1–0.2%*
Alkyl C12-18 dimethylbenzyl ammonium chloride	53516-76-0	0.1–0.2%*

*The exact percentage was withheld as a trade secret.

Table 9. Example table listing the waste ingredients and their concentrations.

STEP 2: FIND TOXICITY DATA

Under Section 11 of the SDS, you see the following toxicity data for ethylene glycol monohexyl ether:

Name	Oral rat LD_{50}	Dermal Rabbit LD_{50}	Inhalation Rat LC_{50}
Ethylene glycol monohexyl ether	739 mg/kg	721 mg/kg	Greater than 0.5 mg/L

Table 10. Example table showing the toxicity data for ethylene glycol monohexyl ether.

STEP 3: DETERMINE THE TOXIC CATEGORY

After looking at all the data, you identify the toxicity for inhalation rat as the most conservative, meaning it has the highest toxicity value.

Compare the data found to the toxic category table:

Table 11. The toxic category table from Chapter 173-303-100 WAC.

Toxic Category	Fish LC_{50} mg/L	Rat Oral LD_{50} mg/kg	Rat Inhalation LC_{50} mg/L	Rabbit Dermal LD_{50} mg/kg
X	Less than 0.01	Less than 0.5	Less than 0.02	Less than 2
A	0.01–less than 0.1	0.5–less than 5	0.02–less than 0.2	2–less than 20
B	0.1–less than 1	5–less than 50	0.2–less than 2	20–less than 200
C	1–less than 10	50–less than 500	2–less than 20	200–less than 2,000
D	10–100	500–5,000	20–200	2,000–20,000

The inhalation rat LC_{50} of 0.5 mg/L falls within the range of toxic category B because it's between 0.2 mg/L and 2 mg/L.

There is no toxicity data available for the quaternary ammonium compounds or the alkyl C12-18 dimethylbenzyl ammonium chloride.

STEP 4: CALCULATE THE EQUIVALENT CONCENTRATION

The SDS shows a percentage of 0.1% to 0.2% ethylene glycol monohexyl. Often, the concentration percentages listed in SDSs are given in a range. Use the highest percentage to determine the most conservative value.

Next, look at the equivalent concentration (EC) formula, which describes how to divide each category's sum:

$$EC(\%) = \frac{\sum X\%}{1} + \frac{\sum A\%}{10} + \frac{\sum B\%}{100} + \frac{\sum C\%}{1{,}000} + \frac{\sum D\%}{10{,}000}$$

The EC formula would look like this after you enter the total for toxic category B:

$$EC = \frac{0\%}{1} + \frac{0\%}{10} + \frac{0.2\%}{100} + \frac{0\%}{1{,}000} + \frac{0\%}{10{,}000} = 0.002\%$$

STEP 5: DETERMINE THE WASTE CODE

Finally, determine the waste code based on the toxic equivalent concentration value.

EC	Waste Code	Designation
< 0.001%	N/A	Not a dangerous waste
0.001% ≤ EQ < 1.0%	WT02	Dangerous Waste
≥ 1.0%	WT01	Extremely Hazardous Waste

Table 12. Example table showing equivalent concentration values and their relative waste code and waste designation.

Since the equivalent concentration is 0.002%, the waste disinfectant wipes are a dangerous waste with a WT02 waste code.

EXAMPLE 2: BOOK DESIGNATION USING ONLINE DATABASES

A maintenance crew found an unused and expired container of detergent and alerted you. You begin to designate the waste to determine proper management of the detergent.

Based on the information in the SDS, you determine the detergent doesn't designate under any federal listing or characteristic. You continue designating for Washington state-only toxicity using the book designation process.

STEP 1: MAKE A LIST

Create a table with a list of all the waste ingredients and their concentrations:

Table 13. Example table listing waste ingredients and their concentrations.

Name	CAS Number	Percentage
Sodium carbonate	497-19-8	40–50%
Pentasodium triphosphate	7758-29-4	10–20%
Sodium metasilicate	6834-92-0	10–20%
Sodium nitrite	7632-00-0	5–10%
Deuterium oxide (heavy water)	7789-20-0	5–10%

STEP 2: FIND TOXICITY DATA FOR EACH INGREDIENT

To determine the toxic category for each of the ingredients you must use published toxicity data. Under Section 11 and 12 of the SDS, you don't see any toxicity data; however, you can find toxicity data in three different databases (EcoTox, PubChem, and RTECS).

Look for these specific endpoints:

- Fish LC_{50} (mg/L)
- Oral Rat LD_{50} (mg/kg)
- Inhalation Rat LC_{50} (mg/L)
- Dermal Rabbit LD_{50} (mg/kg)

Begin by determining the toxicity for the first ingredient, sodium carbonate using the CAS Number (497-19-8) on the SDS. You find the following data after checking all three databases:

- LC_{50} fathead minnow: 850 mg/L.
- LD_{50} oral rat: 4,090 mg/kg.

- LC_{50} inhalation rat: 2.3 mg/L.
- LD_{50} dermal rabbit: >2,000 mg/L.

Find the toxicity data for all the remaining ingredients of the waste detergent.

STEP 3: DETERMINE THE TOXIC CATEGORY FOR EACH CHEMICAL

Use the most toxic value to determine the toxic category for each endpoint. Record the most toxic category for each ingredient.

- The fathead minnow LC_{50} of 850 mg/L for sodium carbonate doesn't fall within a range for any fish toxic categories.
- The oral rat LD_{50} of 4,090 mg/kg falls within the range in toxic category D because it's between 500 and 5,000 mg/kg.
- The inhalation rat LC_{50} of 2.3 mg/L is in toxic category C because it is greater than 2 and less than 20 mg/L.
- The dermal rabbit LD_{50} is greater than 2,000 mg/L and would be considered a toxic category D.

After completing these steps for all the ingredients in the waste, you will have a table documenting the toxic category of each ingredient (Table 14).

Figure 6. Some pesticides are considered WT02 waste in Washington because they are considered toxic to fish at certain levels.

Table 14. Example table showing waste ingredients and their concentrations, toxicity data, and toxic category.

Note: Do not reference the toxicity data in this table as a resource. These numbers are subject to change. Check the databases for the most current data.

Name	Percentage	LC_{50} Fish	LD_{50} Oral Rat	LC_{50} Inhalation Rat	LD_{50} Dermal Rabbit	Toxic Category
Sodium carbonate	40 – 50%	Fathead minnow 850 mg/L Category: None	4,090 mg/kg Category: D	2.3 mg/L Category: C	> 2,000 mg/L Category: D	C
Pentasodium triphosphate	10 – 20%	Japanese Medaka 590 mg/L Category: None	3,120 mg/kg Category: D	No available data	4,640 mg/kg Category: D	D
Sodium metasilicate	10 – 20%	Western Mosquitofish 2,320 mg/L Category: None	1,153 mg/kg Category: D	No available data	No available data	D
Sodium nitrite	5 – 10%	Rainbow Trout 0.11 mg/L Category: B	157.9 mg/kg Category: C	0.0055 mg/L Category: X	No available data	X
Deuterium oxide (heavy water)	5 – 10%	No available data	No available data	No available data	No available data	None

STEP 4: CALCULATE THE EQUIVALENT CONCENTRATION

Using the SDS as a reference, find the concentration percentages for each chemical ingredient in your waste. Often, the concentration percentages listed in SDSs are given in a range. Use the highest percentage.

Add the concentrations in each toxic category. There are none in category A or B.

There is only one chemical in category X:

Toxic Category X	Concentration
Sodium nitrite	10%
Total concentration of category X:	**10%**

Table 15. Example table showing the total concentration of waste ingredients in toxic category X.

There is only one in category C:

Toxic Category C	Concentration
Sodium carbonate	50%
Total concentration of category C:	**50%**

Table 16. Example table showing the total concentration of waste ingredients in toxic category C.

There are two chemicals in category D:

Toxic Category D	Concentration
Pentasodium triphosphate	20%
Sodium metasilicate	20%
Total concentration of category D:	**40%**

Table 17. Example table showing the total concentration of waste ingredients in toxic category D.

Next, look at the equivalent concentration (EC) calculation formula in Chapter 173-303-100(5)(b)(ii) WAC, which describes how to divide each category's sum.

The equivalent concentration formula would look like this after you enter the totals:

$$EC = \frac{10\%}{1} + \frac{0\%}{10} + \frac{0\%}{100} + \frac{50\%}{1{,}000} + \frac{40\%}{10{,}000} = 10 + 0.05 + 0.004 = 10.054\%$$

Use this chart to help sort out the calculations:

Table 18. Example table listing the total concentration for each toxic category and the number to divide each category's sum by to determine the equivalent concentration.

Toxic Category	Total Concentration in Each Category	Divide by	Equals
X	10%	1	10
A	0%	10	0
B	0%	100	0
C	50%	1,000	0.05
D	40%	10,000	0.004

The sum of the last column is the equivalent concentration: 10.054%.

STEP 5: DETERMINE THE WASTE CODE

Finally, determine the waste code based on the equivalent concentration value.

Since the equivalent concentration is 10.054%, the waste detergent is an extremely hazardous waste with a WT01 waste code.

EXAMPLE 3: BOOK DESIGNATION FOR SOME WASTE CONSTITUENTS

A metal fabrication company uses a sandblasting method to clean the surface of a steel component. You are tasked with designating the spent blast media dust collected from the baghouse.

STEP 1. MAKE A LIST

You know the spent blast media includes toxic metals and send a representative sample of the waste to a lab to conduct a total metals analysis.

Using the analytical results, create a table with a list of all the toxic metals detected and their concentrations. Determine the total chemical weight percentage by dividing the concentration by 10,000.

For more detailed information on units of measurement, see Appendix C.

Name	CAS Number	Detected Concentration	Calculated Percentage
Barium	7440-39-3	130 mg/kg	0.013%
Copper	7440-50-8	180 mg/kg	0.018%
Nickel	7440-02-0	62 mg/kg	0.0062%
Zinc	7440-66-6	45,000 mg/kg	4.5%

Table 19. Example table listing the toxic metals and their concentrations and total chemical weight percentages.

STEP 2. FIND TOXICITY DATA

Since the spent blast media doesn't designate under any federal listing or characteristic, you determine the toxic category using the three different databases (see Appendix B).

STEP 3. DETERMINE TOXIC CATEGORY

Determine the toxic category for each metal using the published toxicity data. You end up with a table that looks like this:

Table 20. Example table showing waste ingredients and their concentrations, toxicity data, and toxic category.

Name	Percentage	LC_{50} Fish	LD_{50} Oral Rat	LC_{50} Inhalation Rat	LD_{50} Dermal Rabbit	Toxic Category
Barium	0.013%	>500 mg/L No Toxic Category	No available data	No available data	No available data	None
Copper	0.018%	0.056 mg/L Category A	No available data	No available data	No available data	A
Nickel	0.0062%	15 mg/L Category D	No available data	No available data	No available data	D
Zinc	4.5%	0.24 mg/L Category B	No available data	No available data	No available data	B

STEP 4. CALCULATE THE EQUIVALENT CONCENTRATION

Add the concentrations in each toxic category. There are none in category D or X.

There is one chemical in category A:

Table 21. Example table showing the total concentration of waste ingredients in toxic category A.

Toxic Category A	Concentration
Copper	0.018%
Total concentration of category A:	**0.018%**

There is one chemical in category B:

Table 22. Example table showing the total concentration of waste ingredients in toxic category B.

Toxic Category B	Concentration
Zinc	4.5%
Total concentration of category B:	**4.5%**

There is one chemical in category C:

Toxic Category C	Concentration
Nickel	0.0062%
Total concentration of category C:	**0.0062%**

Table 23. Example table showing the total concentration of waste ingredients in toxic category C.

The equivalent concentration (EC) formula would look like this after you enter the totals:

$$EC = \frac{0\%}{1} + \frac{0.018\%}{10} + \frac{4.5\%}{100} + \frac{0\%}{1{,}000} + \frac{0.0062\%}{10{,}000} = 0.047\%$$

Use this chart to help sort out the calculations:

Toxic Category	Total Concentration in Each Category	Divide by	Equals
X	0%	1	0
A	0.018%	10	0.0018
B	4.5%	100	0.045
C	0%	1,000	0
D	0.0062%	10,000	0.00000062

Table 24. Example table listing the total concentration for each toxic category and the number to divide each category's sum by to determine the equivalent concentration.

The sum of the last column is the equivalent concentration: 0.047%.

STEP 5. DETERMINE THE WASTE CODE

Based on these results the equivalent concentration is 0.047% which is a WT02 dangerous waste.

At this point, you can manage the waste as a WT02 dangerous waste, or you can send a sample to a lab to conduct a fish bioassay to refute the book designation.

STEP 6. CONDUCT A FISH BIOASSAY

You send a sample of the waste to a laboratory to conduct a fish bioassay, which determines if it kills fish at a certain concentration.

The results show 2 out of 30 fish died when exposed to a concentration of 10 mg/L of the waste, so it isn't toxic enough to designate as a WT01. However, all of the fish died when exposed to a concentration of 100 mg/L of the waste. This test confirmed the waste is a WT02 dangerous waste because at least 50% of the fish population died when exposed to 100 mg/L.

Table 25. Example table listing the results of the fish bioassay showing fish mortality when exposed to various samples at different concentrations as well as the assigned waste code.

****Do not reference the toxicity data in this table as a resource. These numbers are subject to change. Check the databases for the most current data.***

Sample ID	Concentration (mg/L)	Survival (# fish, N=30)	Percent Mortality	Dangerous Waste Designation
Control	0	30	0	N/A
Dust	10	28	6.7	Not WT01
Dust	100	0	100	WT02

APPENDIX B: DATABASES

ECOTOX

The ECOTOX home page[1] has links to user guides. We highly recommend reviewing the user guides before using the database.

Use the search function to find toxicity data. On the search page, select the following parameters:

- Chemical (name or CAS number)
- Endpoint (LC_{50} /LD_{50})
- Species/group (fish)

Fish LC_{50} data must be derived from an exposure period greater than or equal to 24 hours. When there are multiple data points for fish toxicity, use the following hierarchy of species (in decreasing order of preference):

1. Salmonids (genus name is *Oncorhynchus*)
2. Fathead minnows
3. All other fish species

The test fish should be adults or juveniles. When there are multiple tests with different life stages, find studies that closely match conditions described in Ecology's Biological Testing Methods for the Designation of Dangerous Waste.[2] We don't recommend using LC_{50} data for fish eggs or fry that don't meet the test organisms criteria in the test method.

PUBCHEM (FORMERLY HSDB)

PubChem[3] is a chemistry database at the National Institutes of Health.

REGISTRY FOR TOXIC EFFECTS FOR CHEMICAL SUBSTANCES (RTECS)

The RTECS database[4] was established by the Canadian Centre for Occupational Health and Safety.

1 https://cfpub.epa.gov/ecotox/index.cfm
2 https://apps.ecology.wa.gov/publications/SummaryPages/8012.html
3 https://pubchem.ncbi.nlm.nih.gov/
4 https://www.ccohs.ca/products/rtecs/

APPENDIX C: UNITS OF MEASUREMENT

When you compare toxicity data to regulatory limits, be sure to check the units of measurement to ensure they match.

CONCENTRATIONS IN SOLIDS

Concentrations of chemicals in solids are typically measured in units of the mass of chemical (milligrams or micrograms) per mass of solid (kilogram). Concentrations may also be reported as parts per million (ppm), parts per billion (ppb), or as a percentage.

1 mg/kg = 1 ppm = 0.0001%

10,000 mg/kg = 10,000 ppm = 1%

1 ppm = 1,000 ppb

For example, an SDS shows the concentration of a constituent in a solid as 5%. This value is the same as 50,000 mg/kg or 50,000 ppm.

CONCENTRATIONS IN LIQUIDS

Concentrations of chemicals in liquids are typically measured in units of the mass of chemical (milligrams or micrograms) per volume (liter). Concentrations may also be reported as ppm, ppb, or as a percentage.

1 mg/L = 1 ppm = 0.0001%

10,000 mg/L = 10,000 ppm = 1%

For example, an analytical report indicates a concentration of 2 mg/L of a constituent in a liquid, which is the same as 2 ppm.

CONCENTRATIONS IN GASES

Concentrations of chemicals in gases are typically measured in units of the mass of chemical (milligrams or micrograms) per volume (cubic meter or liter). Concentrations may also be reported as ppm, ppb, or as a percentage.

1 cubic meter (m^3) = 1,000 liters (L)

For example, an SDS reports inhalation rat LC_{50} of 200 mg/m^3 for a constituent, which is 0.2 mg/L. To convert to ppm, you'll need the molecular weight of the constituent.

APPENDIX D: ACRONYMS AND ABBREVIATIONS

Term	Meaning
CAS number	Chemical Abstracts Service number
DOT	U.S. Department of Transportation
EC	Equivalent concentration
HOCs	Halogenated organic compounds
LC	Lethal concentration
LD	Lethal dose
LQG	Large quantity generator
mg/L	Milligrams per liter
mg/kg	Milligrams per kilogram
MQG	Medium quantity generator
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
ppb	Parts per billion
ppm	Parts per million
psi	Pounds per square inch
PVC	Polyvinyl chloride
QEL	Quantity exclusion limit
RCRA	Resource Conservation and Recovery Act
RTECS	Registry of Toxic Effects of Chemical Substances
SDS	Safety data sheet
SQG	Small quantity generator
TCLP	Toxicity characteristic leaching procedure
TSCA	Toxic Substances Control Act
WAC	Washington Administrative Code
WPCB	Washington state-only dangerous waste

Table 26. Table listing terms used throughout this publication and their associated meanings.

APPENDIX E: DESIGNATION CHECKLIST

DESIGNATION CHECKLIST

Use this checklist to start designating your waste. Next to each question about your waste, you will find the associated rule from WAC 173-303,[1] the Dangerous Waste Regulations. If you have questions about the checklist or need help designating your waste, contact your local regional office.[2]

EPA/State ID Number:

Facility Name:

Generator Category: ○ SQG ○ MQG ○ LQG

Date of Designation:

Waste Stream Name:

Designation completed by:

Point(s) of Generation:

1. IS THIS A SOLID WASTE?

WAC 173-303-016

○ Yes ○ No

If yes, explain and continue. If no, you do not need to designate. Stop here.

Solid waste is any material that is discarded and may include materials that are recycled. Solid waste doesn't mean it's in a solid state—it might be solid, semi-solid, liquid, or compressed gas.

If this waste stream meets the definition of a "solid waste," answer questions 2–14. Remember to provide an explanation for each step.

2. IS THE WASTE EXEMPT FOR RECYCLING?

WAC 173-303-017(2), -019

○ Yes ○ No

If yes, which exemption?

Some categories of materials are not waste when recycled in a particular manner.

1 https://apps.leg.wa.gov/WAC/default.aspx?cite=173-303

2 https://ecology.wa.gov/About-us/Contact-Us/Regional-contacts

3. IS THE WASTE EXCLUDED?

WAC 173-303-071

○ Yes ○ No

If yes, which exclusion?

Certain categories of wastes are excluded from WAC 173-303 because they are already regulated elsewhere or recycled in a manner that does not threaten human health or the environment.

4. IS THE WASTE A UNIVERSAL WASTE?

WAC 173-303-077

○ Yes ○ No

If yes, choose the type(s) of universal waste and explain.

☐ Batteries ☐ Mercury-containing equipment ☐ Lamps

Explanation:

5. IS THE WASTE A USED OIL THAT IS NOT MIXED WITH OTHER DANGEROUS WASTE(S)?

WAC 173-303-515

○ Yes ○ No

If yes, explain and manage according to WAC 173-303-515.

Used oil is any oil that has been refined from crude oil, or any synthetic oil, that has been used and is contaminated by physical or chemical impurities.

6. IS THE WASTE SPENT ANTIFREEZE?

WAC 173-303-522

○ Yes ○ No

If yes, explain and manage according to WAC 173-303-522.

7. IS THE WASTE LISTED UNDER DISCARDED CHEMICAL PRODUCTS?

WAC 173-303-081

○ Yes ○ No

If yes, assign a P or U code and explain.

○ P ○ U

8. IS THE WASTE LISTED UNDER THE DANGEROUS WASTE SOURCES?

WAC 173-303-082

○ Yes ○ No

If yes, assign an F, K, or WPCB code and explain.

○ F ○ K ○ WPCB

9. DOES THE WASTE EXHIBIT THE CHARACTERISTIC OF IGNITABILITY?

WAC 173-303-090(5)

○ Yes ○ No

If yes, choose D001 for your waste code and explain.

☐ D001

10. DOES THE WASTE EXHIBIT THE CHARACTERISTIC OF CORROSIVITY?

WAC 173-303-090(6)

○ Yes ○ No

If yes, assign a D002 or WSC2 waste code and explain.

○ D002 ○ WSC2

11. DOES THE WASTE EXHIBIT THE CHARACTERISTIC OF REACTIVITY?

WAC 173-303-090(7)

○ Yes ○ No

If yes, assign a D003 for your waste code and explain.

☐ D003

12. DOES THE WASTE EXHIBIT THE CHARACTERISTIC OF TOXICITY?

WAC 173-303-090(8)

○ Yes ○ No

If yes, list the applicable D004-D043 waste codes and explain.

D D D D D D

THE FOLLOWING STEPS ARE ONLY REQUIRED IF:

- The waste does not have a listed or characteristic code, or
- The waste has a listed or characteristic code and you are an SQG

SQGs must continue designating for state toxicity criteria to determine if their waste is WT01 extremely hazardous waste, because WT01 waste has more stringent management requirements.

13. DOES THE WASTE MEET THE CRITERIA FOR STATE TOXICITY?

WAC 173-303-100(5)

○ Yes ○ No

If yes, assign a WT01 or WT02 waste code, and explain. Select how you determined if the waste met the criteria.

○ WT01 ○ WT02

☐ Book Designation ☐ Fish Bioassay ☐ Generator Knowledge

Explanation:

14. DOES THE WASTE MEET THE CRITERIA FOR STATE PERSISTENCE?

WAC 173-303-100(6)

○ Yes ○ No

If yes, assign a WP01, WP02, or WP03 waste code and explain. Select how you determined if the waste met the criteria.

○ WP01 ○ WP02 ○ WP03

☐ Analysis ☐ Generator Knowledge

Explanation:

15. IS THE WASTE A CONDITIONALLY EXCLUDED SPECIAL WASTE?

WAC 173-303-073

○ Yes ○ No

If yes, choose the applicable waste codes and explain.

☐ WT02 ☐ WSC2 ☐ WPCB ☐ WP02

Explanation:

Only wastes that are solid in form and either have 1) toxicity equivalent to toxic category D or 2) equivalent concentration equal to or less than 0.01%.

LIST ALL APPLICABLE WASTE CODES:

COMMENTS, NOTES, AND EXPLANATIONS:

Attach a copy of any materials used to designate this waste stream based on testing (laboratory analytical results for example) or generator knowledge. For knowledge-based designations, records must explain the knowledge basis for the generator's designation (for example, safety data sheets, waste composition, the process producing the waste, etc.). Keep a copy of this waste designation record for five (5) years from the date that the waste was last on-site or sent off-site for treatment, storage, or disposal, whichever is later (WAC 173-303-210).

Washington State Department of Ecology
Hazardous Waste and Toxics Reduction Program
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DEPARTMENT OF ECOLOGY
State of Washington

To request materials in a format for the visually impaired, visit ecology.wa.gov/accessibility,call Ecology at 360-407-6700, Relay Service 711, or TTY 877-833-6341.