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Waste Determinations & Hazardous Waste Testing

This guidance document has been produced by the Nebraska Department of Water, Energy, and Environment (DWEE) to discuss hazardous waste determinations, who needs to do determinations, and considerations for analytical testing. The regulations applying to this topic can be found in Nebraska [Title 128 – Hazardous Waste Regulations](#).

Who needs to perform waste determinations?

Businesses, governments, schools, and organizations that generate waste must determine if the waste is a hazardous waste. Household waste is exempt from this requirement.

What are the steps of a waste determination?

1. First, the generator of the waste must determine if the waste is excluded from being a hazardous waste. These exemptions can be found in Title 128, Chapter 2, [§008](#) through [§016](#).
2. Next, determine if the waste is *listed* as a hazardous waste in Title 128, Chapter 3, [§013](#) through [§016](#). *Listed wastes* are wastes from certain nonspecific and specific defined sources. The full lists of F, K, P, and U-listed wastes are found in Tables 4 through 7 of Title 128.
 - P and U-listed wastes are often commercial chemical products. P and U-listed wastes include products that are technical grade or off-specification that have only the generic name of the listed waste and products where the listed ingredient is the sole active ingredient in the product. Wastes can only carry P and U-listings if they are pure, unused commercial grade products. This means that not all wastes that contain a P or U-listed material are a P or U-listed waste.
 - F-listed wastes are more common. The first five (F001 through F005) are all spent solvents that contain certain percentages of the listed constituents before use. For more information on F-listed wastes, refer to the DWEE Guidance Document titled “F-Listed Spent Solvent Hazardous Waste Determinations.” The remainder of the F-listed wastes are related nonspecific sources.
 - K-listed wastes are related to specific sources that create hazardous wastes. Materials on the K list are focused on the process used to generate the waste.

3. Next, determine if the waste is *characteristic* of a hazardous waste described in Title 128, Chapter 3, §005 through §010. Characteristic wastes can be any combination of ignitable (D001), corrosive (D002), reactive (D003), or toxic (D004-D043) properties. These can be identified by doing either of the following:
 - The generator of the waste may apply knowledge of the characteristics considering the material or processes used. This will need to be supported by documentation and a copy of the determination must be kept on-site.
 - The waste may be tested using specified analytical methods.
4. Finally, if the waste is determined to be hazardous, refer to Title 128, Chapters 2, 3, 7, 20 through 22, and 25 for possible exclusions or restrictions related to the management of the waste.

How do you store waste that is undergoing a waste determination?

Wastes that are undergoing determinations should be stored as hazardous waste until the determination has been completed. Label the waste with “Awaiting Hazardous Waste Determination” or similar wording to indicate that the constituents of a waste are unknown. Mark the container with an accumulation start date and store it in a central accumulation area.

If the waste is determined to be hazardous, the accumulation and storage requirements begin on the date that the contents were determined to be a waste, *not* the date that the waste was determined to be hazardous. If the waste is determined to be nonhazardous, the facility may remove all labels and treat it as solid waste.

How can generator knowledge be used to determine if a waste is hazardous?

Safety Data Sheets (also known as SDSs) can provide useful information for determinations. However, SDSs often do not list constituents at levels below 1% which can be a problem because a material with a presence below 1% can still be well above the regulatory limits.

For example, a generator has a waste product where a hazardous constituent makes up 0.9% of the overall material. The constituent isn't listed on the SDS for the product, but when they send it in for analytical testing, the results show that trichloroethylene is present at 100 mg/L. The regulatory level for trichloroethylene is 0.5 mg/L which means that the concentration is 200 times higher than the limit for classification as a hazardous waste.

Are there situations where analytical testing will be required?

The following waste streams are variable in nature and presence of contaminants in a way that cannot be predicted using generator knowledge and will require analytical testing:

- Spent parts washer solvent (see Attachment 1)
- Spent antifreeze (see Attachment 1)
- Sludges from sumps and pits
- Spent sorbents such as “kitty litter,” socks, and pillows used to absorb spills or drips

What does analytical testing refer to?

Analytical testing is used to determine if any one of 40 toxicity characteristic contaminants are present in a representative sample of the waste. The full list of toxicity contaminants can be found in Title 128, Chapter 3, Table 3. The regulatory limits for these contaminants are the *leachable levels*, meaning the amount of the contaminant that would be released to the environment if it encounters water, and are not the actual levels present in the material. The analytical test for determining leaching levels is the Toxicity Characteristic Leaching Procedure (commonly known as TCLP). It simulates how a waste would react in a landfill environment and is used to determine if there are contaminants present and the amount they would leach from the waste into the environment.

Analytical testing can also include testing for the characteristics of hazardous waste. Flash point can determine ignitability, pH of an aqueous solution can determine corrosivity, and potential to generate toxic gases for cyanides or sulfides can determine reactivity. If a waste is nonaqueous, it is unnecessary to obtain a pH result.

Do all 40 contaminants in Table 3 need to be tested for in the sample?

The testing of waste streams should only be done for the contaminants that are reasonably expected to be present. If you have a waste of unknown composition, you will likely need to test for all 40 contaminants.

Is analytical testing required for F, K, P, or U-listed wastes?

Analytical testing is generally only useful for determining characteristic hazardous wastes and it is usually unnecessary to test for F, K, P, and U-listed hazardous waste. Listed wastes do not have specific concentration levels that make waste hazardous. It is the active ingredient or activity that created the waste that makes it a F, K, P, or U-listed waste.

Are there analytical testing options other than a TCLP?

A TCLP test can be run for contaminants of concern to provide specific and unambiguous results if the sampling was performed correctly. However, it can be expensive and take a long time to get results. There are instances where using a less expensive alternative test is appropriate.

A “totals” analysis is a less expensive alternative to a TCLP. A totals analysis can be used when there is a reasonable expectation that the waste will not contain the contaminant of concern above regulatory levels. It can also be used when you expect the contaminants to be under regulatory levels if they are present at all in the waste. A totals analysis should not be used if there are reasons to believe that contaminant levels in the waste will be close to the regulatory limits.

Only single phase waste streams should be selected for a totals analysis. Single phase refers to a waste stream that is either all solid or all liquid.

For liquids with less than 0.5% solids present, the totals analysis result will match the TCLP result.

For 100% solid samples, the totals result will be divided by a dilution factor of 20 to match the TCLP result. The adjustment with the dilution factor is used to estimate the contaminant release if the sample were *fully* leachable during extraction.

For example, a 100% solid sample has a totals analysis result of 80mg/kg (ppm) for total lead. When adjusted for the TCLP dilution factor, the sample is under the toxicity regulatory limit and is not a hazardous waste for lead.

$$\frac{80 \text{ mg/kg total lead}}{20 \text{ (TCLP dilution factor)}} = 4 \text{ mg/kg} \quad (< 5.0 \text{ mg/L lead TCLP limit})$$

Considerations for selecting a contract laboratory

The laboratory you contract with must be capable of conducting the analyses by the required methodologies. The laboratory will require specific sample amounts and appropriate clean sampling containers will generally be provided with instructions on how to sample the waste. It is recommended to use a laboratory accredited for the Resource Conservation and Recovery Act (RCRA) program by the National Environmental Laboratory Accreditation Program (NELAP).

Not all laboratories can produce acceptable results for concentrated organic wastes such as spent solvents and antifreeze. For this reason, the candidate laboratories should be advised of the matrix (type of waste) involved and that reporting limits must be below the regulatory thresholds for the contaminants of concern. It is recommended that the detection limit should be one tenth to one half of the regulatory level, especially if you have a variable waste stream. If the reporting limit is above the regulatory threshold, additional sampling and analysis will be required.

Information to record and submit with your analytical testing results

- Date the material was taken out of service (only for spent solvents)
- Date the material was sampled
- Size (volume) of the waste container
- Type of sampling device used
- Did the sampling device reach the bottom of the container?
- Was the waste stirred (homogenized) prior to sampling?
- Number and quantity of samples collected
- Were visible solids or more than one liquid layer present in the sample? If so, describe.
- Where was the sample glassware obtained?
- How were the samples preserved?
- A record of the chain of custody for the samples

RESOURCES:

- DWEE Home Page <https://dwee.nebraska.gov/>

Contacts:

- DWEE Main Number (402) 471-2186
- DWEE Toll Free Number (877) 253-2603
- DWEE Hazardous Waste Compliance Assistant (402) 471-8308
- Email questions to: DWEE.moreinfo@nebraska.gov

DWEE Publications:

- Environmental Guidance Document – “F-Listed Spent Solvent Hazardous Waste Determinations”
Guidance documents are available on the DWEE website by clicking “Visit Nebraska Department of Environment and Energy (DEE),” selecting “Forms,” and “Publications, Grants & Forms.”
- [Title 128 – Nebraska Hazardous Waste Regulations](#)
Titles are available on the DWEE website by clicking “Visit Nebraska Department of Environment and Energy (DEE),” selecting “Resources and Services,” “Laws & Regulations,” and “Rules & Regulations.”

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Attachment 1

Spent Parts Washer and Antifreeze Testing

Parameters required to be analyzed for spent parts washer solvent and antifreeze:

- Flash Point with a Pensky-Martens Closed Cup Tester using the method specified in ASTM Standard D-93-79 or D-93-80, or a Setaflash Closed Cup Tester using the test method specified in ASTM Standard D-3278-78. If the product has a flash lower than 140°F a copy of the product SDS can be provided in lieu of testing.
- TCLP testing for the eight metals and ten volatile organic compounds identified in Title 128, Chapter 3, Table 3 that are listed below.

Maximum metal concentrations of contaminants

EPA Hazardous Waste Number	Contaminant	CAS Number	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-2	100.0
D006	Cadmium	7440-43-9	1.0
D007	Chromium	7440-47-3	5.0
D008	Lead	7439-92-1	5.0
D009	Mercury	7439-97-6	0.2
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0

Maximum volatile organic compound concentrations of contaminants

EPA Hazardous Waste Number	Contaminant	CAS Number	Regulatory Level (mg/L)
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23-5	0.5
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D028	1,2 Dichloroethane	107-06-2	0.5
D029	1, 1-Dichloroethylene	75-35-4	0.7
D035	Methyl ethyl ketone	78-93-3	200.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D043	Vinyl chloride	75-01-4	0.2

A waste determination is required even if a third party is picking up the waste and the third party's own determination is not acceptable as a valid determination of the waste.

Spent parts washers

The sample should be collected when the parts washer is serviced or when the solvent can no longer be used for cleaning parts. Solvent in a parts washer is not spent until the solvent is taken out of service. A sample collected while the solvent is still in use does not meet the requirement for making a hazardous waste determination. Accumulate the spent solvent in a drum labeled with the words "Hazardous Waste" and mark the drum with the accumulation start date.

Spent antifreeze

Antifreeze is considered spent when it is removed from the vehicle. DWEE allows spent antifreeze from different vehicles to be accumulated in a single container such as a drum or tote. The container must be labeled with the words "Hazardous Waste." When the accumulated quantity reaches 55 gallons, mark the container with the accumulation start date. The sample should be taken from the container when it is full.

Sampling Recommendations

It is best to develop a sampling plan that works with the sampling objectives because the number of sampling events needed will be different depending on the sampling objectives. A single sampling event is used to determine the characteristics of one batch of waste compared to a series of sampling events used to determine the average characteristics expected of all batches of a waste from the same source.

If the sampling objective is to identify the average characteristics of a waste from a single source, a series of at least three samples will be required. Parts washers and full accumulation containers of antifreeze often use a type of sampling called "sequential sampling" where each successive batch is sampled until the required determination is made. Chapter 9 of the SW-846 Compendium by the Environmental Protection Agency (EPA) contains approved statistical methods for making hazardous waste determinations on variable wastes.

The sample should be collected from the drum using a disposable Coliwasa tube that extends to the bottom of the container. The sampling device must collect a column of waste from the entire depth of the container. Devices that do not extend from the top to the bottom of the waste will not procure a representative sample and cannot be used to make a waste determination.

If a reusable device is used, it is recommended that an equipment blank be prepared to demonstrate that the device was properly decontaminated between uses.

Waste should not be shipped for disposal until the analytical testing results have been received and determined to be accurate and defensible.