Laboratory Waste Management Manual

Reduce, identify, store, and dispose of hazardous waste in Oregon

This guidance was written in cooperation with and for Oregon's Environmental Laboratory community

DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

State of Oregon
Department of Environmental Quality

This report prepared by:

Laboratory Environmental Assessment and Hazardous Waste Programs
Oregon Department of Environmental Quality
700 NW Multnomah Street, Suite 600
Portland, OR 97232
1-800-452-4011
www.oregon.gov/deq

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Executive summary

Making accurate hazardous waste determinations provides the foundation for a compliant hazardous waste management program. To that end, DEQ Hazardous Waste and Laboratory Environmental Assessment Program (LEAP) personnel evaluated common analytical environmental laboratory test methods. DEQ summarized this work on the tables attached in Appendix A.

Waste determination

This work provides valuable information for determining which if any hazardous waste codes apply to many common laboratory analytical wastes by identifying likely listed waste streams. Limitations to this approach include variations in test methods and different sample substrates that can carry additional hazardous waste characteristics. Laboratories can also generate hazardous wastes beyond analytical residues. Section 1 of this guidance walks through the complete waste characterization schema and includes a special discussion on the waste characterization tables developed by DEQ LEAP.

Laboratory focus

This information is formatted specifically to address the needs of laboratories. For a more general and detailed discussion on waste characterization please reference Chapter 4 of DEQ's *Small Quantity Generator Handbook* on DEQ's Website (see Appendix D for more links).

Waste management

After a laboratory makes sound waste determinations on each waste stream, the next step is to count the overall amount of hazardous waste generated during each calendar month to determine generator status and identify what regulations apply. Section 2 of this manual discusses waste counting and determining generator status. Use the Hazardous Waste Determination worksheet on Chapter 17, page 7, of DEQ's *Small Quantity Generator Handbook* for help both in characterizing each waste and tabulating monthly waste generation totals. The more hazardous waste a facility generates, typically, the more regulations apply. The sections which follow discuss the Small and Large Quantity Generator requirements.

Technical assistance

This manual is a start. It addresses most commonly applicable hazard waste regulations, and provides guidance to the laboratory community. DEQ values the opportunity for continued communication. Please contact DEQ Hazardous Waste Technical Assistance and the Oregon Environmental Laboratory Accreditation Program (ORELAP) for help moving forward.

DEQ Laboratory Waste Team members and sponsors:

Hazardous Waste – Jay Collins (Author), Jeannette Acomb, Laurey Cook; and Audrey O'Brien (Sponsor)
Laboratory and Assessment Program (LEAP) – Jeremy Unrau (created waste tables), Chris Redman and Scott Hoatson; Zach Mandera and Sarah Krepps (Managers); and Brian Boling (Sponsor)

1. How to conduct hazardous waste determinations

The first step in any effective hazardous waste management program is making accurate waste determinations. As clear as this seems at the outset, the process itself is complex. So it comes as no surprise to DEQ inspectors when a facility mischaracterizes its hazardous wastes.

1.1 Is this a solid waste?

The federal Resource Conservation and Recovery Act (RCRA) defines solid wastes as materials that will be discarded or abandoned and are solid, liquid, or contained gas.

1.2 Exemptions and exclusions common to laboratories

Here we present some common exemptions and exclusions from the hazardous waste requirements. Many of these are conditional, offering alternate management methods to replace the complex hazardous waste requirements.

1.2.1 Special provisions for samples

Samples with useful life are still products, not wastes. Residues from analysis and discarded retains are not samples. These wastes require characterization.

1.2.2 Empty containers

Empty containers are exempt from regulation as hazardous waste. EPA offers a definition of empty containers at 40 CFR 261.7. There are additional requirements for containers that held P-listed chemicals and pesticides. These containers must be triple rinsed or otherwise emptied according to the label directions. If the water—containing low concentrations of contaminants resulting from the cleaning of containers—is not useful as a product, it must also undergo waste characterization.

1.2.3 Universal waste

Fluorescent, High Intensity Discharge (HID) bulbs and other waste lamps, batteries, mercury thermostats and pesticides that would characterize as hazardous waste may be managed as universal wastes. Universal wastes may be stored on site for up to one year. Satellite accumulation, discussed below, does not apply to universal waste. Universal wastes must be stored in containers labeled with the words “universal waste” or “waste lamps.” Search for DEQ’s factsheet for more details Generators must track how long universal waste is stored on site. This is most easily documented by dating containers. Lamps, thermostats and pesticides must be stored closed.

1.2.4 Electronic waste

Include computers, monitors (CRTs), and other electronic devices. This exemption requires management of the waste to a legitimate recycler.

1.2.5 Used oil

Used oil is broadly defined in the 40 CFR Part 279 used oil regulations. Used oil must be labeled with the words “used oil,” stored in closed containers and/or out of the weather and managed for reclamation by a used oil processor, including regulated sale as used oil fuel.

1.2.6 Reclaimed solvent

Some medical laboratories reclaim waste solvents without storage. If xylenes, for instance, are placed in a still immediately upon generation the solvent will not count toward the facility's monthly waste generation total.

1.2.7 Clean water act exclusion

Waste immediately managed in a wastewater system plumbed to discharge to a National Pollutant Discharge Elimination System (NPDES)-permitted system (for instance a sanitary sewer collection system with pre-approval) is exempt from RCRA. This exclusion specifically applies to wastewater treatment tanks. It does not apply to septic drain fields or management to other subsurface, surface infiltration pond, or cesspool units. Facilities that manage hazardous waste to the sanitary sewer must maintain a one-time notification on file noting the types of waste discharged.

1.2.8 Dirty rag management

Rags destined for laundry in a unit with approved discharge to a sanitary sewer or individual NPDES permit are also exempt. The laboratory must label containers holding such rags as "rags destined for laundry" to clarify that the rags are not waste.

1.3 The hazardous waste characterization procedure: step-by-step

If a waste is a solid waste, and is not managed under an exclusion or exemption, then the generator must perform a hazardous waste characterization. This is a step-by-step procedure. The first step is to determine whether a listing applies. The next step is to determine whether the waste exhibits a characteristic. These criteria are established by the US Environmental Protection Agency (EPA). If the waste is not a hazardous waste under these federal criteria, then the laboratory should screen the waste against Oregon-only hazardous waste criteria discussed below.

1.3.1 Is this waste a listed hazardous waste?

There are many listed hazardous wastes. F-listed codes apply to certain wastes generated in general industry, such are listed solvents, plating wastes, and others. K-listed wastes are generated by specific industries, such as baghouse dust from the primary production of steel. At the federal level, U- and P-listed wastes are unused, sole-active ingredient chemicals. Most of these wastes are never generated in analytical laboratories. Here are two classes of listed waste commonly generated at laboratories:

1.3.1.1 F-listed solvents

Laboratories conduct extractions using a variety of solvents with hazardous waste codes from F001 through F005. Know ahead which procedures your laboratory performs that generate which F-listed solvent(s). The laboratory waste tables in Appendix A provide useful points of reference. Besides residues generated from analysis, other solvent uses may generate F-listed waste. For example, acetone generated from cleaning glassware which can characterize as F003 hazardous waste.

1.3.1.2 U- and P-listed commercial chemical products

When a laboratory discards a standard, perhaps it is out-of-date, it may be U- or P-listed hazardous waste. Check the tables in Appendix D for a list of U- and P-listed constituents. RCRA identifies P-listed wastes as "acute hazardous waste." Storing 2.2 pounds or more of P-listed waste moves a laboratory into regulation as a Large Quantity Generator of hazardous waste. With some forethought, selecting P-listed chemicals for discard can often be scheduled in separate months to avoid triggering unnecessarily stringent requirements.

> ***An important note on mixing hazardous wastes:***
> Mixing a listed waste with other materials results in the entire mixture requiring management as that listed waste. Mixing wastes can increase the codes and underlying hazardous characteristics present in the waste and limit the number of facilities permitted to treat and dispose of the waste. This can increase costs.

1.3.2 Is this waste a characteristic hazardous waste?

Wastes can be Characteristic Hazardous Wastes due to three physical characteristics (Ignitability, Corrosivity, and Reactivity). Waste can also be characteristic for Toxicity if it exceeds any Toxicity Characteristic Leaching Procedure (TCLP) concentration thresholds assigned to each of the 40 TC chemicals.

1.3.2.3 Ignitable hazardous wastes (waste code D001) are either:

- Liquids (other than an aqueous solution containing less than 24 percent alcohol) with a flash point (by closed cup method) less than 140 degrees Fahrenheit. For example, many solvents and hydrocarbons test as ignitable hazardous waste;
- A solid or gas capable of causing fire through friction, absorption of moisture, or chemical changes and when ignited creates a hazard. Lack of an adequate test currently limits regulatory enforceability of this provision;
- An oxidizer as defined in 49 CFR 173 (referencing the US DOT regulations); or
- An ignitable compressed gas.

1.3.2.4 Corrosive hazardous wastes (coded D002) are:

- Liquids with a pH less than or equal to 2.0 or greater than or equal to 12.5; or
- A liquid that corrodes steel at a rate of 0.25 inches per year (e.g., wastes with free chlorine).

1.3.2.5 Reactive hazardous wastes (coded D003) include:

- Unstable waste that may readily undergo violent change without detonating;
- Waste that reacts violently with water;
- Waste cyanides capable of producing dangerous toxic fumes; or
- Waste aerosol cans which are considered reactive hazardous wastes in Oregon unless the residue inside is captured and the container punctured.

1.3.2.6 Toxic characteristic (TC) hazardous wastes (coded D004-D043)

EPA's Toxic Characteristic Leaching Procedure (TCLP) test is designed to mimic formation of leachate in a municipal solid waste landfill. The procedure introduces one part waste into 20 parts mild acid solution then performs a digestion. The leachate is tested for totals, with results presented in milligram/liter (mg/L). If the waste is a liquid, TCLP results are simply totals; no digestion is required. If the sample is mixed, then solid and liquid phases are evaluated separately. It may be interesting to note that since solids are digestion at 20:1 and totals run on liquid leachate, no TCLP result on a solid can exceed 5 percent of the totals results for that solid. In this way, totals can sometimes be an effective screening tool to evaluate maximum TC results.

> ***A note on laboratory data versus knowledge of process:***
> Listed wastes are often categorized by knowledge of process. You know that an F-listing applies because of the solvent you use. Generators can also use knowledge of process to determine some of the wastes they generate are corrosive or ignitable. The laboratory waste tables in Appendix A provide data useful towards performing knowledge of process characterizations. Another example of knowledge of process is, when providing a sample, the client might inform you that the soil samples are from a cleanup site and may be expected to exceed TC criteria for arsenic. While they need to have the waste evaluated by your laboratory for total BTEX constituents. Knowing that the retains and likely the analytical residues will fail for a TCLP constituent is valuable knowledge information that should be captured for use when characterizing wastes generated from managing these samples.

1.3.2.7 The 40 Toxic Characteristic (TC) constituents include:

Common organics such as benzene, some creosols, pyridine, and MEK; some common chlorinated solvents such as TCE and perchloroethylene; some pesticides; and the eight "heavy" metals. Always compare your TCLP results against the RCRA concentration limits to determine whether the waste exceeds any of the TC thresholds. Follow this link to EPA's list of TC constituents at 40 CFR 261.24: https://www.ecfr.gov/cgi-bin/text-idx?SID=b37ec9646d85f6f158a3c31aa1bae0bc&mc=true&node=se40.28.261_124&rgn=div8

1.3.3 Is this waste an Oregon-only hazardous waste?

If a waste does not otherwise characterize as hazardous waste, it may be an Oregon-only hazardous waste. If a waste already characterize as hazardous waste, Oregon-only codes do not apply. For example, an ignitable waste containing carbon disulfide cannot also characterize an Oregon-only 'OR P022'hazardous waste.

1.3.3.1 Oregon-only P- and U-listed waste

Oregon-only hazardous wastes include discarded products and residues that contain federally listed constituents that are not pure and are not sole active ingredients. If a waste that is not already characterizing as federally listed or characteristic hazardous waste contains at least 3 percent total P-listed chemicals (3,000 mg/kg) or 10 percent total U-listed chemicals (10,000 mg/kg), it is Oregon-only hazardous waste. Code these Oregon-only wastes as 'OR' followed by the applicable code(s). Oregon-only P-listed waste counts as acute hazardous waste, which is especially important when determining your laboratory's hazardous waste generator category. Generators must use care managing containers that held P-listed constituents; management requirements include triple rinsing.

> ***Recommendations on reducing Laboratory Standards waste***
> In the laboratory environment, Oregon-only classifications most often apply to discarded laboratory standards containing a mix of listed constituents. One laboratory noted that careful selection of laboratory standards can reduce waste generation. Some standards are rarely used. Purchasing standards commonly used mixed with standards used infrequently can avoid costly disposal and time spent on re-calibration.

1.3.3.2 Waste pesticide residues

Waste pesticide residues that do not otherwise code as hazardous waste are Oregon-only hazardous waste unless managed under the universal waste exemption. This does not apply to residues of applied pesticide applied legally and used for their intended purpose.

1.3.3.3 Nerve gas

Oregon created this special classification to address waste munitions formerly stockpiled at chemical weapon depots in Eastern Oregon.

1.4 Common types of laboratory hazardous wastes

We discussed laundered rags, waste electronics, and universal waste under exemptions, above.

1.4.1 Common laboratory hazardous waste include:

Other common hazardous wastes at laboratories include:

- Other solvent wastes used as extractants or diluents in analysis, or as water—containing low concentrations of contaminants—resulting from the cleaning of containers
- Acids/Bases (for instance, acid baths spent from cleaning glassware)
- Alcohols
- Waste gloves, aprons, tubing, desiccants, etc. contaminated with listed waste
- Aerosol Cans and contained gasses generally characterized as D003 reactive hazardous wastes along with the other applicable codes
- Spill cleanup wastes may characterize as hazardous waste. Most acids and flammable-only materials completely soaked up in absorbent materials and no longer in liquid form do not typically characterize as a hazardous waste. The cleanup of U- and P-listed chemicals most commonly generates U- or P-listed hazardous waste debris.

1.4.2 "Lab packs"

One efficient way to efficiently manage smaller units of hazardous waste is to bulk discards together into a lab pack for hazardous waste disposal. 40 CFR 265.316, 268.7(a)(9), and 268.42(c) state the requirements (for example, the waste not contain any of the hazardous waste set out in Appendix IV to part 268, which includes characteristic mercury waste, and certain F-, K-, U- and P-listed wastes) and the rule discusses advantages to employing this waste management method. Small and Large Quantity Generators who store lab packs away from where the waste is generated (not at the "point of generation") are subject to all requirements for storage areas, including labeling, accumulation times and dating containers, and weekly inspections. Be careful to avoid storing incompatibles in the same lab pack. Department of Transportation HazMat Transportation regulations offer some assistance in a hazard classification system. Please note that this system stresses primary hazard classes. Knowledge of chemistry will assist generators in safely building lab packs. Some hazardous waste transportation vendors also offer this service.

1.4.3 Residues from laboratory analytical work

We discussed specific laboratory analytical residues above. The most efficient way for a hazardous waste generator to identify their hazardous waste is to become knowledgeable about each waste stream. This is more difficult for laboratories since every sample brings potential unknowns along for the ride. Again reference the tables in Appendix A, and contact DEQ for technical assistance as needed. Our hope it that work up front to establish minimum codes required for each waste stream will reduce uncertainty, and by recognizing, tracking and managing for variation laboratories will develop confidence in their application of this procedure.

Characterizing discarded sample retains
Have a Written Plan. This includes management methods like appropriate storage practices, labels that identify hazards and help match container contents to laboratory results and other information pertinent to waste characterization, etc. Dating retains and adopting a written retention schedule are especially important; this tell you when to discard the retains and will document to hazardous waste inspectors that the samples remain products and are not yet wastes.

Management of methylene chloride-contaminated wastewater
DEQ has adopted EPA's policy allowing laboratories to decant phase-separated methylene chloride from wastewater generated from extractions, managing the concentrated solvent as F001 listed waste and the wastewater as non-hazardous waste.

What Not to Do
DEQ Hazardous Waste inspectors have seen containers of retains clumped at odd angles into jumbled piles, sometimes even labeled with the words "Throw Me Away" or "Waste." It is hard to argue that containers managed in such fashion are still of value as product.

1.4.4 When to dispose of retains

You will find it important to keep containers labeled with ready access to laboratory data to assist with the waste characterization. A complete hazardous waste determination is required for all wastes. Remember, while your client may have asked only for an 8260 scan for volatiles and semi-volatiles, the sample might also be ignitable, corrosive, or have elevated concentrations of lead or other TC constituents. Captured information during the analytical procedure will help make the waste determination. Information from the client can also be helpful. Some laboratories place special labels on retains identifying how they should be characterized for disposal. This can make compliance a lot easier!

1.4.5 Shipping back to generator

If the laboratory has reached its own retention schedule, the originator of the sample might still have a use for retains. If this is the case, the sample remains a product and may be returned to the originator as a product, which excludes the application of hazardous waste requirements. (Note: Check whether DOT regulations for HAZMAT shipment apply to the material.)

1.4.6 Records retention

Maintain all records used in performing hazardous waste characterizations – including laboratory data, MSDS sheets, profiles from clients, results from practical HAZCAT work (e.g., taking a pH reading), and knowledge of process information at least three years after the waste stream in question is no longer generated.

2. Regulation by generator category

2.1 Generator categories

A generator is any person who produces a hazardous waste as listed or characterized in part 261 of title 40 of the Code of Federal Regulations (CFR). The volume of hazardous waste each generator produces in a calendar month determines which regulations apply to that generator. Recognizing generators produce waste in different quantities, RCRA classes hazardous waste generators using three categories:

2.1.1 Conditionally Exempt Generator (CEG)

A Conditionally Exempt Generator (CEG) generates 220 pounds or less per month of hazardous waste in any one month and does not generate more than 2.2 pounds per month of acutely hazardous waste. Requirements for CEGs include:

- CEGs must identify all the hazardous waste generated.
- CEGs may not accumulate more than 2200 pounds of hazardous waste at any time.
- CEGs must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it.

2.1.2 Small Quantity Generator (SQG)

A Small Quantity Generator generates between 200 and 2200 pounds in any one month. Major requirements for SQGs include:

- SQGs may accumulate hazardous waste on-site for 180 days without a permit (or 270 days if shipping a distance greater than 200 miles).
- The quantity of hazardous on-site waste must never exceed 2200 pounds.
- SQGs must comply with the hazardous waste manifest and pre-transport requirements at 40 CFR part 262, subpart B and 40 CFR §§262.30 through 265.33.
- SQGs must manage hazardous waste in tanks or containers, subject to the requirements found at 40 CFR §265.201 and 40 CFR part 265 subpart I except for 40 CFR §§265.176 and 265.178, respectively.
- SQGs must comply with the preparedness and prevention requirements at 40 CFR part 265 subpart C, and the land disposal restriction requirements at 40 CFR part 268.
- There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. SQGs are not required to have detailed, written contingency plans.

2.1.3 Large Quantity Generator (LQG)

A Large Quantity Generator generates 2200 pounds or more in any one month or accumulates more than 2.2 pounds of acute (P-listed) hazardous waste. Major requirements for LQGs include:

- LQGs may only accumulate waste on-site for 90 days. Certain exceptions apply.
- LQGs do not have a limit on the amount of hazardous waste accumulated on-site.
- Hazardous waste generated must be managed in tanks, containers, drip pads or containment buildings subject to the requirements found at 40 CFR part 265, subparts J, I, W and DD, respectively.
- LQGs must comply with the hazardous waste manifest and pre-transport requirements at 40 CFR part 262 subpart B and 40 CFR §§262.30 through 265.33.
- LQGs must comply with the preparedness and prevention requirements at 40 CFR part 265 subpart C, the contingency plan and emergency procedures at 40 CFR part 265 subpart D, and the land disposal restriction requirements at 40 CFR part 268.
- LQGs must submit a biennial hazardous waste report.

2.2 Hazardous waste counting

Hazardous waste counts toward the generator totals during the month it is generated, not the month it is shipped. Do not count exempt wastes described in Section 2, including universal waste lamps and batteries, used oil, and rags destined for laundry, and waste immediately placed in a Clean Water Act exempt unit, or corrosive-only waste immediately managed and subsequently treated in an elementary neutralization unit (ENU), or solvents immediately managed in a distillation unit for reuse.

Each jump in generator class brings more regulations to bear. Appendix B presents a table summarizing regulations applying to each generator classification. For instance, SQGs and LQGs must obtain a site-specific EPA Facility ID Number. (In Oregon, generators obtain this number from DEQ.)

2.3 Alternate rules for CEGs

CEGs are not required to obtain an EPA ID number. CEGs must complete hazardous waste determinations for each of their wastes. While OSHA and fire code labeling instructions might apply, RCRA does not require CEGs to label their waste containers, or conduct inspections, or track accumulation start dates. Alternate disposal and recycling options for CEGs, set forth at 40 CFR 261.5, can also be very convenient. Many CEGs self-haul their hazardous waste to a local collection waste event or a permanent permitted facility permitted to accept CEG hazardous waste!

The following sections address the many SQG and LQG requirements. Much of this material can be useful for CEGs as well, providing best management practice for waste management at laboratories.

3. Hazardous waste storage

3.1 Storage limits

Small Quantity Generators may store hazardous waste up to 180 days. Large Quantity Generators are limited to 90 days. CEGs can store hazardous waste indefinitely. Remember, if a CEG exceeds 2,200 pounds in storage then they are regulated as a Small Quantity Generator. Small and Large Quantity Generators storing hazardous waste in containers must use compatible and sound containers, kept them closed, labeled with the words "hazardous waste" and marked with the date when waste was first stored in the container (the "accumulation start date").

3.2 Satellite accumulation area (SAA) exemption

An exception to these provisions exists for containers managed in a satellite accumulation area (SAA): at or near the point of generation and under control of the operator. DEQ inspectors commonly apply this rule to require that SAA containers to be in the same room and within eyesight of the work station where employees first generate the waste. The exemption limits satellite accumulation to a maximum of 55 gallons per waste stream per area. Containers must be labeled with the words "hazardous waste" or with a description of their contents; for example, "Spent Solvents" or "AA Waste." SAA containers must be stored closed. The storage clock does not start until the waste is transferred to the timed storage area, so you do not need to mark the containers with the accumulation start date. If you choose to date SAA containers, re-date them on transfer to the main storage area and gain that additional time to arrange for disposal.

Some facilities like to re-label containers with formal hazardous waste stickers upon transfer into the storage area. If you start a second SAA container (or exceed 55 gallons in one container) for the same waste stream, you are allowed up to 72 hours to transfer the full container out to your timed storage area. Note: Fire department approved funnels are available; if properly maintained to ensure closure, these spring-closing, bung-mounted devices can provide safe and easy access while the container is being filled.

3.3 Managing storage areas

The following additional requirements apply when waste is stored outside SAAs.

3.3.1 Aisle space

Generators must provide containers with aisle space adequate to facilitate weekly inspections and emergency response. This is commonly thought of as 30 inches, or one 90 degree arc of the container. This can be accomplished by storing drums in a line against a wall with no storage in front of them, or by creating lines of drums back to back with enough aisle between lanes to allow access by an appropriately-sized drum dolly. This helps ensures that if a drum were to leak it could be safely removed for proper management.

3.3.2 Weekly inspections

Perform weekly inspections of all 90- and 180- day storage areas. It is difficult to document compliance with this requirement without recording these inspections. Generators commonly use an initialed log or electronic record with lines for the date, the name or initials of the inspector, and columns noting compliance with requirements such as labeling, start dates, aisle space, closure, etc. Providing space for comments is valuable for capturing items requiring improvement and making any other notes facility procedure might require, such as number of drums of waste by type, first start date to trigger a call to a hazardous waste transporter, etc. Personnel conducting the inspection must be provided ready access to a telephone with the capability to call outside and report concerns to local emergency responders. In modern times, this is often a cell phone.

3.3.3 Posting emergency contact information

Small Quantity Generators must post names and 24-hour contact numbers for all emergency coordinators next to a main telephone and near the hazardous waste storage area. This posting must also include Oregon and national spill reporting hotlines, local emergency contacts for fire, medical and police (9-1-1, usually), evacuation routes, and locations of emergency equipment. (See below in Contingency Planning for more information.) DEQ recommends this posting for all generators of hazardous waste.

3.3.4 What to do when things start showing up in storage areas

One problem in designating a hazardous waste storage area is where things start showing up. Some of these things are products a section no longer has a use for, or that may be out-of-date for their use. Some are spent materials, discarded retains, or maybe even unlabeled unknowns. Generators need to develop an intake procedure that makes sense. They need to educate staff on its use. And the person charged with operation of the waste storage area should raise concerns over abandoned waste to management. Containers do not necessarily hold what is listed on the label. Characterizing unknowns presents hazards and can be a time and cash sink.

3.3.5 Tank storage requirements

Using tanks to store hazardous waste is not a common practice at analytical laboratories (except for exempt tanks, plumbed for discharge to the local sanitary sewer). RCRA tank regulations are cumbersome. The SQG checklist in the Appendix C identifies many of the applicable regulations. Remember, DEQ offers free of charge hazardous waste technical assistance.

Wastes managed under fume hoods
While protective of laboratory air space, DEQ inspectors commonly observe several problems with hazardous wastes stored under fume hoods. These include unlabeled and open waste containers. Often a simple tape label and a watch glass cover are the difference between being cited for violations or congratulated for employing sound practice. Some laboratories have, in the past, left containers of hazardous waste open intentionally to evaporate the contents. This action would constitute the serious violation of illegal treatment of hazardous waste.

Waste containers hooked up to laboratory analytical equipment
Atomic Absorption (AA) and other analytical equipment commonly operate with drains allowing liquid waste transfer to a waste container. This container must have pressure relief; laboratories normally have a hole cut for the influent hose. The regulations offer several interpretations here. The more widely accepted view is this is a Satellite Accumulation Area container. Inspectors normally ask for the gap to be minimized to reduce potential evaporation, and for the container to be labeled to SAA standards. While not required under RCRA for container storage, DEQ often recommends the use of a secondary containment unit for storage of hazardous wastes; this is especially applicable for auto-fill containers.

4. Hazardous waste transport and disposal

SQGs and LQGs may only ship hazardous waste under a uniform hazardous waste manifest through a registered hazardous waste transporter to an approved destination facilities, which includes hazardous waste Treatment Storage and Disposal (TSD) facilities permitted to accept that waste.

4.1 Manifests and Land Disposal Restriction (LDR) forms

Manifests must be complete. Instructions for completing a hazardous waste manifest are located on page 9-3 of DEQ's *SQG Handbook*. Required information includes: a unique manifest number; generator name, address and EPA ID number; transporter name, address and EPA ID number; designated facility name, address and EPA ID number; wastes by DOT proper shipping name, types and amounts of containers, waste codes; generator responsible party signature and date of consignment to shipper; their signature and date of acceptance. The section provided below the consignment list allows space for identifying hazards and recording emergency response information.

The designated facility should route the final manifest with signatures and dates of all intermediate transporters along with the final signature and date documenting acceptance at the designated facility. Match up this final manifest with the duplicate NCR copy left by the transporter and your copy of the LDR form. Maintain these records on file and available for inspection for at least three years. (New electronic manifesting approved is now becoming available and will operate in a similar fashion.)

4.2 Special reports to DEQ following up on problem shipments

4.2.1 Exception reporting

A Large Quantity Generator must file an Exception Report with DEQ when it does not receive a copy of the manifest within 45 days of shipment of the terminated manifest. Also, LQGs must contact the destination facility within 35 days of shipment without final return copies. A Small Quantity Generator must file an Exception Report with DEQ if it does not have a final copy within 60 days after shipment. An Exception Report includes a copy of the original manifest and any additional information you gather. DEQ will follow up with the transporter(s) and TSD.

4.2.2 Discrepancy reporting

File a Discrepancy Report with DEQ when the quantity of waste varies by greater than 10 percent in weight or volume from amounts recorded on the original manifest.

4.3 Notes on compliance with LDR requirements

Land Disposal Restriction forms notify the receiving facility of treatment thresholds and underlying hazardous constituents. Generators must maintain LDR forms on file for a minimum of three years for each facility receiving a certain waste stream. This recordkeeping requirement has many facilities sending out new LDR forms with each shipment. LDR requirements can be complex. Environmental analytical laboratories are in a better position than most generators to identify underlying hazardous constituents, etc. However, since most TSDs have their own

laboratories and operate on a permit requiring compliance with stipulated acceptance protocols, generators most often draft LDR forms in coordination with their destination facility(s).

4.4 Filing annual generator reports

File an Annual Hazardous Waste Generator Report by March 1 following each reporting year. For annual reporting purposes, use the highest total hazardous waste generation month for that calendar reporting year to determine your generator category. Shortly thereafter DEQ issues invoices based on generator category, amounts of waste and management methods. Mary Fritzmann is the DEQ program coordinator supervising the annual hazardous waste reporting process. Contact her at 503-229-6968.

5. Contingency plans

5.1 Large Quantity Generators

A Large Quantity Generators must develop a formal contingency plan addressing each element (set forth at 40 CFR 265.32) as follows:

- A description of emergency actions, response to spills, hazardous air conditions, fire, and other risks associated with chemical use at the facility
- Emergency notification procedures and contact number, in most areas of Oregon 9-1-1 for police, fire and emergency medical
- Spill reporting procedures and contact numbers including at a minimum:
    - Oregon Emergency Response System (OERS) at 800-452-0311 in-state and 503-378-4214 out-of-state and
    - National Response Center at 800-424-8802
- A list of assigned Emergency Coordinators with 24-hour telephone numbers and addresses
- The facility evacuation plan (having alternate gathering places often makes sense)
- Internal and external communications/alarms
- A list of all emergency response equipment including:
    - All equipment and supplies on lists with amounts, locations and capacities (including the contents of all spill kits)
    - Supplies maintained as specified in the contingency plan
    - Emergency equipment maintained and tested (such as eye wash stations, chemical showers, fire extinguishers) on a regular and documented schedule (often seen as tags and sometimes as logs
- Arrangements made with local emergency response authorities
- Distribution of the plan to local police, fire and emergency medical providers (and designated spill contractors) documenting compliance with return receipts for postal or email distribution.
    - DEQ recommends appending return receipts to the plan, or a facility often loses them.

Maintain the plan and record of distribution on site for facility use and for DEQ review. LQGs must update this plan with any significant change to procedures or personnel, and document re-distribution of the new information.

5.2 Small Quantity Generators

Small Quantity Generators must meet modified contingency plan requirements. Appendix 8 of DEQ's *SQG Handbook* (reference Chapter 17, pages 17-32) provides useful examples for each requirement as follows:

- SQGs must designate emergency coordinators and post their names and 24-hour emergency contact numbers at the waste storage area. This posting must also provide numbers for local emergency responders (often 9-1-1) and spill reporting numbers for OERS and the National Response Center.
- SQGs also must post evacuation maps noting routes of egress, assembly areas after evacuation, and locations of emergency equipment. Post sufficient maps to cover all waste generation and management areas.
- A Small Quantity Generator must send a letter notifying local emergency responders (police, fire and emergency medical providers) of the facility's hazardous waste activity. Maintain return receipts along with copies documenting issuance for DEQ review during inspections.

US EPA recently updated its *Consolidated List of Lists***.** This useful compilation provides CAS numbers and CAS sort values for a wide variety of hazardous chemicals, and compares applicable RCRA hazardous waste codes, CERCLA spill reporting thresholds, Clean Air Act emergency release planning thresholds, and EPCRA requirements (TRI reporting thresholds, for example). See Appendix D for a link to EPA's 2015 updates to this document.

5.3 Non-RCRA planning and reporting requirements

Non-RCRA planning and reporting requirements potentially applicable to laboratories include: OSHA Chemical Hygiene Plans and annual Oregon State Fire Marshal Hazardous Materials Reports.

6. Training requirements

6.1 Conditionally Exempt and Small Quantity Generators

Conditionally Exempt Generators and Small Quantity Generators are not required to develop formal RCRA training plans. DEQ evaluates Small Quantity Generator training programs by evaluating the effective performance of the facility's hazardous waste management program.

6.2 Large Quantity Generators

Large Quantity Generators must observe formal written training plan requirements (set forth at 40 CFR 265.16) as follows:

- Maintain written job descriptions identifying all hazardous waste management duties,
- List personnel within each affected job classification, and
- Document initial training and annual training updates for all affected personnel.

Written job descriptions document assignment of hazardous waste management duties to specific job classifications. Knowing this, we know what kind of training each classification requires to perform assigned duties. Listing personnel within each affected classification tells us exactly who needs training. Affected employees without hazardous waste training cannot work alone managing hazardous waste without trained personnel present. Facilities effectively document training using sign-in sheets, computer logs, and other rolls. Maintain agendas, outlines, notes, slides, and other materials to document what the training covered and demonstrate that it met the needs of affected personnel. LQGs most often comply with training plan requirements, not under a separate plan, but by meeting each of the elements separately. Often, human resources departments maintain training records, or they may be held by the EHS lead or the section manager. All training documentation must be maintained for at least three years.

Some facilities choose to train all of their personnel to a the same general standard; this can be useful in providing shared experience, language and expectation while assuring that everyone receives some training. Some facilities identify staff to higher standards, and offer section training to ensure general understanding and awareness of policy and procedure. Employees whose only job duties are evacuation during an incident and/or managing waste at a satellite accumulation area are exempt from the training requirements. DEQ has found bench meetings discussing hazardous waste management requirements for work areas to be effective in helping facilities maintain compliance.

DEQ offers its popular and free *Hazardous Waste Basics and Managing Common Wastes class* around the state every year. You may also contact personnel from DEQ's Hazardous Waste Technical Assistance program and ORELAP for assistance with your training effort. Just be sure to document them.

This manual does not provide details on DOT Hazardous Materials Transportation (HAZMAT) training requirements. Please contact ODOT or other resource to determine how DOT regulations and more recent DOT HAZMAT transportation training requirements affect your facility.

7. Toxics Use Hazardous Waste Reduction plans

7.1 Small and Large Quantity Generators

Small and Large Quantity Generators, and Large Toxics Users, must develop a Toxics Use and Hazardous Waste Reduction (TUHWR) plan. DEQ sets out TUHWR requirements in Oregon Administrative Rule (OAR) Chapter 340, Division 135. (The rule defines a Large Toxic User as any facility required to submit a uniform toxic chemical release form under the federal Toxics Release Inventory (TRI) program.) Oregon exempts all facilities operating under an approved Environmental Management System (EMS) from Oregon's TUHWR planning requirements. DEQ has guidance and hazardous waste technical assistance resources available to help regulated facilities meet TUHWR planning requirements.

7.2 Developing a TUHWR plan

To develop a TUHWR plan, review all hazardous waste streams and toxic chemical use. Identify and evaluate potential options to reduce toxics use and waste generation. Some facilities have reduced hazardous waste disposal costs, dropped to a lower generator status, saved money on the purchase of hazardous materials, and helped further protect the environment. Strategies include micro-scale chemistry, inventory control, just-in-time purchasing, use of alternate technologies (e.g., for cleaning), solvent reclamation, and product substitution by moving to less toxic chemicals or procedures.

7.3 Filing notice of plan completion

Once your TUHWR plan is complete, file a Notice of Plan Completion form with DEQ to verify facility compliance. DEQ treats TUHWR plans as confidential business information and does not maintain copies. Submit an Implementation Summary to DEQ after implementing your plan strategies. DEQ requires two summaries for new facilities, those that did not report under our previous annual TUHWR reporting program. These summaries form a library of information that DEQ does share in the effort to promote further environmental gains.

7.4 Records retention

Facilities must maintain a copy of their TUHWR Plan on site and available for review. DEQ recommends that each facility review its plan periodically to ensure it covers current waste streams and chemical use. This review offers the opportunity to identify new avenues for further reduction in toxics use.

Appendix

A. Spreadsheets summarizing laboratory waste characterization data for Oregon

B. Table summarizing RCRA requirements by generator category

C. Oregon DEQ Small Quantity Generator Inspection Checklist

D. Links to web-based resources

Appendix A

Spreadsheets Summarizing Laboratory Waste Characterization Data for Oregon

Search DEQ's website for the Lab Waste Characterization Tables

Appendix B

RCRA Hazardous Waste Requirements Commonly Applicable To Laboratories Sorted by Generator Category

	CEG	SQG	LQG
Hazardous Waste Determinations	Required See 40 CFR §261	Required See 40 CFR §261	Required See 40 CFR §261
Hazardous Waste Generation and Storage Limits by Generator Category	≤ 100 kg/month 1 kg/month acute hazardous waste ≤ 100 kg/month of spill residue or soil §261.5(a) and (e)	Between 100-1,000 kg/month §262.34(d)	≤ 1000 kg/month > 1 kg/month of acute hazardous waste > 100 kg/month of acute spill residue or soil Part 262 and §261.5(e)
EPA ID Number	Not required §261.5	Required §262.12	Required §262.12
On-Site Accumulation Quantity	≤ 1000 kg ≤ 1 kg acute ≤ 100 kg acute spill residue or soil §§261.5(f)(2) and (g)(2)	≤ 6000 kg ≤ 1 kg acute §262.34(d)(1)	Accumulation limited only by allowable storage times
Accumulation Time Limits	None §261.5	≤ 180 days or ≤ 270 days (if> 200 miles) §§262.34(d) and (e)	≤ 90 days §262.34(a)
Storage Requirements	None §261.5 [OSHA, fire, or other program's requirements may apply]	Basic requirements with technical standards for tanks and containers §§262.34(d)(2) and (e)	Full compliance for management of tanks, containers, drip pads, and 100+ container containment buildings §262.34(a)
Off-site Management of Wastes	State approved or RCRA permitted/interim status facility §§261.5(f)(3) and(g)(3)	RCRA permitted/interim status facility §262.20(b)	RCRA permitted/interim status facility §262.20(b)
Manifest	Not required §261.5	Required §262.20	Required §262.20
Annual Report	Not required §261.5	Required in Oregon OAR 340-101	Required §262.41 and OAR 340-101
Personnel Training	Not required §261.5	Training to performance standard §262.34(d)(5)(iii)	Required §262.34(a)(4)
Contingency Plan	Not required §261.5	Modified Contingency Plan §262.34(d)(5)(i)	Full Contingency Plan required §262.34(a)(4)
Post Emergency Telephone Numbers in storage area(s)	Not Required	Emergency Coordinators, local responders, and national and state spill Nos.	Not Required (Full plan supplants the posting requirement)
Emergency Procedures	Not required §261.5	Required §262.34(d)(5)(iv)	Required §262.34(a)(4)
DOT Transport Requirements	Yes (if required by DOT)	Yes §§262.30-262.33	Yes §§262.30-262.33

Appendix C

Oregon DEQ Small Quantity Generator Inspection Checklist

Purpose and Explanation:

The following is a general summary of requirements that could apply to a Small Quantity Hazardous Waste Generator (generate between 220 and 2,200 lb/mo hazardous waste, and store less than 13,200 lb total).

Oregon has adopted all federal hazardous waste regulations pursuant to OAR 340-100-002. In addition to the federal hazardous waste regulations (40 CFR §§ 260 - 270), Oregon has state-only hazardous waste regulations (OAR Chapter 340, Divisions 100-120). The regulatory citations should be consulted for more specific information on individual requirements, as this summary is very generalized and not intended to encompass all aspects of hazardous waste regulations. Treatment in units other than tanks or containers would require a hazardous waste treatment or disposal permit; storage for over 180 days (except under certain conditions) would require a hazardous waste storage permit.

In addition to hazardous waste regulations, this checklist also contains sections for Universal Waste and Used Oil management. Although these wastes are not required to be managed as standard hazardous waste, their management is regulated by DEQ's hazardous waste program.

General Information

Site Name: _____

EPA ID No: _____

Physical Location: _____

_____

_____

_____

Telephone Number: _____

Facility Representatives/Titles: _____

_____

_____

Inspector(s): _____

_____

_____

Inspection Date: _____

HAZARDOUS WASTE GENERATOR REQUIREMENT	REGULATORY CITATION(S)	COMPLIANCE? YES	NO	N/A	COMMENTS
RECORDKEEPING AND REPORTING REQUIREMENTS					
EPA Identification Number	40 CFR § 262.12(a) OAR 340-102-012				
Retain HW manifests (3 yrs)	40 CFR § 262.40(a)				
Retain LDR notices (3 yrs)	40 CFR § 268.7(a)(8)				
Retain waste determination data (3 yrs)	40 CFR § 262.40(c) OAR 340-102-011(3)				
Annual reporting	OAR 340-102-041				
Retain annual reports (3 years)	OAR 340-102-040(2)				
Hazardous waste generator fees	OAR 340-102-065				
ACCUMULATION LIMITS					
On-site storage for < 180 days	40 CFR § 262.34(d)				
On-site storage < 270 days (if transporting > 200 miles)	40 CFR § 262.34(e)				
Storage of less than 13,200 lbs	40 CFR § 262.34(d)(1)				
WASTE IDENTIFICATION REQUIREMENTS					
Hazardous waste determination	OAR 340-102-011				
LDR waste determination	40 CFR § 268.7(a)				
Determine all applicable waste code and underlying constituents	40 CFR § 268.9				
PERSONNEL TRAINING REQUIREMENTS					
Ensure employee awareness of waste handling/emergency procedures	40 CFR § 262.34(d)(5)(iii)				
EMERGENCY MANAGEMENT REQUIREMENTS					
Internal communications/alarms	40 CFR § 262.34(d)(4) 40 CFR § 265.32(a)				
External communications	40 CFR § 262.34(d)(4) 40 CFR § 265.32(b)				
Emergency response equipment	40 CFR § 262.34(d)(4) 40 CFR § 265.32(c), (d)				
Equipment testing	40 CFR § 262.34(d)(4) 40 CFR § 265.33				
Adequate aisle space	40 CFR § 262.34(d)(4) 40 CFR § 265.35				
Arrangements with Local Authorities	40 CFR § 262.34(d)(4) 40 CFR § 265.37				
Designated emergency coordinator, on-site or on-call	40 CFR § 262.34(d)(5)(i)				
Information posted next to telephone: A. Name and telephone number of emergency coordinator B. Location of fire extinguishers, spill equipment, alarms. C. Fire department phone number	40 CFR § 262.34(d)(5)(ii)				
SHIPPING REQUIREMENTS					
Hazardous Waste Manifest	40 CFR § 262.20				
Land Disposal Restrictions Notification	40 CFR § 268.7				
Illegal Disposal	ORS 466.100(1)				
Exception reporting	40 CFR § 262.42(a)				
Export notification 60 days prior to export	40 CFR § 262.53				
ON-SITE TREATMENT REQUIREMENTS					

HAZARDOUS WASTE GENERATOR REQUIREMENT	REGULATORY CITATION(S)	COMPLIANCE? YES	NO	N/A	COMMENTS
Treatment only in tanks or containers	ORS 466.095 (1)(c) & 40 CFR § 262.34(d)				
Written Waste Analysis Plan (if treating to meet LDR standards)	40 CFR § 268.7(a)(5)				
Notification of managing waste that is subsequently excluded or exempted	40 CFR 268.7(a)(7)				
Determine all applicable waste codes and underlying constituents	40 CFR § 268.9(a)				
Notification of characteristic HW treatment maintained in files (updated annually or if process changes)	40 CFR § 268.9(d)				
CONTAINER STORAGE REQUIREMENTS					
Marked with Accumulation Start Date	40 CFR § 262.34(d)(4) 40 CFR § 262.34(a)(2)				
Marked with the words "Hazardous Waste"	40 CFR § 262.34(d)(4) 40 CFR § 262.34(a)(3)				
Containers in good condition	40 CFR § 262.34(d)(2) 40 CFR § 265.171				
Containers closed	40 CFR § 262.34(d)(2) 40 CFR § 265.173				
Weekly inspections	40 CFR § 262.34(d)(2) 40 CFR § 265.174				
Containment structure for storage of > 100 containers	OAR 340-102-034(1)				
Satellite Accumulation - < 55 gallons	40 CFR § 262.34(c)(1)				
S.A. - At or near Point of Generation	40 CFR § 262.34(c)(1)				
S.A. - Under control of operator	40 CFR § 262.34(c)(1)				
S.A. - Removal of waste exceeding 55 gallons within 3 days	40 CFR § 262.34(c)(2)				
S.A. - Marked with container contents	40 CFR § 262.34(c)(1)(ii)				
S.A. - Containers closed	40 CFR § 262.34(c)(1)(i) 40 CFR § 265.173				

HAZARDOUS WASTE GENERATOR REQUIREMENT	REGULATORY CITATION(S)	COMPLIANCE? YES	NO	N/A	COMMENTS
TANK STORAGE REQUIREMENTS					
Marked with the words "Hazardous Waste"	40 CFR § 262.34(d)(4) 40 CFR § 262.34(a)(3)				
2 feet freeboard or containment structure (uncovered tanks)	40 CFR § 262.34(d)(3) 40 CFR § 265.201(b)(3)				
Waste feed cutoff system or bypass	40 CFR § 262.34(d)(3) 40 CFR § 265.201(b)(4)				
Daily inspections of discharge equipment, monitoring equipment, waste levels	40 CFR § 262.34(d)(3) 40 CFR § 265.201(c)(1) - (3)				
Weekly inspections of tank and containment structures	40 CFR § 262.34(d)(3) 40 CFR § 265.201(c)(4) - (5)				
Ignitable storage (protected from sources of ignition and buffer zone)	40 CFR § 262.34(d)(3) 40 CFR § 265.201(g)(1) & (2)				
UNIVERSAL HAZARDOUS WASTE REQUREMENTS					
Containers labeled with contents	40 CFR 273.14				

HAZARDOUS WASTE GENERATOR REQUIREMENT	REGULATORY CITATION(S)	COMPLIANCE? YES	NO	N/A	COMMENTS
Storage time limitations	40 CFR 273.15(b) 40 CFR 273.35(b)				
Inventory/dating system to demonstrate compliance with storage time limitations	40 CFR 273.15(c) 40 CFR 273.35(c)				
Shipment to UHW handler or TSD	40 CFR 273.18, 40 CFR 273.38				
Shipping documentation [Large Quantity Handlers (>5,000 kg) only]	40 CFR 273.39(b)				
Retain shipping documentation (3 years - Large Quantity Handlers only)	40 CFR 273.39(c)				
USED OIL MANAGEMENT REQUIREMENTS					
Containers/tanks in good condition	40 CFR 279.22(b)				
Containers/tanks/fill pipes labeled "Used Oil"	40 CFR 279.22(c)				
Used Oil releases cleaned up	ORS 466.645				
Containers closed or under cover	OAR 340-111-032(2)				
Used Oil either self-transported or transported by a registered transporter	40 CFR 279.24				

Appendix D

Links to Web-Based Resources

Oregon DEQ Main Page
http://www.oregon.gov/deq/Pages/index.aspx

Oregon DEQ's *Small Quantity Generator Handbook*
http://www.oregon.gov/deq/FilterDocs/SQGHandbook.pdf

Regional Office Hazardous Waste Technical Assistance contacts and links
http://www.oregon.gov/deq/Hazards-and-Cleanup/hw/Pages/Technical-Assistance.aspx

Oregon DEQ Hazardous Waste Class Schedule
http://www.oregon.gov/deq/Hazards-and-Cleanup/hw/Pages/HW-Trainings.aspx

Oregon Environmental Laboratory Accreditation Program (ORELAP)
https://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx

US EPA's *Consolidated List of Lists*
http://www2.epa.gov/epcra/epcracerclacaa-ss112r-consolidated-list-lists-march-2015-version