

Chapter 3 Operations-based Environmental Health and Safety Procedures

3.1 Overview

Introduction This chapter of the manual addresses environmental health & safety (EH&S) requirements that are driven by specific business processes and operations rather than being “facility-related.” Each EH&S process will be described individually.

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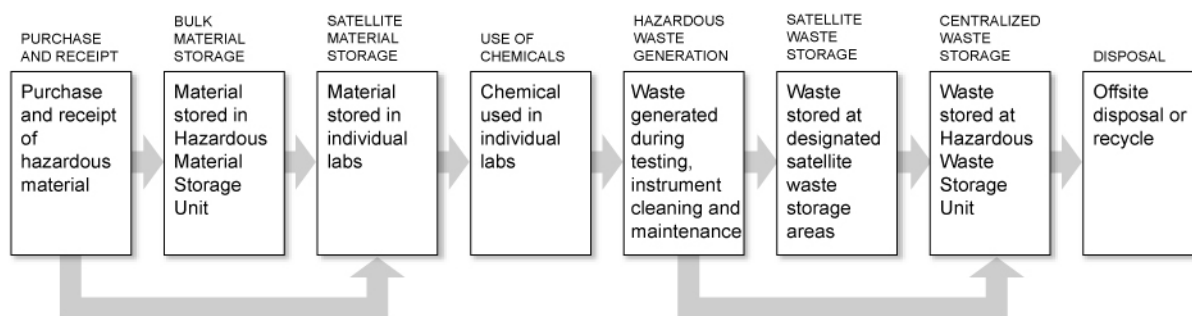
3.2 Scope and Discussion

Background

Management of hazardous chemicals requires a “cradle to grave” approach. This philosophy also ensures compliance with numerous Washington Industrial Safety and Health Administration (WISHA), Washington State Department of Ecology (Ecology), and U.S. Environmental Protection Agency (EPA) regulations. The following section applies to the management of hazardous materials within the Materials Lab.

Activities Involving Handling of Hazardous Material

The laboratory activities involving handling of hazardous material are shown in the following flow diagram:



Activities Involving Handling of Hazardous Material

Management Principles

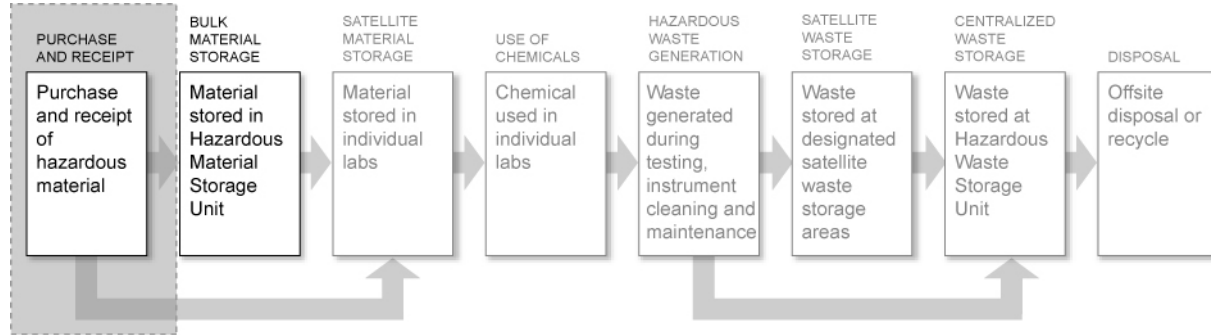
Effective management involves a clear understanding of the goals and end-result. Several goals for the management of chemicals at the Materials Laboratory should be followed:

- **Safety Is The Highest Priority.** Take the necessary precautions to reach goals of achieving zero accidents/injuries and chemical exposures
- **Do Not Underestimate Risks.** Ensure that the risk associated with each chemical is assessed, understood, and communicated. It is prudent to assume all chemicals are hazardous and handle them accordingly.
- **Use Proper Control Measures.** Eliminate the hazard through engineering controls, PPE, and administrative procedures. All staff should be properly trained in accordance with regulatory requirements so they can work safely at their jobs.
- **Waste Reduction.** Reduce wastes through recycling, re-use and the use of alternative, less toxic/hazardous chemicals.

3.3 Purchasing and Receiving of Hazardous Material

Hazardous Material Handling Activity

The activities involving the handling of chemicals and hazardous material discussed in this section are shown below:



Activities Involving Handling of Hazardous Material

Purpose To establish chemical and hazardous materials procurement, receipt, and distribution procedures that will ensure the safety and health of personnel and the environment.

Application This procedure applies to all staff who purchase, receive, and distribute chemicals/hazardous materials that will be used at the Materials Lab.

Policy The use of chemicals creates a variety of environmental and safety issues. These issues must be evaluated prior to the procurement of chemicals and thereby avoid, to the extent feasible, adverse consequences.

Procedure The following steps are to be followed during the procurement, receipt, and distribution of chemicals:

Step	Action	
1	New or non-routinely used chemical	Review the MSDS and other applicable documents to assess the environmental health & safety hazards. Then obtain prior approval from Section/Lab Supervisor.
	Routinely used chemicals	Check the Chemical Inventory Database (Appendix 3) prior to initiation of a purchase requisition.

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3.3 Purchasing and Receiving of Hazardous Material Continued

Procedure (continued)

Step	Action
2	Contact chemical supplier and complete appropriate paper work, online or otherwise.
3	Complete and submit requisition form to the Supply Officer.
4	When chemical is received, contact the initiator of the order as soon as practical. The initiator of the order will be responsible for the proper storage of the chemical. Note: No container should be accepted without an adequate identifying label that includes identity of chemical, appropriate hazard warnings, and manufacturer's name and address. No container should be accepted without an MSDS or without an MSDS on file. Note: All chemicals should be received only by personnel trained in the physical handling and emergency procedures to follow for hazardous chemicals during unloading, storage, and transport.
5	The initiator of the order must enter the information into the Chemical Inventory Database (Appendix 2).

Responsibilities of Section/Lab Supervisors

The responsibilities of the Section/Lab Supervisors are as follows:

Step	Action
1	Review the requisition to ensure that environmental health and safety considerations have been addressed. Consult with the Chemical Hygiene Officer as necessary.
2	Maintain the Chemical Inventory Database.
3	Maintain and update the MSDS file for their Section.

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3.3 Purchasing and Receiving of Hazardous Material, Continued

Procurement Guidelines

Hazardous waste reduction begins at the source of generation. Purchases should be reviewed with the goal of reducing the quantity and hazard of the waste produced whenever possible. Some guidelines are presented below for that purpose.

- Purchase only the quantity of material necessary for the job at hand. Excess material and material that ages past its shelf life become hazardous waste.
- Determine if a less hazardous material can be substituted for the same job. Suppliers often have suggestions for safer or more environmentally friendly products.
- Determine if a reusable or recyclable material can be used for the same job.
- Review the MSDS for chemical occupational hazards.

Note: The Chemical Hygiene Officer must give prior approval whenever extremely hazardous chemicals are to be used in the laboratory or hazardous chemicals are used for the first time.

Training

Personnel who receive and distribute chemicals should be trained in the physical handling and emergency procedures to follow for hazardous chemicals during unloading, storage, and transport.

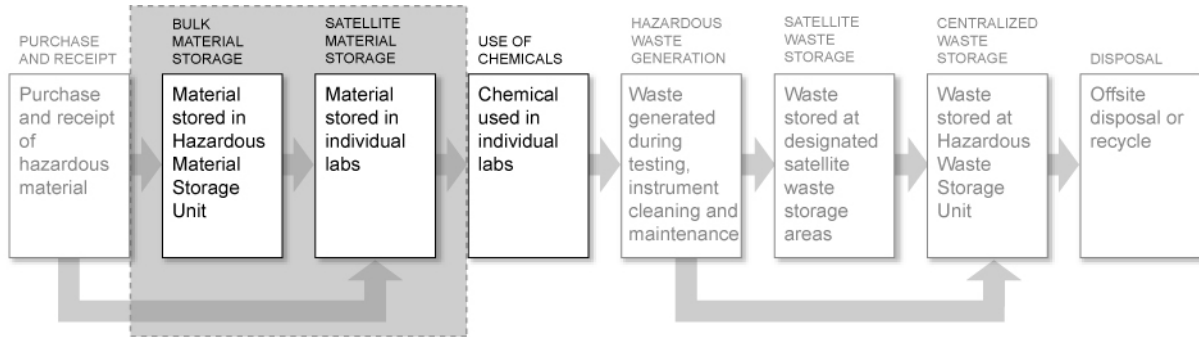
Records

- Chemical Inventory Database
 - Hazardous Materials Requisitions
 - Material Safety Data Sheets (MSDS)
-

3.4 General Chemical Storage Requirements and Guidelines

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Activities Involving Handling of Hazardous Material

Purpose

This section covers chemical storage requirements and guidelines. Storage of chemicals in the bulk storage and satellite storage areas is discussed in a separate section.

Application

This section applies to all units that use or store hazardous material.

Policy

Chemicals should only be stored in designated storage locations.
 Minimize the number of locations where chemicals are stored.
 Keep the amount of chemicals stored in the laboratory to a minimum.

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3.4 General Chemical Storage Requirements and Guidelines, Continued

Chemical Storage Guidelines

General storage guidelines are listed below:

	<i>Guidelines</i>
1	<p><i>Store all chemicals by their hazard class and not in strict alphabetical order.</i></p> <p>Storing chemicals in alphabetical order will often result in incompatible chemicals being stored next to one another. Instead, segregate chemicals into groups according to their hazards; for example, store acids with acids, bases with bases, flammables with flammables, toxins with toxins, reactives with reactives, and oxidizers with oxidizers. Within these groups, chemicals can be stored in alphabetical order to facilitate locating them. If a chemical exhibits more than one hazard, use the highest hazard(s) to segregate it. A chemical segregation and incompatibility chart is presented in Appendix 3.</p>
2	<p><i>Do not store chemicals near heat sources such as ovens or steam pipes. Also, do not store chemicals in direct sunlight.</i></p>
3	<p><i>Date and initial chemicals when received and opened.</i></p> <p>This will assist you in using the oldest chemicals first, which will also decrease the amount of chemicals for disposal. If a particular chemical becomes unsafe upon storage (for example, diethyl ether), then an expiration date should also be included. Keep in mind that expiration dates set by the manufacturer indicate the shelf life of the unopened container, and do not necessarily imply that the chemical is safe to use up to that date after it has been opened.</p>
4	<p><i>Do not use lab benches as permanent storage for chemicals.</i></p> <p>In these locations the chemicals can be easily knocked over, incompatible chemicals can be stored next to one another, and the chemicals are unprotected from a fire situation. Each chemical should have a designated storage location and should be put there after use.</p>
5	<p><i>All chemicals must be clearly labeled (labeling is discussed in Chapter 4.4 General Laboratory Safety). Inspect your chemicals routinely for any signs of deterioration and for the integrity of the label.</i></p> <p>Another benefit of labeling is that unknown chemicals cannot be shipped as chemical waste until an expensive analysis has been performed to identify them. Everything should be done to prevent chemicals from becoming unknowns.</p>

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3.4 General Chemical Storage Requirements and Guidelines, Continued

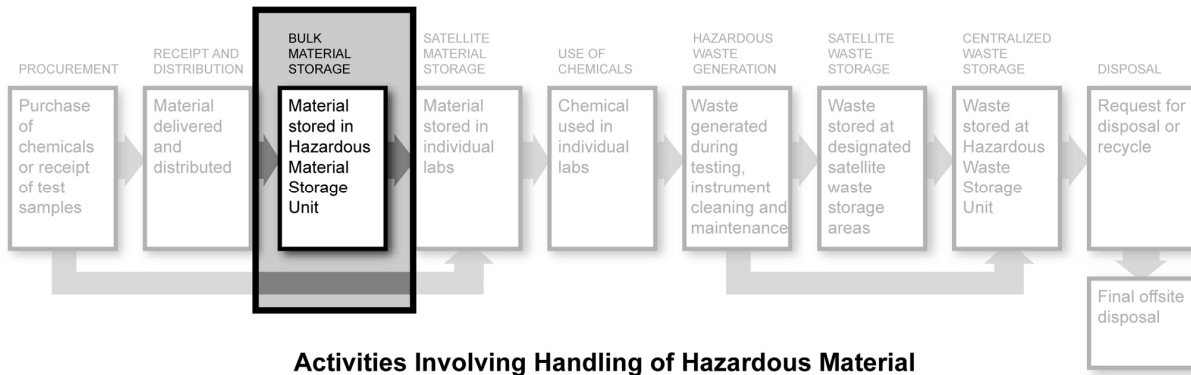
Chemical Storage Guidelines (continued)

	<i>Guidelines</i>
6	<p><i>Do not store chemicals on the floor, especially chemicals in glass containers.</i></p> <p>It is too easy for containers to be knocked over, bumped into, or hit with a chair.</p>
7	<p><i>Do not use fume hoods as a permanent storage location for chemicals, with the exception of particularly odorous chemicals that may require ventilation.</i></p> <p>The more containers, boxes, equipment and other items that are stored in a fume hood, the greater the likelihood of chemical vapors being drawn back into the room. Some chemical fume hoods have ventilated storage cabinets underneath, and this is a good place to put chemicals that require ventilation.</p>
8	<p><i>Promptly contact the Chemical Hygiene Officer for the disposal of any old, outdated, or unused chemicals.</i></p>
9	<p><i>Do not store excessive amounts of chemicals in a lab.</i></p> <p>Buying chemicals in bulk quantities has more disadvantages than advantages: limited work space, creation of a serious fire hazard, and disposal costs of unused chemicals that are often higher than the initial purchase costs.</p>

3.5 Chemical Storage and Retrieval at Hazardous Material Storage Unit (B161)

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Bulk Storage at Hazardous Material Storage Unit

The Hazardous Material Storage Unit (B161) is one of the two hazardous materials/dangerous waste storage units located at the west end of the loading dock outside of the main building. B161 is the western-most of the two units. The other unit (B160) is used for storage of hazardous waste.

Construction of Storage Unit

The 12' x 15' storage unit is constructed on a raised foundation. It is equipped with explosion panel, 1-1/2 hour Curtain Fire Dampers with backdraft damper, mechanical vent, explosion-proof fixtures, and dry chemical fire extinguishing systems.

Security and Access Control

The Hazardous Material Storage Unit has limited access. Ask a lab supervisor when storage unit needs to be accessed.

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3.5 Chemical Storage and Retrieval at Hazardous Material Storage Unit (B161), Continued

Spill Containment Features

The floor of the storage unit is equipped with 10-gauge steel grated decking throughout the width of the room. Accidental spills would be contained within the storage unit. It is designed to safely contain spills of up to 25 percent of the total storage capacity.

Chemical Material Storage

Bulk chemicals are stored within this unit; typically, the following:

Chemicals	Type of Container
Excel	55-gallon metal or 30 gallon Poly Drums
Acetone	4-L Glass container
Alcohol, Reagent	4-L Glass container
Xylenes	4-L Glass container
Trichloroethylene	4-L Glass container or drum
Toluene	4-L Glass container
Sulfuric Acid	4-L Glass container
Hydrochloric Acid	4-L Glass container
Nitric Acid	4-L Glass container

Chemical Retrieval Procedures

The following procedures should be adhered to when retrieving chemicals from the Hazardous Material Storage Unit:

Step	Action
1	Verify that existing inventory stored in the satellite storage area has been exhausted.
2	Depending on type of chemicals being retrieved, ensure you have proper PPE and transporting device such as nitrile gloves, respirator, jug carrier, carts, etc.
3	Use care when transferring chemicals from bulk containers into smaller containers.
4	Close the containers tightly. Place the bulk container back in its appropriate location.
5	Note the date, type of chemical, and quantity you have removed on the log sheet located near the entrance.
6	Secure Hazardous Material Storage Unit.

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3.5 Chemical Storage and Retrieval at Hazardous Material Storage Unit (B161), Continued

Training

All laboratory workers should be trained in the proper procedures for chemical storage and retrieval at the Hazardous Material Storage Unit.

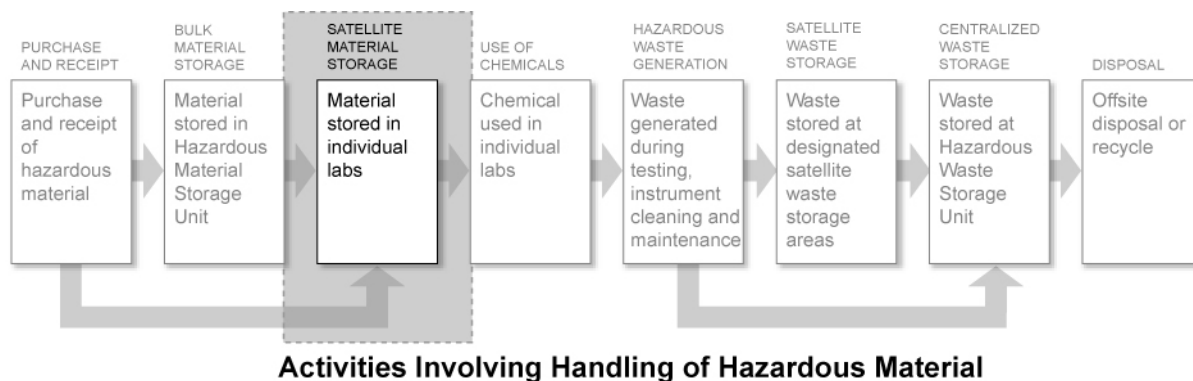
Records

- Hazardous Material Storage Unit Log Sheet (See Appendix 11)
-

3.6 Chemical Storage at Satellite Storage Areas

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Satellite Storage Locations

Each laboratory should have designated storage areas for all chemicals routinely used. Chemicals stored in this area should be segregated on the basis of chemical compatibility (See Appendix 3).

For example, all flammable solvents should be stored in a Flammable Liquid Storage Cabinet away from potential heat sources. Strong acids and bases should be separated into different cabinets or compartments.

After each use, the chemicals should be returned to this area and not stored on bench tops or in fume hoods.

Chemical Inventory

The inventories of the chemicals stored in the satellite storage areas are Satellite Hazardous Material and Waste Storage Area Inspection Form in the Chemical Inventory Database (See Appendix 2). The amounts stored in laboratory areas should be kept to a minimum and inventoried at least annually during the Annual Chemical Inventory check by the Section Supervisor or designee (see Chapter 5.6 Chemical Inventory Management). Outdated chemicals or chemicals that are no longer needed should be disposed of as soon as possible.

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3.6 Chemical Storage at Satellite Storage Areas, Continued

Secondary Containment

Secondary containment is required in circumstances where there is a possibility that the chemicals may spill and contaminate the area. This containment can be achieved in a variety of ways, such as:

- Use of chemical-resistant trays, or other containers, placed under the chemical container
- Use of storage cabinets that are designed to contain spilled chemicals.

Chemicals such as acetone and Excel Clean HD that are stored in plastic carboys with spigots for dispensing should be positioned with the spigot over a tray (secondary container) large enough to contain the entire contents of the carboy in the event of leakage from the spigot.

Labeling

All containers used to store chemicals, regardless of their construction type, must be labeled with appropriate National Fire Protection Association (NFPA) labels (see Chapter 4.13 NFPA Hazard Codes).

Exceptions: Exceptions to this guideline are beakers and glassware used in an immediate laboratory determination. It is advised that all glassware be clearly labeled as to chemical content during any phase of a determination.

Training

Laboratory workers should be trained in proper labeling and chemical storage procedures.

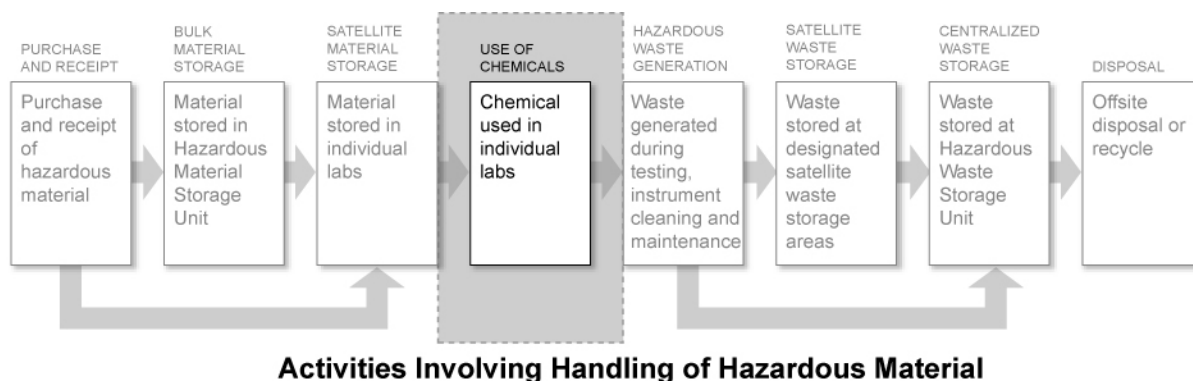
Records

Chemical Inventory

3.7 Chemical Usage Hazards and Control

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Categories of Chemicals

To simplify the discussion of safety considerations for use of particular chemicals that are found in the Materials Lab, seven categories have been developed. These include:

- Flammables
- Oxidizers
- Corrosives
- Reactives
- Toxins
- Compressed Gas

Most laboratory chemicals will fall within one of these seven groups. Of course, many chemicals can fit into more than one category and in this case a decision would have to be made as to what is the most important characteristic of that chemical.

For example, methanol does have toxic properties, but for the purpose of storage it should be stored with other flammables. In general, chemicals within these categories will react similarly and will have similar properties. Being aware of the properties and characteristics of these general chemical categories will aid in the proper storage, handling, and use of chemicals. In addition to the five categories discussed above, additional requirements are applicable to the use of carcinogens. Commonly used chemicals at the Materials Lab are categorized in the following table.

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3.7 Chemical Usage Hazards and Control, Continued

Categories of Chemicals (continued)

Category	Chemicals
Flammables	<ul style="list-style-type: none">• Excel Clean HD (Citrus Cleaner)• Acetone• Toluene• Ethyl ether• Petroleum ether• Alcohol• Methyl Ethyl Ketone• Xylenes
Oxidizers	<ul style="list-style-type: none">• Peroxides• Nitrates• Permanganate
Corrosives	<ul style="list-style-type: none">• Sodium Hydroxide• Hydrochloric Acid• Sulfuric Acid• Nitric Acid• Phosphoric Acid• Hydrofluoric Acid (see Hydrofluoric Acid Chemical Handling Sheet in Appendix 5)
Toxins	<ul style="list-style-type: none">• Hydrofluoric Acid• Mercury• Trichloroethylene

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3.7 Chemical Usage Hazards and Control, Continued

Categories of Chemicals (continued)

Category	Chemicals
Compressed Gas	<ul style="list-style-type: none"> • Argon • Oxygen • Air • Gold Gas (a mixture of CO₂ and Argon)

Chemical Hazards and Safety Considerations

The general characteristics, use and storage guidelines, health hazards, first aid, and personal protective equipment requirements for each of the categories of chemicals are included in Appendix 4. Refer to MSDSs for information about specific chemicals.

Training

Lab personnel who handle chemicals should be familiar with the general characteristics, use and storage guidelines, PPE requirements, and health hazards associated with the chemicals they work with on a routine basis. On-the-job training will be conducted on specific tasks involving the use of chemicals.

Records

MSDSs

3.8 Instrument and Lab Container Cleaning

Background Because of the nature of the material tested at the lab, the instruments and lab containers must be cleaned properly. The proper cleaning procedures are presented in this section.

Application This section is applicable to the following labs that conduct cleaning of instruments and containers:

- Liquid Asphalt Lab
- Chemical Materials Lab
- Bituminous Mixtures Lab
- Physical Testing Lab

Policy Minimize the quantity, volume, and toxicity of chemicals used to clean instruments and lab containers.

Type of Cleaning Operations and Chemicals Used The type of cleaning operations involving the use of hazardous materials are listed in the following table:

Cleaning Operations	Location	Chemicals/Equipment Used
Viscometer Covered with Asphalt	Liquid Asphalt Lab	Excel Clean HD and Acetone
Glassware with Asphalt	Liquid Asphalt Lab	Pyro-Clean Oven
Tools used to handle Asphalt	Liquid Asphalt Lab Bituminous Lab	Excel and Acetone
Glassware with chemicals	Chemical Lab and Physical Testing Lab	Detergent and water
All surfaces in the Moisture Room	Moisture Room (Part of Physical Testing Lab)	Chlorine Bleach

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3.8 Instrument and Lab Container Cleaning, Continued

**Procedure for
Cleaning the
Saybolt
Viscometer**

The procedure for cleaning the Saybolt Viscometer is as follows:

Step	Action
1	Don PPE, including rubber gloves.
2	Flush the viscometer with Excel Clean HD until the liquid that comes out runs clear.
3	Flush the Viscometer with water.
3	Wipe down the surfaces of the Viscometer using Excel Clean HD if needed.
4	Rinse with acetone to remove the residual material if needed.

**Procedure for
Cleaning Tools
Fouled with
Asphalt**

The procedure for cleaning tools is as follows:

Step	Action
1	Don PPE, including rubber gloves.
2	Dip the tools in Excel Clean HD bath.
3	Soak the tools overnight if necessary. Be sure the lid is closed.
4	Remove the tools and spray with acetone to remove the residual.
5	Dispose of the Excel Clean HD bath on a weekly basis or every other day (during high usage times) by taking the bath out to the Bulk Hazardous Waste Storage Unit. See Waste Handling Sheet for Excel Clean HD in Appendix 6.

**Procedure for
Cleaning
Glassware
Fouled with
Asphalt**

Glassware used for handling asphalt at the Liquid Asphalt Lab is cleaned using a thermal cleaning system (Pyro-Clean Oven). The Pyro-Clean Oven eliminates the labor and safety hazards associated with common solvent methods used for cleaning laboratory glassware and metal parts. The procedure for operating the Pyro-Clean Oven is as follows:

Step	Action
1	Place dirty glassware in the oven.
2	Make sure the settings are correct. Press start.

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3.8 Instrument and Lab Container Cleaning, Continued

Procedure for Cleaning Glassware Fouled with Asphalt (continued)

Step	Action
3	Oven temperature is raised to about 900°F to pyrolyze the organic contaminants. Pyrolysis is carried out safely under an oxygen-depleted atmosphere, leaving only carbonized residues on the glassware and parts.
4	After glassware is removed from the oven it is cleaned with soap and water.
5	The ash is vacuumed out using a ShopVac and is disposed as solid waste.

Procedure for Cleaning Moisture Room

The Moisture Room is maintained by the Physical Testing Laboratory. It is cleaned on a monthly basis. The procedure for cleaning the Moisture Room is as follows:

Step	Action
1	Gather supplies for cleaning the Moisture Room. These include: <ul style="list-style-type: none"> • Bleach • Brushes • PPE (see Step 3)
2	Make up bleach cleaning spray solution using 1 part water and 1 part bleach.
3	Don PPE, including the following: <ul style="list-style-type: none"> • Respirator • Rubber gloves • Rubber boots • Apron • Full face shield
4	Spray all surfaces with bleach solution.
5	Rinse with pressure washer.

Training

On-the-job training will be conducted for employees who will be performing cleaning procedures.

3.10 Standard Operating Procedure: Treatment of Polymer Resin Waste

Application This procedure applies to the Chemistry Lab.

Procedure for Onsite Treatment of Polymer Resin Waste

The Chemistry Lab is responsible for conducting testing for polymer resin samples. Once the testing is complete, as determined by the Section Supervisor, the samples will be placed in the area of the Chemistry Lab labeled “Epoxy Samples – Ready for Disposal.” These samples have to be treated onsite prior to disposal as solid waste. The following is the Standard Operating Procedure for Onsite Treatment of Waste Polymer Resin.

Step	Action
1	Obtain and review all MSDSs pertaining to the resin system(s) to be disposed of.
2	Obtain and review the technical data sheets for the resin system(s) to be disposed of. Note any special precautions necessary. Note the required mix ratio (epoxy), or catalyst dosage (acrylic).
3	Eye protection, chemical-resistant gloves, and protective clothing shall be worn when preparing resins. Resins shall only be mixed under conditions providing adequate ventilation.
4	Obtain the “Polymer Disposal Log” clipboard and fill in “Disposal Date,” “Preparer,” “Lab ID#,” “Material Type,” “Brand,” and “Mix Ratio.”
5	Mix each individual component separately as described in the technical data sheets that accompany the polymer.
6	Weigh or otherwise measure each component and note the weight or measurement on the “Polymer Disposal Log.”
7	Mix the appropriate quantities of components together as required by the mix ratio or catalyst dose as described in the technical data sheets. Any excess component shall be labeled as “Excess Component” and shall be identified by Lab ID and Material Type. Excess components shall be identified as either hazardous or non-hazardous and shall be disposed of accordingly.
8	When reacted polymer resins have cured and cooled to room temperature, they shall be inspected by Chemistry Section personnel. Reacted polymer shall either be approved for disposal as regular waste or, in the case of insufficiently or defectively cured product, shall be designated as hazardous waste and disposed of accordingly. The method of disposal (regular or hazardous) shall be noted on the “Disposal Log” along with the authorizer’s initials.

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3.10 Standard Operating Procedure: Treatment of Polymer Resin Waste, Continued

Procedure for Onsite Treatment of Polymer Resin Waste (continued)

Step	Action
9	Polymer Disposal sheets will be maintain by the Lab Supervisor.

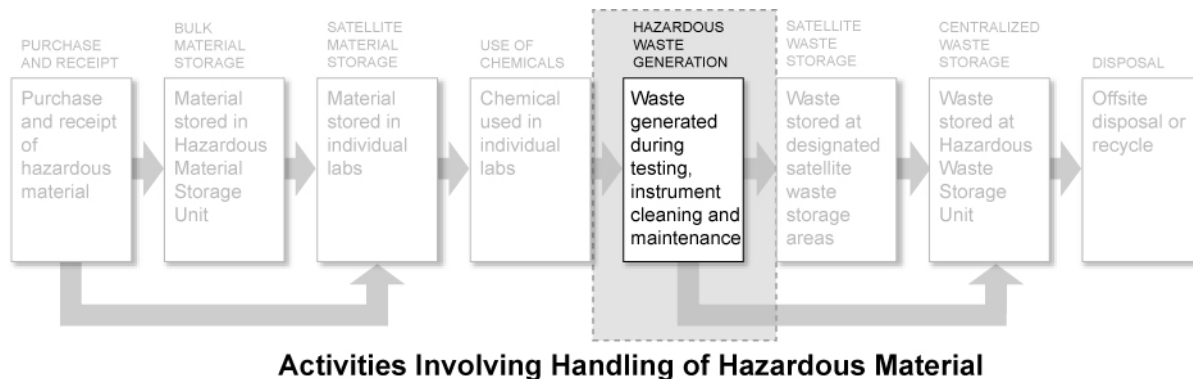
Training On-the-job training will be conducted for employees who will be performing the treatment of polymer resin waste.

Record Polymer Disposal Log

3.11 Overview of Hazardous Waste Generator Requirements

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Purpose

Managing the generation and disposal of hazardous waste is one of the more difficult environmental management challenges for staff in many laboratories. This section presents an overview of hazardous waste generator requirements. More specific information, such as hazardous waste identification, handling and accumulation, and disposal are presented in separate sections.

Application and Responsibility

Hazardous wastes are generated by all the laboratory units. Individuals within the units are responsible for the proper identification, accumulation, and disposal of the waste within the laboratory unit. The Chemical Hygiene Officer is responsible for the overall proper classification, accumulation, disposal, and recordkeeping of the hazardous waste at the Materials Lab.

Definitions

Hazardous waste is a solid, liquid, or gaseous material with certain properties that could pose dangers to human health or the environment. Types of hazardous wastes include certain listed wastes, as well as wastes that exhibit the characteristics of ignitability, corrosivity, reactivity or toxicity.

Policy

Efforts will be taken to assure that waste laboratory chemicals will not harm people or the environment. All hazardous wastes will be disposed of properly in accordance with state, local, and federal laws. Efforts will be taken to continuously identify opportunities to minimize or prevent generation of hazardous waste.

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3.11 Overview of Hazardous Waste Generator Requirements, Continued

Applicable Regulations

As a generator of hazardous waste, the Materials Lab is subject to Resource Conservation and Recovery Act (RCRA) hazardous waste management regulations (40 CFR Parts 260 to 270). These regulations include requirements governing waste classification, accumulation, disposal, recordkeeping, and emergency preparedness. EPA has delegated authority to the states to implement and enforce hazardous waste management. In the State of Washington, generators of hazardous waste are subject to Washington’s Dangerous Waste Regulations (Chapter 173-303 WAC).

Generator Requirement Overview

Hazardous waste management requirements are dependent on the type and quantity of wastes the lab generates. In order to properly manage hazardous waste, the lab must identify and inventory its waste streams, characterize these wastes, and then determine and track its waste generator status. The following 10-step checklist summarizes the responsibilities of a hazardous waste generator. Each of the ten steps is further expanded below.

Stage	Description
1	Identify your waste and generator requirements: <ul style="list-style-type: none"> • The types of wastes generated at the Materials Lab are identified in the section on Types of Wastes Generated. • Generator requirements are dependent on the quantities of waste generated.
2	Obtain a RCRA site identification number. (This is a one time-event that has already been done.)
3	Report annually. A Dangerous Waste Annual Report must be submitted to Ecology by March 1 of each year.
4	Perform preventive maintenance. The facility should be designed, constructed, maintained and operated in a manner that reduces the possibility of a hazardous waste accident. Establish a written schedule for regular inspections of all monitoring equipment, safety and emergency equipment security devices, and operating and structural equipment.

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3.11 Overview of Hazardous Waste Generator Requirements, Continued

Generator Requirement Overview (continued)

Stage	Description						
5	<p>Properly accumulate hazardous waste:</p> <ul style="list-style-type: none"> • All containers must be marked with the words “hazardous or dangerous waste,” an easily understood description of the waste, the date the waste was first placed in the container, and the hazards associated with the waste. • Establish satellite accumulation areas, if necessary. A satellite accumulation area is a location at or near any point of generation of hazardous waste where: <ul style="list-style-type: none"> - The waste is initially accumulated (up to 55 gallons) - There is someone monitoring the area. <p>To avoid the need for a storage permit, ship Materials Lab waste to a facility that has a dangerous waste permit.</p> <table border="1" data-bbox="557 915 1390 1325"> <thead> <tr> <th data-bbox="557 915 976 1024">Annual Quantity of Waste Generated</th> <th data-bbox="976 915 1390 1024">Number of Days Within Which Waste Must be Transported Offsite</th> </tr> </thead> <tbody> <tr> <td data-bbox="557 1024 976 1209">If the Materials Lab generates more than 220 pounds (per month) and accumulates less than 2,200 pounds of hazardous waste on site</td> <td data-bbox="976 1024 1390 1209">Within 180 days of the date the waste was first placed in a container</td> </tr> <tr> <td data-bbox="557 1209 976 1325">If the Materials Lab generates more than 2,200 pounds (per month)</td> <td data-bbox="976 1209 1390 1325">Within 90 days of the date the waste was first placed in a container</td> </tr> </tbody> </table> <p>Note: Currently the Materials Lab generates more than 220 pounds and less than 2,200 pounds of hazardous waste on a monthly basis and is considered a Medium Quantity Generator (MQG). Therefore, the wastes accumulated in the Hazardous Waste Storage Unit should be shipped within 180 days of the date the waste was first placed in the Hazardous Waste Storage Unit.</p> <p>If the Mats Lab generates more than 2,200 pounds of hazardous waste in a month, it will become a Large Quantity Generator, and additional requirements will apply (e.g., Training Plan, Emergency Response Plan, shorter timeframe for filing exception reports, etc.).</p>	Annual Quantity of Waste Generated	Number of Days Within Which Waste Must be Transported Offsite	If the Materials Lab generates more than 220 pounds (per month) and accumulates less than 2,200 pounds of hazardous waste on site	Within 180 days of the date the waste was first placed in a container	If the Materials Lab generates more than 2,200 pounds (per month)	Within 90 days of the date the waste was first placed in a container
Annual Quantity of Waste Generated	Number of Days Within Which Waste Must be Transported Offsite						
If the Materials Lab generates more than 220 pounds (per month) and accumulates less than 2,200 pounds of hazardous waste on site	Within 180 days of the date the waste was first placed in a container						
If the Materials Lab generates more than 2,200 pounds (per month)	Within 90 days of the date the waste was first placed in a container						

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3.11 Overview of Hazardous Waste Generator Requirements, Continued

Generator Requirement Overview (continued)

Stage	Description
6	Plan for emergencies: <ul style="list-style-type: none"> • Have an Emergency Coordinator on the premises or on call. • Post all emergency communication information, such as name and telephone number of Emergency Coordinator; locations of fire extinguishers, spill control material, and fire alarm; and telephone number of fire department. • Report all spills into the environment to the Department of Ecology's Southwest Regional Office. • Ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures relevant to their day-to-day responsibilities.
7	Use proper containers and manage them correctly: <ul style="list-style-type: none"> • Reactive and ignitable wastes are stored in a manner equivalent with the International Fire Code (section 2704). • Wastes are accumulated in compatible, sturdy, leak-proof, closed containers. • All containers are visible for inspection. • Do not accumulate incompatible wastes in the same container or in the same area.
8	Arrange for proper transportation and disposal through the Administrative Officer: <ul style="list-style-type: none"> • Package, label, and mark all containers in accordance with the federal DOT regulations prior to shipment. • Carefully select a permitted hazardous waste treatment, storage, and disposal or recycling facility, or a legitimate recycler, to handle the waste.
9	Manifest shipment of hazardous waste: <ul style="list-style-type: none"> • Use Uniform Hazardous Waste Manifest Form 8700-22 to ship waste • Fill in the manifest completely and clearly • Check all manifest information for accuracy, even if the transporter has completed the manifest. • Verify that a land disposal restriction certificate is attached to the manifest if the waste is restricted from land disposal. • If a signed manifest is not received from the receiving facility within 35 days of pick-up, contact the facility to determine what the disposition of the waste is. If a signed manifest is not received from the receiving facility within 45 days, file an exception report with Ecology.

Continued on next page

3.11 Overview of Hazardous Waste Generator Requirements, Continued

Generator Requirement Overview (continued)

Stage	Description
10	Keep records of hazardous waste activity: <ul style="list-style-type: none">• Keep results from laboratory tests on the wastes.• Keep copies of annual reports, all shipping manifests, land disposal restriction certifications, notification forms, and exception reports for a minimum of 5 years.• Keep an inspection log on site (See Appendix 11).

3.12 Hazardous Waste Identification

Definition A complete definition of a hazardous waste can be found in 40 CFR Part 261, Subpart C and WAC 173-303. Accurate waste identification is essential to ensure the material is handled safely and managed properly.

Application and Responsibility All Materials Lab personnel who handle or generate hazardous waste are responsible for correctly identifying the waste. The Chemical Hygiene Officer is responsible for ensuring that a hazardous waste is correctly identified.

Categories of Hazardous Waste Hazardous waste can fall into one of the following categories:

- Discarded chemical product or dangerous waste sources list (see Chapter 173-303-9903 and -9904 of the Dangerous Waste Regulations)
- Ignitable (flash point of 140 °F or less)
- Corrosive waste (pH less than 2 or greater than 12.5)
- Reactive (could explode, generate harmful vapors, or is an oxidizer; for example, cyanides).
- Toxic
- Toxic or persistent (see WAC 173-303-100; for example, trichloroethylene (TCE), coal tar).

Hazardous wastes generated by the individual lab units (not including samples that will be shipped back to the suppliers or recycled) are listed in the following table:

Lab Unit	Hazardous Waste	Category and Waste Code
Chemical Lab	Outdated chemicals	Discarded chemical products – Miscellaneous
Chemical Lab	Acid Waste Solutions Containing High Metals	Corrosives – D002, WL02
Chemical Lab	Solvent Waste (for example, toluene, acetone)	Ignitable – D001
Chemical Lab	Urethane Paints (test samples to be disposed).	Ignitable – D001

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Hazardous Waste Identification, Continued

Categories of Hazardous Waste (continued)

Lab Unit	Hazardous Waste	Category and Waste Code
Liquid Asphalt Lab	Excel Clean HD Waste Solutions	Toxic – WT02
Liquid Asphalt Lab	Trichloroethylene	Toxic – D040
Liquid Asphalt Lab	Broken or off-spec thermometers containing mercury	Toxic – D009, WL02
Liquid Asphalt Lab	Acetone-soaked rags	Ignitable – D001
Bituminous Mixtures Lab	Excel Clean HD waste solutions	Toxic – WT02
Physical Testing Lab	Acid waste solutions	Corrosives – D002
Physical Testing Lab	Sodium hydroxide waste solutions	Corrosives – D002
Physical Testing Lab	Potassium hydroxide waste solutions	Corrosives – D002
Physical Testing Lab	Calcium hydroxide waste solutions	Corrosives – D002
Geotechnical Lab	Acid waste solutions	Corrosives – D002

3.13 Hazardous Waste Handling

Handling Individual Wastes

A Waste Handling Sheet (WHS) that illustrates the waste handling requirements has been developed for each of the waste streams generated on a routine basis at the Materials Lab. The WHS provides easy-to-understand instructions for waste management activities. If you handle the waste in the manner specified in the WHS, your actions are in compliance with the applicable federal and state laws and regulations. Prior to handling any wastes, review the specific WHS. All sections of the WHS are described in the example below. The WHSs for selected waste streams are located in the Appendix 6.



EXCEL CLEAN HD WASTE SOLUTION

Process Generating Waste: Clearing instruments and containers contaminated with asphalt.

Pollution Prevention: Do not mix oil, lubricants, or other chemicals into the parts washing basin. Keep the basin lid closed and turn the pump off when the system is not in use. Let the cleaned parts dry before removing them from the drainage sump. Prevent spills and releases from the system.

Safe Handling Tips: Review the product label and the material safety data sheet (MSDS) for Excel Clean HD. Wear the personal protective equipment specified by the label and MSDS when using the system and cleaning up any spilled material. PPE listed include Safety goggles, impervious gloves. Prevent fires by eliminating potential nearby sources of heat and ignition.

ACCUMULATION IN LAB UNITS

Accumulation Container	Required Container Label
 Five-gallon drum/pails or equivalent.	 Complete the label with the words "Dangerous waste" and "Toxic"

Handling Requirements



Responsibility: Lab unit personnel generating the waste.

On-site Accumulation Area: This waste is accumulated in the individual lab unit at designated waste accumulation area.

Managing the Container: Keep the washing basin container closed, dry, secure, and in good condition. Make sure the container is correctly labeled. When the parts washing basin containing Excel Clean HD is spent and ready to be replaced, the entire basin is taken to the Hazardous Waste Storage Unit.

EXCEL CLEAN HD WASTE (CONT.)

ACCUMULATION AT HAZARDOUS WASTE STORAGE UNIT

Accumulation Container	Required Container Label
 55-gallon drum	 Complete the label with the words "Dangerous waste" and "Toxic"

Handling Requirements

Handling Responsibility	Chemical Control Officer
On-site Accumulation Area	Hazardous Waste Storage Unit
Managing the Container	Keep the container in good condition. Keep the lid closed. Keep the container secure and ensure it is properly labeled.
Transport Preparation	When nearly full, contact Waste Disposal Contractor
Paperwork/Documentation	Complete and sign Uniform Hazardous Waste manifest. After pickup and disposal, confirm receipt of waste disposition (e.g. certificate/documentation of disposal).

Sections of the Waste Handling Sheet

The sections of a waste handling sheet are described below:

1 This section includes important information about the waste such as:

- How the waste is generated
- **Strategies for pollution prevention** (tips about re-use, recycling, and/or reducing the volume or toxicity of the waste)
- Tips for safe handling

Continued on next page

3.13 Hazardous Waste Handling, Continued

2 *This section includes information regarding managing the wastes in the Satellite Waste Accumulation Areas:*

- The **right container** to accumulate the waste
- The **required label** for the container
- **Responsibility** for managing the waste
- The location where the waste is accumulated at the Materials Lab
- Tips for managing the waste and/or container

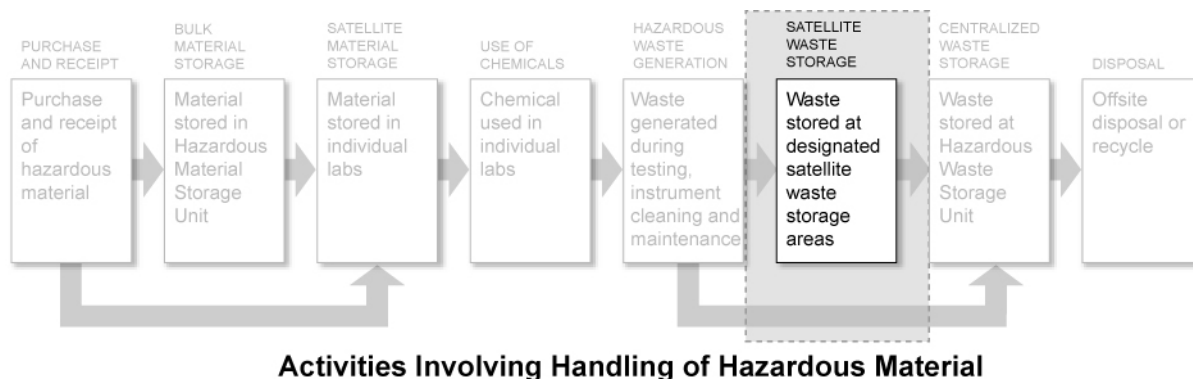
3 *This section includes information about managing the waste at the Hazardous Waste Storage Unit:*

- The **right container** to accumulate the waste
 - The **required label** for the container
 - **Responsibility** for managing the waste
 - The location where the waste is accumulated at the Materials Lab
 - Tips for managing the waste and/or container
 - Tips for preparing the waste for transport by the vendor
 - Required documentation
-

3.14 Waste Storage at Laboratory Satellite Waste Storage Areas

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Application

This procedure applies to all staff who handle hazardous waste generated at the Materials Lab.

Definition of Satellite Accumulation Area

A satellite accumulation area is an area at or near any point of generation where dangerous waste is initially accumulated in containers before consolidating the waste at a designated accumulation area or storage area (that is, Hazardous Waste Storage Area B160).

Satellite Waste Storage Areas

Each laboratory that generates a significant amount of hazardous waste should have a designated satellite storage areas for waste streams routinely generated. Avoid storing wastes on the floor.

Secondary Containment

Secondary containment is required in circumstances where there is a possibility that the chemical may spill and contaminate the area. This containment can be achieved in a variety of ways, such as:

- Use of chemical-resistant trays or other containers placed under the chemical container.
- Use of storage cabinets that are designed to contain spilled chemicals.

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3.14 Waste Storage at Laboratory Satellite Waste Storage Areas, Continued

Labeling All hazardous waste containers must be labeled with the words “Hazardous Waste” or “Dangerous Waste” at the time the waste is first placed into the container. Affix a Hazardous Waste Label to filled containers (See Waste Handling Sheets in Appendix 6). The label must accurately identify the contents of the container.

Container Closure Hazardous waste containers must be closed at all times during storage except when waste is being added or removed. Evaporation of wastes in fume hoods is prohibited.

Satellite Accumulation Provisions The following is a list of provisions for maintaining satellite accumulation areas:

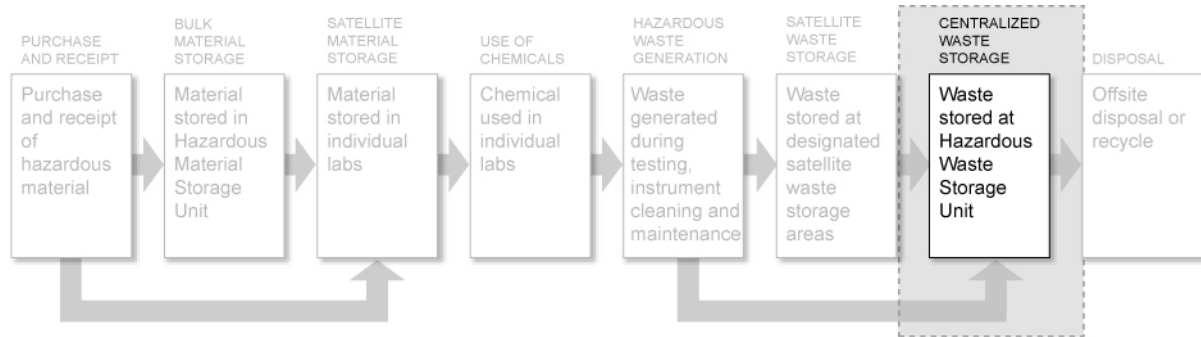
- There are no limits on accumulation time. Closed, properly labeled containers that are partially filled may remain in a Satellite Accumulation Area indefinitely.
- The area must be under the control of the operator of that process.
- Up to 55 gallons of hazardous waste or 1 quart of a particular acutely hazardous waste can be stored in a satellite accumulation area.
- Once the container becomes filled, the containers must be marked immediately with the accumulation start date.
- Containers must be removed from the satellite accumulation area within 3 days after the waste container becomes filled.

Training Laboratory personnel should be trained in proper labeling and waste storage procedures. Laboratory personnel should also be familiar with Ecology regulations regarding satellite accumulation areas.

3.15 Waste Storage at Hazardous Waste Storage Unit (B160)

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Activities Involving Handling of Hazardous Material

Application

This procedure applies to all staff who handle hazardous waste generated at the Materials Lab.

Centralized Waste Storage at Hazardous Material Storage Unit

The Hazardous Waste Storage Unit (B160) is one of the two hazardous materials/hazardous waste storage units located at the west end of the loading dock outside of the main building. The other unit (B161) is used for storage of hazardous chemicals.

Construction of Storage Unit

The 12' x 15' storage unit is constructed on a raised foundation. It is equipped with explosion panel, 1-1/2 hour Curtain Fire Dampers with backdraft damper, mechanical vent, explosion-proof fixtures, and dry chemical fire extinguishing systems.

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3.15 Waste Storage at Hazardous Waste Storage Unit (B160), Continued

Security and Access Control

The Hazardous Waste Storage Unit has limited access. Ask a lab supervisor when storage unit needs to be accessed.

Spill Containment Features

The floor of the storage unit is equipped with 10-gauge steel grated decking throughout the width of the room. Accidental spills would be contained within the storage unit, which is designed to safely contain spills of up to 25 percent of the total storage capacity.

Hazardous Wastes Stored

Bulk chemicals are stored within this unit. Wastes that are typically stored in this unit are as follows:

Chemicals	Typical Quantity	Type of Container
Waste Trichloroethylene	20	1-Gallon Glass container
Waste Excel Clean HD	2	30- or 55-Gallon Poly Drums
Waste alcohol reagent	4	4-L Glass container
Waste Acid Solutions	24	4-L Glass container
Waste Paint	30	Quart container
Waste Curing Compound	30	Quart container
Waste Mercury	Broken thermometers	Plastic bags

Waste Storage Procedures

The following procedures should be adhered to when hazardous wastes are placed in the Hazardous Waste Storage Unit:

Step	Action
1	Within 3 days after a waste container in the satellite accumulation area is full, remove the waste from the satellite accumulation area and place it in the Hazardous Waste Storage Unit (B160).

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3.15 Waste Storage at Hazardous Waste Storage Unit (B160), Continued

Waste Storage Procedures (continued)

Step	Action
1	Depending on the type of waste being stored, ensure you have the proper PPE and transporting device, such as nitrile gloves, respirator, jug carrier, carts, etc.
2	Transport the waste to the Hazardous Waste Storage Unit (B160).
3	If necessary, transfer waste from the smaller container into the larger waste container with care. The acids should be placed in the Acid Storage Cabinet located inside the Hazardous Waste Storage Unit.
4	Close the containers tightly. Place the bulk container back in its appropriate location.
5	Note the date, type of waste, and quantity you have placed in the Hazardous Waste Storage Unit on the Waste Storage Log located near the entrance.
6	Secure Hazardous Waste Storage Unit.

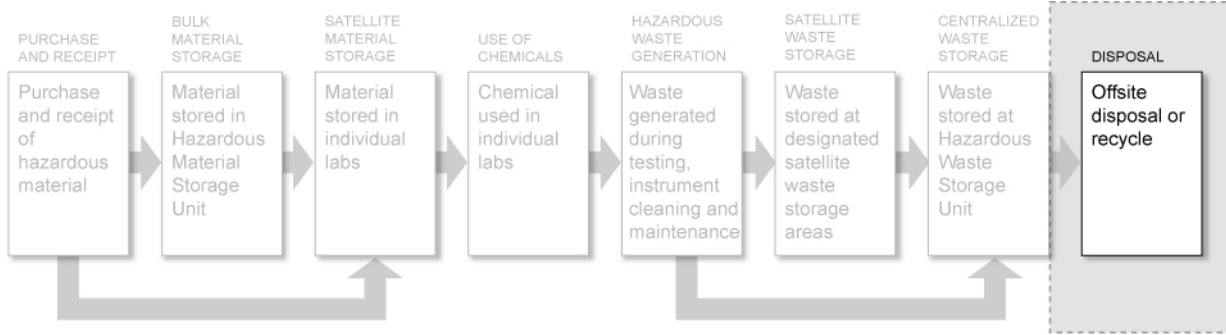
Training All Materials Lab workers should be trained in proper procedures for waste storage at the Hazardous Waste Storage Unit.

Record Waste Storage Log (See Appendix 11)

3.16 Hazardous Waste Disposal

Hazardous Material Handling Activity

The activities involving the handling of hazardous material discussed in this section are shown below:



Activities Involving Handling of Hazardous Material

Application

This procedure applies to the Administrative Officer, Chemical Hygiene Officer and Section/Lab Supervisors, who are responsible for proper disposal of hazardous waste generated at the Materials Lab.

Disposal Procedure from Hazardous Waste Storage Unit

Currently, the Materials Lab is a medium quantity generator (generating between 220 to 2,200 pounds of waste each month). As such, the lab has 180 days from the date the waste was first placed in a container in the Hazardous Waste Storage Unit to dispose of the waste.

The procedure for transporting the wastes offsite are as follows:

Step	Action
1	Notify individual lab units so they have the opportunity to bring their hazardous wastes accumulated in the satellite waste storage areas to the Hazardous Waste Storage Unit for disposal.
2	Contact the Administrative Officer who will coordinate waste disposal with a contracted hazardous waste disposal vendor.
3	Ensure that wastes are properly packaged, labeled, marked and placarded for shipment.
4	Ensure that the Uniform Hazardous Waste Manifests, which accompany the shipment of hazardous waste from the lab to its ultimate destination, are completed properly by the disposal vendor.

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3.16 Hazardous Waste Disposal, Continued

Disposal Procedure from Hazardous Waste Storage Unit (continued)

Step	Action
5	Sign and date the manifest form. Retain one of the signed copies.
6	If the waste is restricted from land disposal, ensure that a land disposal restriction certificate (see below) is completed and attached to the manifest.
7	Contact the transporters and/or facility if the last signed copy of the manifest forms have not been received within 35 days of the shipment date. Submit an exception report to Ecology if the last copy of the manifest has not been received within 45 days of the shipment date.

Land Disposal Restriction Notices

EPA regulations require that nearly all hazardous waste be treated prior to land disposal (40 CFR 268). Hazardous waste generators are required to notify the receiving treatment, storage, and disposal facility (TSDF) when they ship land disposal restricted (LDR) wastes. LDR notices accompany the hazardous waste manifest and include the generator's identification number, the appropriate treatment standards, and the accompanying manifest number.

Lab Packing

Because lab wastes typically include a diverse array of chemicals in small quantities, chemicals can either be consolidated into bulk waste streams that meet specific characteristics, or they can be "lab-packed." When lab-packed, small containers of compatible waste materials are placed intact into a larger packaging unit; usually a steel or fiber drum. The larger container contains an absorbent material, such as vermiculite, to cushion the containers and absorb spilled or leaked waste. An inventory is made as the containers are added to the drum. The drum is then sealed and a copy of the inventory sheet is attached to the drum. The drum is then shipped off site for disposal, accompanied by a uniform hazardous waste manifest.

Training

All laboratory workers who handle hazardous wastes should be trained in proper waste disposal procedures.
All workers who package hazardous wastes for shipment need to be trained as HazMat employees, as discussed in 49 CFR 172 Subpart H.

Records

- Uniform Hazardous Waste Manifest
- Land Disposal Restriction Notices

3.17 Sample Shipping and Disposal

Background The Materials Lab receives samples and materials from a variety of sources, including manufacturers, vendors, and other WSDOT units. Many of the samples would be classified as hazardous waste if disposed; therefore, proper handling of these samples and materials is crucial.

Application Sample and material shipping is applicable to the following lab units:

- Chemical Lab
- Liquid Asphalt Lab
- Bituminous Mixtures Lab
- Physical Testing Lab
- Geotechnical Lab

Policy Samples that have been tested or samples that are no longer needed are shipped back to the supplier, disposed as municipal solid waste, or disposed in the recycling dumpsters, depending on the type of material. Hazardous material must not be disposed as municipal solid waste or in the recycling dumpster.

Method of Disposal The methods of disposal for various types of samples are listed in the following table:

Lab	Sample or Material	Method of Disposal
Chemical Lab	Joint Materials	Mix the two-part components, then dispose as solid waste.
Chemical Lab	Fencing Materials	Recycle
Chemical Lab	Raised Pavement Markers	Dispose as solid waste
Chemical Lab	Epoxies	Mix Parts A and B, cure, and then dispose as solid waste. Keep a log of material mixed.
Chemical Lab	Bearing pad material	Dispose as solid waste
Chemical Lab	Deicers	Use in lab applications or dispose in sewer (liquids) or as solid waste (solids).
Chemical Lab	Urethane paints	Hazardous Waste
Liquid Asphalt	Lane Marker Adhesives	Use in applications or dispose as solid waste

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3.17 Sample Shipping and Disposal, Continued

Method of Disposal (continued)

Lab	Sample or Material	Method of Disposal
Liquid Asphalt Lab	Emulsified asphalts	Ship back to supplier
Liquid Asphalt Lab	Binders	Dispose as solid waste
Bituminous Lab	Asphalt Rock	Dispose in Recycle Dumpster
Physical Testing Lab	Aggregate	Dispose in Recycle Dumpster
Physical Testing Lab	Cement Cylinders	Dispose in Recycle Dumpster
Physical Testing Lab	Concrete	Dispose in Recycle Dumpster
Physical Testing Lab	Curing Compound	Dispose as hazardous waste
Physical Testing Lab	Steel	Recycle by DOT Olympic Regional Office
Physical Testing Lab	Geotextiles	Dispose as solid waste as solid waste
Geotechnical Lab	Soil	Dispose as solid waste

Shipping Procedure

The procedure for shipping the samples (for example, emulsified asphalts) back to suppliers is as follows:

Step	Action
1	Package samples in appropriate containers.
2	Make sure that the sample transmittal form associated with the sample accompanies the container.
3	Complete and affix appropriate shipping paper. If shipping hazardous material, make sure U.S. DOT hazardous material shipping requirements are met.
4	Transport the containers to Shipping area for pickup.

Training

All laboratory workers who handle samples should be trained in proper sample disposal and U.S. DOT hazardous material shipment procedures.

Records

- Sample transmittals
- U.S. DOT hazardous material shipping documents