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CHEMICAL WASTE GUIDELINES

Revised: April 16, 2024

SERVICE ★ INTEGRITY
PROFESSIONALISM

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Chapter 1: Introduction

1.1 Purpose

The Chemical Waste Guidelines (CWG) establishes a formal written program for the safe and compliant collection, storage, and disposal of hazardous waste at all of the University of Minnesota's (U of M) facilities located throughout the state.

1.2 Scope

The CWG applies to all research and teaching laboratories, shops, maintenance areas, or other U of M facilities that generate, store, or handle chemical waste. The CWG was prepared in accordance with the requirements of the EPA's Resource Conservation and Recovery Act (Title 40 of the Code of Federal Regulations) and the Minnesota Administrative Rules (Chapter 7045) facilitated by the MPCA.

1.3 Authority

The CWG is part of the University's Environmental Protection Administrative Policy, which charges Health, Safety and Risk Management with providing leadership, resources, and services to ensure that the University provides a health and safe workplace, and that all applicable regulations, policies, and procedures are being implemented and compliance is met. As stated in the policy, all environmental programs must be followed by all University staff when applicable to the type of work being performed.

1.4 Employee Training Requirements

U of M policy requires both initial and annual chemical waste training for all faculty, staff, and student employees that routinely manage chemical waste. The online Chemical Waste Management Training Module fulfills this requirement and can be accessed by all U of M personnel.

1.5 Health, Safety and Risk Management

The primary role of Health, Safety and Risk Management (HSRM) is to assist in monitoring regulatory compliance with various federal, state, county, and organizational regulations involving environmental health and safety issues. HSRM provides a variety of services to the U of M community. One of these services is chemical waste collection for all of the U of M

campuses and research stations. The primary responsibility of the HSRM Regulated Waste Division is to pick up, transport, process, and dispose of hazardous waste in a safe and environmentally responsible manner. More detailed information regarding the services are included on the HSRM Regulated Waste Division website or by contacting HSRM (612-626-1604 or hazwaste@umn.edu).

Chapter 2: Hazardous Waste Defined

2.1 Regulatory Authority

The EPA's Resource Conservation and Recovery Act (RCRA) passed by the United States Congress in 1976, mandates the proper management of hazardous waste. In Minnesota, the Minnesota Pollution Control Agency (MPCA) as well as county regulatory agencies administer the hazardous waste compliance program. This combination of federal, state, and county regulations governs the management of hazardous waste from the point of generation to the point of final disposition, also known as "cradle to grave management".

All U of M facilities are subject to inspection by federal, state, and county regulatory agencies. These inspections are frequent and can lead to regulatory citations and fines if the proper procedures detailed in this document are not followed by all U of M employees.

2.2 Hazardous Waste Determination

Determining if a chemical waste meets the regulatory definition of a hazardous waste can be difficult and requires specific training. Therefore, it is the U of M's policy that all staff assumes that all chemical wastes are hazardous and must be managed by HSRM for proper disposal unless told otherwise. Chemical wastes should never be thrown in the trash or poured down the drain without first seeking permission from HSRM. While it is the U of M's policy to assume all chemical waste is hazardous, this section describes the details of how hazardous waste is defined by the EPA and MPCA.

There are two criteria to determine if a waste is classified as hazardous waste. First, determine if the waste exhibits one or more of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. Second, determine if the waste is listed by the EPA as a hazardous waste.

Characterisitic Hazardous Waste:

Characteristic hazardous waste is waste that is ignitable, oxidant, corrosive, reactive, toxic, or lethal. The specific criteria for characteristic hazardous waste are listed in Table 2.1. A waste is considered to exhibit the characteristic of toxicity if it is in concentrations greater than the regulatory thresholds listed in Table 2.2.

Table 2.1 – Criteria and Characteristics of Ignitability, Corrosivity, and Reactivity

EPA Waste Code	Criteria
Ignitable (D001)	**A waste that meets *any* of the following criteria:** • A liquid whose flashpoint is less than 60^{o} Celsius (140^{o} Fahrenheit) is an ignitable waste. However, water-based solutions (50% or more water) containing less than 24% alcohol are not ignitable, regardless of their flashpoint. • A solid that will spontaneously combust or ignite through friction or by absorbing moisture and once ignited, will burn vigorously and persistently that it creates a hazard. • A compressed gas that will either burn when mixed at 13% or less with air or has a flammability range of 12% or more, regardless of the lower limit.
Oxidizer (D001)	**A waste that meets *any* of the following criteria:** • Is defined by an oxidizer under the Department of Transportation Hazardous Materials Regulations. • Readily supplies oxygen to a chemical reaction or acts similarly to oxygen in a reaction.
Corrosive (D002)	**A waste that meets *any* of the following criteria:** • An aqueous liquid (20 percent or more water) that has a pH of 2 or less or 12.5 or more; or, • A liquid that corrodes steel at a rate of 0.25 inches or more per year.
Reactive (D003)	**A waste that meets *any* of the following criteria:** • Instability and readiness to undergo violent change; • Violent reactions when mixed with water; • Formation of potentially explosive mixtures when mixed with water; • Generation of toxic fumes in quantities sufficient to present a danger to human health or the environment when mixed with water; • Cyanide or sulfide waste which generate toxic fumes when exposed to acidic conditions; • Ease of detonation or explosive reaction when exposed to pressure or heat; or • Ease of detonation or explosive decomposition or reaction at standard temperature and pressure.
Toxic (D004 – D043)	**See Table 2.2**
Lethal (MN01)	**A waste that meets *any* of the following criteria:** • Oral LD50 (rat) 500 mg/kg • Dermal LD50 (rabbit) 1000 mg/kg • Inhalation LC50 (rat): • Dust/mist 2000 mg/m^{3} • Gas/vapor 1000 mg/L

Table 2.2 – Criteria and Characteristics of Toxicity

EPA Waste Code	Chemical Name	Regulatory Threshold (mg/L)	EPA Waste Code	Chemical Name	Regulatory Threshold (mg/L)
D004	Arsenic	5.0	D024	m-Cresol	200.0
D005	Barium	100.0	D025	p-Cresol	200.0
D006	Cadmium	1.0	D026	Cresol	200.0
D007	Chromium	5.0	D027	1,4-Dichlorobenzene	7.5
D008	Lead	5.0	D028	1,2-Dichloroethane	0.5
D009	Mercury	0.2	D029	1,1-Dichloroethylene	0.7
D010	Selenium	1.0	D030	2,4-Dinitrotoluene	0.13
D011	Silver	5.0	D031	Heptachlor (and its epoxide)	0.008
D012	Endrin	0.02	D032	Hexachlorobenzene	0.13
D013	Lindane	0.4	D033	Hexachlorobutadiene	0.5
D014	Methoxychlor	10.0	D034	Hexachloroethane	3.0
D015	Toxaphene	0.5	D035	Methyl ethyl ketone	200.0
D016	2,4-D	10.0	D036	Nitrobenzene	2.0
D017	2,4,5-TP (Silvex)	1.0	D037	Pentachlorophenol	100.0
D018	Benzene	0.5	D038	Pyridine	5.0
D019	Carbon tetrachloride	0.5	D039	Tetrachloroethylene	0.7
D020	Chlordane	0.03	D040	Trichloroethylene	0.5
D021	Chlorobenzene	100.0	D041	2,4,5-Trichlorophenol	400.0
D022	Chloroform	6.0	D042	2,4,6-Trichlorophenol	2.0
D023	o-Cresol	200.0	D043	Vinyl Chloride	0.2

Listed Hazardous Waste:

Wastes may be hazardous if the EPA specifically lists them on of four lists for hazardous waste:

1. **F** list
2. **K** list
3. **P** list
4. **U** list

The **F** list includes wastes from nonspecific sources. At the U of M, the most common F listed waste is waste generated from the use of organic solvents. This includes waste mixtures of organic solvents and debris and/or media contaminated with organic solvents. Table 2.3 lists the most common **F** listed wastes found at the U of M.

Table 2.3 – Common Listed Hazardous Wastes from Non-Specific Sources (F001 – F005)

EPA Waste Code	Waste Listing
F001 (Spent solvents used in degreasing)	1,1,1-trichloroethane, carbon tetrachloride, chlorinated fluorocarbons, methylene chloride, trichloroethylene
F002 (Spent solvents)	1,1,1-trichloroethane, 1,1,2-trichloro-1,1,2-trifluoroethane, 1,1,2-trichloroethane, chlorobenzene, methylene chloride, o-dichlorobenzene, tetrachloroethylene, trichlorofluoromethane
F003 (Spent solvents)	Acetone, cyclohexanone, ethyl acetate, ethyl ether, methanol, methyl isobutyl ketone, n-butyl alcohol, xylene
F004 (Spent solvents)	Cresols, cresylic acid, nitrobenzene
F005 (Spent solvents)	2-ethoxyethanol, 2-nitropropene, benzene, carbon disulfide, isobutyl alcohol, methyl ethyl ketone, pyridine, toluene

The **K** list includes wastes generated from specific industrial process and is not typically applicable at a university setting.

The **P** list (Appendix A) and the **U** list (Appendix B) include pure or commercial grade formulations of specific unused chemicals. Chemicals on the **P** list are considered acutely toxic and chemicals on the **U** list are considered toxic. Chemicals on both the **P** and **U** lists can also display other characteristics, such as ignitability, corrosivity, reactivity, and toxicity.

2.3 Commercial Products

Many common commercial products such as fuels, paints, cleaners, and pesticides have regulated constituents included in their chemical makeup. For this reason, it is essential that the product and label and SDS be reviewed before using or disposing of any commercial product waste. All commercial products must be submitted to HSRM for proper disposal.

Chapter 3: Hazardous Waste Storage Requirements

3.1 Satellite Accumulation Areas

Most hazardous waste containers generated at the U of M are stored in satellite accumulation areas (SAA). SAAs are used to manage hazardous waste in laboratories and other areas because doing so provides a safe and effective means to accumulate hazardous waste before removal by HSRM. Additionally, SAAs provide the least restrictive regulatory option for the accumulation and storage of hazardous waste containers. While identification of SAAs by signage is not required, but it is recommended as a good practice. Appendix C lists the SAA rules and can be posted in waste collection areas. The following SAA rules must be followed at all times when managing hazardous waste:

- **All waste must be stored in containers that are suitable for the type of waste they contain.** Usually the original container of the main component of the waste can be used (*e.g.,* 4-liter glass jar). Reusable containers such as a 20-liter carboy can also be used to collect waste. More detail regarding chemical waste containers can be found in Section 3.4 of this document.
- **Containers must remain closed at all times except when adding or removing waste.** Open waste containers are the most common EPA hazardous waste violations cited at colleges and universities. Safety funnels that close and seal can be used as a more convenient way to fill waste containers as shown in Figure 3.1.

Figure 3.1 – Safety Funnel

- **Containers must be properly labeled.** The following elements must be container label: the words “Hazardous Waste”, an accurate description of the waste, a description of the primary hazard present, and the date waste was first added to the container (start

date). More detail regarding hazardous waste container labeling can be found in Section 3.3 below.

- **All containers must be in good condition and not leaking.** Containers must be relatively clean without gross chemical contamination on the outside of the container. If a container holding hazardous waste is not in good condition, or if it begins to leak, the waste should be transferred to a container that is in good condition. Alternatively, over-pack the container that is leaking or in poor condition into a larger, compatible container with a tight fitting lid as illustrated in Figure 3.2.

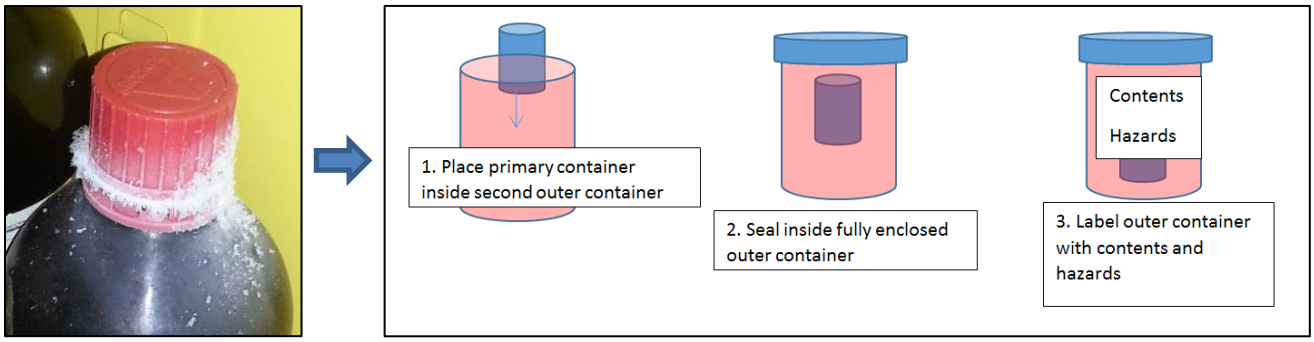


Figure 3.2 – Example of a Container Over-Pack

- **All liquid waste must be stored in secondary containment.** Trays, tubs, or buckets are all acceptable forms of secondary containment as shown in Figure 3.3.

Figure 3.3 – Example of Secondary Containment

- **Containers must be stored at or near the point of generation and under the control of the generator of the waste.** Waste must remain in the same room that it is generated in. Establish an area to accumulate hazardous waste. This area can be a bench top, fume hood that is being used for storage, or a cabinet. Store containers upright and securely. Do not place containers in areas such as hallways, doorways, sinks, or next to moving equipment where the chance of spills is likely.

- **The waste storage volume should never exceed 55 gallons per SAA.** Submit waste to HSRM on a routine basis to avoid excess storage.
- **Containers must be segregated by chemical compatibility during storage.** For example, acids (*e.g.,* hydrochloric acid) must be stored away from bases (*e.g.,* sodium hydroxide) and organic acids (*e.g.,* acetic acid) must be stored away from oxidizing acids (*e.g.,* nitric acid). Segregation can be achieved either by physical distance or by secondary containment.
- **Do not put incompatible chemicals in the same waste container.** Generally, only wastes with the same hazard class should be added to a waste container. More detail regarding waste collection containers can be found in Section 3.4.

3.2 Central Accumulation Areas

Some U of M locations such as shops and maintenance areas (and some laboratories) may choose to manage their waste in what is referred to as a central accumulation area rather than a SAA. Under this management plan, waste is generated at one location such as a jobsite and then taken to another location for storage and pickup by HSRM (not stored at or near the point of generation as with SAAs). While there are some advantages to managing waste under this model, there are also additional requirements such as documented weekly inspections, a 90-day or 180-day storage limit (depending on location), and additional spill cleanup supplies and emergency response equipment. Therefore, HSRM strongly discourages managing waste in this manner unless it is absolutely necessary. For detailed requirements regarding managing waste in Central Accumulation Areas, contact HSRM (612-626-1604 or hazwaste@umn.edu).

3.3 Hazardous Waste Labeling

All chemical waste, regardless of where it is stored or how it is managed, must be properly labeled as soon waste is added to a container. All chemical waste containers must be labeled and clearly marked with:

- The words “Hazardous Waste”
- An accurate description of the waste (*e.g.,* Halogenated Waste: Dichloromethane 60%, Chloroform 30%, Water 10%)
- The primary hazard(s) present in the waste (*e.g.,* Poison, Flammable)
- The date that waste was initially added to a container (start date)

Waste descriptions must be accurate, comprehensive, and include all regulated constituents as defined in Chapter 2 of this CWG. Chemical constituents should be listed completely; do not use chemical formulae or abbreviations on chemical waste labels. Listing accurate percentages is not as important as listing all the chemicals that makeup the waste. For example, ± 5% concentration is acceptable and constituents less than 1% can be listed as “trace”. The label

that HSRM provides for proper identification of hazardous waste is shown in Figure 3.4. Contact HSRM to receive Hazardous Waste Disposal labels free of charge (612-626-1604 or hazwaste@umn.edu). Additionally, the online Chematix waste inventory system allows for waste labels, referred to as "Waste Cards", to be printed once waste has been created in the system (Figure 3.5). Detailed information regarding the Chematix waste inventory system is detailed in Chapter 4.

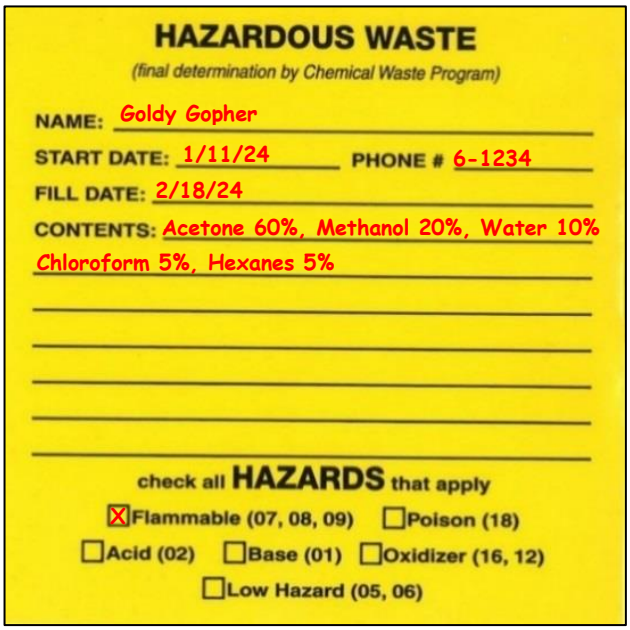


Figure 3.4 – Hazardous Waste Label

Figure 3.5 – Chematix Hazardous Waste Label

3.4 Hazardous Waste Containers

All chemical waste must be collected in containers that are appropriate for the waste that they contain and must be able to be properly closed. Examples of suitable waste containers include 4-liter or 1-liter glass jars, 20-liter carboys (Figure 3.6), and buckets (Figure 3.7). Examples of unsuitable waste containers include beakers, Erlenmeyer flasks, food grade containers such as milk jugs, or bags for liquid wastes. The department/lab that generates the waste is responsible for providing most waste containers. It is recommended that chemical containers used in the work area be reused for waste collection when they are empty. However, the U of M UMarket offers a variety of containers for purchase. Additionally, HSRM can provide some one-time use containers such as 5-gallon buckets free of charge (Figure 3.7).

When selecting a waste container, make sure that the container is the appropriate type and size for the waste being added. For applications that generate high volumes of waste, a 20-liter carboy or bucket should be considered. If the application does not generate much volume, use a smaller container such as a 1-liter or 4-liter container.

Make sure that the container is compatible with the waste being added. For example, do not put corrosive waste into a metal container. When containers are reused for waste collection, thoroughly rinse the container before putting a different type of waste to avoid chemical reactions and potential over-pressurization of the waste container.

Do not put incompatible chemicals in the same waste container. Examples of chemicals that should not be placed into the same waste container include acids with bases, organic solvents with oxidizers (mixing nitric acid into flammable liquid waste containers has caused several incidents in the past), acids with toxics, or reactive chemicals with water. If possible, avoid mixing aqueous waste with organic waste such as flammable liquids. Collect all highly toxic, reactive, mercury, and any exotic wastes (*e.g.,* dioxin compounds, PCBs, controlled substances, pesticides) separately even if they are chemically compatible with other waste streams. Mixing these types of wastes with common waste streams such as organic solvents can result in costly disposal fees. For example, mixing mercury with organic solvent waste means that the entire waste stream must be treated as mercury waste, which is 5 times more expensive.

If requested, reusable chemical waste containers such as 20-liter carboys or safety cans may be returned to the generator's area for reuse. Clearly mark the container with the building and room number as illustrated in Figure 3.8. Containers unsuitable for reuse will be properly disposed of and not returned. Reusable waste containers should not be used for mercury or mercury compounds, highly toxic, or reactive waste streams. They should only be used for common waste streams such as organic solvents and aqueous solutions. Please contact HSRM for more information regarding chemical waste containers (612-626-1604 or hazwaste@umn.edu).

Figure 3.6 – 20 Liter Carboy

Figure 3.7 – Bucket Provided by HSRM

Figure 3.8 – Reusable Safety Can

Empty Containers:

Empty chemical containers that are not grossly contaminated should be triple rinsed and may be disposed of in the trash or recycled. Any rinse waste should be collected as hazardous waste. While it is good practice to rinse all chemical containers once they are empty, any empty containers the held constituents found in Appendix A (P-listed acutely toxic chemicals) are required by law to be triple rinsed. For detailed procedures on disposal of empty glassware, visit the Facilities Management Recycling and Waste Reduction webpage.

Chapter 4: Chemical Waste Disposal Procedures

4.1 HSRM Chemical Waste Disposal Procedures

The HSRH Regulated Waste Division provides chemical waste pickup and disposal services at no cost to U of M departments. To have chemical waste removed from your location by HSRM staff, complete the online Chematix Chemical Waste Pickup Form. Detailed instructions regarding the waste form submission process are on the Chematix webpage linked above. Once this form has been submitted, HSRM staff will come to your location within a few days to pick up the waste if you are located on the Twin Cities Campus. If you are not located on the Twin Cities Campus, then HSRM will coordinate a pickup time with you.

Chemical waste containers may be rejected by HSRM staff at the time of pickup for the following reasons:

- Room is locked and HSRM personnel do not have a key or a way to gain access
- Improper container being used or container is leaking or has been overfilled
- Improper caps/lids
- Mislabeled containers, container label does not match the description submitted
- No label or label has faded and is no longer legible
- Use of chemical formula or abbreviations
- Outside of containers are heavily contaminated and not in good condition; not appropriate for safe and compliant transportation

4.2 Chemical Laboratory Cleanouts

Abandoned chemicals in laboratories create unsafe and non-compliant conditions. Additionally, these orphan materials are expensive and time consuming to manage. Therefore, it is imperative that principal investigators and laboratory staff take responsibility for properly decommissioning their laboratories. Before leaving your laboratory or assigned space, all unwanted chemicals, research samples, and chemical waste must be disposed following the chemical waste disposal procedures detailed in Section 4.1. Please note that you are responsible for all materials in your area, including materials you purchased, created, or may have inherited from former laboratory occupants. The role of HSRM is to provide consultation and assistance with the decommissioning process. HSRM will ease the process as much as possible, and then

remove the materials once the chemical waste pickup procedures have been followed. If materials are abandoned by laboratory occupants, it is the department's responsibility to prepare and submit a request for those materials. More detail regarding the laboratory closeout process can be found on the HSRM Laboratory Closeout Checklist.

In some cases, HSRM can provide chemical laboratory cleanout services at a cost of $75/hour. This service only includes the disposal of chemicals, it does not include the disposal of lab equipment or supplies. Alternatively, if the department would rather hire or assign a departmental employee to clean out a laboratory following the standard chemical waste disposal procedures, HSRM can provide training to the employee free of charge to ensure the process is conducted in a safe and efficient manner. Contact HSRM for further assistance (612-626-1604 or hazwaste@umn.edu).

4.3 Unknown Chemical Waste

Unknown chemicals are a serious problem in laboratories. Every effort should be made by laboratory personnel to identify unknown chemicals. Ask other laboratory personnel if they are responsible for, or can help identify the unknown chemical. The Principal Investigator of the lab is often a good resource. If it is not possible to identify the material, an Unknown Chemical Identification Request Form should be completed and submitted to HSRM. Print the form and place it on or near the unknown chemical so it is properly labeled as illustrated in Figure 4.1. Once a request has been submitted, HSRM staff will come to the area to pick up the unknown.

Preventing Unknown Chemicals:

Here are a few tips that will help prevent the generation of unknown chemicals:

- Label all chemical containers, including beakers, flasks, vials, and test tubes.
- Immediately replace labels that have fallen off or that are deteriorated.
- Label containers using chemical names. Do not use abbreviations, chemical structure, or formulae.
- Archived research samples are often stored in boxes containing dozens of small vials. Label the outside of the box with the chemical constituents paying special attention to regulated materials such as radioactives, organic solvents, heavy metals and other toxics. If the samples are nonhazardous, label them as such.
- Submit frequent Hazardous Materials Pickup Request Forms to reduce the amount of chemicals in your laboratory.

Employees should dispose of all of their waste before leaving/graduating from the U of M. The department should come up with a system to ensure that all faculty, staff, and students

properly dispose of chemical waste, including unwanted research samples, before employees leave.

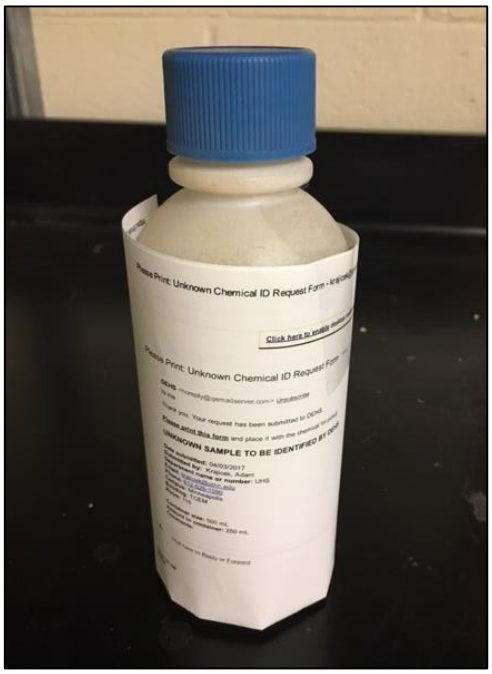
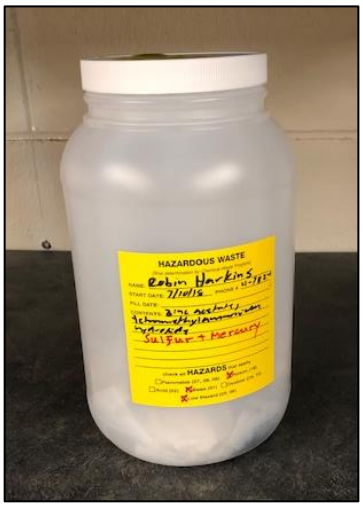


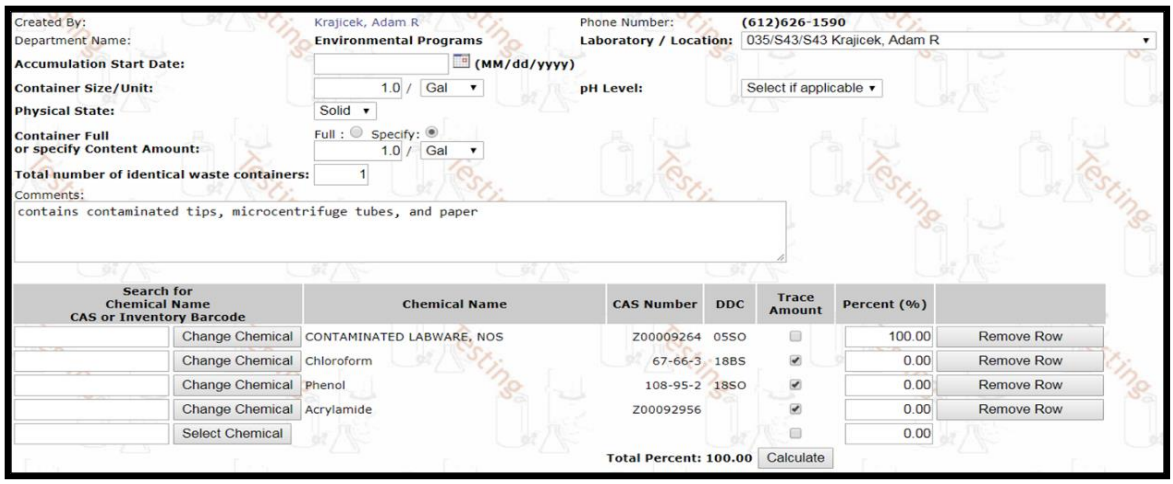
Figure 4.1 – Properly Labeled Unknown Chemicals

4.4 Contaminated Labware



Contaminated labware is solid debris waste that is grossly contaminated with hazardous chemicals. Examples include chemical contamination on vials, pipettes, paper towels, and wipes. All contaminated labware should be collected and managed as hazardous waste. Containers such as wide mouth HDPE bottles or buckets can be used to collect contaminated labware. Figure 4.2 illustrates an example of how to submit contaminated labware to USH for disposal. Contaminated labware should not include:

- Containers/vials with free liquids
- Sharps such as needles or razor blades
- Completely empty containers/vials/tips/debris with no appreciable chemical residue
- Trash, uncontaminated PPE, other non-regulated wastes



Created By: Krajicek, Adam R | Phone Number: (612)626-1590
Department Name: Environmental Programs | Laboratory / Location: 035/S43/S43 Krajicek, Adam R
Accumulation Start Date: (MM/dd/yyyy)
Container Size/Unit: 1.0 / Gal | pH Level: Select if applicable
Physical State: Solid
Container Full or specify Content Amount: Full : Specify: 1.0 / Gal
Total number of identical waste containers: 1
Comments: contains contaminated tips, microcentrifuge tubes, and paper

Search for Chemical Name CAS or Inventory Barcode		Chemical Name	CAS Number	DDC	Trace Amount	Percent (%)	
	Change Chemical	CONTAMINATED LABWARE, NOS	Z00009264	05SO	☐	100.00	Remove Row
	Change Chemical	Chloroform	67-66-3	18BS	☑	0.00	Remove Row
	Change Chemical	Phenol	108-95-2	18SO	☑	0.00	Remove Row
	Change Chemical	Acrylamide	Z00092956		☑	0.00	Remove Row
	Select Chemical				☐	0.00	

Total Percent: 100.00 Calculate

Figure 4.2 – Contaminated Labware Chematix Waste Submission

4.5 Sink and Trash Disposal

No chemical waste should be poured down the drain or discarded in the trash unless it is certain that doing so does not violate hazardous waste regulations or the Metropolitan Council's wastewater discharge requirements. In order to ensure improper disposal does not occur, please contact HSRM to seek permission to dispose of nonhazardous chemical waste in the sink or trash (612-626-1604 or hazwaste@umn.edu).

4.6 Liquid Chromatography Waste

Liquid chromatography (LC) is an analytical technique used to separate, identify, quantify, and purify individual components of a mixture and that commonly used in U of M research laboratories. The most common type of LC at the U of M is High Performance Liquid Chromatography (HPLC). Because organic solvents (*e.g.,* methanol, acetonitrile) are commonly used in the process, most LC waste is regulated by the EPA as hazardous waste. Consequently, all containers collecting LC waste must remain closed while the LC unit is in operation. It is neither acceptable to place a waste line running from the LC unit into an open waste container nor is it acceptable to use foil or Parafilm® as a means of closure. Figure 4.3 illustrates these unacceptable LC collection practices. Several universities have received citations in the past from the EPA during hazardous waste inspections so it is of the utmost importance that LC waste be collected in a compliant manner.

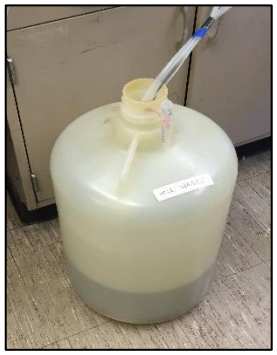
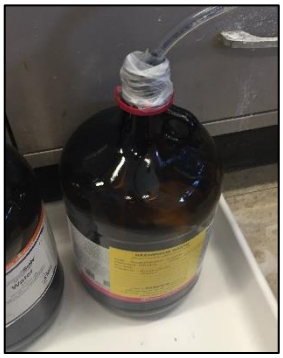
Open HPLC Waste No Containment	Open HPLC Waste No Containment	Open HPLC Waste Foil	Open HPLC Waste Parafilm ®
			

Figure 4.3 – Improper LC Waste Collection Practices

One of the following practices must be employed in order to comply with hazardous waste regulations for LC waste collection systems:

- Purchase an engineered container or cap designed for LC waste collection. Figure 4.4 shows several examples of acceptable solutions for proper LC waste collection that can be purchased.

Safety Cans	Ported (no threads) Cap	4 Port (threaded) Cap	Solvent Bottle Cap
			

Figure 4.4 – Proper LC Waste Collection Options for Purchase

- An existing cap can be modified by the research lab for LC waste collection. To modify an existing cap, a hole can be drilled into a cap. The diameter of the hole should be similar to the diameter of the waste line; there should be a tight fit between the container opening and waste line. In addition, a hole should be drilled to accommodate any exhaust filter or air valve tube that may be required. It is recommended that either a 4-liter container or 5-gallon carboy be used for waste collection. The modified cap should be replaced with a regular, unmodified cap once the container is full and ready for HSRM pickup. See Figure 4.5 for examples of acceptable modified caps.

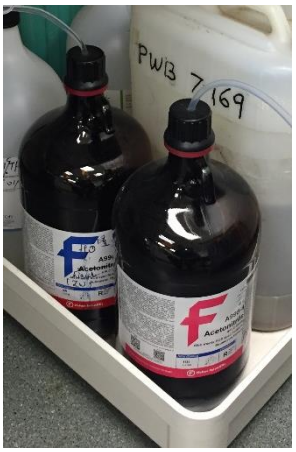
Closed HPLC Waste 2-Line Carboy	Closed HPLC Waste 1-Line Glass Bottle
	

Figure 4.5 – Proper LC Waste Collection with Modified Caps

4.7 Ethidium Bromide Waste

Ethidium bromide (EtBr) is a powerful mutagen widely used in biochemical research laboratories for visualizing nucleic acids. EtBr is generally used in the laboratory dissolved in water or buffer solutions. Since this mutagenic compound so widely used, proper management of EtBr containing waste and EtBr contaminated materials is important. Below are the procedures to be followed for the proper management of waste containing EtBr.

Ethidium Bromide Aqueous Solutions:

Aqueous solutions of less than 10 mg/L EtBr may be disposed of in the sanitary sewer. Aqueous solutions of more than 10 mg/L EtBr must first be treated before they are disposed of in the sanitary sewer or they may be sent to HSRM as chemical waste for proper disposal (Water 100%, trace Ethidium Bromide). Aqueous solutions can be deactivated or filtered through an EtBr filter. Several EtBr filters are available for purchase at UMarket. Refer to Appendix D for EtBr deactivation and decontamination procedures.

Acrylamide and Agarose Gels Containing Ethidium Bromide:

Acrylamide and agarose gels containing less than 10 mg/L EtBr can be disposed of in the trash. Gels that are trashed should be put in double lined trash bags and labeled as nonhazardous. Acrylamide and agarose gels containing more than 10 mg/L EtBr must be containerized (plastic bag inside of a 20-liter bucket is ideal) and sent to HSRM as chemical waste for proper disposal (Agarose Gel 100%, trace Ethidium Bromide").

4.8 Controlled Substances Waste

Substances registered with the Drug Enforcement Agency (DEA) require special disposal procedures. All registrants transferring controlled substances must complete a Controlled Substance Disposal Form. One form should be prepared for each collection of controlled substance containers to be transferred. It is important to include the DEA Registrant number. If you do not have a DEA Registrant number, indicate "unknown" or "abandoned" on the form instead. Email (hazwaste@umn.edu) one copy of the completed form to HSRM. Include your name, department, phone number and location (building and room number) to facilitate the transfer. HSRM will contact you to schedule the transfer.

Researchers who have excess controlled substances in syringes after a research procedure are required to collect the excess in a slurry bottle and document the contents of the slurry bottle on a Controlled Substance Disposal Form. Use the same procedure as above to initiate collection. Do not use a syringe to remove the unused contents of a vial and collect in a slurry bottle. The unused substance in a vial should be transferred using the procedure described in the previous section.

4.9 Compressed Gas Cylinders and Aerosol Cans

If at all possible, compressed gas cylinders should be returned to the original manufacturer or distributor. Often there are rental charges that the department will continue to pay until the cylinder is returned. If cylinders are unable to be returned (*e.g.,* lecture bottles), then they should be submitted to HSRM for proper disposal. Aerosol cans should be collected and submitted to HSRM for proper disposal.

4.10 Nanomaterial Waste

Since the environmental fate and impact of nanoparticles is still largely unknown, all nanomaterials such as powders, solutions, and unwanted labware that have not been decontaminated should be conservatively managed as hazardous waste and submitted to HSRM for disposal.

4.11 Biohazardous and Infectious Waste

Biohazardous and infectious waste is managed differently than chemical waste and is not covered in this document. For details regarding this type of waste, visit the HSRM Biosafety and Occupational Health Biohazardous and Infectious Waste webpage.

4.12 Sharps Waste

All sharps must be placed into appropriate sharps containers. Sharps are managed depending on what agent they are contaminated with (*e.g.,* infectious or chemical agents). Sharps disposal procedures are detailed on the HSRM Biosafety and Occupational Health Sharps, Non-Sharps, and Glass Waste Disposal webpage.

4.13 Batteries

Many types of batteries are regulated as universal waste (a form of hazardous waste) and must be sent to HSRM for recycle. The most common batteries collected for recycle include:

- Lithium
- Lithium Ion
- Nickel-Cadmium
- Nickel Metal Hydride
- Lead-Acid
- Mercury Oxide
- Silver Oxide
- Alkaline
- Zinc Carbon

Figure 4.6 – Battery Collection Bucket

Batteries can be collected in battery collection buckets and submitted to HSRM for recycle. Contact HSRM (612-626-1604 or hazwaste@umn.edu) to receive a battery collection bucket as shown in Figure 4.6.

4.14 Lamps

Fluorescent, high intensity discharge (HID), and UV germicidal lamps are considered a universal waste (a form of hazardous waste) and must be collected intact for proper disposal or recycling. Therefore, these types of lamps must be collected in containers that protect the lamps from breaking during collection and transportation. The original shipping container is the preferred collection package for spent lamps. HSRM also has boxes available for packaging standard 4-foot and 8-foot length fluorescent lamps. Shorter lamps can be packaged with the 4 and 8 footers, if packed as to prevent movement. Otherwise any sturdy box will do for small lamps, mercury vapor lamps and other odd shaped fluorescent tubes. In the case of smaller bulbs, additional packing materials may need to be added to prevent breakage. Properly

mark the box with the words "Universal Waste – Lamps for Recycle". Once the box is full, properly packaged and sealed, you should arrange for collection by contacting the Facilities Management zone office for your area for collection. If you generate a large number of lamps or are located at an off-campus Twin Cities location, call the HSRM (612-626-1604 or hazwaste@umn.edu) to arrange for collection.

4.15 Electronic Waste

All electronic waste (e-waste) containing circuit boards must be collected for recycle. It is against the law in Minnesota to discard of e-waste in the regular trash. Common examples of e-waste include keyboards, monitors, televisions, calculators, copiers, and laboratory equipment. HSRM does not generally pick up e-waste. In order to have e-waste picked up and properly recycled from your area, visit the Information Technology Computer and Device Recycling and Donation webpage.

Appendix A:

Listed Hazardous Waste – P List

Appendix A: Listed Hazardous Waste - P List

Listed Hazardous Waste - Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof (**P** list):

EPA Waste Code	CAS#	Chemical Name
P023	107-20-0	Acetaldehyde, chloro-
P002	591-08-2	Acetamide, N-(aminothioxomethyl)-
P057	640-19-7	Acetamide, 2-fluoro-
P058	62-74-8	Acetic acid, fluoro-, sodium salt
P002	591-08-2	1-Acetyl-2-thiourea
P003	107-02-8	Acrolein
P070	116-06-3	Aldicarb
P203	1646-88-4	Aldicarb sulfone
P004	309-00-2	Aldrin
P005	107-18-6	Allyl alcohol
P006	20859-73-8	Aluminum phosphide
P007	2763-96-4	5-(Aminomethyl)-3-isoxazolol
P008	504-24-5	4-Aminopyridine
P009	131-74-8	Ammonium picrate
P119	7803-55-6	Ammonium vanadate
P099	506-61-6	Argentate(1-), bis(cyano-C)-, potassium
P010	7778-39-4	Arsenic acid H_3AsO_4
P012	1327-53-3	Arsenic oxide As_2O_3
P011	1303-28-2	Arsenic oxide As_2O_5
P011	1303-28-2	Arsenic pentoxide
P012	1327-53-3	Arsenic trioxide
P038	692-42-2	Arsine, diethyl-
P036	696-28-6	Arsonous dichloride, phenyl-
P054	151-56-4	Aziridine
P067	75-55-8	Aziridine, 2-methyl-
P013	542-62-1	Barium cyanide
P024	106-47-8	Benzenamine, 4-chloro-
P077	100-01-6	Benzenamine, 4-nitro-
P028	100-44-7	Benzene, (chloromethyl)-
P042	51-43-4	1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-
P046	122-09-8	Benzeneethanamine, alpha,alpha-dimethyl-
P014	108-98-5	Benzenethiol
P127	1563-66-2	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate

EPA Waste Code	CAS#	Chemical Name
P188	57-64-7	Benzoic acid, 2-hydroxy-(3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamateester
P001	[1]81-81-2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%
P028	100-44-7	Benzyl chloride
P015	7440-41-7	Beryllium powder
P017	598-31-2	Bromoacetone
P018	357-57-3	Brucine
P045	39196-18-4	2-Butanone,3,3-dimethyl-1-(methylthio)-O-[methylamino)carbonyl] oxime
P021	592-01-8	Calcium cyanide
P021	592-01-8	Calcium cyanide $Ca(CN)_2$
P189	55285-14-8	Carbamic acid, [(dibutylamino)-thio]methyl-, 2,3-dihydro-2,2-dimethyl- 7-benzofuranyl ester
P191	644-64-4	Carbamic acid,dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H- pyrazol-3-yl ester
P192	119-38-0	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H- pyrazol-5-yl ester.
P190	1129-41-5	Carbamic acid, methyl-, 3-methylphenyl ester
P127	1563-66-2	Carbofuran
P022	75-15-0	Carbon disulfide
P095	75-44-5	Carbonic dichloride
P189	55285-14-8	Carbosulfan.
P023	107-20-0	Chloroacetaldehyde
P024	106-47-8	p-Chloroaniline
P026	5344-82-1	1-(o-Chlorophenyl)thiourea
P027	542-76-7	3-Chloropropionitrile
P029	544-92-3	Copper cyanide
P029	544-92-3	Copper cyanide Cu(CN)
P202	64-00-6	m-Cumenyl methylcarbamate
P030		Cyanides (soluble cyanide salts), not otherwise specified
P031	460-19-5	Cyanogen
P033	506-77-4	Cyanogen chloride
P033	506-77-4	Cyanogen chloride (CN)Cl
P034	131-89-5	2-Cyclohexyl-4,6-dinitrophenol
P016	542-88-1	Dichloromethyl ether
P036	696-28-6	Dichlorophenylarsine
P037	60-57-1	Dieldrin
P038	692-42-2	Diethylarsine
P041	311-45-5	Diethyl-p-nitrophenyl phosphate
P040	297-97-2	O,O-Diethyl O-pyrazinylphosphorothioate
P043	55-91-4	Diisopropylfluorophosphate (DFP)

EPA Waste Code	CAS#	Chemical Name
P004	309-00-2	1,4,5,8-Dimethanonaphthalene,1,2,3,4,10,10-hexa-chloro-1,4,4a,5,8,8a,-hexahydro-(1α,4α,4β,5α,8α,8β)-
P060	465-73-6	1,4,5,8-Dimethanonaphthalene,1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a-hexahydro-,(1α,4α,4β,5β,8β,8β)-
P037	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro- 1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aα,3β,6β,6aα,7β, 7aα)-
P051	[1]72-20-8	2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2β,3α,6α,6aβ,7β, 7aα)-, & metabolites
P044	60-51-5	Dimethoate
P046	122-09-8	alpha,alpha-Dimethylphenethylamine
P191	644-64-4	Dimetilan.
P047	[1]534-52-1	4,6-Dinitro-o-cresol, & salts
P048	51-28-5	2,4-Dinitrophenol
P020	88-85-7	Dinoseb
P085	152-16-9	Diphosphoramide, octamethyl-
P111	107-49-3	Diphosphoric acid, tetraethyl ester
P039	298-04-4	Disulfoton
P049	541-53-7	Dithiobiuret
P185	26419-73-8	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O- [(methylamino)-carbonyl] oxime.
P050	115-29-7	Endosulfan
P088	145-73-3	Endothall
P051	72-20-8	Endrin
P051	72-20-8	Endrin, & metabolites
P042	51-43-4	Epinephrine
P031	460-19-5	Ethanedinitrile
P194	23135-22-0	Ethanimidothioc acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester
P066	16752-77-5	Ethanimidothioic acid,N-[[(methylamino)carbonyl]oxy]-,methyl ester
P101	107-12-0	Ethyl cyanide
P054	151-56-4	Ethyleneimine
P097	52-85-7	Famphur
P056	7782-41-4	Fluorine
P057	640-19-7	Fluoroacetamide
P058	62-74-8	Fluoroacetic acid, sodium salt
P198	23422-53-9	Formetanate hydrochloride.
P197	17702-57-7	Formparanate
P065	628-86-4	Fulminic acid, mercury(2+) salt
P059	76-44-8	Heptachlor
P062	757-58-4	Hexaethyl tetraphosphate
P116	79-19-6	Hydrazinecarbothioamide

EPA Waste Code	CAS#	Chemical Name
P068	60-34-4	Hydrazine, methyl-
P063	74-90-8	Hydrocyanic acid
P063	74-90-8	Hydrogen cyanide
P096	7803-51-2	Hydrogen phosphide
P060	465-73-6	Isodrin
P192	119-38-0	Isolan
P202	64-00-6	3-Isopropylphenyl N-methylcarbamate.
P007	2763-96-4	3(2H)-Isoxazolone, 5-(aminomethyl)-
P196	15339-36-3	Manganese,bis(dimethylcarbamodithioato-S,S')-,
P196	15339-36-3	Manganese dimethyldithiocarbamate
P092	62-38-4	Mercury, (acetato-O)phenyl-
P065	628-86-4	Mercury fulminate
P082	62-75-9	Methanamine, N-methyl-N-nitroso-
P064	624-83-9	Methane, isocyanato-
P016	542-88-1	Methane, oxybis[chloro-
P112	509-14-8	Methane, tetranitro-
P118	75-70-7	Methanethiol, trichloro-
P198	23422-53-9	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride
P197	17702-57-7	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-
P050	115-29-7	6,9-Methano-2,4,3-benzodioxathiepin,6,7,8,9,10,10-hexachloro- 1,5,5a,6,9,9a-hexahydro-,3-oxide
P059	76-44-8	4,7-Methano-1H-indene,1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-
P199	2032-65-7	Methiocarb.
P066	16752-77-5	Methomyl
P068	60-34-4	Methyl hydrazine
P064	624-83-9	Methyl isocyanate
P069	75-86-5	2-Methyllactonitrile
P071	298-00-0	Methyl parathion
P190	1129-41-5	Metolcarb.
P128	315-8-4	Mexacarbate.
P072	86-88-4	alpha-Naphthylthiourea
P073	13463-39-3	Nickel carbonyl
P073	13463-39-3	Nickel carbonyl $Ni(CO)_4$, (T-4)-
P074	557-19-7	Nickel cyanide
P074	557-19-7	Nickel cynaide $Ni(CN)_2$
P075	[1]54-11-5	Nicotine, & salts
P076	10102-43-9	Nitric oxide
P077	100-01-6	p-Nitroaniline

EPA Waste Code	CAS#	Chemical Name
P078	10102-44-0	Nitrogen dioxide
P076	10102-43-9	Nitrogen oxide NO
P078	10102-44-0	Nitrogen oxide NO_2
P081	55-63-0	Nitroglycerine
P082	62-75-9	N-Nitrosodimethylamine
P084	4549-40-0	N-Nitrosomethylvinylamine
P085	152-16-9	Octamethylpyrophosphoramide
P087	20816-12-0	Osmium oxide OsO_4, (T-4)-
P087	20816-12-0	Osmium tetroxide
P088	145-73-3	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
P194	23135-22-0	Oxamyl
P089	56-38-2	Parathion
P034	131-89-5	Phenol, 2-cyclohexyl-4,6-dinitro-
P048	51-28-5	Phenol, 2,4-dinitro-
P047	[1]534-52-1	Phenol, 2-methyl-4,6-dinitro-, & salts
P020	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P009	131-74-8	Phenol, 2,4,6-trinitro-, ammonium salt
P128	315-18-4	Phenol,4-(dimethylamino)-3,5-dimethyl-,methylcarbamate (ester).
P199	2032-65-7	Phenol, (3,5-dimethyl-4-(methylthio)-,methylcarbamate
P202	64-00-6	Phenol, 3-(1-methylethyl)-, methylcarbamate.
P201	2631-37-0	Phenol, 3-methyl-5-(1-methylethyl)-,methyl carbamate.
P092	62-38-4	Phenylmercury acetate
P093	103-85-5	Phenylthiourea
P094	298-02-2	Phorate
P095	75-44-5	Phosgene
P096	7803-51-2	Phosphine
P041	311-45-5	Phosphoric acid, diethyl 4-nitrophenylester
P039	298-04-4	Phosphorodithioic acid, ,O-diethylS-[2-(ethylthio)ethyl] ester
P094	298-02-2	Phosphorodithioic acid, ,O-diethylS-[(ethylthio)methyl] ester
P044	60-51-5	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester
P043	55-91-4	Phosphorofluoridic acid, bis(1-methylethyl) ester
P089	56-38-2	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
P040	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester
P097	52-85-7	Phosphorothioic acid,O-[4-[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester
P071	298-00-0	Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester
P204	57-47-6	Physostigmine
P188	57-64-7	Physostigmine salicylate
P110	78-00-2	Plumbane, tetraethyl-

EPA Waste Code	CAS#	Chemical Name
P098	151-50-8	Potassium cyanide
P098	151-50-8	Potassium cyanide K(CN)
P099	506-61-6	Potassium silver cyanide
P201	2631-37-0	Promecarb
P070	116-06-3	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl] oxime
P203	1646-88-4	Propanal, 2-methyl-2-(methyl-sulfonyl)-, O-[(methylamino)carbonyl] oxime
P101	107-12-0	Propanenitrile
P027	542-76-7	Propanenitrile, 3-chloro-
P069	75-86-5	Propanenitrile, 2-hydroxy-2-methyl-
P081	55-63-0	1,2,3-Propanetriol, trinitrate
P017	598-31-2	2-Propanone, 1-bromo-
P102	107-19-7	Propargyl alcohol
P003	107-02-8	2-Propenal
P005	107-18-6	2-Propen-1-ol
P067	75-55-8	1,2-Propylenimine
P102	107-19-7	2-Propyn-1-ol
P008	504-24-5	4-Pyridinamine
P075	[1]54-11-5	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts
P204	57-47-6	Pyrrolo[2,3-b]indol-5-ol,1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl, methylcarbamate (ester), (3aS-cis)-
P114	12039-52-0	Selenious acid, dithallium(1+) salt
P103	630-10-4	Selenourea
P104	506-64-9	Silver cyanide
P104	506-64-9	Silver cyanide Ag(CN)
P105	26628-22-8	Sodium azide
P106	143-33-9	Sodium cyanide
P106	143-33-9	Sodium cyanide Na(CN)
P108	[1]57-24-9	Strychnidin-10-one, & salts
P018	357-57-3	Strychnidin-10-one, 2,3-dimethoxy-
P108	[1]57-24-9	Strychnine, & salts
P115	7446-18-6	Sulfuric acid, dithallium(1+) salt
P109	3689-24-5	Tetraethyldithiopyrophosphate
P110	78-00-2	Tetraethyl lead
P111	107-49-3	Tetraethyl pyrophosphate
P112	509-14-8	Tetranitromethane
P062	757-58-4	Tetraphosphoric acid, hexaethyl ester
P113	1314-32-5	Thallic oxide
P113	1314-32-5	Thallium oxide $Tl_2 O_3$

EPA Waste Code	CAS#	Chemical Name
P114	12039-52-0	Thallium(I) selenite
P115	7446-18-6	Thallium(I) sulfate
P109	3689-24-5	Thiodiphosphoric acid, tetraethylester
P045	39196-18-4	Thiofanox
P049	541-53-7	Thioimidodicarbonic diamide $[(H_2N)C(S)]_2NH$
P014	108-98-5	Thiophenol
P116	79-19-6	Thiosemicarbazide
P026	5344-82-1	Thiourea, (2-chlorophenyl)-
P072	86-88-4	Thiourea, 1-naphthalenyl-
P093	103-85-5	Thiourea, phenyl-
P185	26419-73-8	Tirpate.
P123	8001-35-2	Toxaphene
P118	75-70-7	Trichloromethanethiol
P119	7803-55-6	Vanadic acid, ammonium salt
P120	1314-62-1	Vanadium oxide V_2O_5
P120	1314-62-1	Vanadium pentoxide
P084	4549-40-0	Vinylamine, N-methyl-N-nitroso-
P001	[1]81-81-2	Warfarin, & salts, at concentrations greater than 0.3%
P205	137-30-4	Zinc, bis(dimethylcarbamodithioato-S,S')-
P121	557-21-1	Zinc cyanide
P121	557-21-1	Zinc cyanide $Zn(CN)_2$
P122	1314-84-7	Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%
P205	137-30-4	Ziram

Appendix B:

Listed Hazardous Waste – U List

Listed Hazardous Waste - Discarded commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products (**U** list):

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U001	75-07-0	Acetaldehyde (I)	U034	75-87-6	Acetaldehyde, trichloro-
U187	62-44-2	Acetamide, N-(4-ethoxyphenyl)	U005	53-96-3	Acetamide, N-9H-fluoren-2-yl-
U112	141-78-6	Acetic acid, ethyl ester (I)	U144	301-04-2	Acetic acid, lead salt
U214	563-68-8	Acetic acid, thallium (1 +) salt	U232	93-76-5	Acetic acid, (2,4,5,-trichlorophenoxy)-
U002	67-64-1	Acetone (I)	U003	75-05-8	Acetonitrile (I,T)
U004	98-86-2	Acetophenone	U005	53-96-3	2-Acetylaminofluorene
U006	75-36-5	Acetyl chloride (C,R,T)	U007	79-06-1	Acrylamide
U008	79-10-7	Acrylic acid(I)	U009	107-13-1	Acrylonitrile
U011	61-82-5	Amitrole	U012	62-53-3	Aniline (I,T)
U014	492-80-8	Auramine	U015	115-02-6	Azaserine
U010	50-07-7	Azirino(2 ,3 :3,4)pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[((aminocarbonyl)oxy) methyl]-1, 1a, 2, 8, 8a, 8b-hexahydro-8a- methoxy-5-methyl-	U157	50-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-
U016	225-51-4	3,4-Benzacridine	U017	98-87-3	Benzal chloride
U192	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1 diethyl-2-propynyl)-	U018	56-55-3	Benz[a]anthracene
U094	57-97-6	Benz[a]anthracene, 7,12-dimethyl-	U012	62-53-3	Benzenamine (I,T)
U014	492-80-8	Benzenamine, 4,4 -carbonimidoylbis[N,N-dimethyl-	U049	3165-93-3	Benzenamine, 4-chloro-2-methyl
U093	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-	U328	95-53-4	Benzenamine, 2-methyl-
U353	106-49-0	Benzenamine, 4-methyl-	U158	101-14-4	Benzenamine, 4,4 -methylenebis[2-chloro-
U222	636-21-5	Benzenamine, 2-methyl-, hydrochloride	U181	99-55-8	Benzenamine, 2-methyl-5-nitro-
U019	71-43-2	Benzene	U038	510-15-6	Benzeneacetic acid, 4-chloro-alpha-(4 chlorophenyl)-alpha- hydroxy, ethyl ester
U030	101-55-3	Benzene, 1-bromo-4-phenoxy-	U035	305-03-3	Benzenebutanoic acid, 4[bis(2chloroethyl)amino]-
U037	108-90-7	Benzene, chloro-	U221	25376-45-8	Benzenediamine, ar-methyl
U028	117-81-7	1,2-Benzenedicarboxylic acid, [bis(2-ethyl-hexyl)] ester	U069	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester
U088	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	U102	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U107	117-84-0	1,2-Benzenedicarboxylic acid, di-n-octyl ester	U070	95-50-1	Benzene, 1,2-dichloro-
U071	541-73-1	Benzene, 1,3-dichloro-	U072	106-46-7	Benzene, 1,4-dichloro-
U060	72-54-8	Benzene, 1,1 -(2,2-dichloro-ethylidene) bis[4-chloro-	U017	98-87-3	Benzene, (dichloromethyl)-
U223	26471-62-5	Benzene, 1,3 diisocyanatomethyl- (R,T)	U239	1330-20-7	Benzene, dimethyl- (I,T)
U201	108-46-3	1,3-Benzenediol	U127	118-74-1	Benzene, hexachloro-
U056	110-82-7	Benzene, hexahydro- (I)	U220	108-88-3	Benzene, methyl-
U105	121-14-2	Benzene, 1-methyl-2,4-dinitro-	U106	606-20-2	Benzene, 2-methyl-1,3-dinitro-
U055	98-82-8	Benzene, (1-methylethyl)- (I)	U169	98-95-3	Benzene, nitro- (I,T)
U183	608-93-5	Benzene, pentachloro-	U185	82-68-8	Benzene, pentachloronitro-
U020	98-09-9	Benzenesulfonic acid chloride (C,R)	U020	98-09-9	Benzenesulfonyl chloride (C,R)
U207	95-94-3	Benzene, 1,2,4,5-tetrachloro-	U061	50-29-3	Benzene, 1,1 -(2,2,2-trichloroethylidene)bis[4-chloro-
U247	72-43-5	Benzene, 1,1 -(2,2,2-trichloroethylidene)[4 -methoxy-	U023	98-07-7	Benzene, (trichloromethyl)- (C,R,T)
U234	99-35-4	Benzene, 1,3,5-trinitro- (R,T)	U021	92-87-5	Benzidine
U202	[1]81-07-2	1,2-Benzisothiazol-3-(2H)-one,1,1 dioxide and salts	U203	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-
U141	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-	U090	94-58-6	1,3-Benzodioxole, 5-propyl-
U064	189-55-9	Benzo[rst] pentaphene	U022	50-32-8	Benzo[a]pyrene
U197	106-51-4	p-Benzoquinone	U023	98-07-7	Benzotrichloride (C,R,T)
U085	1464-53-5	2,2'-Bioxirane (I,T)	U021	92-87-5	[1,1' -Biphenyl]-4,4' -diamine
U073	91-94-1	[1,1' -Biphenyl]-4,4' -diamine, 3,3' -dichloro-	U091	119-90-4	[1,1' -Biphenyl]-4,4' -diamine, 3,3' -dimethoxy-
U095	119-93-7	[1,1' -Biphenyl]-4,4' -diamine, 3,3' -dimethyl-	U027	39638-32-9	Bis(2-chloroisopropyl) ether
U024	111-91-1	Bis(2-chloromethoxy) ethane	U028	117-81-7	Bis(2-ethylhexyl) phthalate
U225	75-25-2	Bromoform	U030	101-55-3	4-Bromophenyl phenyl ether
U128	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	U172	924-16-3	1-Butanamine, N-butyl-N-nitroso
U031	71-36-3	1-Butanol (I)	U159	78-93-3	2-Butanone (I,T)
U160	1338-23-4	2-Butanone peroxide (R,T)	U053	4170-30-3	2-Butenal
U074	764-41-0	2-Butene, 1,4-dichloro- (I,T)	U143	303-34-4	2-Butenoic acid, 2-methyl-, 7-[(2,3-dihydroxy- 2-(1-methoxyethyl)- 3-methyl-1- oxobutoxy)methyl]-2,3,5,7a-tetrahydro-1- pyrrolizin-1- yl ester, [1S-[1alpha(Z),7(2S,3R),7aalpha]]-
U031	71-36-3	n-Butyl alchohol (I)	U136	75-60-5	Cacodylic acid

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U032	13765-19-0	Calcium chromate	U238	51-79-6	Carbamic acid, ethyl ester
U178	615-53-2	Carbamic acid, methylnitroso, ethyl ester	U097	79-44-7	Carbamic chloride, dimethyl-
U114	[1]111-54-6	Carbamodithioic acid, 1,2-ethanediylbis-, salts and esters	U062	2303-16-4	Carbamothioic acid, bis(1-methylethyl)- S-(2,3-dichloro-2-propenyl) ester
U215	6533-73-9	Carbonic acid, dithallium (1+) salt	U033	353-50-4	Carbonic difluoride
U156	79-22-1	Carbonochloridic acid, methyl ester (I,T)	U033	353-50-4	Carbon oxyfluoride (R,T)
U211	56-23-5	Carbon tetrachloride	U034	75-87-6	Chloral
U035	30503-3	Chlorambucil	U036	12789-03-6	Chlordane
U026	494-03-1	Chlornaphazine	U037	108-90-7	Chlorobenzene
U039	59-50-7	p-Chloro-m-cresol	U041	106-89-8	1-Chloro-2,3 epoxypropane
U042	110-75-8	2-Chloroethyl vinyl ether	U044	67-66-3	Chloroform
U046	107-30-2	Chloromethyl methyl ether	U047	91-58-7	beta-Chloronaphthalene
U048	95-57-8	o-Chlorophenol	U049	3165-93-3	4-Chloro-o-toluidine, hydrochloride
U032	13765-19-0	Chromic acid, calcium salt	U050	218-01-9	Chrysene
U051	8021-39-4	Creosote	U052	1319-77-3	Cresols (Cresylic acid)
U053	4170-30-3	Crotonaldehyde	U055	98-82-8	Cumene (I)
U246	506-68-3	Cyanogen bromide	U197	106-51-4	2,5-Cyclohexadiene-1,4-dione
U056	110-82-7	Cyclohexane (I)	U057	108-94-1	Cyclohexanone (I)
U130	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexa-chloro-	U058	50-18-0	Cyclophosphamide
U240	[1]94-75-7	2,4-D, salts and esters	U059 2	0830-81-3	Daunomycin
U060	72-54-8	DDD	U061	50-29-3	DDT
U062	2303-16-4	Diallate	U063	53-70-3	Dibenz[a,h]anthracene
U064	189-55-9	Dibenzo[s,i]pyrene	U066	96-12-8	1,2-Dibromo-3-chloropropane
U069	84-74-2	Dibutyl phthalate	U070	95-50-1	o-Dichlorobenzene
U071	541-73-1	m-Dichlorobenzene	U072	106-46-7	p-Dichlorobenzene
U073	91-94-1	3,3'-Dichlorobenzidine	U074	764-41-0	1,4-Dichloro-2-butene (I,T)
U075	75-71-8	Dichlorodifluoromethane	U078	75-35-4	1,1-Dichloroethylene
U079	156-60-5	1,2-Dichloroethylene	U025	111-44-1	Dichloroethyl ether
U081	120-83-2	2,4-Dichlorophenol	U082	87-65-0	2,6-Dichlorophenol
U240	[1]94-75-7	2,4-Dichlorophenoxyacetic acid, salts and esters	U083	78-87-5	1,2-Dichloropropane
U084	542-75-6	1,3-Dichloropropene	U085	1464-53-5	1,2:3,4-Diepoxybutane (I,T)
U108	123-91-1	1,4-Diethyleneoxide	U086	1615-80-1	N,N-Diethylhydrazine
U087	3288-58-2	O,O-Diethyl-S-methyl-dithiophosphate	U088	84-66-2	Diethyl phthalate
U089	56-53-1	Diethylstilbestrol	U090	94-58-6	Dihydrosafrole

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U091	119-90-4	3,3'-Dimethoxybenzidine	U092	124-40-3	Dimethylamine (I)
U093	60-11-7	Dimethylaminoazobenzene	U094	57-97-6	7,12-Dimethylbenz [a]anthracene
U095	119-93-7	3,3'-Dimethylbenzidine	U096	80-15-9	alpha,alpha-Dimethylbenzylhydroperoxide (R)
U097	79-44-7	Dimethylcarbamoyl chloride	U098	57-14-7	1,1-Dimethylhydrazine
U099	540-73-8	1,2-Dimethylhydrazine	U101	105-67-9	2,4-Dimethylphenol
U102	131-11-3	Dimethyl phthalate	U103	77-78-1	Dimethyl sulfate
U105	121-14-2	2,4-Dinitrotoluene	U106	606-20-2	2,6-Dinitrotoluene
U107	117-84-0	Di-n octyl phthalate	U108	123-91-1	1,4-Dioxane
U109	122-66-7	1,2-Diphenylhydrazine	U110	142-84-7	Dipropylamine (I)
U111	621-64-7	Di-n-propylnitrosamine	U001	75-07-0	Ethanal (I)
U174	55-18-5	Ethanamine, N-ethyl-N-nitroso-	U155	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'- (2-thienylmethyl)-
U067	106-93-4	Ethane, 1,2-dibromo-	U076	75-34-3	Ethane, 1,1-diichloro-
U077	107-06-2	Ethane, 1,2-dichloro-	U131	67-72-1	Ethane, hexachloro-
U024	111-91-1	Ethane, 1,1' -[methylenebis(oxy)]bis[2-chloro-	U117	60-29-7	Ethane, 1,1-oxybis- (1)
U025	111-44-4	Ethane, 1,1-oxybis[2-chloro-	U184	76-01-7	Ethane, pentachloro-
U208	630-20-6	Ethane, 1,1,1,2-tetrachloro-	U209	79-34-5	Ethane, 1,1,2,2-tetrachloro-
U218	62-55-5	Ethanethioamide	U227	110-80-5	Ethanol, 2-ethoxy
U359	79-00-5	Ethane, 1,1,2-trichloro-	U173	1116-54-7	Ethanol, 2,2'-(nitrosoimino)bis-
U004	98-86-2	Ethanone, 1-phenyl-	U043	75-01-4	Ethene, chloro-
U042	110-75-8	Ethene, (2-chloroethoxy)-	U078	75-35-4	Ethene, 1,1-dichloro-
U079	156-60-5	Ethene, 1,2-dichloro-	U210	127-18-4	Ethene, tetrachloro-
U228	79-01-6	Ethene, trichloro	U112	141-78-6	Ethyl acetate (I)
U113	140-88-5	Ethyl acrylate (I)	U238	51-79-6	Ethyl carbamate
U038	510-15-6	Ethyl 4,4'-dichlorobenzilate	U114	[1]111-54-6	Ethylenebis(dithiocarbamic acid), salts and esters
U067	106-93-4	Ethylene dibromide	U077	107-06-2	Ethylene dichloride
U359	110-80-5	Ethylene glycol monoethyl ether	U115	75-21-8	Ethylene oxide (I,T)
U116	96-45-7	Ethylene thiourea	U117	60-29-7	Ethyl ether (I)
U076	75-34-3	Ethylidene dichloride	U118	97-63-2	Ethyl methacrylate
U119	62-50-0	Ethylmethanesulfonate	U120	206-44-0	Fluoranthene
U122	50-00-0	Formaldehyde	U123	64-18-6	Formic acid (C,T)
U124	110-00-9	Furan (I)	U125	98-01-1	2-Furancarboxaldehyde (I)
U147	108-31-6	2,5-Furandione	U213	109-99-9	Furan, tetrahydro- (I)
U125	98-01-1	Furfural (I)	U124	110-00-9	Furfuran (I)
U206	18883-66-4	D-Glucopyranose, 2-deoxy-2(3-methyl-3-nitrosoureido)	U126	765-34-4	Glycidylaldehyde

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U163	70-25-7	Guanidine, N-methyl-N'-nitro-N-nitroso-	U127	18-74-1	Hexachlorobenzene
U128	87-68-3	Hexachlorobutadiene	U129	58-88-9	Hexachlorocyclohexane (gamma isomer)
U130	77-47-4	Hexachlorocyclopentadiene	U131	67-72-1	Hexachloroethane
U132	70-30-4	Hexachlorophene	U243	1888-71-7	Hexachloropropene
U133	302-01-2	Hydrazine (R,T)	U086	1615-80-1	Hydrazine, 1,2-dimethyl- -
U098	57-14-7	Hydrazine, 1,1-dimethyl-	U099	540-73-8	Hydrazine, 1,2-diethyl
U109	122-66-7	Hydrazine, 1,2-diphenyl-	U134	7664-39-3	Hydrofluoric acid (C,T)
U134	7664-39-3	Hydrogen fluoride (C,T)	U135	7783-06-4	Hydrogen sulfide
U096	80-15-9	Hydroperoxide, 1-methyl-1-phenylethyl- (R)	U136	75-60-5	Hydroxydimethylarsine oxide
U116	96-45-7	2-Imidazolidinethione	U137	193-39-5	Indeno[1,2,3-cd]pyrene
U139	9004-66-4	Iron dextran	U190	85-44-9	1,3-isobenzofurandione
U140	78-83-1	Isobutyl alcohol (I,T)	U141	120-58-1	Isosafrole
U142	143-50-0	Kepone	U143	303-34-4	Lasiocarpine
U144	301-04-2	Lead acetate	U146	1335-32-6	Lead, bis(acetato-O)tetrahydroxytri-
U145	7446-27-7	Lead phosphate	U146	1335-32-6	Lead subacetate
U129	58-89-9	Lindane	U147	108-31-6	Maleic anhydride
U148	123-33-1	Maleic hydrazide	U149	109-77-3	Malononitrile
U150	148-82-3	Melphalan	U151	7439-97-6	Mercury
U152	126-98-7	Methacrylonitrile (I,T)	U092	124-40-3	Methanamine, N-methyl- (I)
U029	74-83-9	Methane, bromo-	U045	74-87-3	Methane, chloro-(I,T)
U046	107-30-2	Methane, chloromethoxy-	U068	74-95-3	Methane, dibromo-
U080	75-09-2	Methane, dichloro-	U075	75-71-8	Methane, dichlorodifluoro-
U138	74-88-4	Methane, iodo-	U119	62-50-0	Methanesulfonic acid, ethyl ester
U211	56-23-5	Methane, tetrachloro-	U153	74-93-1	Methanethiol (I,T)
U225	75-25-2	Methane, tribromo-	U044	67-66-3	Methane, trichloro-
U121	75-69-4	Methane, trichlorofluoro-	U123	64-18-6	Methanoic acid (C,T)
U154	67-56-1	Methanol (I)	U155	91-80-5	Methapyrilene
U142	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1, 1a,3,3a,4,5,5,5a,5b,6- decachloro-octahydro-	U247	72-43-5	Methoxychlor
U154	67-56-1	Methyl alcohol (I)	U029	74-83-9	Methyl bromide
U186	504-60-9	1-Methylbutadiene (I)	U045	74-87-3	Methyl chloride (I,T)
U156	79-22-1	Methylchlorocarbonate (I,T)	U226	71-55-6	Methylchloroform
U157	56-49-5	3-Methylcholanthrene	U158	101-14-4	4,4'-Methylenebis(2-chloroaniline)
U068	74-95-3	Methylene bromide	U080	75-09-2	Methylene chloride
U159	78-93-3	Methyl ethyl ketone (MEK)(I,T)	U160	1338-23-4	Methyl ethyl ketone peroxide (R,T)

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U138	74-88-4	Methyl iodide	U161	108-10-1	Methyl isobutyl ketone (I)
U162	80-62-6	Methyl methacrylate (I,T)	U163	70-25-7	N-Methyl-N'-nitro-N-nitrosoguanidine
U161	108-10-1	4-Methyl-2-pentanone (I)	U164	56-04-2	Methylthiouracil
U010	50-07-7	Mitomycin C	U059	20830-81-3	5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[(3-amino- 2,3,6- trideoxy alpha-L-lyxo- hexopyranosyl)oxy]-7,8,9,10- tetrahydro- 6,8,11-trihydroxy-1-methoxy-
U165	91-20-3	Naphthalene	U047	91-58-7	Naphthalene, 2-chloro-
U166	130-15-4	1,4-Naphthalenedione	U236	72-57-1	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'- dimethyl-(1,1'- biphenyl)-4,4'diyl)]-bis (azo) bis(5-amino-4-hydroxy)-, tetrasodium salt
U166	130-15-4	1,4-Naphthoquinone	U167	134-32-7	alpha-Naphthylamine
U168	91-59-8	beta-Naphthylamine	U026	494-03-1	2-Naphthylamine, N,N' -bis(2-chloroethyl)-
U167	134-32-7	1 -Naphthylenamine	U168	91-59-8	2-Naphthylenamine
U217	10102-45-1	Nitric acid, thallium(1 +) salt	U169	98-95-3	Nitrobenzene (I,T)
U170	100-02-7	p-Nitrophenol	U171	79-46-9	2-Nitropropane (I,T)
U172	924-16-3	N-Nitrosodi-n-butylamine	U173	1116-54-7	N-Nitrosodiethanolamine
U174	55-18-5	N-Nitrosodiethylamine	U176	759-73-9	N-Nitroso-N ethylurea
U177	684-93-5	N-Nitroso-N-methylurea	U178	615-53-2	N-Nitroso-N-methylurethane
U179	100-75-4	N-Nitrosopiperidine	U180	930-55-2	N-Nitrosopyrrolidine
U181	99-55-8	5-Nitro-o-toluidine	U193	1120-71-4	1,2 Oxathiolane, 2,2-dioxide
U058	50-18-0	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2- chloroethyl) tetrahydro-, 2-oxide	U115	75-21-8	Oxirane (I,T)
U126	765-34-4	Oxiranecarboxyaldehyde	U041	106-89-8	Oxirane, (chloromethyl)-
U182	123-63-7	Paraldehyde	U183	608-93-5	Pentachlorobenzene
U184	76-01-7	Pentachloroethane	U185	82-68-8	Pentachloronitrobenzene (PCNB)
U242	87-86-5	Pentachlorophenol	U186	504-60-9	1,3-Pentadiene (I)
U187	62-44-2	Phenacetin	U188	108-95-2	Phenol
U048	95-57-8	Phenol, 2-chloro-	U039	59-50-7	Phenol, 4-chloro-3-methyl-
U081	120-83-2	Phenol, 2,4-dichloro-	U082	87-65-0	Phenol, 2,6-dichloro-
U089	56-53-1	Phenol, 4,4' -(1,2-diethyl-1,2-ethenediyl)bis-,(E)-	U101	105-67-9	Phenol, 2,4-dimethyl-
U052	1319-77-3	Phenol, methyl-	U132	70-30-4	Phenol, 2,2' -methylenebis[3,4,6-trichloro-
U170	100-02-7	Phenol, 4-nitro-	U242	87-86-5	Phenol, pentachloro-
U212	58-90-2	Phenol, 2,3,4,6-tetrachloro-	U230	95-94-4	Phenol, 2,4,5-trichloro-

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U231	88-06-2	Phenol, 2,4,6-trichloro-	U150	148-82-3	L-Phenylalanine, 4[bis(2-chloroethyl) amino]-
U145	7446-27-7	Phosphoric acid, lead salt	U087	3288-58-2	Phosphorodithioic acid, O,O-diethyl-, S-methyl ester
U189	108-95-2	Phosphorus sulfide (R)	U190	85-44-9	Phthalic anhydride
U191	109-06-8	2-Picoline	U179	100-75-4	Piperidine, 1-nitroso-
U192	23950-58-5	Pronamide	U194	107-10-8	1-Propanamine (I,T)
U111	621-64-7	1-Propanamine, N-nitroso-N-propyl-	U110	142-84-7	1-Propanamine, N-propyl- (I)
U066	96-12-8	Propane, 1,2-dibromo-3-chloro-	U149	109-77-3	Propanedinitrile
U171	79-46-9	Propane, 2-nitro-(I,T)	U027	39638-32-9	Propane, 2,2' -oxybis[2-chloro-
U193	1120-71-4	1,3-Propane sultone	U235	126-72-7	1-Propanol, 2,3-dibromo-, phosphate (3:1)
U140	78-83-1	1-Propanol, 2-methyl- (I,T)	U002	67-64-1	2-Propanone (I)
U084	542-75-6	1-Propane, 1,3-dichloro-	U152	126-98-7	2-Propanenitrile, 2-methyl- (I,T)
U007	79-06-1	2-Propenamide	U243	1888-71-7	1-Propene, hexachloro-
U009	107-13-1	2-Propenenitrile	U008	79-10-7	2-Propenoic acid (I)
U113	140-88-5	2-Propenoic acid, ethyl ester (I)	U118	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester
U162	80-66-2	2-Propenoic acid, 2-methyl-, methyl ester(I,T)	U233	93-72-1	Propionic acid, 2-(2,4,5-trichlorophenoxy)-
U194	107-10-8	n-Propylamine (I,T)	U083	78-87-5	Propylene dichloride
U148	123-33-1	3,6-Pyridazinedione, 1,2-dihydro	U196	110-86-1	Pyridine
U191	109-06-8	Pyridine, 2-methyl-	U237	66-75-1	2,4(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-
U164	56-04-2	4-(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	U180	930-55-2	Pyrrolidine, 1-nitroso-
U200	50-55-5	Reserpine	U201	108-46-3	Resorcinol
U202	[1]81-07-2	Saccharin and salts	U203	94-59-7	Safrole
U204	7783-00-8	Selenious acid	U204	7783-00-8	Selenium dioxide
U205	7446-34-6	Selenium sulfide (R,T)	U015	115-02-6	L-Serine, diazoacetate (ester)
U233	93-72-1	Silvex	U206	18883-66-4	Streptozotocin
U103	77-78-1	Sulfuric acid, dimethyl ester	U189	1314-80-3	Sulfur phosphide (R)
U232	93-76-5	2,4,5-T	U207	95-94-3	1,2,4,5-Tetrachlorobenzene
U208	630-20-6	1,1,1,2-Tetrachloroethane	U209	79-34-5	1,1,2,2-Tetrachloroethane
U210	127-18-4	Tetrachloroethylene	U212	58-90-2	2,3,4,6-Tetrachlorophenol
U213	109-99-9	Tetrahydrofuran (I)	U214	15843-14-8	Thallium(I) acetate
U215	6533-73-9	Thallium(I) carbonate	U216	7791-12-0	Thallium chloride
U217	10102-45-1	Thallium(I) nitrate	U218	62-55-5	Thioacetamide
U153	74-93-1	Thiomethanol (I,T)	U244	137-26-8	Thioperoxydicarbonic diamide, tetramethyl-

EPA Waste Code	CAS#	Chemical Name	EPA Waste Code	CAS#	Chemical Name
U219	62-56-6	Thiourea	U244	137-26-8	Thiuram
U220	108-88-3	Toluene	U221	25376-45-8	Toluenediamine
U223	26471-62-5	Toluene diisocyanate (R,T)	U328	95-53-4	o-Toluidine
U353	106-49-0	p-Toluidine	U222	636-21-5	o-Toluidine hydrochlorlde
U011	61-82-5	1H-1,2,4- Triazol-3-amine	U226	71-55-6	1,1,1 -Trichloroethane
U227	79-00-5	1,1,2-Trichtoroethane	U228	79-01-6	Trichloroethylene
U121	75-69-4	Trichloromonofluoromethane	U230	95-95-4	2,4,5-Trichlorophenol
U231	88-06-2	2,4,6-Trichlorophenol	U234	99-35-4	sym-Trinitrobenzene (R,T)
U182	123-63-7	1,3,5- Trioxane, 2,4,6- trimethyl-	U235	126-72-7	Tris(2,3-dibromopropyl) phosphate
U236	72-57-1	Trypan blue	U237	66-75-1	Uracil mustard
U176	759-73-9	Urea, N-ethyl-N-nitroso-	U177	684-93-5	Urea, N-methyl-N-nitroso-
U043	75-01-4	Vinyl chloride	U248	[1]81-81-2	Warfarin, when present at concentrations of 0.3% or less
U239	1330-20-7	Xylene (I)	U200	50-55-5	Yohimban-16 carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyt) oxy]-, methyl ester
U249	1314-84-7	Zinc phosphide, when present at concentrations of 10% or less			

Appendix C:

Satellite Accumulation Area Rules Posting

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HAZARDOUS WASTE STORAGE REQUIREMENTS

- All waste must be stored in containers.
- Containers must be kept closed at all times except when adding or removing waste.
- Containers must be labeled or clearly marked with the words "Hazardous Waste", a description of the waste (e.g., Water 50%, Hexanes 50%), the primary hazard(s) in the waste (e.g., Flammable), and the start date.
- Containers must be in good shape and not leaking and must be compatible with the waste they contain.
- Liquid waste must be stored in secondary containment.
- Containers must be stored at or near the point of generation and under the control of the generator of the waste.
- The waste volume should never exceed 55 gallon per waste collection area.
- Containers must be segregated by chemical compatibility during storage (e.g., acids away from bases, organics away from oxidizers, reactives stored separately).

Contact UHS with questions: 612-626-1604

Appendix D:

Ethidium Bromide Decontamination and Deactivation Procedures

Decontamination of Equipment Contaminated with Ethidium Bromide:

Wear proper PPE at all times when performing this activity. Prepare the decontamination solution in a chemical fume hood.

1. The decontamination solution is prepared by adding 20 mL of 50% hypophosphorous acid to a solution of 2 g of sodium nitrite in 300 mL of water.
2. Scrub the contaminated surface or equipment with a paper towel soaked in freshly prepared decontamination solution. Scrub another five times with paper towels soaked the decontamination solution.
3. Place all used towels in a container and soak them in fresh decontamination solution for at least one hour.
4. Neutralize used decontamination solution and towels with sodium carbonate. The towels then can be discarded in the trash, and solution may be rinsed down the sanitary sewer with water.

Note: A small amount of nitrogen dioxide may be liberated when the decontamination solution is initially mixed so the procedure should be conducted in a chemical fume hood.

(Lunn, George, and Sansone, Eric B. 1994. Destruction of Hazardous Chemicals in the Laboratory. John Wiley and Sons, Inc. pp. 186.)

Armour Ethidium Bromide Deactivation Method:

Wear proper PPE at all times when performing this activity. All work should be performed in a chemical fume hood if possible.

1. Dilute solutions containing EtBr to concentration <0.05% w/v (50mg/100mL).
2. For each 100mL of EtBr solution, add 20mL of fresh 5% hypophosphorous acid and 12mL of fresh 0.5M sodium nitrite solution. Check that the pH of the solution is <3.0. Stir briefly.
3. After reacting for at least 20 hours, neutralize with sodium bicarbonate, then rinse the solution down the sanitary sewer with water.

(Armour, Margaret-Ann. 1994. Personal Communication) (Kaufman, James A. ed. 1990. Waste Disposal in Academic Institutions. Lewis Publishers. pp. 127-128)