Temple University
Environmental Health and Radiation Safety

TEMPLE UNIVERISTY

CHEMICAL WASTE MANAGEMENT MANUAL

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I. INTRODUCTION

OVERVIEW

Temple University (TU) research, clinical, academic, service and maintenance operations generates several types of waste. Waste materials are typically divided into four broad categories: general refuse or municipal waste, biological waste, chemical waste and radiological waste. Each of these waste types have unique handling and disposal protocols based on regulations and best management practices.

General refuse or municipal waste is not covered by this manual except for certain non-regulated chemicals that require special handling in order to avoid impermissible or unsafe disposal.

Radiological and biological waste are covered in the Radiation Safety Manual and the Biosafety Manual respectively, and are therefore not covered by this manual.

Campus dumpsters and compactors must remain free of liquid or semi-liquid waste of any kind, untreated biological waste, regulated hazardous waste, and radioactive waste. With limited exceptions, restrictions are also in place for drain disposal of certain waste types and disposal of debris that is contaminated with any of these waste types.

The primary focus of this manual is on chemical waste management and disposal.

APPLICABILITY

The chemical waste management techniques identified in this manual apply to all students, faculty, staff, and visitors who use chemicals while working at Temple University (TU).

ROLE OF ENVIRONMENTAL HEALTH AND RADIATION SAFETY (EHRS)

The principal role of EHRS is to serve as the primary universal resource for all matters pertaining to biological safety, chemical safety, radiation safety, occupational safety and emergency response support within Temple University (TU). EHRS provides technical guidance, compliance assistance, remediation oversight and training to the TU community.

For the purpose of the chemical waste management program, the main role of EHRS is to provide chemical waste management services in conjunction with technical assistance,

training, and support resources so that all TU personnel are aware of their individual responsibilities in helping the University meet the following goals:

- Ensure all chemical wastes are managed in a way that protects the health and safety of all students, faculty, staff and visitors to the University;
- Use the most responsible and environmentally sound management and disposal methods as are practical, and that prevents release into the environment;
- Reduce the quantity and/or toxicity of chemical waste generated by the University to the lowest level possible;
- Comply with all local, state, and federal regulations regarding waste management and disposal; and
- Ensure that all hazardous waste determinations and other regulatory determinations for waste are accurately conducted.

This manual will be revised and updated as necessary to reflect changing regulations and circumstances. The most current copy of this manual is available on the EHRS website. Copies of the written manual and related information may be obtained from Environmental Health & Radiation Safety (EHRS)

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YOUR RESPONSIBILITY

The success of the chemical waste management program depends on the conscientious efforts of all Temple University personnel. When chemical waste are mismanaged, they have the potential to threaten human health and pollute the environment. To ensure the safety and compliance with the law, the first responsibility of all TU personnel is to follow the procedures outlined in the program and specifically in this manual. Additional individual responsibilities are to:

- Understand the hazards of all chemicals in your area. Read and understand the Safety Data Sheets (SDS) for all chemical that you work with directly;

- Identify and label all chemical containers accurately and promptly so that unidentified waste or "unknowns" are not generated;
- Label, store and package chemical waste according to the procedures in this manual until EHRS can take possession of them for subsequent storage and/or off-campus disposal;
- Contact EHRS with questions on how to handle or disposal of a waste material; and
- Include the waste minimization strategies and techniques described in the Chemical Waste Minimization & Pollution Prevention Program, and make every effort to reduce the amount of chemical waste you generate.

REGULATORY OVERVIEW

All chemical waste must be evaluated to determine whether or not it is regulated as a "hazardous waste" under the Environmental Protection Agency's Resource and Recovery Act (RCAR). Through RCRA regulations, EPA requires all hazardous waste to be properly identified, labeled, stored, treated and disposed. From a regulatory standpoint, the United States Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (PADEP) define a hazardous waste as:

- A listed hazardous waste (specifically identified by an alpha-numeric code from one of four lists maintained by the EPA); or

- Waste that exhibit one of the following hazardous characteristics (also identified with an alpha-numeric code) as determined standard testing procedures:
    - Ignitability
    - Corrosivity
    - Reactivity
    - Toxicity

It is the responsibility of the waste generator to make an initial waste determination at the point of generation and determine whether or not it is waste regulated by RCRA. Often, this is based on information provided on the original container. Safety Data Sheets (SDS) can be used to help determine whether or not expired or discarded commercial products are regulated as hazardous waste. Occasionally, a waste sample must be analyzed to obtain more detailed information before a determination can be made.

For practical purposes, TU personnel should manage all chemical waste as hazardous unless otherwise specified in this manual or EHRS has specifically made an evaluation and determined that a waste can be managed in another way. It is important to note that some

waste are restricted from sewer or landfill disposal even if they are not regulated by RCRA as a hazardous waste. Specific disposal guidance and procedures for the most common waste streams generated at the University can be found in this manual and/or on the EHRS website.

II. GENERAL INFORMATION FOR ALL WASTE GENERATORS

TRAINING REQUIREMENTS

EHRS chemical waste disposal procedures are incorporated into various EHRS safety training courses. All waste generators are required to receive both initial and an annual refresher course that covers chemical waste management. Refer to the EHRS training website for a description of these trainings.

Site or laboratory specific training on chemical waste procedures is required to be provided by the Principal Investigator (PI) and/or Supervisor at the time of hire and prior to working with new chemicals.

CHEMICAL WASTE MINIMIZATION & POLLUTION PREVENTION

As required by both the EPA and PADEP, Temple University has developed the Chemical Waste Minimization & Pollution Prevention Program that establishes the framework and procedures necessary to minimize the volume and/or toxicity of chemical waste generated at the University, and to manage any chemical waste that must be generated in the most responsible way possible.

Additional information can be found in the Chemical Waste Minimization & Pollution Prevention Program.

SEWER DISPOSAL

The disposal of chemical waste via sink drain is highly-regulated. These regulations have been established to protect human health and the environment from an exposure to hazardous substances, as well as prevent damage to the City's water treatment facilities. EHRS must approve of any chemical prior to discharge to the sanitary sewer (sink). In most cases, the Philadelphia Water Department (PWD) must also grant approval prior to EHRS issuing a final approval. Contact EHRS for questions regarding the sewer disposal of chemicals.

COST RECOVERY

Under normal circumstances, EHRS does not charge for the cost of chemical waste management and disposal services to the University. However, EHRS reserves the right to

charge the laboratory or Department of waste generators who incur regulatory fines as a result of non-compliance with the Chemical Waste Management Program, or who require services that results in significant cost for EHRS or the University. Services include but are not limited to:

- Disposal of Cylinders: many cylinders can be returned to the manufacturer for refill or recycling in quantities as low as 1 lb. In most cases, disposable cylinder (non-returnable) with remaining pressure, product or product residue must be referred to EHRS for disposal. Empty cylinders can only be discarded as general refuse or scrap metal if they only once contained an inert, non-toxic gas and are proven to be at atmospheric pressure by valve removal or puncture. Check with your Principal Investigator, Supervisor or department for returnable options prior to purchasing a cylinder.

- High-hazard Waste Disposal: Unstable, reactive, peroxide forming, shock-sensitive or other potential explosive chemicals that are improperly stored, mixed with incompatible materials or otherwise mishandled can pose serious risks, including fire or explosion. Due to the high-hazard nature of these materials, EHRS must contract special services for the stabilization, transportation and disposal at extremely high cost. Costs are typically charged per container.

- Unknowns Fingerprinting-Identification: All chemical waste must be fully identified and labeled by the generator with adequate information for EHRS to determine potential hazards and a proper disposal method. Unidentified chemicals are difficult to dispose, expensive and dangerous for emergency responders. Costs are determined by EHRS and are based on the cost of characterization and disposal.

- Chemical Moves/Cleanouts: Personnel must comply with specific requirements for inter and intra building chemical moves. Preparation and move assistance from an EHRS approved vendor is available with adequate notification for a fee that include time and materials. Responsible PIs, Supervisors and/or departments must ensure that University procedures are followed to ensure that all chemical waste, and contaminated materials are identified and managed before a laboratory or area is vacated. Responsible departments are charged for any cost incurred for the cleanout of labs or area that do not comply with the proper procedures.

- Construction, Renovation and Demolition Waste: Chemical waste management cost from construction, renovation and/or demolition projects are not covered by EHRS. These chemical waste must be properly managed to avoid fines or environmental liability. Proper management includes identification, accumulation and disposal. The Department and/or project Managers should consult EHRS for additional information in any preliminary project scope discussions.

SATELLITE ACCUMUALTION AREA (SAA) REQUIREMENTS

A satellite accumulation area (SAA) is a designated area within the laboratory/work area where chemical waste is stored until collected by EHRS. This area can be a small section of a chemical hood, bench top, cabinet or any combination, depending on storage requirements, which must be under the control of the generator. Certain conditions must be met to maintain this designation.

SAA Poster

All SAAs must be designated with a Satellite Accumulation Area poster. Contact EHRS to obtain a copy of the poster.

SAA Location

The SAA must be at or near the point of waste generation. This means that the waste must remain in the same laboratory/area and cannot be moved through a corridor to a different room for storage.

SAA Storage Limits

Satellite Accumulation Areas are limited to storing:

- 55-gallons of chemical waste; and
- 1 quart or 1 kg of acutely hazardous waste. (See Appendix C)

Contact EHRS immediately if these storage limits are exceeded. Waste must be removed within 3 calendar days of exceeding these limits.

III. CHEMICAL WASTE DISPOSAL PROCEDURES

Chemical waste are generated from the disposal of old stock chemicals or byproducts of work activities. Unless another specific chemical waste disposal procedures are identified in this manual or on the EHRS website, chemical waste must be managed as outlined in this section and provided to EHRS for disposal.

CONDUCT A CHEMICAL WASTE DETERMINATION

Effective, May 30, 2017, a chemical waste determination must be performed when a chemical is first declared a waste or a chemical waste is first added to a container. This change was mandated by new EPA regulations and EHRS has issued revised chemical waste tags to assist waste generators with this new requirement. EHRS staff assumes responsibility for picking up all properly identified and labeled chemical waste from your laboratory or work area and for making the final waste determinations. See Appendix B for details on conducting a chemical waste determination.

SELECT WASTE CONTAINERS

Generators of chemical waste must use appropriate waste containers. It is acceptable to reuse empty chemical bottles to collect chemical waste.

- Containers must be compatible with the waste chemicals. Special caution and consideration for solvent and corrosive waste to ensure the waste contents will not melt or dissolve the waste container.
- Container lids must be closed and secure (i.e. screw type lid) at all times waste is not being added to them. Stoppered bottles or use of paraffin wax to seal container sis not acceptable.
- Separate containers must be used to collect unique or incompatible waste types.

LABEL-TAG IMMEDIATELY

After you have determined what waste you are going to generate and have obtained the appropriate containers, you must complete and affix a “white” “HAZARDOUS WASTE“ tag to each chemical waste container. Chemical waste tags are available from EHRS, free of charge. There are directions on back side of the tag and tags must be applied to all chemical waste containers as soon as waste is added. These tags are designed to meet the regulatory

requirements, therefore, every piece of information on the tag is critical and must be completed.

- The generator is the person who is filling out the waste label, not the lab group, Principal Investigator (PI) or Supervisor unless they are the one filling out the waste tag.
- Date the label with the date that the waste was first added.
- Fill in the Telephone #, building and room # where waste is generated and stored.
- Check the box next to the appropriate waste stream(s) or write it in.
- Check the boxes for the appropriate hazards that apply to the waste. Consults SDS
- List each constituent down to 1%; heavy metals must be listed down to the parts per million range. Tag constituents must add up to 100%. Volumes are acceptable.
- Use only common chemical names or IUPAC nomenclature when listing the constituents on the tag.
- Do not Use:
    - Abbreviations
    - Chemical symbols
    - Trade Names
    - Non-Specific wording such as “organic waste”, “running buffer”, or “Solution A” on a tag is not acceptable.

ADD WASTE TO A CONTAINER

Waste can be added only after you choose the proper container and it is labeled and /or tagged. The minimum personal protective equipment (ppe) may be dictated by the Chemical Hygiene Manual. If not, all personnel working with chemical waste must wear the following:

- Safety glasses
- Splash goggles if working with liquid waste
- Lab coat or appropriate work attire
- Gloves specific for the chemicals in use.

STORING YOUR WASTE

Proper storage of chemical waste is extremely important. Adhere to the following procedures on chemical waste storage:

- Chemical waste containers must be stored in the Satellite Accumulation Area (CAA) at all times except when the waste is being “actively” filled.

- Waste container must remain closed or sealed at all times, except when waste is being added or removed from the container.
- Liquid waste containers must be stored in secondary containment systems according to hazard class.
- Store all bulk liquid waste containers in appropriate cabinets. DO NOT store bulk liquid chemical waste containers in fume hoods that have active experiments or reactions occurring.
    - Flammable Cabinets
    - Corrosive Cabinets
    - Under Fume Hood Cabinets
- Do not allow excess accumulation of chemical waste to build up in your lab or area. See Satellite Accumulation Area (SAA) requirements for more information on the limitations of waste storage.
- Containers can only be filled to a maximum 90% full. Head space is need for expansion and/or ease of dispensing.
- Chemical waste containers must be stored in the Satellite Accumulation Area (CAA) at all times except when the waste is being "actively" filled.

INSPECT YOUR WASTE ACCUMULATION AREA

All satellite accumulation areas must be inspected on a weekly basis. This inspection does not have to be a formal inspections with documentation but personnel must inspect all chemical waste stored in their laboratories or work areas to assure the following:

- There are no leaking containers of chemical waste.
- All containers holding chemical waste are labeled with a completed white tag or labeling requirements as specified in this manual or EHRS approved procedure.
- All containers are sealed and closed. This includes waste containers holding solid chemical waste.
- All liquid chemical waste are stored in secondary containment bins.
- Incompatible wastes are stored away from each other and in separate containment bins.
- There is no excessive accumulation of waste stored in the laboratory or work area.

A chemical waste self-audit form is available to assist chemical waste generators in auditing their practices. Contact EHRS with questions. There is no requirement to save or retain copies of the completed self-audit forms. This form is only an audit tool to assist generators with managing their chemical waste.

SUBMIT A CHEMICAL WASTE COLLECTION REQUEST

Submit an online Chemical Waste Collection Request Form to initiate a chemical collection. Chemical waste collections are typically completed within 3 business days of submittal.

> CAUTION: EHRS will only remove a waste that is properly identified, labeled/tagged and in a satisfactory container. If the container is not properly tagged, labeled or satisfactory, an attempt will be made to find the appropriate personnel to correct the problems. If no one can be located, the container will be left and EHRS will send an email to the responsible parties notifying them that the container was not removed.

Special Collection Request

Contact EHRS to arrange for large or non-routine collections of chemical waste.

IV. REFERENCES

- US DEA Controlled Substance Regulations 21 CFR 1300-1321
- US EPA Resource Conservation and Recovery Act (RCRA) Regulations 40 CFR 239-282
- US EPA Toxic Substance Control Act (TSCA) Regulations 40 CFR 761
- Pennsylvania Code Title Chapters 260-270 Hazardous Waste Management Regulations
- Temple University Chemical Waste Minimization and Pollution Prevention Manual

APPENDIX A: Glossary

Best Management Practices: Methods or techniques found to be the most effective and practical means in achieving an objective (such as preventing or minimizing pollution) while making the optimum use of their resources.

Central Accumulation Area (CAA): Site designated by EHRS to be used for the accumulation of chemical waste prior to shipment to permitted disposal facilities.

CFR: Code of Federal Regulations

DEA: Drug Enforcement Agency

Electronic Waste: Includes electrical or battery operated devices, or appliances such as computers or lab equipment that require recycling or special disposal due to the presence of toxic metals or other contaminants.

EPA: Environmental Protection Agency

Hazardous Material: Any substance regulated by the Department of Transportation because the material poses an unreasonable rick to health, safety and property during transport.

Hazardous Waste: listed or characteristic waste regulated for handling and disposal as defined by the EPA Resource Conservation & Recovery Act.

Non-Hazardous Waste: Waste that does not meet the definition of a RCRA hazardous waste; but may still be regulated as a hazardous material under Department of Transportation Regulation during transportation.

Non-Regulated Waste: Waste that does not meet the definition of a RCRA hazardous waste, and also does not meet the definition of a Department of Transportation hazardous materials during transportation

PADEP: Pennsylvania Department of Environmental Protection

Polychlorinated Biphenyls (PCB) Waste: Waste contaminated with polychlorinated biphenyls in excess of 50 parts per million.

RCRA: Resource Conservation and Recovery Act

Satellite Accumulation Area (SAA): Satellite Accumulation Area (SAA) is the name given to the location where chemical waste are generated and stored prior to transport to a campus Central Accumulation Area (CAA) or to a permitted off-site destination.

TSCA: Toxic Substance Control Act

Universal Waste: Certain waste that meet the definition of a hazardous waste but have modified regulatory requirements that encourage recycling. Includes batteries, fluorescent light bulbs, mercury containing equipment and certain pesticides.

Universal Waste lamps: are lamps that due to the presence of toxic heavy metals such as mercury or lead, must comply with EPA and PADEP when disposed. These include, but are not limited to, fluorescent, high-intensity discharge (HID), neon, mercury vapor, high pressure sodium, and metal halide lamps. Note: incandescent bulbs, including halogen bulbs, do not container any of these heavy metals of concern and therefore not included in this definition.

Waste Chemical: Any expired, spent or unwanted chemical or chemical mixture, including hazardous and non-hazardous wastes.

Waste Minimization: Procedures to minimize the volume and/or toxicity of hazardous waste produced at the University.

Waste Generators: Students, faculty, staff, visitors, and contractors working on behalf of Temple University that participate in any activity that generates chemical waste.

APPENDIX B: Chemical Waste Determination

As a result of recent changes to US Environmental Protection Agency regulations regarding hazardous waste disposal, a waste determination must be performed by the waste generator at the point of generation in any area in which a chemical waste is generated.

EHRS understands that this is a new procedure and can be a challenging task. A new chemical waste tag has been developed by EHRS to assist you in complying with this change. Contact EHRS if you require any assistance in conducting a chemical waste determination.

This procedure provides guidance on conducting a chemical waste determination at Temple University.

WASTE DETERMINATION

The process for determining if your chemical waste is a "hazardous" waste is called a *waste determination.* Waste determinations can be made in one of two ways:

1. Through collecting a sample of the waste and sending it for analysis using EPA approved standardized test methods, or
2. Exercising knowledge of the chemical and process knowledge to make an accurate waste determination. Safety Data Sheets (SDS) are useful in these determinations.

   NOTE: For most operations, it is usually possible to use chemical and process knowledge to make an accurate waste determination. The generators must be able to document the chemicals used in the process and maintain supporting documents, such as SDS, process controls or written procedures.

If the waste meets any of the requirements described below then the material is a regulated waste and must be processed through EHRS for proper disposal. Refer to the Chemical Waste Management Manual for additional information.

1. Is it a waste?

In general, an unwanted or unneeded material is considered a waste if:

- It has been used or has gone through a process causing it to be contaminated/impure and is no longer needed,

- It is an unused commercial chemical product that is no longer wanted or has exceeded its expiration date, or
- It is a cleanup material from a chemical spill.

NOTE: Even if you no longer desire to keep a material, it may not be waste if it is still usable and has value. Refer to the Chemical Waste Minimization and Pollution Prevention program for additional information.

2. Is it a hazardous waste?

For a material to be a hazardous waste, it must first be what is termed a solid waste. Solid is a regulatory term that does not refer to a physical sate of matter; thus, many solid waste are actually liquids, sludges or gases. The regulations define what exactly a solid waste is and what is exclude from the definition. A material that meets the definition of a solid waste must then be assessed by the person generating the waste to determine if it also a hazardous waste.

NOTE: EPA provides exemptions or reduced compliance requirements for certain waste in order to promote recycling and to provide practical alternatives for managing many common, low-risk waste-Contact EHRS for additional information.

There are two ways a waste may be hazardous-waste is either (1) listed or (2) characteristic.

LISTED

Unused or unopened chemicals that will meet the definition of a listed waste if they appear on one of the EPA list below:

There are four list which include › 400 chemicals or mixtures:

F List : waste from non-specific sources. Mostly mixtures containing 10% or more (before use) of halogenated and non-halogenated solvents such as: *trichloroethylene, methylene chloride, carbon tetrachloride, chlorobenzene, xylene, acetone, ethyl acetate, ethyl benzene, methanol ethyl ether, cresols, nitrobenzene, toluene, MEK, carbon disulfide, pyridine, benzene….*

K List: waste from specific sources, such as wood preserving waste (rare at colleges/universities)

U List: The U-list contains materials that are unused that have one of the listed chemicals as the sole active ingredients. The list also applies to spill cleanups of these unused materials. Some common examples of U listed waste are: *acetone, formaldehyde, alcohols and many solvents.*

P List: The P list contains materials that are acutely hazardous (toxic or reactive in small amounts) wastes. Some common examples of P listed waste are: *sodium azide, acrolein, oxides of arsenic, benzyl chloride, carbon disulfide, cyanides, nicotine, nitroglycerin…*

> CAUTION: Empty containers that previously contained a P-listed chemical such as sodium azide or cyanide salts are also regulated as hazardous waste. These containers must be labelled as hazardous waste and process through EHRS for proper disposal.

CHARACTERISTIC

Characteristic waste are not listed specifically by their chemical name but they are regulated as hazardous waste because they exhibit one or more of the four characteristics shown below.

Ignitability

- A liquid with a flash point < 140^{o}F
- A solid that can cause a fire and sustain combustion
- An ignitable compressed gas or aerosol can
- An oxidizer

Examples: *Alcohols, solvents, stains and mixtures containing these materials.*

Corrosivity (Acids/Bases)

- Aqueous solutions with a pH ≥ 2 or ≤ 12.5.

Examples: *Hydrochloric acid, nitric acid and sodium hydroxide.*

Reactivity

- Materials that react violently or generate toxic fumes when mixed with water.
- Cyanide or sulfide bearing waste which evolve toxic fumes when mixed with acids or bases.

- Materials that are normally unstable or explosive.

Examples*: Sodium metal, reactive sulfides, potassium cyanide and picric acid.*

Toxicity

The toxicity characteristic applies to waste that have the potential to contaminate groundwater if improperly disposed of. These materials are regulated as hazardous waste due to their potential to leach out specific toxic substances in a landfill. There are currently 40 contaminants on the list that include certain metals, pesticide and organic compounds. These chemical constituents are listed in the two tables below;

Metals: Reagents and items/debris contaminated with or containing any of the following:

Arsenic (As)	Barium (Ba)	Cadmium (Cd)	Chromium (Cr)
Lead (Pb)	Mercury (Hg)	Selenium (Se)	Silver (Sg)

Examples*: Mercury containing compounds, elemental mercury, silver, lead nitrate and chromic acid.*

Organics: Reagents and items/debris contaminated with or containing any of the following:

Benzene	Carbon tetrachloride	Chlordane
Chlorobenzene	Chloroform	o-Cresol
m-Cresol	p-Cresol	Cresol
1,4 Dichlorobenzene	1,2-Dichlorothane	1,1-Dinitroethylene
Heptachlor (and its epoxide)	Hexachlorobenzene	Hexachlorobutadiene
Methyl ethyl ketone	Nitrobenzene	Pentachlorophenol
Pyridine	Tetrachloroethylene	2,4,5-Triclorophenol
2,4,6-Trichlorophenol	Vinyl chloride	

Pesticide: Reagents and items/debris contaminated with or containing any of the following

Endrin	Methoxychlor	2,4-Dichlorophenoxyacetic acid
Lindane	Toxaphene	2,4,5-TP (Silvex)

The levels at which these chemicals are regulated varies from 0.2 ppm to 400 ppm. These levels are very low. A waste should be considered as hazardous if the waste contains one or more of the components listed above unless a TCLP analysis has been conducted and it shows the waste to be below the regulatory limits. All TCLP analysis results must be approved by EHRS.

3. Is it a special subclass of "hazardous waste"?

UNIVERSAL WASTE

There are 6 types of wastes that are currently classified as "Universal Waste" by the EPA and PADEP. Universal waste is hazardous, but the generators can manage it separately and with fewer regulatory restrictions. Refer to the Chemical Waste Management Manual for specific waste management procedures.

EPA Universal Waste: EPA has designated four classes of universal waste.

Batteries: Includes most rechargeable batteries *(i.e. Ni-Cd, Li-ion and small lead sealed (Pb) batteries commonly found in cordless tools, cellular phones, laptops, cameras and 2-way radios).*large Pb-acid batteries(e.g. auto) must be recycled separately and are not Universal waste. Common dry-cell batteries (i.e. AA, AA, C & D) are not hazardous and may be discarded in the municipal waste stream.

Pesticides: This is a very limited category and should seldom be a concern. It primarily applies to recalled, banned, damaged or obsolete pesticide subject to a pesticide collection program.

Mercury-containing equipment: Includes mercury-containing thermometers, thermostats, manometers, sphygmomanometers, mercury switches and mercury tube control devise.

Lamps: Includes all types of fluorescent bulbs, high-intensity bulbs (HID), Mercury lamps, UV, projector bulbs, and U-tube or circular bulbs.

In Pennsylvania, the PADEP has also included the following:

Oil-Based Finishes: Includes oil-based paints, lacquers, stains and aerosol paint cans.

Photographic Solutions: Includes silver-bearing waste streams from photographic processing solutions or rinse water.

4. Is it a chemical waste that requires special management?

Certain chemical waste require special management because they may threaten water quality, create a nuisance, or endanger humans or the environment. Examples of these waste include, but are not limited to:

- Lead-acid batteries
- Used oil and oil filters
- PCBs (e.g. pre-1979 lighting ballast)
- Other waste known to be hazardous or otherwise may be dangerous to humans or the environment.

  Examples*:*

  - *Concentrated stock solutions and stained agarose gels containing Ethidium bromide*
  - *Corrosive solids, such as anhydrous metal salts or solid hydroxide compounds (i.e. sodium hydroxide or potassium hydroxide pellets, commonly used to adjust pH's of working solutions.*
  - *Carcinogens (dioxins, asbestos, aldehydes. etc.) mutagen, teratogens; and*
  - *Chemicals with an SDS which warn of skin irritation, eye damage, noxious fumes, etc.*

APPENDIX C: Acutely Toxic Chemical List

United States Environmental Protection Agency (EPA) Acutely Toxic Chemical Name	EPA Waste Code	CAS #
Acetaldehyde, chloro-	P023	107-20-0
Acetamide, N-(aminothioxomethyl)-	P002	591-08-2
Acetamide, 2-fluoro-	P057	640-19-7
Acetic acid, fluoro-, sodium salt	P058	62-74-8
1-Acetyl-2-thiourea	P002	591-08-2
Acrolein	P003	107-02-8
Aldicarb	P070	116-06-3
Aldicarb sulfone.	P203	1646-88-4
Aldrin	P004	309-00-2
Allyl alcohol	P005	107-18-6
Aluminum phosphide (R,T)	P006	20859-73-8
5-(Aminomethyl)-3-isoxazolol	P007	2763-96-4
4-Aminopyridine	P008	504-24-5
Ammonium picrate (R)	P009	131-74-8
Ammonium vanadate	P119	7803-55-6
Argentate(1-), bis(cyano-C)-, potassium	P099	506-61-6
Arsenic acid H_3AsO_4	P010	7778-39-4
Arsenic oxide As_2O_3	P012	1327-53-3
Arsenic oxide As_2O_5	P011	1303-28-2
Arsenic pentoxide	P011	1303-28-2
Arsenic trioxide	P012	1327-53-3
Arsine, diethyl-	P038	692-42-2
Arsonous dichloride, phenyl-	P036	696-28-6
Aziridine	P054	151-56-4
Aziridine, 2-methyl-	P067	75-55-8
Barium cyanide	P013	542-62-1
Benzenamine, 4-chloro-	P024	106-47-8
Benzenamine, 4-nitro-	P077	100-01-6
Benzene, (chloromethyl)-	P028	100-44-7
1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-, (R)-	P042	51-43-4
Benzeneethanamine, alpha, alpha-dimethyl-	P046	122-09-8
Benzenethiol	P014	108-98-5
7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate.	P127	1563-66-2
Benzoic acid, 2-hydroxy-, compd. W (3aS-cis)-1,2,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1)	P188	57-64-7
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%	P001	81-81-2
Benzyl chloride	P028	100-44-7
Beryllium Powder	P015	7440-41-7
Bromoacetone	P017	598-31-2

United States Environmental Protection Agency (EPA) Acutely Toxic Chemical Name	EPA Waste Code	CAS #
Brucine	P018	357-57-3
2-Butanone, 3,3-dimethyl- 1-(methylthio)-,O-[(methylamino)carbonyl] oxime	P045	39196-18-4
Calcium cyanide	P021	592-01-8
Calcium cyanide $Ca(CN)_2$	P021	592-01-8
Carbamic acid, [(dibutylamino)-thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester	P189	55285-14-8
Carbamic acid, dimethyl-, 1-[(dimethyl-amino)carbonyl]-5-methyl-1H- pyrazol-3-yl ester.	P191	644-64-4
Carbamic acid, dimethyl-, 3-methyl-1(1-methylethyl)-1H-pyrazol-5-yl ester.	P192	119-38-0
Carbamic acid, methyl-, 3-methylphenyl ester.	P190	1129-41-5
Carbofuran.	P127	1563-66-2
Carbon disulfide	P022	75-15-0
Carbonic dichloride	P095	75-44-5
Carbosulfan	P189	55285-14-8
Chloroacetaldehyde	P023	107-20-0
p-Chloroaniline	P024	106-47-8
1-(o-Chlorophenyl)thiourea	P026	5344-82-1
3-Chloropropionitrile	P027	542-76-7
Copper cyanide	P029	544-92-3
Copper cyanide Cu(CN)	P029	544-92-3
m-Cumenyl methylcarbamate	P202	64-00-6
Cyanides (soluble cyanide salts), not otherwise specified	P030	
Cyanogen	P031	460-19-5
Cyanogen chloride	P033	506-77-4
Cyanogen chloride (CN)Cl	P033	506-77-4
2-Cyclohexyl-4,6-dinitrophenol	P034	131-89-5
Dichloromethyl ether	P016	542-88-1
Dichlorophenylarsine	P036	696-28-6
Dieldrin	P037	60-57-1
Diethylarsine	P038	692-42-2
Diethyl-p-nitrophenyl phosphate	P041	311-45-5
O,O-Diethyl O-pyrazinyl phosphorothioate	P040	297-97-2
Diisopropylfluorophosphate (DFP)	P043	55-91-4
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa-chloro-1,4,4a,5,8,8a,-hexahydro-,(1alpha, 4alpha,4abeta,5alpha,8alpha,8abeta)-	P004	309-00-2
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha, 4abeta,5beta,8beta,8abeta)-	P060	465-73-6
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-, (1 a alpha,2beta,2aalpha, 3beta,6beta, 6aalpha,7beta, 7aalpha)-	P037	60-57-1

United States Environmental Protection Agency (EPA) Acutely Toxic Chemical Name	EPA Waste Code	CAS #
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-, (1aalpha,2beta,2abeta,3alpha, 6alpha,6abeta,7beta, 7aalpha)-, & metabolites	P051	72-20-8
Dimethoate	P044	60-51-5
alpha,alpha-Dimethylphenethylamine	P046	122-09-8
Dimetilan.	P191	644-64-4
4,6-Dinitro-o-cresol, & salts	P047	534-52-1
2,4-Dinitrophenol	P048	51-28-5
Dinoseb	P020	88-85-7
Diphosphoramide, octamethyl-	P085	152-16-9
Diphosphoric acid, tetraethyl ester	P111	107-49-3
Disulfoton	P039	298-04-4
Dithiobiuret	P049	541-53-7
1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)-carbonyl]oxime.	P185	26419-73-8
Endosulfan	P050	115-29-7
Endothall	P088	145-73-3
Endrin	P051	72-20-8
Endrin, & metabolites	P051	72-20-8
Epinephrine	P042	51-43-4
Ethanedinitrile	P031	460-19-5
Ethanimidothioc acid,2-(dimethylamino)-N-[[(methylamino) carbonyl]oxy]-2-oxo-, methyl ester.	P194	23135-22-0
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	P066	16752-77-5
Ethyl cyanide	P101	107-12-0
Ethyleneimine	P054	151-56-4
Famphur	P097	52-85-7
Fluorine	P056	7782-41-4
Fluoroacetamide	P057	640-19-7
Fluoroacetic acid, sodium salt	P058	62-74-8
Formetanate hydrochloride.	P198	23422-53-9
Formparanate.	P197	17702-57-7
Fulminic acid, mercury(2+) salt (R,T)	P065	628-86-4
Heptachlor	P059	76-44-8
Hexaethyl tetraphosphate	P062	757-58-4
Hydrazinecarbothioamide	P116	79-19-6
Hydrazine, methyl-	P068	60-34-4
Hydrocyanic acid	P063	74-90-8
Hydrogen cyanide	P063	74-90-8
Hydrogen phosphide	P096	7803-51-2
Isodrin	P060	465-73-6
Isolan.	P192	119-38-0

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3-Isopropylphenyl N-methylcarbamate.	P202	64-00-6
3(2H)-Isoxazolone, 5-(aminomethyl)-	P007	2763-96-4
Manganese, bis(dimethylcarbamodithioato-S,S')-,	P196	15339-36-3
Manganese dimethyldithiocarbamate.	P196	15339-36-3
Mercury, (acetato-O)phenyl-	P092	62-38-4
Mercury fulminate (R,T)	P065	628-86-4
Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride	P198	23422-53-9
Methanimidamide,N,N-dimethyl-N'-[2-methyl-4-(methylamino) carbonyl]oxy]phenyl]-	P197	17702-57-7
Methanamine, N-methyl-N-nitroso-	P082	62-75-9
Methane, isocyanato-	P064	624-83-9
Methane, oxybis[chloro-	P016	542-88-1
Methane, tetranitro- (R)	P112	509-14-8
Methanethiol, trichloro-	P118	75-70-7
6,9-Methano-2,4, 3-benzodioxathiepin,6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	P050	115-29-7
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	P059	76-44-8
Methiocarb.	P199	2032-65-7
Methomyl	P066	16752-77-5
Methyl hydrazine	P068	60-34-4
Methyl isocyanate	P064	624-83-9
2-Methyllactonitrile	P069	75-86-5
Methyl parathion	P071	298-00-0
Metolcarb.	P190	1129-41-5
Mexacarbate.	P128	315-18-4
alpha-Naphthylthiourea	P072	86-88-4
Nickel carbonyl	P073	13463-39-3
Nickel carbonyl Ni(CO)4, (T-4)-	P073	13463-39-3
Nickel cyanide	P074	557-19-7
Nickel cyanide Ni(CN)2	P074	557-19-7
Nicotine, & salts	P075	54-11-5
Nitric oxide	P076	10102-43-9
p-Nitroaniline	P077	100-01-6
Nitrogen dioxide	P078	10102-44-0
Nitrogen oxide NO	P076	10102-43-9
Nitrogen oxide NO_2	P078	10102-44-0
Nitroglycerine (R)	P081	55-63-0
N-Nitrosodimethylamine	P082	62-75-9
N-Nitrosomethylvinylamine	P084	4549-40-0
Octamethylpyrophosphoramide	P085	152-16-9
Osmium oxide OsO_4, (T-4)-	P087	20816-12-0
Osmium tetroxide	P087	20816-12-0

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7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	P088	145-73-3
Oxamyl.	P194	23135-22-0
Parathion	P089	56-38-2
Phenol, 2-cyclohexyl-4,6-dinitro-	P034	131-89-5
Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester).	P128	315-18-4
Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate	P199	2032-65-7
Phenol, 3-(1-methylethyl)-, methyl carbamate.	P202	64-00-6
Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate.	P201	2631-37-0
Phenol, 2,4-dinitro-	P048	51-28-5
Phenol, 2-methyl-4,6-dinitro-, & salts	P047	[1]534-52-1
Phenol, 2-(1-methylpropyl)-4,6-dinitro-	P020	88-85-7
Phenol, 2,4,6-trinitro-, ammonium salt (R)	P009	131-74-8
Phenylmercury acetate	P092	62-38-4
Phenylthiourea	P093	103-85-5
Phorate	P094	298-02-2
Phosgene	P095	75-44-5
Phosphine	P096	7803-51-2
Phosphoric acid, diethyl 4-nitrophenyl ester	P041	311-45-5
Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester	P039	298-04-4
Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester	P094	298-02-2
Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester	P044	60-51-5
Phosphorofluoridic acid, bis(1-methylethyl) ester	P043	55-91-4
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	P089	56-38-2
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	P040	297-97-2
Phosphorothioic acid, O-[4-[(dimethylamino) sulfonyl]phenyl] O,O-dimethyl ester	P097	52-85-7
Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester	P071	298-00-0
Physostigmine.	P204	57-47-6
Physostigmine salicylate.	P188	57-64-7
Plumbane, tetraethyl-	P110	78-00-2
Potassium cyanide	P098	151-50-8
Potassium cyanide K(CN)	P098	151-50-8
Potassium silver cyanide	P099	506-61-6
Promecarb	P201	2631-37-0
Propanal, 2-methyl-2- (methylthio)-, O-[(methylamino)carbonyl]oxime	P070	116-06-3
Propanal, 2-methyl-2-(methyl-sulfonyl)-, O-[(methylamino)carbonyl] oxime.	P203	1646-88-4
Propanenitrile	P101	107-12-0

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Propanenitrile, 3-chloro-	P027	542-76-7
Propanenitrile, 2-hydroxy-2-methyl-	P069	75-86-5
1,2,3-Propanetriol, trinitrate (R)	P081	55-63-0
2-Propanone, 1-bromo-	P017	598-31-2
Propargyl alcohol	P102	107-19-7
2-Propenal	P003	107-02-8
2-Propen-1-ol	P005	107-18-6
1,2-Propylenimine	P067	75-55-8
2-Propyn-1-ol	P102	107-19-7
4-Pyridinamine	P008	504-24-5
Pyridine, 3-(1-methyl- 2-pyrrolidinyl)-, (S)-, & salts	P075	54-11-5
Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a, 8-trimethyl-, methylcarbamate (ester), (3aS-cis)-.	P204	57-47-6
Selenious acid, dithallium(1+) salt	P114	12039-52-0
Selenourea	P103	630-10-4
Silver cyanide	P104	506-64-9
Silver cyanide Ag(CN)	P104	506-64-9
Sodium azide	P105	26628-22-8
Sodium cyanide	P106	143-33-9
Sodium cyanide Na(CN)	P106	143-33-9
Strychnidin-10-one, & salts	P108	157-24-9
Strychnidin-10-one, 2,3-dimethoxy-	P018	357-57-3
Strychnine, & salts	P108	157-24-9
Sulfuric acid, dithallium(1+) salt	P115	7446-18-6
Tetraethyldithio pyrophosphate	P109	3689-24-5
Tetraethyl lead	P110	78-00-2
Tetraethyl pyrophosphate	P111	107-49-3
Tetranitromethane (R)	P112	509-14-8
Tetraphosphoric acid, hexaethyl ester	P062	757-58-4
Thallic oxide	P113	1314-32-5
Thallium oxide Tl_2O_3	P113	1314-32-5
Thallium(I) selenite	P114	2039-52-0
Thallium(I) sulfate	P115	7446-18-6
Thiodiphosphoric acid, tetraethyl ester	P109	3689-24-5
Thiofanox	P045	39196-18-4
Thioimidodicarbonic diamide $[(H_2N)C(S)]_2NH$	P049	541-53-7
Thiophenol	P014	108-98-5
Thiosemicarbazide	P116	79-19-6
Thiourea, (2-chlorophenyl)-	P026	5344-82-1
Thiourea, 1-naphthalenyl-	P072	86-88-4
Thiourea, phenyl-	P093	103-85-5
Tirpate.	P185	26419-73-8

United States Environmental Protection Agency (EPA) Acutely Toxic Chemical Name	EPA Waste Code	CAS #
Toxaphene	P123	8001-35-2
Trichloromethanethiol	P118	75-70-7
Vanadic acid, ammonium salt	P119	7803-55-6
Vanadium oxide V_2O_5	P120	314-62-1
Vanadium pentoxide	P120	1314-62-1
Vinylamine, N-methyl-N-nitroso-	P084	4549-40-0
Warfarin, & salts, when present at concentrations greater than 0.3%	P001	81-81-2
Zinc cyanide	P121	557-21-1
Zinc cyanide $Zn(CN)_2$	P121	557-21-1
Zinc, bis(dimethylcarbamodithioato-S,S')-,	P205	137-30-4
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10% (R,T)	P122	1314-84-7
Ziram.	P205	137-30-4