Tennessee TECH

Environmental Health and Safety

HAZARDOUS WASTE MANAGEMENT AND SATELLITE ACCUMULATION AREA GUIDE

I. Overview

a. The framework for hazardous waste regulation was established in 1976 by the Federal Resource Conservation and Recovery Act (RCRA). RCRA was enacted by Congress to protect human health and the environment from improper management of hazardous waste. RCRA introduced the concept that the generator of a waste is responsible for proper waste management from "cradle-to- grave" (i.e. from the laboratory to the waste's ultimate destruction). RCRA regulations may be found in 40 CFR Parts 260-279 and Tennessee Code Annotated 0400-12-01.

b. At Tennessee Tech University, all chemical waste is managed by the Environmental Health and Safety office (EHS). Hazardous chemicals are not allowed to be disposed of in drains, in the trash, storm sewers, or by evaporation. All chemical waste is required to be held in the generating location (this location is defined as a "Satellite Accumulation Area") prior to movement to a “Hazardous Waste Storage Area.”

c. There are specific regulatory requirements for the individuals who generate and accumulate chemical waste. These individuals must properly identify and label all hazardous wastes in their workplace. They must properly store and submit requests for disposal of chemical wastes. Finally, they must minimize the amount of waste generated and recycle whenever possible. The purpose of this document is to assist labs and shops with this regulatory compliance. Every lab and shop on campus is subject to unannounced inspections by both the Federal Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC). Lack of compliance can result in citations and fines.

II. Roles and Responsibilities

a. Environmental Health and Safety (EHS)

i. EHS is responsible for coordinating all aspects of hazardous waste management, implementing safety policies, procedures, and guidelines for the University.

ii. Specific duties of the department include:

1. Design and improve disposal procedures for chemical waste materials.
2. Prepare, submit, and maintain records, reports and manifests as required by government regulations.
3. Prepare applications for state and federal permits to generate and properly dispose of hazardous chemical waste.
4. Schedule and coordinate the activities of the hazardous waste disposal contractors on campus.
5. Ensure the university’s compliance with all applicable federal (EPA) and state (TDEC) environmental regulations concerning hazardous waste.

6. Ensure the university is making an effort to minimize the amounts of hazardous waste generated on campus.

b. Principle Investigator, Classroom Instructor, or Supervisor
    i. The principal investigator, classroom instructor, or supervisor has the direct responsibility for ensuring that the guidelines established herein are followed by all personnel, including other researchers under their jurisdiction. This person is also directly responsible of the "cradle to grave" concept for all hazardous waste generated from their experiments. Cradle to grave is a system developed by the EPA Resource Conservation and Recovery Act (RCRA Subtitle C) that establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal.

c. Laboratory Worker and Other Individuals
    i. The success of the hazardous chemical waste management program at TTU is dependent on the conscientious efforts of the individual laboratory worker/student and staff employee. Because the laboratory workers/students frequently handle hazardous chemicals, it is essential that they follow the advice, guidelines, and procedures pertaining to hazardous materials handling. The individual staff members are expected to:
        1. Manage and dispose of all chemical waste in accordance with established procedures set forth in this disposal guide.
        2. Maintain the identity of all chemicals with which they work.
        3. Package and label surplus and waste chemicals in accordance with established procedures set forth in this disposal guide.
        4. Seek the advice, when necessary, of EHS concerning the proper handling and disposal of hazardous chemicals.
        5. Ensure they are properly trained on hazardous waste management, and that this documented training is refreshed on an annual basis.

III. Identifying a hazardous waste

a. Hazardous Waste – The EPA defines hazardous waste as a material that no longer has an intended value with properties that make it dangerous or potentially harmful to human health or the environment. Hazardous wastes can exist as liquids, solids, compressed gases, or sludges. They can be the by-products of manufacturing processes or simply discarded commercial products, like cleaning fluids or pesticides.

b. Waste: A material/chemical that has no intended use or reuse, including chemicals and materials from a spill clean-up.

c. In regulatory terms, a Resource Conservation and Recovery Act (RCRA) hazardous waste is either a listed waste that appears on one of the four hazardous wastes lists (F-list, K-list, P-list, or U-list), and/or exhibits at least one of four characteristics—ignitability, corrosivity, reactivity, or toxicity. Hazardous waste is regulated under the RCRA Subtitle C, which is enforced by the EPA on a federal level, and by TDEC on a state level.

d. A waste is determined to be hazardous by one of three means:
    i. It is on one of the EPA's lists of hazardous chemicals.
    ii. It meets the definition of at least one of the EPA-defined characteristics of toxicity, ignitability, reactivity, or corrosiveness.

iii. The waste's generator, utilizing some outside source of information, (Safety Data Sheet or Material Safety Data Sheet (SDS or MSDS), manufacturer's website, etc.) determines that the waste should be treated as hazardous.

IV. Listed Hazardous Wastes

a. The EPA has published four lists (F-list, K-list, P-list, or U-list) identifying hazardous wastes. Appendices 'A' and 'B' are a composite of approximately 850 chemicals that are recognized by the EPA and EHS as hazardous.

b. Acutely toxic hazardous wastes, also called "P-listed" wastes, comprise Appendix 'A'. Any container that once held a **P-listed waste must be triple rinsed before the container can be discarded. The rinsate cannot be put down the sink. An alternative would be to have EHS handle the unrinsed empty containers along with other chemical wastes.**

V. EPA Characteristic Hazardous Wastes 40 CFR Part 261 Subpart C

a. A waste is hazardous if it exhibits any one of the four characteristics of a hazardous waste. The following are the four characteristics and a few examples of common wastes at the University:

i. Ignitable

1. Flammable Liquids- Flashpoint <140° F
    a. Examples: Alcohols, Benzene, Toluene, Xylene, Acetonitrile
2. Oxidizers
    a. Examples: Nitrates, Perchlorates, Bromates, Permanganates, Peroxides, Periodates
3. Organic Peroxides:
    a. Examples: Benzoyl Peroxide, Cumene Hydroperoxide, Methyl Ethyl Ketone Peroxide

2. Corrosive - Aqueous liquids with $pH \leq 2$ or $pH \geq 12.5$

1. Inorganic Acids
    a. Examples: Hydrochloric Acid, Sulfuric Acid, Nitric Acid, Phosphoric Acid
2. Organic Acids
    a. Examples: Formic Acid, Lactic Acid, Acetic Acid
3. Bases
    a. Examples: Hydroxide solutions, Amines

3. Reactive - materials which can react violently with water, create toxic and /or flammable gases when mixed with water, ignite or react upon exposure to air, or are capable of detonation at standard temperature and pressure.

1. Sulfides and Cyanides
2. Peroxide formers
3. Alkali metals - Sodium, Potassium, Lithium
4. Dinitro - and Trinitro - compounds - Picric Acid
5. Carbonyl compounds
6. Isocyanates
7. Perchlorate crystal formers - Perchloric Acid

4. Toxic - Toxic chemicals are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead, etc.). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute ground water. Toxicity is defined through a laboratory procedure called the Toxicity Characteristic Leaching Procedure (TCLP). **Any detectable amount of these**

chemicals must be identified on a hazardous waste label. The complete list is located in Appendix 'B'.

VI. Determined by other sources

a. Many chemicals which are not listed by the EPA and do not possess a characteristic of a hazardous waste are nonetheless hazardous. Concentrated solutions of Ethidium Bromide are an example.

b. Consult the product's SDS or other product information prior to disposal. If you are ever unsure of a waste's characteristics, contact EHS so that a waste determination can be made.

VII. Accumulation Areas

a. Satellite Accumulation Areas (SAA)

i. It is the responsibility of the Principal Investigator (PI) and his/her designee to ensure that waste storage areas are maintained in accordance with applicable rules and regulations. Within the area hazardous waste is generated and stored is defined as a "Satellite Accumulation Area" (SAA). Satellite Accumulation Areas are located within the laboratories of chemistry, biology, physics, nanotechnology, art studios, engineering, and maintenance shops, etc. The SAA is located at or near the point of generation (i.e, within the lab).

ii. EPA regulations 40 CFR 262.34 state that the maximum amount of hazardous waste that can accumulate in the laboratory is 55 gallons of hazardous waste or 1 kilogram of acutely toxic waste (Appendix 'A'). If you accumulate more than the maximum amount, the waste needs to be removed from your lab no later than 3 days after these maximum amounts are reached.

iii. A *Satellite Accumulation Area* sheet (Appendix 'C') must be posted close to the accumulated waste. The Principle Investigator (PI) or designee (i.e., Lab Manager) must ensure that the waste is being handled correctly on a day-to-day basis. The PI must also ensure that everyone in the lab has read and is familiar with the *Satellite Accumulation Area* sheet and the *Hazardous Waste Management and Satellite Accumulation Area Guide.* Once this familiarization training is accomplished, it must be documented by the individual's signature in Appendix 'D' of this guide and this sheet must be maintained in the lab and provided upon request.

b. Central Accumulation Areas (also known as a Hazardous Waste Storage Room)

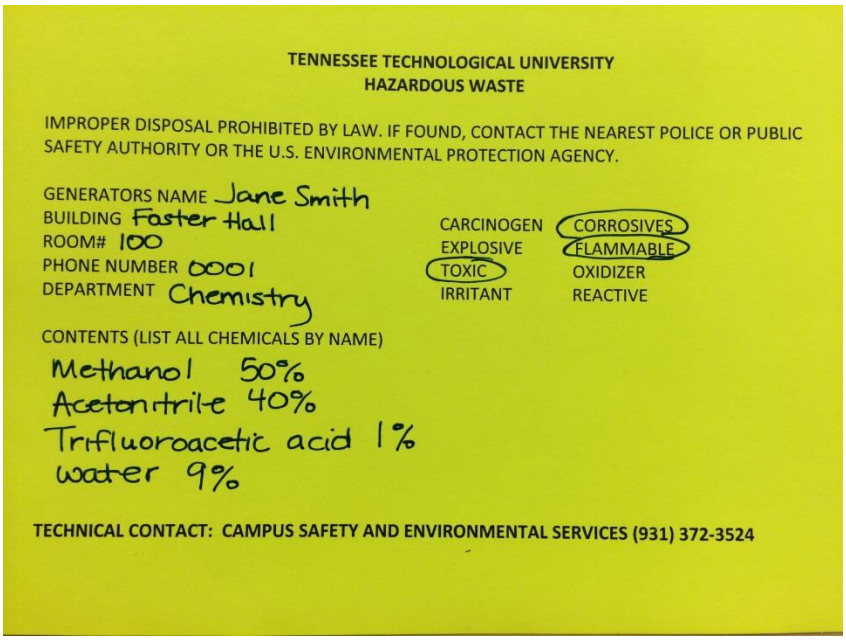
i. When a Satellite Accumulation Area exceeds 55 gallons of hazardous waste, the waste must be placed in a designated Accumulation Area to await transport to a hazardous waste treatment, storage, and disposal facility (TSDF). It may remain in the Accumulation Area either 90 days or 180/270 days before shipping, depending upon the designation of Tennessee Tech University as a Large Quantity Generator (LQG) of hazardous waste or a Small Quantity Generator (SQG). Currently, TTU is designated as a SQG with a 180 to 270 day storage limit in Central Accumulation Areas. Not every building on the TTU campus has a Central Accumulation Area. If your building has a Central Accumulation Area the PI is responsible for transferring their hazardous waste to the designated central accumulation area within their building. The transfer of hazardous waste to the Central Accumulation Area must happen when the 55 gallon limit or 1 kilogram of P-listed material has been reached.

c. Do not transport hazardous waste outside of the building.

VIII. Procedures for Managing Hazardous Waste

a. Containers
   i. All containers must be leak-proof and chemically compatible with their contents. Lids should fit properly so that the container is leak-proof.
   ii. When selecting a waste container, pay attention to the original container material to ensure waste added to the container is not incompatible with residues of the original material. It is vital that chemical waste be compatible with its container. If the waste is placed in an inappropriate container, the container might disintegrate or rupture.
   iii. Bags may be used only for dry solids. Needles (capped or uncapped), pipettes, broken glass or other sharp-edged materials that are chemically contaminated are not acceptable in bags. All "sharps" must be placed in puncture-resistant containers.
   iv. Containers which show signs of contamination on their exterior are not acceptable regardless of their contents. EHS must take every step available to protect its staff from potential chemical hazards.
   v. If a waste has biological and/ or radiological and chemical hazards, please contact EHS for guidance before packaging. Containers and bags marked with **biohazard or radioactive warnings** cannot be used for chemical waste disposal.
   vi. Minimize void space in containers by assuring that collection containers should be filled to capacity (with head room for expansion) before requesting disposal or combining two containers of identical material into one.
   vii. When adding hazardous waste to a container, only the constituents that are specifically listed on the waste label should be added and care must be taken not to mix incompatibles.
   viii. All containers must be closed with a tight-fitting lid, unless waste is being added or removed from the container. It is illegal to store waste in an open container.

b. Labeling
   i. In order to comply with state and federal regulations, the following information must appear on each container of hazardous waste.
   ii. "Hazardous Waste": State and federal regulations require that each container must be clearly marked with the words, "Hazardous Waste". EHS requires that all hazardous waste must be labeled with a TTU hazardous waste label. Labels can be obtained from EHS.
   iii. Generator's Name: The individual who is responsible for the area or process from which the waste originated and contact information (including name, phone # and room #) for the best person to contact if further information about the material is needed.
   iv. Chemical Constituents: Write all constituents, whether hazardous or non-hazardous, on the waste label. Formulas, trade names, abbreviations, and general names and nomenclature are not acceptable. The proper chemical name must be written out in its entirety. Provide percentage of constituents, if known. Estimates are acceptable.
   v. Do not add an accumulation start date. The date will be added by EHS.
   vi. Unused chemicals in their original container do not need a hazardous waste label. **The original label is sufficient.** No other identifying information is needed.
   vii. This is an example of a correctly completed label.



TENNESSEE TECHNOLOGICAL UNIVERSITY
HAZARDOUS WASTE

IMPROPER DISPOSAL PROHIBITED BY LAW. IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

GENERATORS NAME Jane Smith
BUILDING Foster Hall
ROOM# 100
PHONE NUMBER 0001
DEPARTMENT Chemistry

CARCINOGEN
EXPLOSIVE
TOXIC
IRRITANT
CORROSIVES
FLAMMABLE
OXIDIZER
REACTIVE

CONTENTS (LIST ALL CHEMICALS BY NAME)
Methanol 50%
Acetonitrile 40%
Trifluoroacetic acid 1%
water 9%

TECHNICAL CONTACT: CAMPUS SAFETY AND ENVIRONMENTAL SERVICES (931) 372-3524

IX. Storage

a. Any container used for disposal and storage of waste must be marked with the information specified in the Labeling section immediately upon placing the first drop of waste into the container.
b. Whenever possible, store flammable waste liquids and waste corrosive liquids in cabinets designed for these materials.
c. The maximum amount of hazardous waste that can be accumulated in the lab is 55 gallons of hazardous waste or 1 kilogram of acutely toxic (P-listed) waste (Appendix 'A'). If you accumulate more than the maximum amount of hazardous waste (55 gallons of hazardous waste or 1 kilogram of acutely toxic (P-listed) waste), the waste needs to be removed from your lab no later than 3 days after these maximum amounts are reached. The waste must be moved to a Central Accumulation Area. If your building does not have a Central Accumulation Area, contact EHS for guidance. Never move hazardous waste outside of your building.
d. All waste must be stored in secondary containment (i.e. cabinets and trays), and should be segregated according to hazard class (i.e. flammables, toxics, etc.).
e. All hazardous waste should be stored in a Satellite Accumulation Area (SAA) which should be clearly marked with a sign found in Appendix 'C'.
f. Situations requiring corrective action shall be reported immediately to the department laboratory manager, principal investigator (PI), or TTU EHS Office. Emergency situations (spills or leaks) should be reported to EHS during business hours at 372-3524, and after hours to University Police at 372-3234.

X. Specific Hazardous Waste Management Practices

a. Certain wastes generated at the University have special handling or labeling requirements. Examples are:
    i. Unknowns - Special effort should be exercised to prevent the generation of

unknown wastes, since characterization of unknown wastes significantly increases the cost for of disposal. To have unknowns picked up; place a *Hazardous Waste label* on the container with the word *"Unknown"* in the chemical constituent's area. Add the unknown to your *Hazardous Waste Pick-up Request form*.

ii. Pharmaceutical Waste - There are many chemical and/or pharmaceutical compounds that are used in research or in the treatment of diseases that are also considered hazardous wastes by the EPA when disposed of. Call EHS (372-3524) for further guidance.

iii. Gas Cylinders - Generators should attempt to establish accounts with suppliers who will allow the return of unused product and empty cylinders. If possible, the entire contents of the cylinder should be used up. Generators must ensure that aging cylinders are picked up by the supplier before the integrity of the valve and cylinder is compromised. A compressed gas cylinder safety Standard Operating Procedure is available on the EHS website (https://www.tntech.edu/planning-and-finance/safety/).

iv. Peroxide Formers - These compounds must be disposed of within six (6) months after date of opening or one (1) year after date of receipt. Common peroxide formers are ethyl ether, ethylene glycol dimethyl ether (glyme), vinyl ethers, isopropyl ether, potassium metal, and sodium amide.

v. Dinitro and trinitro compounds - These compounds must be disposed of within six (6) months after date of opening or one (1) year after date of receipt. These compounds must be picked up by EHS before the contents have dried. These crystals can become shock sensitive when the moisture content is less than 10%. Picric acid (also known as 2,4,6-trinitrophenol (TNP)) is a common example of this type of compound.

vi. Ethidium bromide - Concentrated stock solutions must be handled as a hazardous laboratory waste. Stained gels must be handled as hazardous laboratory waste. EHS will provide a 5 gallon bucket for stained gels to be handled as a hazardous laboratory waste.

vii. Destained gels can be placed into the trash. If a lab chooses to decontaminate their ethidium bromide solution, the filter and/or resin beads must be managed as hazardous waste.

viii. Used Oil - Used oil includes all vacuum pump oil, synthetic oil, transmission and brake fluids, lubricating greases, etc. Used oil must be stored in securely closed containers provided with secondary containment. The secondary containment must have the capacity to hold 110 % of the volume of the largest container within the containment area.

1. Non-PCB containing used oil can be brought to the TTU Facilities Garage at 214 W. 10th Street for disposal. Make arrangements with Facilities (372-3227) PRIOR to bringing your used oil for disposal. Refer to the manufacture's SDS for information about whether the oil contains PCB's. Each used oil container must be labeled clearly with the words "Used Oil". Do not use a TTU yellow *Hazardous Waste* label. When transporting used oil ensure it is in secondary containment with a lid for transport. Secure the container in the vehicle to prevent shifting or tipping.
2. PCB containing used oil is disposed of through a hazardous waste

contractor. Do not use a TTU yellow *Hazardous Waste* label. Each used oil container must be labeled clearly with the words "Used Oil contains polychlorinated biphenyls".

ix. Spilled Materials - the spilled chemical and the absorbent must be packaged and handled as hazardous waste. The *Hazardous Waste* label and the *Hazardous Waste Pick-up Request* form must name the chemical(s) and the absorbent used.

XI. Chemical Waste Pick-up Procedures

a. For buildings with no Central Accumulation Area (i.e., Hazardous Waste room): To have hazardous waste picked-up from your satellite accumulation area, submit a *Hazardous Waste Pick-up Request*. Return information is found at the bottom of the form.

b. For buildings with a Central Accumulation Area (Hazardous Waste room): Designate an individual to complete and submit a *Hazardous Waste Pick-up Request*. Return information is found at the bottom of the form.

   i. If the Central Accumulation Area room is full and there is additional hazardous wastes within your lab (i.e., in your satellite accumulation area), submit a separate *Hazardous Waste Pick-up Request*. Return information is found at the bottom of the form.

c. When filling out the *Hazardous Waste Pick-up Request* form provide as much information about the contents of each container as possible. As a minimum, the chemicals' names, the number of containers, and the total weight or volume should be listed.

d. An inventory of all hazardous wastes is required prior to pick-up. An email from the EHS Coordinator is sent out about 1 month before a pick-up. The *Hazardous Waste Pick-up Request* form must be submitted within two weeks from the email.

e. Currently TTU is a small quantity generator, and pick-ups are every 180 to 270 days, or more if needed.

XII. Spill Response Clean-up Procedures

a. If there is an immediate danger to health, life, property, or risk of an environmental release, evacuate the area and contact EHS and emergency personnel immediately. Call 911 or TTU PD at 372-3234 and/or contact EHS at 372-3524. All spills occurring after normal working hours should be reported to the University Police Department (TTU PD) at 372-3234. A TTU PD representative will contact EHS if necessary.

b. Each laboratory should have a spill kit. In the event of a spill which does not meet the above criteria; stop the spill, contain the spill, notify other's in area, and clean up immediately. All flames should be extinguished and spark-producing equipment turned off. All non-essential personnel should be evacuated.

c. After cleaning up the spill, place the chemical and absorbents in a container with a *Hazardous Waste* label on it. A *Hazardous Waste Pickup Request* form should be submitted, as in other waste disposal. Ensure that the *Hazardous Waste* label identifies the absorbent and the chemical(s).

XIII. References

OSHA 29 CFR 1910.120 (Hazardous Waste)
EPA 40 CFR Parts 260-279
Tennessee Code Annotated (1200-01-11; 0400-12-01)

Appendix A: EPA P-Listed Chemical Waste (acutely-toxic)

HW No. CAS No. Substance
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 116-06-2 Aldicarb
P004 309-00-2 Aldrin
P005 107-18-6 Allyl alcohol
P006 20859-73-8 Aluminum phosphide (R,T)
P007 2763-96-4 5-(Aminomethyl)-3-isoxazolol
P008 504-24-5 4-Aminopyridine
P009 131-74-8 Ammonium picrate (R)
P119 7803-55-6 Ammonium vanadate
P099 506-61-6 Argentate(1-), bis(cyano-C)-potassium
P010 7778-39-4 Arsenic Acid H(3)AsO(4)
P012 1327-53-3 Arsenic oxide As(2)O(3)
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]-, (R)-
P046 122-09-8 Benzeneethanamine, alpha, alpha-dimethyl-
P014 108-98-5 Benzenethiol
P001 [1]81-81-2 2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)- and 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
P022 75-15-0 Carbon disulfide
P095 75-44-5 Carbonic dichloride
P023 107-20-0 Chloroacetaldehyde
P024 106-47-8 p-Chloroaniline
P026 5344-82-1 1-(o-Chlorophenyl)thiourea
P029 544-92-3 Copper cyanide

P030 -------- Cyanides (soluble cyanide salts), not otherwise specified
P031 460-19-5 Cyanogen
P033 506-77-4 Cyanogen chloride
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-pyrazinyl phosphorothioate
P043 55-91-4 Diisopropylfluorophosphate (DFP)
P004 309-00-2 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha, 4abeta, 5alpha, 8alpha,8abeta)-
P060 465-73-6 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro- ,(1alpha,4alpha,4abeta,5beta, 8beta,8abeta)-
P037 60-57-1 2,7:3,6-Dimethanonaphth[2,3b]oxirane,3,4,5,6,9,9-hexachloro- 1a,2,2a,3,6,6a,7,7a-octahydro- ,(1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta,7aalpha)-
P051 72-20-5 2,7,3,6-Dimethanonaphth[2,3b] oxirine,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
P044 60-51-5 Dimethoate
P046 122-09-8 alpha, alpha-Dimethylphenethylamine
P047 [1]534-52-1 4,6-Dinitro-o-cresol, and 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
P050 115-29-7 Endosulfan
P088 145-73-3 Endothall
P051 72-20-8 Endrin, & metabolites
P042 51-43-4 Epinephrine
P031 460-19-5 Ethanedinitrile
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
P065 628-86-4 Fluminic acid, mercury(2+) salt (R,T)
P059 76-44-8 Heptachlor
P062 757-58-4 Hexaethyl tetraphosphate
P116 79-19-6 Hydrazinecarbothioamide
P068 80-34-4 Hydrazine, methyl-
P063 74-90-8 Hydrocyanic acid (Hydrogen cyanide)

P096 7803-51-2 Hydrogen phosphide
P060 465-73-6 Isodrin
P007 2763-96-4 3(2H)-Isoxazolone, 5-(aminomethyl)-
P092 62-38-4 Mercury, (acetato-O)phenyl
P065 628-86-4 Mercury fulminate (R,T)
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- (R)
P118 75-70-7 Methanethiol, trichloro-
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,4,7,7atetrahydro
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
P072 86-88-4 alpha-Naphthylthiourea
P073 13463-39-3 Nickel carbonyl
P074 557-19-7 Nickel cyanide
P075 [1]54-11-5 Nicotine and salts
P076 10102-43-9 Nitric oxide
P077 100-01-6 p-Nitroaniline
P078 10102-44-0 Nitrogen dioxide
P076 10102-43-9 Nitrogen oxide NO
P081 55-63-0 Nitroglycerine (R)
P082 62-75-9 N-Nitrosomethylamine
P084 4549-40-0 N-Nitrosomethylvinylamine
P085 152-16-9 Octamethylpyrophosphoramide
P087 20816-12-0 Osmium tetroxide)
P088 145-73-3 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
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- and salts
P020 88-85-7 Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P009 131-74-8 Phenol, 2,4,6-trinitro-, ammonium salt (R)
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-nitrophenyl ester
P039 298-04-4 Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl]ester
P094 296-04-2 Phosphorodithioic acid, O,O-diethyl S-[(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 297-92-2 Phosphorodithioic acid, O,O-diethyl O-pyrazinyl ester
P097 52-85-7 Phosphorodithioic acid, O-O,4 [(diimethylamino)sulfonyl])phenyl]O,O-dimethyl ester
P071 296-00-0 Phosphorodithioic acid, O,O-dimethyl O-(4-nitrophenyl)ester
P110 78-00-2 Plumbane, tetraethyl-
P098 151-50-8 Potassium cyanide
P099 506-61-6 Potassium silver cyanide
P070 116-06-3 Propanal, 2-methyl-2-(methylthio)-,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 (R)
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)-, and salts
P114 12039-52-0 Selenious acid, dithallium(1+) salt
P103 630-10-4 Selenourea
P104 506-64-9 Silver cyanide
P105 26628-22-8 Sodium azide
P106 143-33-9 Sodium cyanide
P108 [1]57-24-9 Strychnidin-10-one (Strychnine), and salts
P018 357-57-3 Strychnidin-10-one, 2,3-dimethoxy-
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 (R)
P062 757-58-4 Tetraphosphoric acid, hexaethyl ester
P113 1314-32-5 Thallic oxide
P114 12039-52-0 Thallium(I) selenite
P115 7446-18-6 Thallium(I) sulfate
P109 3689-24-5 Thiodiphosphoric acid, tetraethyl ester
P045 39196-18-4 Thiofanox
P049 541-53-7 Thiomidodicarbonic diamide [(H(2)N)C(S)](2)NH
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-

P123 8001-35-2 Toxaphene
P118 75-70-7 Trichloromethanethiol
P119 7803-55-6 Vanadic acid, ammonium salt
P120 1314-62-1 Vanadium pentoxide
P084 4549-40-0 Vinylamine, N-methyl-N-nitroso
P001 [1]81-81-2 Warfarin, & salts, when present at concentrations greater than 0.3%
P121 557-21-1 Zinc cyanide
P122 1314-84-7 Zinc phosphide (R,T)

Appendix B: EPA Listed TCLP Toxicity Characteristic Wastes

Chemical Name	CAS #
Arsenic	7440-38-2
Barium	7440-39-3
Benzene	71-43-2
Cadmium	7440-43-9
Carbon tetrachloride	56-23-5
Chlordane	57-74-9
Chlorobenzene	108-90-7
Chloroform	67-66-3
Chromium	7440-47-3
o-Cresol	95-48-7
m-Cresol	108-39-4
p-Cresol	106-44-5
Cresol	
2,4-D	94-75-7
1,4-Dichlorobenzene	106-46-7
1,2-Dichloroethane	107-06-2
1,1-Dichloroethylene	75-35-4
2,4-Dinitrotoluene	121-14-2
Endrin	72-20-8
Heptachlor (and its epoxide)	76-44-8
Hexachlorobenzene	118-74-1
Hexachlorobutadiene	87-68-3
Hexachloroethane	67-72-1
Lead	7439-92-1
Lindane	58-89-9
Mercury	7439-97-6
Methoxychlor	72-43-5
Methyl ethyl ketone	78-93-3
Nitrobenzene	98-95-3
Pentrachlorophenol	87-86-5
Pyridine	110-86-1
Selenium	7782-49-2
Silver	7440-22-4
Tetrachloroethylene	127-18-4

Toxaphene	8001-35-2
Trichloroethylene	79-01-6
2,4,5-Trichlorophenol	95-95-4
2,4,6-Trichlorophenol	88-06-2
2,4,5-TP (Silvex)	93-72-1
Vinyl chloride	75-01-4

Appendix C: Satellite Accumulation Area (SAA) Posting (40 CFR 262.34 (c)(1))
Please review the following requirements to ensure that you comply with environmental regulations and safe handling procedures for hazardous waste. **Post this sheet to designate your accumulation area.**

1. **SCHEDULING DISPOSAL.** For disposal of hazardous waste please submit a *Hazardous Waste Pick-up Request* form: https://www.tntech.edu/planning-and-finance/safety/forms Filled or unwanted waste must be removed from the satellite area within three days so it is important that you contact us once your container(s) are filled or ready for removal.

2. **APPROPRIATE CONTAINERS.** Containers must be compatible with the hazardous waste being accumulated. Hazardous waste containers must be closed at all times during storage, except when waste is being added or removed. Regulations do not permit funnels in waste containers unless it is being filled. The maximum size allowed for containers is 55 gallons for hazardous waste and one quart for acutely hazardous waste.

3. **LABELING.** All hazardous waste containers must be labeled at the time the waste is first placed into the container. Please call EHS at 372-3524 if you need labels.

4. **DESIGNATED STORAGE AREA.** For safety and environmental reasons, hazardous waste must be stored in a designated "Satellite Accumulation Area", (e.g. flammable storage cabinet, bench top). These must be located at or near the point of generation. Storage areas that could result in a leak into a sink or floor drain must have secondary containment to guard against this. Designated "Satellite Accumulations Areas" must be inspected **weekly** for leakage and compliance with these requirements.

5. **WEEKLY INSPECTIONS** must be documented. The documentation requires initials and the date of inspection for each SAA.

6. **BIOHAZARDOUS** waste and **RADIOACTIVE** waste must not be mixed with or stored in the same location(s) as Hazardous Waste.

7. **TRAINING.** Environmental regulations require training of people who generate, handle or manage hazardous waste. Training is offered online by EHS: https://www.tntech.edu/planning-and-finance/safety/training

8. **IMPROPER DISPOSAL**. Sinks or trash cans should never be used for hazardous waste disposal. Please contact EHS to confirm what chemicals can be managed as non-hazardous waste.

9. **WASTE MINIMIZATION.** Generators of hazardous waste are required to incorporate waste minimization into the process generating their waste. Waste minimization includes changing procedures, reducing scale and substituting materials.

10. **EMERGENCY SPILL RESPONSE.** Know the location of your spill kits, emergency shower, fire extinguisher, fire alarm, and exits. *Chemical Spill – minor*: Stop the spill; Cover the spill; Tell non-essential persons to leave the lab; Decontaminate; Dispose of cleanup debris as Hazardous Waste *Chemical Spill or Fire – major*: Evacuate area, isolate area to prevent entry; (If a fire) Pull the fire alarm; Call 911 or TTU PD at 372-3234.

Appendix D: Hazardous Waste Familiarity Training for SAA Workers

It is the responsibility of each Laboratory Manager or Principle Investigator (PI) to ensure that all personnel who work with generate, or otherwise come into contact with Hazardous Waste receives adequate familiarization training on the requirements which this manual covers. Each worker must thoroughly understand the rules and regulations associated with Hazardous Waste before any duties requiring them to come into contact with such materials are assigned to them.

This sheet is to be maintained in the laboratory by the lab's Manager or PI, and provided upon request.

By my signature below, I acknowledge that I am thoroughly aware of and understand the rules and regulations associated with Hazardous Waste as covered in this manual. Furthermore, I agree to comply with these rules as they apply to the storage, labeling, segregation, and minimization of all Hazardous Wastes in my workplace.

Last	First	T number	Signature	Date

Last	First	T number	Signature	Date