HAZARDOUS WASTE MANAGEMENT PROCEDURES

Department of Environmental Health & Safety

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INTRODUCTION

The proper, responsible disposal of hazardous radioactive, infectious, and chemical waste is a continuing concern across the nation. The Department of Environmental Health & Safety (EHS) manages the disposal of hazardous wastes for the campus community. Infectious biological, chemical and radioactive hazardous wastes are disposed of in accordance with all applicable State and Federal laws and regulations. (The State of Maryland uses the term "Controlled Hazardous Substance" (CHS) as a synonym for hazardous waste.) The hazardous waste (or CHS) disposal procedures listed below are designed to make this service function efficiently and safely.

The areas where hazardous wastes are generated on the TU campus are broadly classified into one of two categories: **a) Satellite Storage Areas**, and **b) 90-Day Storage Areas**.

a) Satellite Storage Area: An area where a hazardous waste is generated and the waste is under the direct control of the person(s) who generated the waste. Wastes generated must be properly labeled as specified in paragraph 8 below. The maximum volume of any single waste that may be accumulated in one single Satellite Storage Area is restricted to 55 gallons of a hazardous waste or 1 quart of an acute hazardous waste. There is no limit on the time a waste may be accumulated. As an example, each academic science lab, office, print shop, art studio, photographic darkroom or maintenance shop is classified as a Satellite Storage Area.

b) 90-Day Storage Area: Any area where hazardous wastes are consolidated and centrally stored outside of the Satellite Storage Area. There is no maximum volume of hazardous waste that may be accumulated in these areas. The only restriction is that wastes may not be accumulated for more than 90 days at this location. Presently, there is only one designated 90-Day Storage Areas on campus. It is located in Room 532 in Smith Hall. This area requires special storage and containment features and must be inspected weekly and an inspection log maintained.

The procedures for managing hazardous wastes in these two categories are essentially the same with the exception of the items specifically discussed in the following pages.

GENERAL GUIDELINES

1. **Anyone who requests disposal of a hazardous waste is considered a hazardous waste "generator" and is required by University Policy to attend Hazardous Waste Generator Training provided by EHS. Only trained generators may request disposal of hazardous wastes and are responsible for the proper labeling, storage & disposal of their hazardous wastes and for complying with *ALL* of the procedures in this publication.** To register for Hazardous Waste Generator Training, go to:

   www.towson.edu/ehs/programs/chemical/waste.html

2. No chemicals, no matter how innocuous they might seem, shall be placed in domestic waste containers (dumpsters, trash cans, etc.), poured down drains, rinsed down sanitary sewers or in any other way released into the environment. Improper CHS waste disposal could result in a fine/imprisonment or both. CHS waste includes, but is not limited to, laboratory reagents, solvents, non-latex paints, fuels, photographic chemicals, corrosives, poisons, pesticides, pump oils, electrical equipment containing oils, heating oils, refrigerants, water treatment chemicals such as descaling agents or any compressed gases. Materials used to clean up spills of CHS are considered to be CHS waste. See Appendix A Hazard Determination for a detailed definition of what constitutes a hazardous waste. If there are any questions as to what is a hazardous waste or CHS, please contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

3. CHS waste should not be placed in areas accessible by the public (e.g. hallways, restrooms, stairways, outside buildings, loading docks, parking lots or in open motor vehicles) or areas that may be subject to temperature extremes.

4. All CHS waste that you wish to have disposed of must be segregated from chemicals in use and in a safe, but conspicuous location. Do not place CHS waste in a location where it could be mistaken for ordinary trash and accidentally disposed of by Housekeeping personnel.

5. All CHS waste for disposal must be placed in appropriate glass, metal, or chemically inert, non-reactive, non-flexible plastic containers with tightly fitting screw caps. Leaking, visibly damaged or rusted containers are not acceptable. Used reagent bottles are ideal. Corrosives should not be placed in metal containers. Used containers should be clean. DO NOT REFILL USED REAGENT CONTAINERS WITH POTENTIALLY INCOMPATIBLE WASTE CHEMICALS. (For additional information regarding chemical compatibilities, refer to the TU Lab Safety Manual.) Plastic milk jugs are not acceptable. Open containers or containers with cut glass, aluminum foil, "Parafilm", rubber or cork stoppers are unacceptable. Bulk Waste containers over 15 gallons must be Department of Transportation approved. It is the generators responsibility to ensure his/her waste is packaged properly. DO NOT OVERFILL CONTAINERS!!! Leave at least 1 ½" of air space in all containers containing liquids to allow for expansion. EHS will not accept overfilled waste containers for disposal until the excess waste has been transferred to a suitable container and the exterior of the container is cleaned. EHS will not accept waste in improper or damaged containers until the waste has been transferred to an acceptable container. It is the generators responsibility to make the necessary corrections. EHS has approved waste containers available for the disposal of University waste at no charge. Contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu if you need containers for your CHS.

6. To minimize waste disposal costs EHS will only pickup full containers of waste. In addition, solid wastes must be separated from liquids and the following groups of chemicals must be collected separately and not mixed with other wastes as much as possible:

Acids	Ethers
Bases	Heavy Metals (Other than Mercury)*
Formaldehyde	Mercury Containing Wastes*
Amines	Phenol/Chloroform
Alcohols	Sulfides*
Cyanide Compounds*	

Solvents: Collect halogenated and non-halogenated solvents separately.

*Addition of these highly toxic chemical groups to general solvents may increase disposal costs to ten times the original cost.

7. The exterior of each waste container must be clean and free from any chemical contamination so that labels will adhere. All markings not pertaining to actual waste contents must be completely removed or obliterated.

8. The Generator will ensure that each waste container is indelibly and legibly labeled with the following:

   A. The exact chemical contents preceded by the word "Waste" (e.g. Waste Ethanol, Waste Hydrochloric Acid, etc.). Generic identifications such as "Waste Solvents", "Waste Pesticides", and "Unknown" are unacceptable. If wastes are in solution, the solvent must be identified, even if it is water.

   B. The estimated chemical concentrations (% by weight) of the wastes in the container. Concentrations must total 100%.

   C. The pH of the waste if it contains any corrosive chemicals.

   D The date waste was initially placed into the container. When a waste is moved from a Satellite Storage Area to a 90-Day Storage Area, the original date must be deleted and the date the waste was moved into the 90-Day Storage Area be applied.

   NOTE: EHS has pre-printed, approved hazardous waste labels available at no charge. (See Appendix D) To request blank labels, call (410) 704-2949 or e-mail safety@towson.edu.

9. Labels must not contain abbreviations, chemical formulas or "Trade" names. If the waste is packaged in its original container without any other wastes and the exact chemical contents are listed on the label, under "Ingredients", the only additional labeling normally required will be the words "Hazardous Waste", and the pH if the waste contains any corrosive chemicals.

10. All containers labeled as containing a hazardous waste must be stored in a secondary containment device (i.e. tub or basin) to prevent environmental contamination in the event of a spill or leaking container. Each basin must be leakproof and constructed of a chemically inert material. It must be capable of containing either the total volume of the largest waste container in the basin or 10% of the total waste volume in the basin, whichever is greater. EHS will provide secondary containment basins (SCD's) at no charge. To request SCD's, call (410) 704-2949 or e-mail safety@towson.edu.

11. Unknowns will not be accepted for disposal. Federal and State law requires complete identification of all wastes prior to disposal. Generators should make every attempt to identify unknowns. If required, samples of unknowns will be picked up on a case-by-case basis and sent for off-campus analysis at the individual generators expense. Questions concerning the identification of unknowns should be directed to EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

12. Waste solids must be free of all liquids and sealed in sturdy, leakproof, puncture proof containers. Normally, 2 or 3 layers of heavy-duty trash bags are sufficient. Tape the bags closed and label in the manner stated above.

13. Sharp, potentially injurious wastes such as glass, thermometers or pipettes that are chemically contaminated and not contaminated with a potentially infectious material must be placed in leakproof containers that are puncture proof. Normally, a sealed, thick plastic bag inside a sealed cardboard box is adequate. Label the exterior of the container in the manner stated above. If the waste is contaminated with a potentially infectious material or is a syringe or needle, it must be disposed of as a PATHOLOGICAL/BIOLOGICAL/INFECTIOUS WASTE as outlined in the section below. Please do not remove needles from syringes. EHS has approved syringe and needle waste containers available at no cost. ALL LIQUIDS MUST BE REMOVED FROM NEEDLES & SYRINGES!

14. Potentially unstable peroxide forming wastes, explosives, shock sensitive or other dangerous reactive chemicals such as those listed in Appendix B are extremely dangerous and are disposed of utilizing different procedures and on an as-needed basis. If you have any of these wastes, contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu to schedule disposal.

15. Empty chemical containers with the exception of pesticide containers may be disposed of via normal domestic waste channels. All labels must either be removed or defaced and the cap removed. The container must be free from all free flowing liquids or visible solids. Empty liquid and solid pesticide containers should be disposed of through the EHS.

16. Wherever possible, wastes should be minimized and re-cycled.

17. CHS waste must not be brought to the EHS office. EHS will remove it from your campus location.

PROCEDURES FOR SHIPPING WASTES FROM OFF-CAMPUS TO TU FOR DISPOSAL

1. Towson University has a small, fully permitted Part B Treatment, Storage & Disposal Facility (TSDF). The facility is authorized by the Maryland Department of the Environment to accept hazardous chemicals wastes from other University of Maryland System schools for storage pending final disposal off campus.

   Due to the small size of the facility, wastes generated at other UMS schools will be accepted by TU on a case-by-case basis and the generating institution will be required to reimburse TU for all costs associated with the transportation and disposal of these wastes.

   If necessary, TU EHS can provide DOT approved packaging and safe transportation of the hazardous wastes from the Generator's location to the TU TSDF. TU is fully permitted to transport hazardous wastes by MDE and has several permitted vehicles. The Generator will be required to reimburse TU for all expenses associated with the packaging and/or transportation that is provided.

   All off-campus generators are expected to fully comply with procedures in the most recent edition of this publication. Failure to comply with these procedures will result in the rejection of the waste for disposal.

2. As a condition of our permit, TU is limited to the types of wastes we can accept and must follow strict procedures when accepting these wastes. TU is only permitted to accept the following EPA Waste Codes:

   A. D001-D043;

   B. F001-F012, F014, F015, F019-F028, F037, F038;

   C. P001-P005, P007-P018, P020-P024, P026-P031, P033, P034, P036-P051, P054, P056-P060, P062-P064, P066-P072, P074-P078, P082, P084, P085, P087-P089, P092-P099, P101-P106, P108-P111, P113-P116, P118-P123;

   D. U001-U012, U014-U039, U041-U053, U055-U099, U101-U103, U105-U138, U140-U174, U176-U194, U196, U197, U200-U211, U213-U228, U234-U240, U242-U249, U328, U353, U359;

   E. M001, MT01.

3. **TU is NOT permitted to accept the following categories of hazardous wastes:**

   A. Radioactive & Mixed Low Level Wastes
   B. Pathological/Biological/Infectious Wastes
   C. Controlled Dangerous Substances
   D. Explosive Wastes (as defined in COMAR 26.13.02.13 A (8))
   E. Wastes Generated Outside of the United States
   F. Unknowns

4. All requests for disposal of wastes generated at other UMS schools must be made in writing to the following address:

Towson University
Department of Environmental Health & Safety
8000 York Road,
Towson, Maryland 21252

All requests must include the Generator's name, address, telephone number and EPA ID Number. In addition, the generator must specify the exact chemical name(s); the total quantity of each waste; and, the number, size and type of each type of waste container that is to be disposed. For proprietary wastes, enclose a legible Material Safety Data Sheet.

Prior to disposal, a representative from TU EHS will make a site visit to inspect the waste that is scheduled for disposal to ensure it fully complies with EPA, DOT and MDE requirements and to assist the Generator in preparing their waste for disposal.

Once the request has been received and approved, the generator will be notified in writing that his wastes have been accepted for disposal by TU.

5. Questions concerning the disposal of hazardous chemical wastes through TU should be directed to EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

PATHOLOGICAL/BIOLOGICAL/INFECTIOUS WASTES

This document details the steps to be taken for the Towson University campus community to comply with the Code of Maryland Regulation (COMAR) Title 26, Subtitle 13 Chapter 11 Special Medical Waste (SMW), and COMAR Title 10, Subtitle 6, Chapter 6 Diseases. Both of the regulations are complementary. Each regulation was written by a different state agency. Title 26 is promulgated by the Maryland Department of the Environment (MDE), and Title 10 is promulgated by the Maryland Department of Health and Mental Hygiene (DHMH). The regulations essentially parallel the currently existing state hazardous waste (CHS) regulations in that each generator and transporter of SMW must apply for an additional state identification number and must use SMW permitted transport vehicles and certified drivers. SMW may only be disposed of via state licensed SMW disposal facilities. Land filling of SMW is strictly prohibited. SMW manifests (similar to the present CHS waste manifest) must be utilized whenever SMW is transported over public roadways. The following material is to be classified as Special Medical Waste (SMW) and dealt with in accordance with the above noted regulations:

1. Blood (animal or human) or blood-soiled articles;

2. Anatomical materials (animal or human);

3. Microbiological laboratory waste;

4. Contaminated materials; or

5. Sharps (needles, syringes, surgical instruments, etc.).

I. GENERAL INFORMATION PERTAINING TO THE SMW REGULATIONS

Emergency regulations governing the handling, treatment and disposal of special medical waste went into effect on September 30, 1988. Major features of the new regulations are highlighted here.

1. WHAT IS SPECIAL MEDICAL WASTE?

   Special Medical Waste (SMW) is defined by the regulations as anatomical material, blood or blood soiled articles, contaminated material (contaminated feces or articles contaminated with infectious agents), microbiological laboratory waste, needles, sharps, and syringes.

2. WHO MUST FOLLOW THE REGULATIONS?

   Any person who generates SMW in the normal course of business must follow the DHMH regulations for handling, treatment, and disposal of SMW (COMAR 10.06.06); any company/individual who generates more than 110 pounds of SMW must follow the Maryland Department of Environment (MDE) regulations for hauling and disposal of SMW (COMAR 26.13.11 et seq.).

3. WHAT IS THE DIFFERENCE BETWEEN "HANDLING" AND "TREATMENT" OF SMW?

   "Handling" refers to handling or maintaining the SMW immediately after it is generated and before it is "treated" or hauled away for treatment. "Treatment" refers to the process of assuring that the SMW is not infectious.

4. WHAT ARE THE REQUIREMENTS FOR HANDLING OF SMW?

Blood, anatomical and contaminated materials must be placed in a leak proof container to prevent spillage. Sharps, needles and syringes must be placed in a container that is impervious to puncture.

5. WHAT ARE THE REQUIREMENTS FOR TREATMENT OF SMW?

The regulations allow several different methods of treatment for each type of SMW. Liquid blood may be deposited in a sanitary sewage system (flushed in toilet), incinerated, autoclaved, or chemically disinfected. Blood-soiled articles may incinerated, autoclaved or chemically disinfected. Anatomical materials may be buried, cremated, mechanically destroyed and deposited in sanitary sewer (grinding and flushing), or incinerated.

Needles, sharps, and syringes may be incinerated, autoclaved, or chemically disinfected. If treatment is by incineration or chemical disinfection, needles, sharps and syringes must be mechanically destroyed prior to disposal. Contaminated materials must be incinerated, autoclaved, or chemically disinfected.

6. WHAT ABOUT DISPOSAL OF SMW AFTER IT HAS BEEN TREATED?

If you generate less than 110 pounds of SMW, after treatment, you may dispose of SMW in accordance with local and State laws and regulations. If you generate more than 110 pounds of SMW per month, you must comply with regulations (if appropriate) for manifesting, packaging, transporting, record keeping and reporting.

7. WHAT ARE THE PENALTIES FOR NON-COMPLIANCE?

Under DHMH regulations, the Secretary may fine any person who violates the regulations up to $500 per day of the violation. In addition, the Secretary may suspend, revoke or suspend any license, permit or certificate issued to any person who violates the regulations.

FOR MORE INFORMATION, OR A COPY OF THE DHMH REGULATION, PLEASE CONTACT THE DEPARTMENT OF ENVIRONMENTAL HEALTH & SAFETY AT (410) 704-2949 OR BY E-MAIL AT SAFETY@TOWSON.EDU.

II. DISPOSAL PROCEDURES FOR SMW:

Individual generators of SMW at TU will ensure that all SMW is disposed of in accordance with this procedure. New employees should undergo training on these procedures prior to handling SMW.

Occupational Health & Safety Administration (OSHA) regulations concerning potential exposures to bloodborne pathogens requires TU to establish safe working procedures for personnel who handle SMW contaminated with blood or other potentially infectious materials. Employees who may be at risk from exposure to contaminated SMW must attend training presented by the Department of Environmental Health & Safety (EHS) as required by OSHA regulations. This requirement for specialized training is limited to those individuals whose duties will involve handling the disposal of materials contaminated with human blood or other potentially infectious materials. For further information on Bloodborne Pathogens Training, contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

Generators of SMW are responsible for complying with the following procedures:

BLOOD AND BLOOD SOAKED MATERIALS:

1. Must be placed into leakproof plastic containers, properly labeled as containing biohazardous material. This material will be collected by EHS personnel for proper disposal, or;

2. This material may also be disposed of by either: a. If in liquid form, may be deposited into a sanitary sewer; or b. Incinerated c. Autoclaving; or d. Chemical disinfection. If treated by above noted method c., or d., then it may be disposed of as domestic solid waste.

ANATOMICAL MATERIALS:

1. Must be placed into leakproof (minimum 3 mil thick) plastic bag, which is properly labeled as containing biohazardous material. This material will be stored in an approved, appropriately labeled cardboard box that will be picked up by EHS personnel for proper disposal when full.

2. Bags must be placed in rigid containers which are clearly labeled as containing biohazardous material; and,

3. If the container is to be reused for any purpose, it must be disinfected prior to reuse. The disinfection agent must be used in such a manner as to assure the eradication of any biological agent that may have remained within the container.

4. May be treated and disposed only by: a) Internment, or b) Cremation, or c) Incineration, followed by disposal as domestic solid waste.

CLINICAL MICROBIOLOGICAL LABORATORY WASTE/CONTAMINATED MATERIALS

This section entails the following categories of SMW: a.) Feces or other body fluids from an individual diagnosed as having, or suspected of having, a disease capable of being transmitted to another human through the feces or other body fluid; b.) An article soiled with feces or other body fluid from an individual diagnosed as having, or suspected of having, a disease capable of being transmitted to another human through the feces or other body fluid.

1. Must be placed in leakproof bags of at least 3 mils thickness; and,

2. Bags must be placed in rigid containers clearly labeled that they contain biohazardous material, and,

3. If rigid containers are to be reused, they must be disinfected prior to reuse; and,

4. May be disposed of by: a. If fecal material, deposited down a sanitary sewer; or b. Incineration; or c. Autoclaving; or d. Chemical disinfection; and e. Disposing of as solid domestic waste.

SHARPS:

1. Must be placed in a puncture proof container that is clearly labeled as containing biohazardous materials.

2. Full sharps containers will be placed into appropriate SMW solid waste containers for proper disposal.

SPECIFIC TU HEALTH CENTER & TOWSON CENTER DISPOSAL PROCEDURES:

A. All treatment rooms, examining rooms, laboratories, restrooms, and Medical Records areas will have containers for the disposal of SMW. Each container will be properly labeled with a "Biohazard" sign and have a properly functioning lid, which will be closed at all times unless in actual use, and will be made of metal, thick impervious heavy plastic, or thick cardboard. Each container will be lined with a red plastic biohazard bag. Care must be taken so the proper type of container is used. Sharps (Needles/puncture type items) are to be placed in the hard red plastic containers, which are labeled "Biohazard". Objects, such as gauze and bandages, are to be placed in the containers lined with red plastic biohazard bags.

B. Items contaminated with blood and or body products and would not be able to puncture the plastic bag, are to be placed in the red "Biohazard" labeled plastic bag. These bags are to be placed in hard, covered containers. The lids on these containers must be closed at all times except when in actual use.

C. Health Center and Training Room Staff will monitor Biohazard Containers and dispose of them when they become approximately 2/3rd's full. This will assist in the prevention of employee exposure and contamination of the local area where the container is placed. Employees are also to use appropriate disposable gloves at all times while working with potentially infectious material, and are to report all exposures to potentially infectious agents immediately to their supervisor.

D. Laboratory coats, towels, cloth aprons, and/or bed lines that have become visibly soiled with blood or body fluids will be treated as being a biohazardous material. These items will be placed in a red biohazard plastic bag for proper disposal.

DECONTAMINATION:

A. Surfaces that have been contaminated with blood or body fluids must be properly decontaminated by the occupant as soon as possible after the incident occurs. The area must be decontaminated with an agent strong enough to kill HIV and HBV, as well as other pathogens, such as Mycobacterium and streptococcus, to name a few. Decontamination can be performed by applying a mixture of 1 part household bleach ("CHLOROX" or similar product) and 9 parts water to the area and allowing it to stand for 20 minutes. The surface is then to be cleansed with soap and water. This mixture should be freshly prepared. Another appropriate type of solution or commercial product may be used in place of the bleach solution, as long as it can document that it is effective against HBV, HIV, and other bloodborne pathogens. Disposable gloves must be worn when an area is being decontaminated, and eye protection is to be worn if there is any likelihood of splash. All materials used to clean the area must be disposed of as SMW when appropriate, or decontaminated in the same manner as was the originally contaminated area.

B. Laboratory jackets that become soiled with visible blood or body fluids must be placed in a plastic biohazard labeled bag for proper disposal or decontamination.

C. Contaminated non-disposable safety equipment will be decontaminated in accordance to Section A above. This would include such items as pocket respirators used in CPR, bag-valve masks, goggles, face shields, and the like.

D. Contaminated disposable items, such as, gloves, paper aprons, and surgical masks, will be disposed of in the proper receptacle used for SMW.

Additional SMW containers and bags can be obtained upon request by contacting EHS at (410) 704-2949 or by e-mail at safety@towson.edu. There is no charge for these materials.

DISPOSAL OF SMW

A. Contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu to request disposal of SMW.

RADIOACTIVE & MIXED LOW LEVEL WASTES

1. All personnel that use radioactive materials (i.e., Authorized Users/Principle Investigators) must be authorized to do so by EHS and the State of Maryland. All waste that is generated must be properly managed.

2. Radioactive waste is defined as any material that contains or is contaminated with a radioactive material. This includes animal carcasses, liquid scintillation vials, bulk liquids, sealed sources, and dry solids. Naturally occurring or accelerator-produced radioactive materials (NARM) are also included even though some of this material can be purchased and used in a non-regulatory capacity. Examples include all Uranium and Thorium compounds.

3. All radioactive waste must be stored in containers provided and/or approved by EHS. Appropriate labels for the containers will also be available through EHS. Procedures and sites for the disposal of this waste are different than those for chemical and infectious wastes. Therefore, strict segregation of radioactive waste from all other waste types is required. The different types of radioactive wastes will also require segregation (e.g. dry solids must be segregated from liquid scintillation vials, etc.).

Authorized Users are responsible for all radioactive wastes they generate and shall:

1. Label all radioactive wastes legibly and indelibly with each isotope and it's activity present in the waste.

2. Properly manage all waste scintillation cocktails. Radioactive waste containing liquid scintillation cocktail, bulk or vial, and other mixed liquid wastes must be labeled with all of the chemical constituents with percent concentration. This includes the type of liquid scintillation fluid that has been used. When bulking liquid scintillation fluids, segregation of "EHS Approved" biodegradable cocktails and organic-based cocktails is required. By segregating this waste, disposal costs can be minimized because biodegradable cocktails presently do not exhibit a characteristic of a hazardous waste and can be disposed as non-hazardous radioactive material. Radioactive and old, unused organic based scintillation cocktails will be disposed of through EHS.

3. Segregate all dry solid radioactive wastes with respect to the half-lives of the isotopes that are used. Isotopes with half-lives less than 90 days will be decayed-in-storage by the principal investigator and, as a result, will need to be segregated from longer-lived isotopes. The date that the waste was generated will be recorded on the container, the container will be sealed to avoid the addition of new material, and the waste decayed for seven (7) to ten (10) half-lives. The period of decay will depend on the original activity of the isotope present in the waste. High activity isotopes will require longer periods of storage. EHS recommends segregation of this waste by isotope because certain widely used short-lived isotopes have shorter half-lives than others and, as a result, will reduce the time needed for decay.

EXAMPLE: The half-lives of P_{32} and S_{35} are 14.3 days and 87.2 days, respectively. Both will be decayed-in-storage. If the two isotopes were mixed, you would be required to store the waste until all of the S_{35} decayed or approximately 600 days. If the waste was segregated, the P_{32} contaminated waste could be disposed after approximately 98 days. This would reduce the amount of material present in the laboratory.

After the waste has been stored for the required amount of time, the Authorized User will be responsible for surveying the waste with an appropriate radiation detector for the particular isotope. This will ensure that the isotope has decayed below normal background radiation levels. Additional storage time may be required if radiation levels above background are found. When detection levels are at or below background levels, all radiation warning labels must either be removed or permanently defaced. If may benefit the user to perform this task prior to adding the material to the waste container. The waste can then be disposed via domestic waste channels.

Dry Solid waste containing isotopes with half-lives greater than 90 days will be sent for disposal at an approved land-burial site through EHS.

7. Animal carcasses contaminated with radioactive materials will be placed into a leakproof plastic bag and frozen until disposal can be coordinated through EHS.

8. For more specific information on how to segregate and dispose of radioactive wastes, contact EHS at (410) 704-2949, by e-mail at safety@towson.edu, or consult the Radiation Protection Program at:

www.towson.edu/ehs/programs/biologicalsafety/index.html

ANIMAL CARCASSES

The method of disposal of dead animal carcasses depends on whether or not the carcass is contaminated by any regulated materials such as radioactive materials, potentially infectious organisms, or chemical carcinogens.

The disposal of non-contaminated, non-infectious or "clean" animal carcasses are strictly regulated and must be disposed of in accordance with existing procedures approved by the TU Institution Animal Care & Use Committee (IACUC). For information on the proper disposal of "clean" animal carcasses, contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

For radioactive contaminated animal carcasses, the Authorized User must segregate them with respect to the half-lives of the isotopes that are used. Carcasses containing isotopes with half-lives less than 90 (<90) days will be decayed-in-storage in freezers by EHS and, as a result, will need to be segregated from longer-lived isotopes. The Authorized User shall place the carcasses into leakproof plastic bags at least 3 mils thick and securely sealed. The date that the carcass was placed into the bag will be clearly and permanently recorded on the bag or on a durable tag securely attached to the bag. The bag will be clearly labeled as to contents, isotope and activity and the bag will be securely sealed to avoid the addition of new carcasses. The carcasses will be decayed for seven (7) to ten (10) half-lives. The period of decay will depend on the isotope and original activity of the isotope present in the waste. High activity isotopes will require longer periods of storage. EHS recommends segregation of this waste by isotope because certain widely used short-lived isotopes have shorter half-lives than others and, as a result, will reduce the time needed for decay.

Animal carcasses contaminated with radioactive isotopes that have half-lives greater than 90 (>90) days will be disposed of by EHS. The Authorized User shall segregate these carcasses from all other carcasses and place them into leakproof plastic bags at least 3 mils thick and seal them securely. The date that the carcass was placed into the bag will be clearly and permanently recorded on the bag or on a durable tag securely attached to the bag. The bag will be clearly labeled as to contents, isotope and activity and the bag will be securely sealed to avoid the addition of new carcasses.

EXAMPLE: The half-lives of P_{32} and S_{35} are 14.3 days and 87.2 days, respectively. Both will be decayed-in-storage. If the two isotopes were mixed, you would be required to store the waste until all of the S_{35} decayed or approximately 600 days. If the waste was segregated, the P_{32} contaminated waste could be disposed after approximately 98 days. This would reduce the amount of material present in the laboratory.

Once the carcasses have been placed into plastic bags and labeled as specified above, contact EHS at (410) 704-2949 or by email at safety@towson.edu for disposal.

CONTROLLED DANGEROUS SUBSTANCES

The disposal of "Controlled Dangerous Substances" as defined by the U.S. Drug Enforcement Agency (DEA) is the licensee's responsibility. Only individuals licensed by DEA may use controlled dangerous substances for research or medical purposes.

Old or unused controlled dangerous substances must be returned to the DEA for disposal. No controlled dangerous substances may be disposed of through any other disposal means.

If you are unable to dispose of old or unused controlled dangerous substances, please contact EHS for assistance at (410) 704-2949 or by e-mail at safety@towson.edu.

WASTE PAINTS & SOLVENTS

Waste paints and paint related solvents account for a large portion of the volume of hazardous waste generated each year on campus. Not all paints are hazardous and require special disposal procedures. The procedures for disposing of waste paints and paint related solvents are listed below:

1. The Generator shall determine if the paint is a latex based paint, oil based paint or if the paint contains lead, silver, chromium or other toxic heavy metal. (This can be done by either reading the container label or consulting the Material Safety data Sheet [MSDS]). If the paint is latex based it is not a hazardous waste. Latex based paints may be disposed of in normal domestic waste containers **AFTER** they have solidified. Open the latex paint container and allow the paint to solidify (**not just "skin over"**). Solidification may be accelerated by mixing kitty-liter or other inert material with the latex paint. Once the paint is solid throughout, it may be disposed of. **Do not dispose of liquefied latex paint**.

2. Oil based paints, solvents and paints that contain lead, silver, chromium or other toxic heavy metals **are hazardous wastes** and must be disposed properly through the Department of Environmental Health & Safety (EHS). These paints and solvents such as turpentine, xylene, toluene, mineral spirits, etc should be collected in bulk containers to minimize disposal costs. It is the generator's responsibility to bulk waste paints and solvents. EHS has bulk containers in 1 and 5 gallon sizes. To request a bulk container, contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu.These containers are provided free of charge.

   Paints containing lead, silver, chromium or other toxic heavy metals should be collected separately from other oil-based paints and placed into bulk containers. EHS has bulk containers in 1 and 5 gallon sizes. To request a bulk container, contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu. These containers are provided free of charge.

   EHS has bulk waste oil paint and solvent recycling containers in the Paint Shop in the General Services Building and a waste solvent recycling container in the Center For The Arts Building. **These containers are NOT for paints containing lead, silver, chromium or other toxic heavy metals.** If you are near either location, you should dispose of your waste materials in these containers. This is the preferred method of disposal in General Services or Center For The Arts. Contact EHS for guidance.

3. Once the Generator has poured the waste oil paint and solvent containers into the bulk waste containers, the individual empty containers should be taken to a well-ventilated area and be allowed to dry thoroughly. Once the residue is solid, the container may be disposed of via normal domestic waste disposal channels.

4. EHS also collects aerosol paint spray cans for disposal and recycling of metals. EHS recommends that Generators accumulate at least 10 empty spray cans before contacting EHS for disposal. Once collected, the cans are punctured, the paint and solvents are drained and recovered for proper disposal and the aerosol propellants are filtered of harmful contaminants. The empty spray cans are recycled as scrap metal.

5. To request the disposal of waste paints, solvents or paint spray cans, contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

POTENTIAL REACTIVE/EXPLOSIVE CHEMICALS

A number of relatively common chemicals and reagents can become explosive when stored improperly or for excessive periods of time. The following discussion highlights the most common of these chemicals and provides information on preventing explosive hazards.

1. Peroxidizable Chemicals

A variety of chemicals can form highly explosive peroxide compounds as impurities when exposed to air over a period of time. This problem is most common in ethers, but also occurs in a variety of other organic compounds as well in some alkali metals and amides. A number of severe laboratory explosions have occurred as a result of handling old diethyl ether and isopropyl ether. As a result, great care must be taken to prevent the formation of peroxides in these chemicals.

Preventing the formation of peroxides is dependent on careful inventory control of peroxidizable chemicals. Most peroxidizable chemicals are sold commercially with inhibitors to prevent peroxide formation. These are effective until the container is first opened. After a container is opened, the chemical comes in contact with air and may begin to form peroxides. Therefore, the generator is responsible for complying with the steps below to prevent the hazards of peroxide formation in peroxidizable chemicals.

STEP 1: **DATE ALL CONTAINERS OF PEROXIDIZABLE CHEMICALS** listed below and in Appendix B with the date the container was first opened. EHS has pre-printed stickers available free of charge for this purpose.

STEP 2: **Discard or remove peroxides** from containers of peroxidizable chemicals within the time limitations listed below:

Severe Peroxide Hazard - Discard within **3 months**

-Diisopropyl ether
-Divinylacetylene
-Potassium metal
-Potassium amide
-Sodium amide
-Vinylidene dichloride (1,1-dichloroethylene)

High Peroxide Hazard - Discard within **6 months**

-Acetalaldehyde diethyl acetate (acetal)
-Cumene
-Cyclohexane
-Cyclopentene
-Decalin (decahydronapthalene)
-Diethyl ether
-Diethylene glycol dimethyl ether (diglyme)
-Dioxane
-Diacetylene (butadiene)
-Dicyclopentadiene
-Ethylene glycol ethers (acetates, cellosolves & glymes)

-Furan
-Methyl acetylene
-Methylcyclopentane
-Methyl isobutyl ketone
-Tetrahydrofuran (THF)
-Tetralin (tetrahydronapthalene)
-Vinyl ethers

NOTE: **<u>This list is by no means complete.</u>** Additional peroxidizable chemical compounds are listed in Appendix B. Also, manufacturers will often state warnings on their peroxidizable chemicals. In this case, the chemicals should be dated and discarded in accordance with manufacturers recommendations.

There are also methods for testing ethers for peroxide formation and for removing peroxides from ethers. Contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu for information.

2. Picric Acid & Other Polynitroaromatic Compounds

Picric Acid is commonly used in labs and is relatively safe in the form in which it is sold. It is ordinarily sold with 10% water added to stabilize it. However, picric acid can become explosive when it is allowed to dry out or when it forms certain metal salts. The following steps should be taken by the user to safely store picric acid:

STEP 1: Never allow picric acid to be stored in containers with metal caps or come in contact with any metal.

STEP 2: Check picric acid frequently to ensure it remains damp. Add water if needed.

STEP 3: Never attempt to open a bottle of old or very dry picric acid. Contact EHS if you have any old or dry picric acid.

If you are using polynitroaromatic compounds, contact EHS for handling and storage information.

3. Tollen's Reagent

Tollen's Reagent (ammoniacal silver nitrate) has caused several lab explosions when not discarded immediately after use. The reagent can form highly explosive silver fulminate over time after it has been used. To avoid this problem, add dilute nitric acid to Tollen's Reagent immediately after use and contact EHS at (410) 704-2949 or by email at safety@towson.edu for disposal.

4. Sodium Azide

Sodium Azide may form highly explosive heavy metal azides if contaminated or used improperly. Disposal of sodium azide solutions to the sanitary sewer may cause the formation of lead or copper azide in the plumbing. There have been cases of serious explosions resulting from the improper disposal of sodium azide. Sodium azide should also never be heated rapidly or stored in containers with metal components.

PHOTOGRAPHIC CHEMICALS

Waste photographic chemicals represent one of the largest potential sources of hazardous waste on the TU campus. Presently, only photographic developers and fixers in diluted, ready-to-use concentrations are regulated as hazardous wastes. The developers are regulated because they generally tend to be caustic (pH >12.5) and fixers typically contain high concentrations of inorganic silver. "Spent" developer should be collected in an appropriate waste container, labeled as to contents and when filled, EHS should be contacted at (410) 704-2949 or by e-mail at safety@towson.edu for disposal. Other photo chemicals such as stop-baths and bleaches are not hazardous when diluted to working strengths and may be disposed of via the sanitary sewer.

Old or unused concentrated/full strength photography chemicals shall be disposed of through EHS. Old or unused, concentrated/full strength photographic chemicals may be hazardous and EHS will make the determination as to which chemicals are hazardous or non-hazardous.

EHS has installed commercial silver recovery units in several photo darkrooms on campus. These units are designed to recover silver from photographic fixer solutions and make the fixers non-hazardous. THESE UNITS ARE NOT DESIGNED TO BE USED WITH ANY OTHER PHOTO-CHEMICALS NOR ARE THEY DESIGNED TO FILTER OUT PARTICULATES. (Particulates tend to clog the units.) ONLY SPENT FIXER FREE OF ALL PARTICULATE MATTER IS TO BE PROCESSED THROUGH THE SILVER RECOVERY UNITS.

"Spent" fixer solutions are poured into the top of the reservoir by the user and allowed to flow through the filter cartridge where any silver is removed. The fixer that flows from the filter cartridge does not contain silver and is therefore non-hazardous and may be disposed of via the sink or sanitary sewer.

The silver recovery units have a limited life span depending on the size of the cartridge. The small cartridges (5 gallon) have a life span of approximately 200 gallons of fixer. The large units (20 gallon) have a life span of approximately 800 gallons of fixer. After this volume of fixer has been recycled through the unit, the filter cartridge is replaced at no charge to the user. Users shall track the volume of fixer that is processed through the silver recovery units. When your filter is approaching the end of its life span, contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu to have it replaced.

Presently, we have a silver recovery unit installed in the Center For The Arts Building. If you have a wet-chemistry photography darkroom on campus and do not have a silver recovery unit, please contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

For additional information or to dispose of spent developers or old, unused concentrated/full strength photographic chemicals, contact EHS at (410) 704-2949 or by email at safety@towson.edu.

MERCURY CONTAINING FLUORESCENT/INCANDESCENT LIGHT BULBS, & MATERIALS CONTAINING PCB

LAMPS AND BALLASTS

Old or burnt out fluorescent, incandescent mercury vapor, mercury halide or high intensity discharge lamps and certain fluorescent light ballasts are regulated as hazardous wastes in the State of Maryland due to their content of inorganic mercury. Fluorescent ballasts are regulated if they contain polychlorinated biphenyls (PCB's).

EHS has a program in place in conjunction with Facilities Management for the collection and proper disposal of mercury containing fluorescent lights and incandescent lamps. It is anticipated that the majority of all light bulbs and ballasts will be generated as a result of campus maintenance activities. However, if you have any old or burnt out fluorescent or incandescent mercury containing light bulbs from desk lamps or TU property, contact your TU Building Maintenance Mechanic to have them picked up pending disposal. BULBS SHOULD NOT BE BROKEN FOR DISPOSAL. Questions concerning the disposal of mercury containing light bulbs should be directed to EHS at (410) 704-2949 or by e-mail at safety@towson.edu.

If you have any old (manufactured prior to 1972) electrical ballasts, you should consider them as potentially containing PCB's. Contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu for the disposal of old light ballasts. If the ballasts are leaking, avoid contact with the liquid, contain any spilled liquids and immediately contact EHS for cleanup and decontamination assistance.

PCB IN WALLS

PCB is present and encapsulated (sealed) in select walls in the Center for the Arts Building around the perimeters of windows. In its encapsulated state, the PCBs are confined in the concrete and do not pose a health risk. This PCB remains in the concrete after remediation. Towson conducts annual monitoring of this PCB and concrete to ensure that the condition of the encapsulant and concrete remains intact and that damage does not occur to them. Appendix E contains the sampling procedures EHS follows as part of this effort.

Any construction or repair activities to interior and exterior walls and to windows at the Center for the Arts Building must be verified with EHS to determine if they are within the PCB encapsulated areas. EHS has sent a Toolbox Talk on the presence of PCB to facilities staff, building supervisors, and maintenance staff apprising them of the locations of the encapsulated PCB. The walls with encapsulated PCB cannot be disturbed without EPA permission. The Toolbox document includes instructions for workers to report any degradation with the concrete to EHS. Moreover, if demolition of the building or the concrete occurs in the future, PCB contamination must be handled and disposed of according to EPA regulations.

For more information on the Toolbox topic, PCB, contact EHS at safety@towson.edu.

BATTERIES/ELECTRONIC COMPONENTS

Most, if not all, types of electric batteries are regulated as a hazardous waste due to the high content of leachable inorganic metals or corrosive materials (i.e., battery acids). Users shall segregate batteries by type, (I.e., alkaline batteries, nickel-cadmium batteries, carbon-zinc batteries, nickel-metal hydride, lead-acid, etc.) and stored at the point of generation until such time as they can be collected for disposal by EHS. Leaking batteries shall be placed in a plastic bag or other leakproof container pending disposal.

Old or surplus electronic components (e.g., circuit boards, etc.) may also be regulated due to their high concentration of leachable inorganic metals from solders, etc.

Contact EHS at (410) 704-2949 or by e-mail at safety@towson.edu to request disposal of old batteries and/or electronic components. For additional information pertaining to electronic components recycling contact Office of Sustainability at (410) 704-2034 or by e-mail at gogreen@towson.edu.

COMPRESSED GAS CYLINDERS & PRESSURIZED SPRAY CANS

Compressed Gas Cylinders:

Compressed gas cylinders are typically regulated as hazardous waste due to the contents of the cylinder. However, it has been our experience that no matter how innocuous the cylinder contents (e.g., compressed air) or even if the cylinder is empty, most domestic waste disposal companies/landfills will not accept compressed gas cylinders for disposal. As a general rule of thumb, the smaller the gas cylinder the more hazardous the contents and the more difficult the cylinder disposal. All compressed gas cylinders, and especially small compressed gas cylinders (i.e., lecture bottles) or unlabeled gas cylinders, are extremely expensive to properly dispose of.

In order to reduce skyrocketing compressed gas cylinder disposal costs, EHS strongly recommends that whenever compressed gases are purchased for use on campus, you make arrangements for the supplier to take back the empty cylinder even if it means paying a little extra. Even if the vendor will not take back the empty cylinder, you can help by only buying the volume of gas you expect to use and by making sure the cylinders are legibly labeled as to contents at all times.

Pressurized Spray Cans:

Pressurized spray cans may be regulated as a hazardous waste because of the cans contents (pesticides, corrosives, flammables, etc.) and also because of the gas that is used as a propellant.

Contact EHS at (410) 704-2949 or by email at safety@towson.edu to request the disposal of partially filled or empty compressed gas cylinders or pressurized spray cans.

WASTE MINIMIZATION

1. The cost for disposal of campus hazardous wastes is increasing rapidly. It currently costs approximately $75.00/gallon for liquids and $50.00/pound for solid wastes. Compressed gas cylinders are outrageously expensive. (Small lecture bottles cost approximately $500.00 each to dispose of.) Costs will rapidly continue to increase as Federal and State regulations become more and more stringent and as the public becomes more environmentally conscious. In some cases, hazardous wastes cannot be disposed of because there is no proven, environmentally safe method available. Presently, there is no way to dispose of radioactively contaminated hazardous wastes (i.e. Mixed Low Level Radioactive Wastes - MLLRW). Generators are being forced to store it on site for an indefinite period of time.

2. Hazardous waste disposal costs may be realistically reduced by minimizing the volumes of hazardous wastes generated. The following are some recommended guidelines for users for minimizing hazardous wastes:

   -Purchase and utilize only the quantities and types of reagents absolutely necessary. DO NOT purchase reagents based upon future long-range predictions or because you can receive a quantity discount from the vendor. Any "up front" savings are lost when disposal costs are factored in.

   -Only purchase "fresh" reagents that will have the longest possible shelf life. Do not purchase a reagent that will quickly expire and require an additional purchase.

   -DO NOT accept or solicit "gifts reagents" from off campus sources unless they will be immediately and completely utilized. Again, any perceived savings would be lost due to increased disposal costs.

   -If possible, centralize the storage of chemical reagents to avoid duplicate purchases and to promote a shorter shelf life and more rapid utilization.

   -If possible, centralize the procurement of lab reagents through one person so that they are aware of the current on-hand inventory and its' location.

   -Inventory chemicals at least annually and indicate where the chemicals are stored. Update the inventory when chemicals are purchased or used up.

   -Do not hoard reagents.

   -Wherever possible, conduct experiments on the micro-volumetric scale to reduce the volume of reagents required and also the volume of potentially hazardous wastes generated.

   -If only a small quantity of a reagent is needed, borrow from a colleague or purchase the minimum amount needed and share.

   -Store all chemical reagents properly in accordance with manufacturers' recommendations. Improper storage increases the rate of degradation and necessitates more frequent purchases.

-Wherever possible, recycle. If possible, collect waste solvents separately and re-distill for re-use or filter out precipitates and reuse. Circulate lists of surplus chemicals within your department or building before requesting disposal. **Do not attempt to recycle potential peroxide forming chemicals or unstable reactives/explosives.**

-If possible, eliminate the utilization of chromic acid.

-Include waste management procedures as part of the pre- and post-lab written student experience.

-Polymerize epoxy wastes to a safe, non-hazardous solid.

-Destroy Ethidium Bromide using $NaNo_2$ and hypophosphorus acid.

-Treat sulfur and phosphorus wastes with bleach before disposal.

-Treat organolithium waste with either water or ethanol.

-Substitute red liquid alcohol thermometers (range up to 150^{o}C) for standard mercury thermometers wherever possible. Use metal oven thermometers instead of mercury thermometers in ovens. Use digital thermometers wherever possible.

-Use procedures to recover metallic mercury. Review procedures to recover mercury from mercury containing solutions.

-Recover silver from silver chloride residue waste.

-Only request disposal of full waste containers. The University pays for disposal based upon container size not the volume of waste within the container. Request disposal of waste containers as soon as they are full. Do not allow several waste containers to accumulate before requesting disposal. Disposal costs are constantly increasing and it may cost more to dispose of a waste next month than it does now.

-Substitute a non-hazardous reagent for hazardous ones. There are non-hazardous formaldehyde substitutes, biodegradable scintillation fluids and a non-hazardous scientific glass cleaning solution that can be substituted for solutions containing chromic acid.

-If possible, avoid using reagents containing arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver or other inorganic metals.

-Wherever possible, avoid generating wastes that are both chemical and radioactive wastes.

-Look into the possibility of including detoxification and/or waste neutralization steps into laboratory experiments. EHS has several publications available for loan that give specific steps for detoxifying and/or neutralizing hazardous chemical wastes.

-If possible, try using detergent and hot water for cleaning lab equipment instead of solvents. If solvents must be used, try using spent solvents for the initial cleaning and fresh solvent for the final cleaning. Consider using ozone treatment for cleaning parts.

-If possible, eliminate the use of uranium and thorium compounds that are naturally radioactive, but must be disposed of as an expensive radioactive waste.

-Acids and bases that are not specifically listed by chemical name as hazardous wastes (Appendix A) should be disposed of by neutralizing them to a pH of 7.0 and then washing them down laboratory sink drains with large quantities of water. Acids and bases, which are specifically listed by name as hazardous wastes, should be disposed of through EHS.

-Consider using waste acid mixtures for electro-polishing.

-Compressed gases should only be procured from vendors that will accept the return of empty bottles. This is especially applicable to Lecture Bottles. Most Lecture Bottles are sold "no deposit-no return" and must be disposed of as hazardous wastes. The disposal of empty Lecture Bottles is very expensive and can only be accomplished through very specialized waste disposal firms. The average cost for disposing of a used or empty Lecture Bottle is $500.

-Wherever possible, do not utilize oil or solvent based paints or paints which contain lead, silver, chromium, copper or other toxic heavy metals. These must be disposed of as hazardous wastes. If possible, substitute water based paints for these paints. Water based paints are typically non-hazardous.

-Only dispose of those items that are contaminated with hazardous wastes as hazardous waste. Do not dispose of non-hazardous chemicals (non-contaminated solid debris, water, etc) as hazardous wastes. Empty chemical containers, except pesticide containers, may be disposed of via normal domestic waste channels.

-If hazardous chemicals are used separately, they should be segregated and disposed of separately. Mixing waste chemicals sometimes increases disposal costs. (See General Guidelines, Paragraph 5.)

-Return excess pesticides to the manufacturer.

-Replace items containing polychlorinated biphenyls (PCB's). Dispose of PCB's through EHS.

-Use the following substitutions wherever possible:

Original Material	***Substitute***	***Comments***
Acetamide	Stearic Acid	In phase change & freezing point depression
Benzene	Alcohol	
Benzoyl Peroxide	Lauryl Peroxide	When used as a polymer catalyst
Chloroform	1,1,1 - Trichloroethane	
Carbon Tetrachloride	Cyclohexane	In test for halide ions

Carbon Tetrachloride	1,1,1 - Trichloroethane 1,1,2 - Trichlorotrifluoroethane	
Formaldehyde	Ethanol	For storage of biological specimens "Formalternate" (Flinn Scientific) "CaroSafe" (Carolina Biologicals)
Formalin	See Formaldehyde	
Halogenated Solvents	Non-halogenated Solvents	In parts washers or other solvent processes
Sodium Dichromate	Sodium Hypochlorite	
Sulfide Ion	Hydroxide Ion	In analysis of heavy metals
Toluene	Simple Alcohols & Ketones	
Wood's Metal	Onion's Fusible Alloy	
Xylene	Simple Alcohols & Ketones	
Xylene or Toluene	Non-hazardous Proprietary liquid scintillation cocktails	In radioactive tracer studies liquid scintillation cocktails
Fluorinert	Non-volatile, reusable pressurizing fluid	CS_2

WASTE DISPOSAL PROCEDURES

To request the disposal of a hazardous waste, contact EHS at (410) 704-2949 or by email at safety@towson.edu or go to the following web site:

www.towson.edu/ehs/programs/chemical/waste.html

APPENDIX A

HAZARD DETERMINATION

Compounds or solutions that meet one or more of the following criteria or are specifically named on one of the following lists are regarded as a hazardous waste by the EPA and the State of Maryland. Maryland uses the term "Controlled Hazardous Substance" (CHS) as a synonym for hazardous waste.

I. Criteria

A. Ignitability

1. Liquids, other than an aqueous solution containing less than 24% alcohol by volume, with a flash point less than 140° F (60° C). This covers most common laboratory solvents. The Aldrich Chemical Catalog and Material Safety Data Sheets (MSDS) list flash points for most liquids.

2. Not a liquid, and is capable under standard temperature and pressure, of causing a fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

3. It is an ignitable compressed gas as described in 49 CFR 173.300 and as determined by the test methods described in that regulation.

4. It is an oxidizer as defined in 49 CFR 173.151.

5. A hazardous waste that exhibits the characteristic of Ignitability has the EPA Hazardous Waste Number of D001.

B. Corrosivity

1. Liquids with a pH less than or equal to 2.0 or greater than or equal to 12.5.

2. It is a liquid and corrodes steel at a rate greater than 0.25 inches per year at 130°F as specified in the appropriate test method.

3. A hazardous waste that exhibits the characteristic of Corrosivity has the EPA Hazardous Waste Number of D002.

C. Reactivity

1. Reacts violently with water or air.

2. Cyanide or sulfide bearing compounds.

3. Shock-sensitive compounds (e.g. old picric acid, old anhydrous ether).

4. Explosives.

5. Any hazardous material that is normally unstable and readily undergoes violent change without detonating.

6. A hazardous waste that exhibits the characteristic of Reactivity has the EPA Hazardous Waste Number of D003.

D. Toxicity

The criteria for toxicity may be fulfilled if one or more of the following chemicals are present in a solution or compound at a concentration at or above the specified Regulatory Level:

EPA Hazardous Waste #	***Contaminant***	***Regulatory Level (mg/L)***
D004	**ARSENIC**	**5.0**
D005	**BARIUM**	**100.0**
D018	**BENZENE**	**0.5**
D006	**CADMIUM**	**1.0**
D019	**CARBON TETRACHLORIDE**	**0.5**
D020	**CHLORDANE**	**0.03**
D021	**CHLOROBENZENE**	**100.0**
D022	**CHLOROFORM**	**6.0**
D007	**CHROMIUM**	**5.0**
D023	**o-CRESOL**	**200.0***
D024	**m-CRESOL**	**200.0***
D025	**p-CRESOL**	**200.0***
D026	**CRESOL**	**200.0***
D016	**2,4, D**	**10.0**
D027	**1,4-DICHLOROBENZENE**	**7.5**
D028	**1,2-DICHLOROETHANE**	**0.5**
D029	**1,1-DICHLOROETHYLENE**	**0.7**
D030	**2,4-DINITROTOLUENE**	**0.13**
D012	**ENDRIN**	**0.02**
D031	**HEPTACHLOR (& IT'S EPOXIDE)**	**0.008**
D032	**HEXACHLOROBENZENE**	**0.13**
D033	**HEXACHLOROBUTADIENE**	**0.5**
D034	**HEXACHLOROETHANE**	**3.0**
D008	**LEAD**	**5.0**
D013	**LINDANE**	**0.4**
D009	**MERCURY**	**0.2**
D014	**METHOXYCHLOR**	**10.0**
D035	**METHYL ETHYL KETONE**	**200.0**
D036	**NITROBENZENE**	**2.0**
D037	**PENTACHLOROPHENOL**	**100.0**
D038	**PYRIDINE**	**5.0**
D010	**SELENIUM**	**1.0**
D011	**SILVER**	**5.0**
D039	**TETRACHLOROETHYLENE**	**0.7**
D015	**TOXAPHENE**	**0.5**
D040	**TRICHLOROETHYLENE**	**0.5**

D041	**2,4,5-TRICHLOROPHENOL**	**400.0**
D042	**2,4,6-TRICHLOROPHENOL**	**2.0**
D017	**2,4,5-TP (SILVEX)**	**1.0**
D043	**VINYL CHLORIDE**	**0.2**

***- If o-, m-, and p-Cresol concentrations can't be differentiated, the total Cresol (D026) concentration is used (i.e., 200.0 mg/L)**

NOTE: The chemicals listed above have been identified by the EPA and the State because of their potential for migration from landfills under normal conditions. No other specific criteria have been established by the EPA or the State to determine if a waste is a toxic waste. However, there are countless toxic and highly toxic substances in our laboratories that do not meet the above criteria and are not named on the following lists. These compounds must also be disposed of through the EHS. You are urged to consult Material Safety Data Sheets, chemical labels, chemical catalogs (Aldrich), the Merck Index, or the EHS to assure that potentially harmful compounds are handled responsibly when no longer needed.

Hazardous Waste from Non-Specific Sources

40 CFR 261.31

EPA Hazardous Waste Number	Substance
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1- trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F002	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene,1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and f005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and align=center etching and milling of aluminum.
F007	Spent cyanide plating bath solutions from electroplating operations.
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.

F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat-treating operations.
F012	Quenching wastewater treatment sludges from metal heat-treating operations where cyanides are used in the process.
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process.
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.).
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.).
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in § 261.31 or § 261.32).
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing Hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.).
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027.

F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with § 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.
F037	Petroleum refinery primary oil/water/solids separation sludge--Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in § 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge--Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in § 261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and f037, K048, and K051 wastes are not included in this listing.
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)

Acute Hazardous Wastes

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EPA Hazardous Waste Number	Substance
P023	Acetaldehyde, chloro-
P002	Acetamide, N- (aminothioxomethyl)-
P057	Acetamide, 2-fluoro-
P058	Acetic acid, fluoro-, sodium salt
P002	Acetyl-2-thiourea, 1-
P003	Acrolein
P070	Aldicarb
P203	Aldicarb sulfone
P004	Aldrin
P005	Allyl alcohol
P006	Aluminum phosphide
P007	Aminomethyl)-3-isoxazolol, 5-(
P008	Aminopyridine, 4-
P009	Ammonium picrate
P119	Ammonium vanadate
P099	Argentate (1-), bis (cyano-C)-, potassium
P010	Arsenic acid H3AsO4
P012	Arsenic oxide As2O3
P011	Arsenic oxide As2O5
P011	Arsenic pentoxide
P012	Arsenic trioxide
P038	Arsine, diethyl-
P036	Arsonous dichloride, phenyl-
P054	Aziridine
P067	Aziridine, 2-methyl-
P013	Barium cyanide
P024	Benzenamine, 4-chloro-
P077	Benzenamine, 4-nitro-
P028	Benzene, (chloromethyl)-
P042	Benzenediol, 4-[1-hydroxy-2- (methylamino) ethyl]-, 1,2-
P046	Benzeneethanamine, alpha, alpha-dimethyl-
P014	Benzenethiol

P127	Benzofuranol, 2,3-dihydro-2, 2-dimethyl-, -2-methylcarbamate
P188	Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a, 8,8a-hexahydro-1, 3a, 8-tr imethylpyrrolo [2,3-b] indol-5-yl methylcarbamate ester
P001	Benzopyran-2-one, 4-hydroxy-3- (3-oxo-1-2-phenylbutyl)-2H-1-, & salts, when present at concentrations greater than 0.3%
P028	Benzyl chloride
P015	Beryllium powder
P017	Bromoacetone
P018	Brucine
P045	Butanone, 3,3-dimethyl-1- (methylthio)-, O-4- [methylamino) carbonyl] oxime
P021	Calcium cyanide
P021	Calcium cyanide Ca (CN)
P189	Carbamic acid, [(dibutylamino)- thio] methyl-, 2,3, -dihydro-2, 2-dimethyl- 7-benzofuranyl ester
P191	Carbamic acid, dimethyl-, 1-[(dimethyl-amino) carbonyl]-5-methyl-1H- pyrazol-3-yl ester
P192	Carbamic acid, dimethyl-, 3-methyl-1- (1-methylethyl)-1H-pyrazol-5-yl ester
P190	Carbamic acid, methyl-, 3-methylphenyl ester
P127	Carbofuran.
P022	Carbon disulfide
P095	Carbonic dichloride
P189	Carbosulfan
P023	Chloroacetaldehyde
P024	p-Chloroaniline
P026	Chlorophenyl) thiourea, 1-(o-
P027	Chloropropionitrile, 3-
P029	Copper cyanide
P029	Copper cyanide Cu (CN)
P202	Cumenyl methylcarbamate, m-
P030	Cyanides (soluble cyanide salts), not otherwise specified
P031	Cyanogen
P033	Cyanogen chloride
P033	Cyanogen chloride (CN) Cl
P034	Cyclohexyl-4, 6-dinitrophenol, 2-
P016	Dichloromethyl ether
P036	Dichlorophenylarsine
P037	Dieldrin
P038	Diethylarsine
P041	Diethyl-p-nitrophenyl phosphate
P040	Diethyl O-pyrazinyl phosphorothioate, O, O-
P043	Diisopropylfluorophosphate (DFP)
P004	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)-

P060	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	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, 2aalpha, 3beta, 6beta, 6aalpha, 7beta, 7aalpha)-
P051	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
P044	Dimethoate
P046	Alpha, alpha-Dimethylphenethylamine
P191	Dimetilan
P047	4,6-Dinitro-o-cresol, & salts
P048	2,4-Dinitrophenol
P020	Dinoseb
P085	Diphosphoramide, octamethyl-
P111	Diphosphoric acid, tetraethyl ester
P039	Disulfoton
P049	Dithiobiuret
P185	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O- [(methylamino)-carbonyl] oxime
P050	Endosulfan
P088	Endothall
P051	Endrin
P051	Endrin, & metabolites
P042	Epinephrine
P031	Ethanedinitrile
P194	Ethanimidothioc acid, 2-(dimethylamino)-N-0- [[(methylamino) carbonyl] oxy]-2-oxo-, methyl ester
P066	Ethanimidothioic acid, N- [[(methylamino) carbonyl] oxy]-, methyl ester
P101	Ethyl cyanide
P054	Ethyleneimine
P097	Famphur
P056	Fluorine
P057	Fluoroacetamide
P058	Fluoroacetic acid, sodium salt
P198	Formetanate hydrochloride
P197	Formparanate
P065	Fulminic acid, mercury (2+) salt
P059	Heptachlor
P062	Hexaethyl tetraphosphate
P116	Hydrazinecarbothioamide
P068	Hydrazine, methyl-
P063	Hydrocyanic acid
P063	Hydrogen cyanide
P096	Hydrogen phosphide

P060	Isodrin
P192	Isolan
P202	Isopropylphenyl N-methylcarbamate
P007	3(2H)-Isoxazolone, 5-(aminomethyl)-
P196	Manganese, bis (dimethylcarbamodithioato-S, S')-,
P196	Manganese dimethyldithiocarbamate
P092	Mercury, (acetato-O) phenyl-
P065	Mercury fulminate
P082	Methanamine, N-methyl-N-nitroso-
P064	Methane, isocyanato-
P016	Methane, oxybis [chloro-
P112	Methane, tetranitro-
P118	Methanethiol, trichloro-
P198	Methanimidamide, N, N-dimethyl-N'- [3-[[(methylamino)-carbonyl] oxy] phenyl]-, monohydrochloride
P197	Methanimidamide, N, N-dimethyl-N'- [2-methyl-4- [[(methylamino) carbonyl] oxy] phenyl]-
P050	Methano-2, 4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1, 5,5a, 6,9,9a-hexa hydro-, 3-oxide
P059	Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a, 4,7,7a-tetrahydro-
P199	Methiocarb
P066	Methomyl
P068	Methyl hydrazine
P064	Methyl isocyanate
P069	Methyllactonitrile
P071	Methyl parathion
P190	Metolcarb
P128	Mexacarbate
P072	Alpha-Naphthylthiourea
P073	Nickel carbonyl
P073	Nickel carbonyl Ni (CO) 4
P074	Nickel cyanide
P074	Nickel cyanide Ni (CN) 2
P075	Nicotine, & salts
P076	Nitric oxide
P077	p-Nitroaniline
P078	Nitrogen dioxide
P076	Nitrogen oxide NO
P078	Nitrogen oxide NO2
P081	Nitroglycerine
P082	N-Nitrosodimethylamine
P084	N-Nitrosomethylvinylamine
P085	Octamethylpyrophosphoramide

P087	Osmium oxide OsO4
P087	Osmium tetroxide
P088	Oxabicyclo [2.2.1] heptane-2, 3-dicarboxylic acid
P194	Oxamyl
P089	Parathion
P034	Phenol, 2-cyclohexyl-4, 6-dinitro-
P048	Phenol, 2,4-dinitro-
P047	Phenol, 2-methyl-4, 6-dinitro-, & salts
P020	Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P009	Phenol, 2,4,6-trinitro-, ammonium salt
P128	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester)
P199	Phenol, (3,5-dimethyl-4- (methylthio)-, methylcarbamate
P202	Phenol, 3-(1-methylethyl)-, methyl carbamate
P201	Phenol, 3-methyl-5- (1-methylethyl)-, methyl carbamate
P092	Phenylmercury acetate
P093	Phenylthiourea
P094	Phorate
P095	Phosgene
P096	Phosphine
P041	Phosphoric acid, diethyl4-nitrophenyl ester
P039	Phosphorodithioic acid, O, O-diethyl S- [2-(ethylthio) ethyl] ester
P094	Phosphorodithioic acid, O, O-diethyl S- [(ethylthio) methyl] ester
P044	Phosphorodithioic acid, O, O-dimethyl S- [2-(methylamino)-2-oxoethyl] ester
P043	Phosphorofluoridic acid, bis (1-methylethyl) ester
P089	Phosphorothioic acid, O, O-diethyl O- (4-nitrophenyl) ester
P040	Phosphorothioic acid, O, O-diethyl O-pyrazinyl ester
P097	Phosphorothioic acid, O- [4-[(dimethylamino) sulfonyl] phenyl] O, O-dimethyl ester
P071	Phosphorothioic acid, O, O, -dimethyl O- (4-nitrophenyl) ester
P204	Physostigmine
P188	Physostigmine salicylate
P110	Plumbane, tetraethyl-
P098	Potassium cyanide
P098	Potassium cyanide KCN
P099	Potassium silver cyanide
P201	Promecarb
P070	Propanal, 2-methyl-2- (methylthio)-, O- [(methylamino) carbonyl] oxime
P203	Propanal, 2-methyl-2- (methyl-sulfonyl)-, O- [(methylamino) carbonyl] oxime
P101	Propanenitrile
P027	Propanenitrile, 3-chloro-
P069	Propanenitrile, 2-hydroxy-2-methyl-

P081	Propanetriol, trinitrate
P017	Propanone, 1-bromo-
P102	Propargyl alcohol
P003	Propenal
P005	Propen-1-ol
P067	Propylenimine
P102	Propyn-1-ol
P008	Pyridinamine
P075	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts 5
P204	Pyrrolo [2,3-b] indol-5-ol, 1,2,3,3a, 8,8a-hexahydro-1, 3a, 8-trimethyl-, methylcarbamate (ester), (3aS-cis)-
P114	Selenious acid, dithallium (1+) salt
P103	Selenourea
P104	Silver cyanide
P104	Silver cyanide Ag (CN)
P105	Sodium azide
P106	Sodium cyanide
P106	Sodium cyanide Na (CN)
P108	Strychnidin-10-one, & salts
P018	Strychnidin-10-one, 2,3-dimethoxy-
P108	Strychnine, & salts
P115	Sulfuric acid, dithallium (1+) salt
P109	Tetraethyldithiopyrophosphate
P110	Tetraethyl lead
P111	Tetraethyl pyrophosphate
P112	Tetranitromethane
P062	Tetraphosphoric acid, hexaethyl ester
P113	Thallic oxide
P113	Thallium oxide Tl2O3
P114	Thallium (I) selenite
P115	Thallium (I) sulfate
P109	Thiodiphosphoric acid, tetraethyl ester
P045	Thiofanox
P049	Thioimidodicarbonic diamide
P014	Thiophenol
P116	Thiosemicarbazide
P026	Thiourea, (2-chlorophenyl)-1
P072	Thiourea, 1-naphthalenyl-
P093	Thiourea, phenyl-
P185	Tirpate

P123	Toxaphene
P118	Trichloromethanethiol
P119	Vanadic acid, ammonium salt
P120	Vanadium oxide V2O5
P120	Vanadium pentoxide
P084	Vinylamine, N-methyl-N-nitroso-
P001	Warfarin, & salts, when present at concentrations greater than 0.3%
P205	Zinc, bis (dimethylcarbamodithioato-S, S')-,
P121	Zinc cyanide
P121	Zinc cyanide Zn (CN) 2
P122	Zinc phosphide Zn3P2, when present at concentrations greater than 10%
P205	Ziram

Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either

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EPA Hazardous Waste Number	Substance
U394	A2213
U001	Acetaldehyde
U034	Acetaldehyde, trichloro-
U187	Acetamide, N- (4-ethoxyphenyl)-
U005	Acetamide, N-9H-fluoren-2-yl-
U240	Acetic acid, (2,4-dichlorophenoxy)-, salts & esters
U112	Acetic acid ethyl ester
U144	Acetic acid, lead (2+) salt
U214	Acetic acid, thallium (1+) salt see F027Acetic acid, (2,4,5-trichlorophenoxy)-
U002	Acetone
U003	Acetonitrile
U004	Acetophenone
U005	Acetylaminofluorene
U006	Acetyl chloride
U007	Acrylamide
U008	Acrylic acid
U009	Acrylonitrile
U011	Amitrole
U012	Aniline
U136	Arsinic acid, dimethyl-
U014	Auramine
U015	Azaserine
U365	Azepine-1-carbothioic acid, hexahydro-, S-ethyl 1 ester
U010	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-, [1aS-(1aalpha, 8beta, 8aalpha, 8balpha)]-
U280	Barban
U278	Bendiocarb
U364	Bendiocarb phenol
U271	Benomyl
U157	Benz [j] aceanthrylene, 1,2-dihydro-3-methyl-
U016	Benz[c] acridine
U017	Benzal chloride
U192	Benzamide, 3,5-dichloro-N- (1,1-dimethyl-2-propynyl)-

U018	Benz [a] anthracene
U094	Benz [a] anthracene, 7,12-dimethyl-
U012	Benzenamine
U014	Benzenamine, 4,4'-carbonimidoyl bis [N, N-dimethyl-
U049	Benzenamine, 4-chloro-2-methyl-, hydrochloride
U093	Benzenamine, N, N-dimethyl-4- (phenylazo)-
U328	Benzenamine, 2-methyl-
U353	Benzenamine, 4-methyl-
U158	Benzenamine, 4,4'-methylenebis[2-chloro-
U222	Benzenamine, 2-methyl-, hydrochloride
U181	Benzenamine, 2-methyl-5-nitro-
U019	Benzene
U038	Benzeneacetic acid, 4-chloro-alpha- (4-chlorophenyl)-alpha-hydroxy-, ethyl ester
U030	Benzene, 1-bromo-4-phenoxy-
U035	Benzenebutanoic acid, 4-[bis (2-chloroethyl) amino]-
U037	Benzene, chloro-
U221	Benzenediamine, ar-methyl-
U028	1,2-Benzenedicarboxylic acid, bis (2-ethylhexyl) ester
U069	1,2-Benzenedicarboxylic acid, dibutyl ester
U088	1,2-Benzenedicarboxylic acid, diethyl ester
U102	1,2-Benzenedicarboxylic acid, dimethyl ester
U107	1,2-Benzenedicarboxylic acid, dioctyl ester
U070	Benzene, 1,2-dichloro-
U071	Benzene, 1,3-dichloro-
U072	Benzene, 1,4-dichloro-
U060	Benzene, 1,1'-(2,2-dichloroethylidene) bis [4-chloro-
U017	Benzene, (dichloromethyl)-
U223	Benzene, 1,3-diisocyanatomethyl-
U239	Benzene, dimethyl-
U20	1,3-Benzenediol
U127	Benzene, hexachloro-
U056	Benzene, hexahydro-
U220	Benzene, methyl-
U105	Benzene, 1-methyl-2, 4-dinitro-
U106	Benzene, 2-methyl-1, 3-dinitro-
U055	Benzene, (1-methylethyl)-
U169	Benzene, nitro-
U183	Benzene, pentachloro-
U185	Benzene, pentachloronitro-
U020	Benzenesulfonic acid chloride

U020	Benzenesulfonyl chloride
U207	Benzene, 1,2,4,5-tetrachloro-
U061	Benzene, 1,1'-(2,2,2-trichloroethylidene) bis [4-chloro-
U247	Benzene, 1,1'-(2,2,2-trichloroethylidene) bis [4-methoxy-
U023	Benzene, (trichloromethyl)-
U234	Benzene, 1,3,5-trinitro-
U021	Benzidine
U202	Benzisothiazol-3 (2H)-one, 1,1-dioxide, & salts
U278	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate
U364	1,3-Benzodioxol-4-ol, 2,2-dimethyl-,
U203	1,3-Benzodioxole, 5-(2-propenyl)-
U141	1,3-Benzodioxole, 5-(1-propenyl)-
U367	Benzofuranol, 2,3-dihydro-2, 2-dimethyl-
U090	1,3-Benzodioxole, 5-propyl-
U064	Benzo [rst] pentaphene
U248	Benzopyran-2-one, 4-hydroxy-3- (3-oxo-1-phenylbutyl)-, & salts, when present at concentrations of 0.3% or less
U022	Benzo [a] pyrene
U197	p-Benzoquinone
U023	Benzotrichloride
U085	2,2'-Bioxirane
U021	[1,1'-Biphenyl]-4,4'-diamine
U073	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-
U091	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-
U095	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-
U401	Bis (dimethylthiocarbamoyl) sulfide
U400	Bis (pentamethylene) thiuram tetrasulfide
U225	Bromoform
U030	4-Bromophenyl phenyl ether
U128	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-
U172	1-Butanamine, N-butyl-N-nitroso-
U031	1-Butanol
U159	2-Butanone
U160	2-Butanone, peroxide
U053	2-Butenal
U074	2-Butene, 1,4-dichloro-
U143	Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2- (1-methoxyethyl)-3-methyl-1-oxobutoxy] methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1- yl ester, [1S-[1alpha(Z), 7(2S*, 3R*), 7aalpha]]-
U031	N-Butyl alcohol
U392	Butylate

U136	Cacodylic acid
U032	Calcium chromate
U372	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester
U271	Carbamic acid, [1-[(butylamino) carbonyl]-1H-benzimidazol -2-yl]-, methyl ester
U375	Carbamic acid, butyl-, 3-iodo-2-propynyl ester
U280	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester
U238	Carbamic acid, ethyl ester
U178	Carbamic acid, methylnitroso-, ethyl ester
U373	Carbamic acid, phenyl-, 1-methylethyl ester
U409	Carbamic acid, [1,2-phenylenebis (iminocarbonothioyl)] bis-, dimethyl ester
U097	Carbamic chloride, dimethyl-
U379	Carbamodithioic acid, dibutyl, sodium salt
U277	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester
U381	Carbamodithioic acid, diethyl-, sodium salt
U383	Carbamodithioic acid, dimethyl, potassium salt
U382	Carbamodithioic acid, dimethyl-, sodium salt
U376	Carbamodithioic acid, dimethyl-, tetraanhydrosulfide with orthothioselenious acid
U378	Carbamodithioic acid, (hydroxymethyl) methyl-, monopotassium salt
U384	Carbamodithioic acid, methyl-, monosodium salt
U377	Carbamodithioic acid, methyl, - monopotassium salt
U389	Carbamothioic acid, bis (1-methylethyl)-, S- (2,3,3-trichloro-2-propenyl) ester
U392	Carbamothioic acid, bis (2-methylpropyl)-, S-ethyl ester
U391	Carbamothioic acid, butylethyl-, S-propyl ester
U386	Carbamothioic acid, cyclohexylethyl-, S-ethyl ester
U390	Carbamothioic acid, dipropyl-, S-ethyl ester
U387	Carbamothioic acid, dipropyl-, S- (phenylmethyl) ester
U385	Carbamothioic acid, dipropyl-, S-propyl ester
U114	Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters
U062	Carbamothioic acid, bis (1-methylethyl)-, S- (2,3- dichloro-2-propenyl) ester
U279	Carbaryl
U372	Carbendazim
U367	Carbofuran phenol
U215	Carbonic acid, dithallium (1+) salt
U033	Carbonic difluoride
U156	Carbonochloridic acid, methyl ester
U033	Carbon oxyfluoride
U211	Carbon tetrachloride
U034	Chloral
U035	Chlorambucil
U036	Chlordane, alpha & gamma isomers

U026	Chlornaphazin
U037	Chlorobenzene
U038	Chlorobenzilate
U039	p-Chloro-m-cresol
U042	2-Chloroethyl vinyl ether
U044	Chloroform
U046	Chloromethyl methyl ether
U047	beta-Chloronaphthalene
U048	o-Chlorophenol
U049	4-Chloro-o-toluidine, hydrochloride
U032	Chromic acid H2CrO4, calcium salt
U050	Chrysene
U393	Copper, bis (dimethylcarbamodithioato-S, S')-,
U393	Copper dimethyldithiocarbamate
U051	Creosote
U052	Cresol (Cresylic acid)
U053	Crotonaldehyde
U055	Cumene
U246	Cyanogen bromide (CN) Br
U386	Cycloate
U197	2,5-Cyclohexadiene-1, 4-dione
U056	Cyclohexane
U129	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1alpha, 2alpha, 3beta, 4alpha, 5alpha, 6beta)-
U057	Cyclohexanone
U130	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-
U058	Cyclophosphamide
U240	2,4-D, salts & esters
U059	Daunomycin
U366	Dazomet
U060	DDD
U061	DDT
U062	Diallate
U063	Dibenz [a, h] anthracene
U064	Dibenzo [a, i] pyrene
U066	1,2-Dibromo-3-chloropropane
U069	Dibutyl phthalate
U070	o-Dichlorobenzene
U071	m-Dichlorobenzene
U072	p-Dichlorobenzene
U073	3,3'-Dichlorobenzidine

U074	1,4-Dichloro-2-butene
U075	Dichlorodifluoromethane
U078	1,1-Dichloroethylene
U079	1,2-Dichloroethylene
U025	Dichloroethyl ether
U027	Dichloroisopropyl ether
U024	Dichloromethoxy ethane
U081	2,4-Dichlorophenol
U082	2,6-Dichlorophenol
U084	1,3-Dichloropropene
U085	1,2:3,4-Diepoxybutane
U108	1,4-Diethyleneoxide
U028	Diethylhexyl phthalate
U395	Diethylene glycol, dicarbamate
U086	N, N’-Diethylhydrazine
U087	O, O-Diethyl S-methyl dithiophosphate
U088	Diethyl phthalate
U089	Diethylstilbesterol
U090	Dihydrosafrole
U091	3,3'-Dimethoxybenzidine
U092	Dimethylamine
U093	p-Dimethylaminoazobenzene
U094	7,12-Dimethylbenz [a] anthracene
U095	3,3'-Dimethylbenzidine
U096	Alpha, alpha-Dimethylbenzylhydroperoxide
U097	Dimethylcarbamoyl chloride
U098	1,1-Dimethylhydrazine
U099	1,2-Dimethylhydrazine
U101	2,4-Dimethylphenol
U102	Dimethyl phthalate
U103	Dimethyl sulfate
U105	2,4-Dinitrotoluene
U106	2,6-Dinitrotoluene
U107	Di-n-octyl phthalate
U108	1,4-Dioxane
U109	1,2-Diphenylhydrazine
U110	Dipropylamine
U111	Di-n-propylnitrosamine
U403	Disulfiram
U390	EPTC

U041	Epichlorohydrin
U001	Ethanal
U404	Ethanamine, N, N-diethyl-
U174	Ethanamine, N-ethyl-N-nitroso-
U155	1,2-Ethanediamine, N, N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-
U067	Ethane, 1,2-dibromo-
U076	Ethane, 1,1-dichloro-
U077	Ethane, 1,2-dichloro-
U131	Ethane, hexachloro-
U024	Ethane, 1,1'-[methylenebis (oxy)] bis [2-chloro-
U117	Ethane, 1,1'-oxybis-(I)
U025	Ethane, 1,1'-oxybis[2-chloro-
U184	Ethane, pentachloro-
U208	Ethane, 1,1,1,2-tetrachloro-
U209	Ethane, 1,1,2,2-tetrachloro-
U218	Ethanethioamide
U226	Ethane, 1,1,1-trichloro-
U227	Ethane, 1,1,2-trichloro-
U410	Ethanimidothioic acid, N, N’- [thiobis [(methylimino) carbonyloxy]] bis-, dimethyl ester
U394	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-1 oxo-, methyl ester
U359	Ethanol, 2-ethoxy-
U173	Ethanol, 2,2'-(nitrosoimino) bis-
U395	Ethanol, 2,2'-oxybis-, dicarbamate
U004	Ethanone, 1-phenyl-
U043	Ethene, chloro-
U042	Ethene, (2-chloroethoxy)-
U078	Ethene, 1,1-dichloro-
U079	Ethene, 1,2-dichloro-
U210	Ethene, tetrachloro-
U228	Ethene, trichloro-
U112	Ethyl acetate
U113	Ethyl acrylate
U238	Ethyl carbamate (urethane)
U117	Ethyl ether
U114	Ethylenebisdithiocarbamic acid, salts & esters
U067	Ethylene dibromide
U077	Ethylene dichloride
U359	Ethylene glycol monoethyl ether
U115	Ethylene oxide
U116	Ethylenethiourea

U076	Ethylidene dichloride
U118	Ethyl methacrylate
U119	Ethyl methanesulfonate
U407	Ethyl Ziram
U396	Ferbam
U126	Fluoranthene
U122	Formaldehyde
U123	Formic acid
U124	Furan
U125	Furancarboxaldehyde
U147	2,5-Furandione
U213	Furan, tetrahydro-
U125	Furfural
U124	Furfuran
U206	Glucopyranose, 2-deoxy-2- (3-methyl-3-nitrosoureido)-,
U206	D-Glucose, 2-deoxy-2- [[(methylnitrosoamino)-4 carbonyl] amino]-
U126	Glycidylaldehyde
U163	Guanidine, N-methyl-N'-nitro-N-nitroso-
U127	Hexachlorobenzene
U128	Hexachlorobutadiene
U130	Hexachlorocyclopentadiene
U131	Hexachloroethane
U132	Hexachlorophene
U243	Hexachloropropene
U133	Hydrazine
U086	Hydrazine, 1,2-diethyl-
U098	Hydrazine, 1,1-dimethyl-
U099	Hydrazine, 1,2-dimethyl-
U109	Hydrazine, 1,2-diphenyl-
U134	Hydrofluoric acid
U134	Hydrogen fluoride
U135	Hydrogen sulfide
U135	Hydrogen sulfide H2S
U096	Hydroperoxide, 1-methyl-1-phenylethyl-
U116	2-Imidazolidinethione
U137	Indeno [1,2,3-cd] pyrene
U375	3-Iodo-2-propynyl n-butylcarbamate
U396	Iron, tris (dimethylcarbamodithioato-S, S')-,
U190	1,3-Isobenzofurandione
U140	Isobutyl alcohol

U141	Isosafrole
U142	Kepone
U143	Lasiocarpine
U144	Lead acetate
U146	Lead, bis (acetato-O) tetrahydroxytri-
U145	Lead phosphate
U146	Lead subacetate
U129	Lindane
U163	MNNG
U147	Maleic anhydride
U148	Maleic hydrazide
U149	Malononitrile
U150	Melphalan
U151	Mercury
U384	Metam Sodium
U152	Methacrylonitril
U092	Methanamine, N-methyl-
U029	Methane, bromo-
U045	Methane, chloro-
U046	Methane, chloromethoxy-
U068	Methane, dibromo-
U080	Methane, dichloro-
U075	Methane, dichlorodifluoro-
U138	Methane, iodo-
U119	Methanesulfonic acid, ethyl ester
U211	Methane, tetrachloro-
U153	Methanethiol
U225	Methane, tribromo-
U044	Methane, trichloro-
U121	Methane, trichlorofluoro-
U036	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2, 3,3a, 4,7,7a-hexahydro-
U154	Methanol
U155	Methapyrilene
U142	1,3,4-Metheno-2H-cyclobuta [cd] pentalen-2-one, 1,1a, 3,3a, 4,5,5,5a, 5b, 6-decachlorooctahydro-
U247	Methoxychlor
U154	Methyl alcohol
U029	Methyl bromide
U186	1-Methylbutadiene
U045	Methyl chloride
U156	Methyl chlorocarbonate

U226	Methyl chloroform
U157	3-Methylcholanthrene
U158	4,4'-Methylenebis(2-chloroaniline)
U068	Methylene bromide
U080	Methylene chloride
U159	Methyl ethyl ketone (MEK)
U160	Methyl ethyl ketone peroxide
U138	Methyl iodide
U161	Methyl isobutyl ketone
U162	Methyl methacrylate
U161	4-Methyl-2-pentanone
U164	Methylthiouracil
U010	Mitomycin C
U365	Molinate
U059	5,12-Naphthacenedione, 8-acetyl-10- [(3-amino-2, 3,6-3 trideoxy)-alpha-L-lyxo-hexopyranosyl) oxy]-7,8,9,10-tetrahydro-6, 8,11-trihydroxy-1-methoxy-, (8S-cis)-
U167	1-Naphthalenamine
U168	2-Naphthalenamine
U026	Naphthalenamine, N, N'-bis (2-chloroethyl)-
U165	Naphthalene
U047	Naphthalene, 2-chloro-
U166	1,4-Naphthalenedione
U236	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl[1,1'-biphenyl]-4,4'-diyl) bis (azo) bis [5-amino-4-hydroxy]-, tetrasodium salt
U279	1-Naphthalenol, methylcarbamate
U166	1,4-Naphthoquinone
U167	alpha-Naphthylamine
U168	beta-Naphthylamine
U217	Nitric acid, thallium (1+) salt
U169	Nitrobenzene
U170	p-Nitrophenol
U171	2-Nitropropane
U172	N-Nitrosodi-n-butylamine
U173	N-Nitrosodiethanolamine
U174	N-Nitrosodiethylamine
U176	N-Nitroso-N-ethylurea
U177	N-Nitroso-N-methylurea
U178	N-Nitroso-N-methylurethane
U179	N-Nitrosopiperidine
U180	N-Nitrosopyrrolidine

U181	Nitro-o-toluidine
U193	1,2-Oxathiolane, 2,2-dioxide
U058	2H-1, 3,2-Oxazaphosphorin-2-amine, N, N-bis (2-chloroethyl) tetrahydro-, 2-oxide
U115	Oxirane
U126	Oxiranecarboxyaldehyde
U041	Oxirane, (chloromethyl)-
U182	Paraldehyde
U391	Pebulate
U183	Pentachlorobenzene
U184	Pentachloroethane
U185	Pentachloronitrobenzene (PCNB)
See F027	Pentachlorophenol
U161	Pentanol, 4-methyl-
U186	1,3-Pentadiene
U187	Phenacetin
U188	Phenol
U048	Phenol, 2-chloro-
U039	Phenol, 4-chloro-3-methyl-
U081	Phenol, 2,4-dichloro-
U082	Phenol, 2,6-dichloro-
U089	Phenol, 4,4'-(1,2-diethyl-1, 2-ethenediyl) bis-
U101	Phenol, 2,4-dimethyl-
U052	Phenol, methyl-
U132	Phenol, 2,2'-methylenebis[3,4,6-trichloro-
U411	Phenol, 2-(1-methylethoxy)-, methylcarbamate
U170	Phenol, 4-nitro
See F027	Phenol, pentachloro
See F027	Phenol, 2,3,4,6-tetrachloro
See F027	Phenol, 2,4,5-trichloro
See F027	Phenol, 2,4,6-trichloro
U150	L-Phenylalanine, 4-[bis (2-chloroethyl) amino]-
U145	Phosphoric acid, lead (2+) salt (2:3)
U087	Phosphorodithioic acid, O, O-diethyl S-methyl ester
U189	Phosphorus sulfide
U190	Phthalic anhydride
U191	2-Picoline
U179	Piperidine, 1-nitroso-
U400	Piperidine, 1,1'-(tetrathiodicarbonothioyl)-bis-
U383	Potassium dimethyldithiocarbamate
U378	Potassium n-hydroxymethyl- n-methyldi-thiocarbamate

U377	Potassium n-methyldithiocarbamate
U192	Pronamide
U194	1-Propanamine
U111	1-Propanamine, N-nitroso-N-propyl-
U110	1-Propanamine, N-propyl-
U066	Propane, 1,2-dibromo-3-chloro-
U083	Propane, 1,2-dichloro-
U149	Propanedinitrile
U171	Propane, 2-nitro-
U027	Propane, 2,2'-oxybis[2-chloro-
U193	1,3-Propane sultone
See F027	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-
U235	1-Propanol, 2,3-dibromo-, phosphate (3:1)
U140	1-Propanol, 2-methyl-
U002	2-Propanone
U007	2-Propenamide
U084	1-Propene, 1,3-dichloro-
U243	1-Propene, 1,1,2,3,3,3-hexachloro-
U009	2-Propenenitrile
U152	2-Propenenitrile, 2-methyl-
U008	2-Propenoic acid
U113	2-Propenoic acid, ethyl ester
U118	2-Propenoic acid, 2-methyl-, ethyl ester
U162	2-Propenoic acid, 2-methyl-, methyl ester
U373	Propham
U411	Propoxur
U387	Prosulfocarb
U194	N-Propylamine
U083	Propylene dichloride
U148	3,6-Pyridazinedione, 1,2-dihydro-
U196	Pyridine
U191	Pyridine, 2-methyl-
U237	2,4-(1H, 3H)-Pyrimidinedione, 5-[bis (2-chloroethyl) amino]-
U164	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-
U180	Pyrrolidine, 1-nitroso-
U200	Reserpine
U201	Resorcinol
U202	Saccharin, & salts
U203	Safrole
U204	Selenious acid

U204	Selenium dioxide
U205	Selenium sulfide
U205	Selenium sulfide SeS2
U376	Selenium, tetrakis (dimethyldithiocarbamate)
U015	L-Serine, diazoacetate (ester)
See F027	Silvex (2,4,5-TP)
U379	Sodium dibutyldithiocarbamate
U381	Sodium diethyldithiocarbamate
U382	Sodium dimethyldithiocarbamate
U206	Streptozotocin
U103	Sulfuric acid, dimethyl ester
U277	Sulfallate
U189	Sulfur phosphide
See F027	2,4,5-T
U402	Tetrabutylthiuram disulfide
U207	1,2,4,5-Tetrachlorobenzene
U208	1,1,1,2-Tetrachloroethane
U209	1,1,2,2-Tetrachloroethane
U210	Tetrachloroethylene
See F027	2,3,4,6-Tetrachlorophenol
U213	Tetrahydrofuran
U401	Tetramethylthiuram monosulfide
U214	Thallium (I) acetate
U215	Thallium (I) carbonate
U216	Thallium (I) chloride
U216	Thallium chloride (Tlcl)
U217	Thallium (I) nitrate
U366	2H-1, 3,5-Thiadiazine- 2-thione, tetrahydro-3, 5- dimethyl-
U218	Thioacetamide
U410	Thiodicarb
U153	Thiomethanol
U244	Thioperoxydicarbonic diamide [(H2N) C (S)] 2S2, tetramethyl-
U402	Thioperoxydicarbonic diamide, tetrabutyl
U403	Thioperoxydicarbonic diamide, tetraethyl
U409	Thiophanate-methyl
U219	Thiourea
U244	Thiram
U220	Toluene
U221	Toluenediamine
U223	Toluene diisocyanate

U328	o-Toluidine
U353	p-Toluidine
U222	o-Toluidine hydrochloride
U389	Triallate
U011	1H-1, 2,4-Triazol-3-amine
U227	1,1,2-Trichloroethane
U228	Trichloroethylene
U121	Trichloromonofluoromethane
See F027	2,4,5-Trichlorophenol
See F027	2,4,5-Trichlorophenol
U404	Triethylamine
U234	1,3,5-Trinitrobenzene
U182	1,3,5-Trioxane, 2,4,6-trimethyl-
U235	Tris (2,3-dibromopropyl) phosphate
U236	Trypan blue
U237	Uracil mustard
U176	Urea, N-ethyl-N-nitroso-
U177	Urea, N-methyl-N-nitroso-
U385	Vernolate
U043	Vinyl chloride
U248	Warfarin, & salts, when present at concentrations of 0.3% or less
U239	Xylene
U200	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18- [(3,4,5-trimethoxybenzoyl) oxy]-, methyl ester, (3beta, 16beta, 17alpha, 18beta, 20alpha)-
U407	Zinc, bis (diethylcarbamodithioato-S, S')-
U249	Zinc phosphide Zn3P2, when present at concentrations of 10% or less

Appendix B

Potentially Unstable, Reactive, Explosive and Peroxide Forming Wastes

TABLE 1 - LIST OF PEROXIDIZABLE COMPOUNDS

Acetal
Acetaldehyde
Acrylamide
Acrylic Acid
Acrylonitrile
Allyl ethyl ether
Allyl phenyl ether
Allyl vinyl ether
1-Allyloxy-2, 3-epoxypropane
Benzyl-1-naphthyl ether
Benzyl butyl ether
Benzyl ethyl ether
Bis (2-ethoxyethyl) ether
Bis (2-methoxyethyl) ether
1,3-Butadiene
1,3-Butadiyne
2-Butanol
Buten-3-yne
Butyl ethyl ether
Butyl formate
Butyl vinyl ether
2-Chloro-1, 3-butadiene
1-Chloro-2, 2-diethoxyethane
2-Chloroacrynitrile
2-Chloroethyl vinyl ether
Chloroethylene
Chloroprene
Chlorotrifluoroethylene
Cinnamaldehyde
Crotonaldehyde
Cyclohexene
Cyclooctene
Cyclopropyl methyl ether
Decahydronaphthalene
Decalin
Di(2-propynyl)ether
Diacetylene
Diallyl ether
Dibenzyl ether
p-Dibenzyloxybenzene
1,2-Dibenzyoxyethane
Dibutyl ether
1,1-Dichloroethylene
Dicyclopentadiene
1,1-Diethoxyethane
1,2-Diethoxyethane
Diethoxymethane
3,3-Diethoxypropene
Diethyl ether
Diethyl fumarate
Diethylene glycol dimethyl ether
Diethylketene
Digylme
2,3-Dihydrofuran
2,3-Dihydropyran
Diisopropyl ether
1,1-Dimethoxyethane
1,2-Dimethoxyethane
1,1-Dimethoxypropane
2,2-Dimethoxypropane
3,3-Dimethoxypropene
2,2-Dimethyl-1, 3-dioxolane
2,6-Dimethyl-1, 4-dioxane
1,3-Dioxane
1,4-Dioxane
1,3-Dioxep-5-ene
1,3-Dioxol-4-en-2-one
Dipropoxymethane
Dipropyl ether
Divinyl acetylene*
Divinyl ether
1,2-Epoxy-3-isopropoxy propane
1-Ethoxy-2-propyne
2-Ethoxyethanol
2-Ethyl butanal
Ethyl isopropyl ether
Ethyl propenyl ether
Ethyl vinyl ether
2-Ethylacrylaldehyde oxime
Ethylene glycol dimethyl ether
2-Ethylhexanal
2-Ethylhexyl vinyl ether
2-Furaldehyde
Furan
Glyme compounds
4,5-Hexadien-2-yn-1-ol
2,4-Hexadienal
2,5-Hexadiyn-1-ol
2-Hexenal
Indole-2-carboxyaldehyde
Isobutyl vinyl ether
Isobutyraldehyde
Isopropoxypropionitrile
Isopropyl alcohol
Isopropyl ether
Isopropyl propyl ether
Isopropyl vinyl ether
2-Isopropylacrylaldehyde oxime
Isovaleraldehyde
Limonene
1,5-p-Menthadiene
Methoxy-1, 3,5,7-cyclo octatetraene
2-Methoxyethanol
2-Methoxyethyl vinyl ether
Methyl acetylene
Methyl methacrylate
4-Methyl-1, 3-dioxane
2-(1-Methylheptyl)-4,6 dinitrophenyl crotonate
2,3-Methyl-2-methylene butanal
4-Methyl-2-pentanone
2-Methyltetrahydrofuran
Methyl vinyl ether
2-Penten-4-yn-3-ol
a-Pentylcinnamaldehyde
Potassium* (forms yellow potassium peroxide on the surface)
Potassium amide
2-Propanol
Propionaldehyde
2-Propyne-1-thiol
Sodium 5,8,11,14,-eicosatetraenoate
Sodium amide
Sodium ethoxyacetylide
Styrene
1,1,2,3-Tetrachloro-1,3,-butadiene
Tetrafluoroethylene
Tetrahydrofuran
Tetrahydronaphthalene
Tetrahydropyran
Tetralin
Tridecanal
1,3,3-Trimethoxypropene
3,3,5-Trimethyl-2-cyclo-hexene-1-one (isophorone)
Vinyl acetate
Vinyl acetylene
Vinyl chloride
Vinyl ethers
Vinyl pyridine
4-Vinylcyclohexene
Vinylidene chloride

APPENDIX C

Hazardous Waste Disposal Request

www.towson.edu/ehs/forms/index.html

APPENDIX D

Hazardous Waste Container Label

Hazardous Waste
Accumulation Start Date:
Container Contents:
Handle With Care!
IN THE EVENT OF AN EMERGENCY WITH THIS CONTAINER CONTACT ENVIRONMENTAL HEALTH & SAFETY AT (410) 704-2949

APPENDIX E

Center for the Arts Protocols for PCB Wipe Sampling and Visual Inspections of PCB Concrete

Annual Polychlorinated Biphenyl (PCB) Wipe Sampling

Beginning in April 2021, annual PCB wipe sampling will occur at the Center for the Arts Building for at least two consecutive years to satisfy EPA requirements within Towson's approved PCB Cleanup Plan from April 2020. Wipe samples will be collected in accordance with *40 C.F.R. § 761.123,* Standard Wipe Test, using 100 cm^2 templates, with an EPA Region 3 recommended modification against using hexane as the wiping solvent. Wipes, sampling jars/vials and a toluene/methanol blend solvent should be procured from the laboratory (Maryland Spectral Services or others) prior to sampling.

Wipe Sampling Locations and Sample Quantities

Ten samples and at least one field blank must be collected annually at the following locations:

- Interior wipe testing at two windows that had the highest known concentrations of PCB in caulk, in Room 3080A and Room 2079. Wipe testing should be conducted in the front window in each room.
- Exterior wipe testing at two windows that had the highest known concentrations of PCB in caulk, outside of Room 2075 and Room 2076.
- Exterior wipe testing of the concrete slab under the window from Room 2075.

Figure 1: Center for the Arts Sampling Locations plots the rooms where sampling should occur. Two wipe samples will be collected at each location and the exact same location each year. The first wipe sample will be collected from the encapsulated area, and the second wipe sample will be collected from the area immediately adjacent to the encapsulated area. The encapsulated area extends to 1.5" from the caulk seam.

Wipe samples will be collected and analyzed for PCB using EPA SW-846 Method 8082. Maryland Spectral Services of Halethorpe, MD, will analyze the wipe samples. If Maryland Spectral Services cannot guarantee the turnaround time, another accredited laboratory may be used. Results of these sampling events will be furnished to the EPA Region 3 Land, Chemicals and Redevelopment Division within 10 days of receipt of results.

Documentation from each sampling event, including any photographs and laboratory reports must be kept on file at the Towson University Office of Environmental Health and Safety.

Personal Protective Equipment and Sampling Media Required

- Safety glasses/goggles
- Nitrile gloves – enough to change gloves with each sampling location
- 100 cm^2 templates – enough for each location
- Glass vials filled with a 90/10 toluene/methanol solution, not hexane. Alternatively, the laboratory can provide this solution in a separate jar with a medicine dropper to use for filling it into the vials.
- Wipes
- Tape

- Pens
- Chain-of-custody

Sampling Procedure

After donning PPE, place a 100 cm^2 template on area to be wiped (if on a wall, use tape that best adheres to concrete). Soak wipe in toluene and methanol solution, ensuring it is thoroughly saturated. Use uniform pressure when wiping the area within the template.

With one side of the wipe, blot the area within the template vertically. After the entire area has been blotted, use the other side of the wipe and blot the area horizontally. Blot at least five times in each direction.

Roll or fold the wipe into the sample container with the wetter side inside.

Prepare one field blank by soaking the wipe with the toluene and methanol solution.

Seal the vial, write sample number on the vial, and fill in chain-of-custody information, including the wipe area.

Discard soiled templates and gloves into garbage bag and dispose of properly.

Blotting and not wiping the sampling area helps collect PCB and not other surface dirt or contamination, which can alter analytical results.

Results Submission

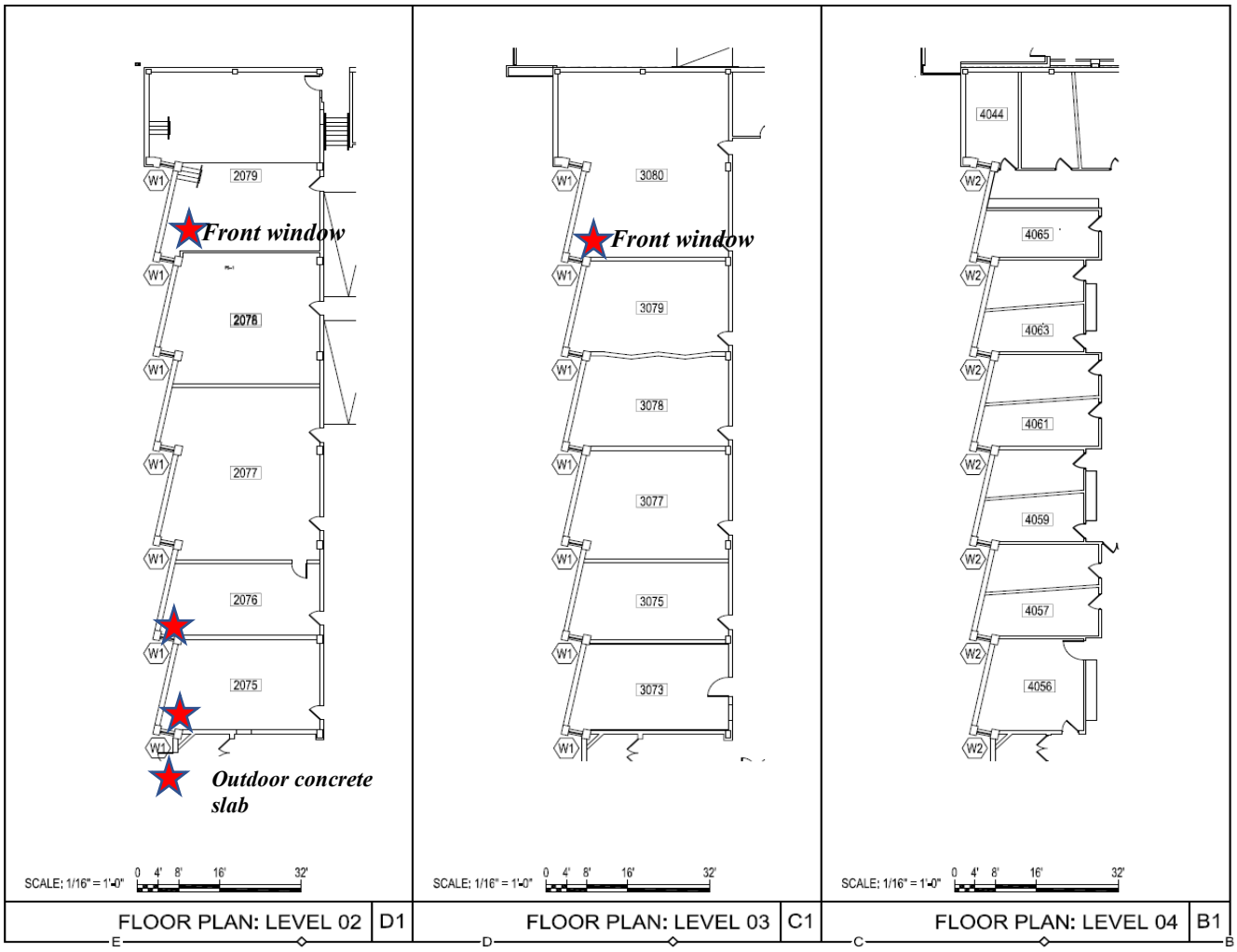
The encapsulated surface PCB concentration shall be maintained at concentrations ≤ 1 µg/100 cm^2 for interior surfaces and at ground level to 9 feet above ground level for exterior surfaces and at ≤ 10 µg/100 cm^2 for exterior surfaces found at 9 feet and above. If the surface wipe results exceed these concentrations, Towson shall apply two additional coats of epoxy to mitigate further breakthrough.

Sampling results should be submitted to EPA Region 3 within 10 days of receipt.

U.S. EPA Region 3
Land, Chemicals and Redevelopment Division
RCRA Corrective Action Branch 1 (3LC10)
1650 Arch Street
Philadelphia, PA 19103

Records from the sampling events, including laboratory reports, will be kept on file at the Towson University Office of Environmental Health and Safety.

Figure 1: Center for the Arts Sampling Locations



Center for the Arts Annual Visual Inspection Operations and Maintenance Protocol (For Years 2023 and Later)

After two consecutive years of wipe samples are completed in 2021 and 2022, Towson University EHS must continue to monitor the encapsulated concrete to ensure that it is intact and does not have any degradation, which could include but is not limited to cracks, flaking chips, surface damage, or signs of brittleness. Use the following table to document observations where PCB is encapsulated in concrete. This visual inspection should occur at least once annually. If maintenance staff observe degrading concrete, additional visual inspections should occur on a frequency based on the extent of degradation and likelihood of further degradation to document this issue and then determine the best remedy for correcting and resealing the concrete with encapsulant. EHS must be notified as soon as possible, and immediate steps should be taken to prevent exposure from damaged concrete dust, such as encapsulation, thorough cleaning, plastic or adhesive coverings, closure of the space to occupants, until more permanent actions can be completed. In addition to filling out the table below, photographs of the concrete should be taken annually and included with the table in the EHS file. EHS should notify the EPA Region 3 office for guidance if damage requires more than minor encapsulation or minor repair.

If damage is observed on the concrete, the source of the damage should be noted, where possible. Sources of damage could include water/flooding conditions, damage from furniture, and if outdoors, fallen trees. The source of damage should be contained or corrected.

When damage is documented, EHS should be notified immediately.

Table 1: Visual Inspections, Center for the Arts, PCB in Concrete

Inspection Date		
Inspector		
Annual Inspection or Additional Inspection (Circle one)		
Room Location **(Note if concrete is near a front or rear window)** **<u>Indoor and Outdoor</u> observations must also be documented**	***Observation Ranking: Intact or Damaged*** **If damaged, what is the source?**	***Change in Status Since Last Inspection (Y/N)***
Slab outside of 2075		
2075		
2076		
2077		

Inspection Date		
Inspector		
Annual Inspection or Additional Inspection (Circle one)		
Room Location **(Note if concrete is near a front or rear window)** **<u>Indoor and Outdoor</u> observations must also be documented**	***Observation Ranking: Intact or Damaged*** **If damaged, what is the source?**	***Change in Status Since Last Inspection (Y/N)***
2078		
2079		
3073		
3075		
3077		
3078		
3079		
3080		
4044		

Inspection Date		
Inspector		
Annual Inspection or Additional Inspection (Circle one)		
Room Location **(Note if concrete is near a front or rear window)** **<u>Indoor and Outdoor</u> observations must also be documented**	***Observation Ranking: Intact or Damaged*** **If damaged, what is the source?**	***Change in Status Since Last Inspection (Y/N)***
4056		
4057		
4059		
4061		
4063		
4065		