HAZARDOUS WASTE MANAGEMENT GUIDE

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Revised January 2014

777-2211
IN THE EVENT OF AN EMERGENCY: DIAL 911

Revised January 2015

PURPOSE OF THIS MANUAL

This manual has been designed to assist all Binghamton University faculty, staff, and graduate students in the safe and economical management of hazardous wastes generated on campus. The hazardous waste manager coordinates the hazardous waste management program including the identification of hazardous wastes, compliance with state and federal regulatory requirements, hazardous waste storage and disposal, spill response, and hazardous waste minimization.

The role of the hazardous waste manager is to act in the capacity of a consultant for the Binghamton University campus and to provide customer service oriented programs that help achieve compliance with various state and federal hazardous waste regulations. The input and cooperation of chemical users is an important part in the overall success of the hazardous waste management program.

This manual discusses the vital role YOU play in this management effort.

This revised guide includes a number of additional sections to better assist the campus community in managing hazardous waste. Please read the guide carefully and call the hazardous waste manager at 777-2211 if you have any questions. Your comments and suggestions are always appreciated.

1.0 INTRODUCTION

It is a policy of Binghamton University "to maintain an environment tor its faculty, staff, students, and visitors that will not adversely affect their health and safety nor subject them to avoidable risk of injury". The Environmental Health and Safety Office (EH&S) was established in 1974 to provide guidance and services needed by campus personnel to attain the goals and objectives of the campus environmental health and safety policy.

Environmental Health and Safety Mission Statement

"With enthusiasm for excellence, the Department of Environmental Health and Safety promotes and supports a safety conscious campus community through professional consultation, education, training, and services".

The following are programs and initiatives developed by your EH&S professional and technical staff:

- Asbestos Awareness
- Bloodborne Pathogens
- Chemical Spill Response
- Disaster Planning
- Fire and Safety Code Compliance
- Hazard Communication
- Hazardous Waste Management
- Hazardous Work Permits
- Incident and Hazard Reports
- Industrial Hygiene
- Laboratory Safety
- Regulated/Infectious Medical Waste
- Respiratory Protection
- Safety Consultation
- Right to Know
- Contingency Plan

If you would like more information or want to receive a copy of our brochure detailing these programs, contact the Environmental Health and Safety office at 777-2211.

2.0 YOUR RESPONSIBILITIES

As a chemical user, YOU have a legal and moral responsibility to ensure the proper disposal of any hazardous waste you generate. There are various state and federal regulations that govern the disposal of chemical wastes. There are also criminal and civil penalties that can result from improper disposal of these wastes. In addition to potential citations, fines, and imprisonment; improper waste disposal can also result in national media attention and damage to the University's reputation.

YOU CAN BE PERSONALLY HELD LIABLE FOR "WILLFULLY AND KNOWINGLY" VIOLATING THESE REGULATIONS.

You also have a moral responsibility to properly dispose of chemicals that can pose a present or potential hazard to human health or the environment. This includes accident and injury prevention to students, coworkers, and the campus community.

The Binghamton University management procedure for the policy on environmental health and safety can be found in Appendix A.

3.0 HAZARDOUS WASTE MINIMIZATION

Disposal of hazardous waste is regulated by the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (DEC) under the Resource Conservation and Recovery Act (RCRA). The Act makes it illegal to mismanage hazardous wastes. The Act's emphasis is on waste reduction and recycling. You can help reduce the expenditure of University funds (and ultimately your department's funds) on waste disposal and material procurement by practicing waste minimization.

3.1 Plan Your Experiment

Include waste minimization practices when you are planning for an experiment. Consider the chemicals you will be using and whether or not they will become hazardous waste. Only mix the amount of reagents and stock solutions that you need for the experiment and will be able to use. Do not make excess solutions for potential later use. Know in advance how you will be handling any hazardous waste. Read Safety Data Sheets (SDS) BEFORE working with chemicals to understand any hazards and special handling precautions. Allow for time at the end of each day to clean up, and always practice good housekeeping.

3.2 Maintain a Current Inventory

The first step to effectively minimizing the amount of hazardous waste you generate is to maintain a current inventory of all chemicals being used and stored in your lab or work area. You should check your inventory first before ordering any new chemicals. It may also be possible to borrow small amounts of chemicals from other labs. Please take the time to check with your colleagues.

3.3 Use Recycled Chemicals

There is an on-going program of recycling usable but unwanted chemicals. All recycled chemicals are in their original containers and many still have their factory seals. You can also put in a special request for a particular chemical. Once you have submitted a request, EH&S will look for the requested items(s) in the chemicals that are sent through the hazardous waste management program.

If you would like to be included on the e-mail distribution list for surplus chemicals or would like to request a particular chemical(s), contact the hazardous waste manager at 7-2211.

3.4 Purchasing Chemicals

When ordering new chemicals, only order the amount of chemical that you need for the experiment you are conducting. Do not order a larger size container for an experiment that will only last a semester or for an experiment that may occur in the future. Although chemicals usually cost less per unit when purchased in large containers, when the actual usage, storage, and disposal are factored in, the cost savings diminish significantly and in some cases result in higher costs overall.

In addition, chemicals in large containers that are not used frequently can be rendered useless over time by contamination or degradation. In general you should only order the minimum quantity of a chemical that you need for the experiment, or one year's worth of stock at the absolute most.

3.5 Nonhazardous Substitutes

There are many nonhazardous substitutes for hazardous chemicals used in laboratories. Hazardous chemicals that should be substituted with nonhazardous alternatives in particular include those chemicals that are highly toxic, reactive, contain heavy metals, and are known or suspected carcinogens, mutagens, or teratogens.

Examples of nonhazardous chemical substitutes can be found in reference materials such as Prudent Practices in the Laboratory (see Appendix I). If you are using a specific hazardous chemical on a routine basis, EH&S can research possible alternatives for you.

3.6 Appropriate Storage Practices

Storing chemicals properly promotes safer and healthier working conditions and extends the usefulness of chemicals. Improperly stored chemicals can result in:

- degraded containers that allow chemicals to become contaminated
- degraded containers that can release hazardous vapors that are detrimental to the health of lab workers
- degraded containers that can release vapors that can affect the integrity of nearby containers
- degraded labels that can result in the generation of unknowns
- chemicals becoming unstable and/or potentially explosive

3.6.1 General Storage Guidelines

1) Chemical containers should be dated when they arrive and should be checked regularly and disposed of if the chemical is past its expiration date. NOTE: Peroxide forming chemicals are required to be dated (see Section 8.16).

2) Large chemical bottles should be stored towards the back of a storage cabinet and smaller bottles should be stored up front where they are visible. Labels should be turned so they can be easily read.

3) For multiples of the same chemical, older containers should be stored in front of newer chemicals, and containers with the least amount of chemical should be stored in front of full containers. This allows older chemicals to get used up first and helps to minimize the number of chemical containers in the storage area.

4) All chemical containers MUST be labeled. Labels must include the name of the chemical constituent(s) and any hazards present. You should check chemical containers regularly and be sure to replace any labels that are deteriorating BEFORE the chemical becomes an unknown.

5) Flammable liquids in excess of the quantities for the specific classes listed below must be stored in approved flammable liquid storage cabinets.

a)	Class IA	(flashpoint < 73° F, boiling point < 100° F)	1 pint
b)	Class IB	(flashpoint < 73° F, boiling point > 100° F)	1 quart
c)	Class IC	(flashpoint > 73° F, boiling point > 100° F)	1 gallon
d)	Class II	(140° F > flashpoint > 100° F)	1 gallon

6) Do not store corrosive chemicals in metal storage cabinets, this can result in serious degradation of the storage cabinet and the containers inside. Corrosive chemicals should be stored in corrosion resistant cabinets.

7) Do not store flammable liquids in a non-explosion-proof refrigerator. This can result in the flammable vapors being ignited by the electrical components of the refrigerator. Only store flammable liquids in explosion-proof (or flammable storage) refrigerators. Explosion-proof refrigerators have protected electrical components and are designed to store flammable liquids.

8) Highly toxic chemicals such as inorganic cyanides should be stored in locked storage cabinets.

3.7 Chemical Storage Classes

Chemicals should be stored according to compatibility groups, they should not be stored alphabetically (or otherwise) until they have first been segregated by hazard class. In general, chemicals should first be separated into their organic and inorganic families and then segregated according to hazard class groups. The basic hazard class groups, which are based on the Department of Transportation (DOT) hazard classes, include:

Flammable liquids (Class 3)
Spontaneously combustible (Class 4.2)
Oxidizers (Class 5.1)
Poisons (Class 6 .1)
Bases
Inorganic acids
Flammable solids (Class 4.1)
Dangerous when wet (Class 4.3)
Organic peroxides (Class 5.2)
Cyanides
Organic acids
Other

Be sure to check Safety Data Sheets (SDS) for any special storage requirements. There are a number of storage patterns and systems that are recommended by various manufacturers.

EH&S has a customized label maker and hazard class stickers for labeling your chemical storage areas and can provide assistance in segregating your chemicals for you. If you would like to take advantage of these services, contact the hazardous waste manager at 7-2211.

3.8 Cylinder and Lecture Bottles

Disposal of cylinders and lecture bottles is expensive, especially if the contents are unknown. Make sure that all cylinders and lecture bottles are labeled and included in your chemical inventory. Before you place an order for a cylinder or lecture bottle, determine if the manufacturer will take back the cylinder or lecture bottle when it becomes empty. If at all possible, only order from manufacturers who will accept cylinders and lecture bottles for return.

3.9 Microscale Activities

If possible, consider switching to microscale experiments. Benefits include:

- reduced costs in chemical purchases and hazardous waste disposal
- shorter analysis times
- significantly less glassware breakage
- compatibility with macro-scale equipment

- less hazardous chemical exposure to employees and students
- minimized potential for fires and explosions
- less space required for chemical and hazardous waste storage

For more information and training on microscale activities, check out The National Microscale Chemistry Center:

www.microscale.org

4.0 DISPOSAL OF NONHAZARDOUS WASTE

Binghamton University does not advise the disposal of non-hazardous chemicals by trash or sanitary sewer. Chemicals not regulated today, could be in the future, and the generator of chemical waste can still be held liable in the future if a particular chemical became regulated.

This is referred to as “retroactive liability” under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), ie “Superfund”. A good example of this is the disposal of PCBs before they were regulated. There are numerous sites across the country that are now Superfund sites because of past disposal practices of PCBs - even though the disposal practices were acceptable at the time. Many institutions, including universities, that followed these accepted disposal practices are now being asked to fund the cleanup of these Superfund sites.

It is also important to keep in mind the stigma attached with the disposal of chemicals in the normal trash. This is especially true when chemicals are discovered in the trash by other members of the campus community who may not have the technical knowledge needed to identify and evaluate those chemicals. This type of situation can quickly escalate into unwarranted attention from the media and regulatory agencies. Please be aware of the concerns people have with regard to their health and safety when discovering strange and unknown chemicals in the trash.

In an effort to minimize any potential incidents, Environmental Health and Safety recommends disposing of all chemical wastes through the hazardous waste management program.

Please keep in mind that improper disposal of hazardous wastes can result in fires, chemical reactions, release of toxic or noxious gases and vapors, corrosion of the plumbing system, and can result in other environmental problems at the sewage treatment plant.

NOTE: Dilution is not allowed as a treatment method for hazardous waste.

5.0 THE HAZARDOUS WASTE MANAGEMENT PROGRAM

There is a large variety of chemical waste generated at Binghamton University. Nearly all facets of the campus community generate some form of hazardous waste. Examples include:

- flammable, corrosive, reactive, and toxic laboratory waste
- waste solvents from vehicle maintenance, printing, and painting operations
- corrosive wastes from cleaning operations
- waste fixer and photographic chemicals from darkrooms
- paints, thinners, corrosives, and metal containing wastes from art studios
- other miscellaneous wastes from across campus

The management of hazardous waste generated on campus includes:

- information on safe chemical handling, storage, use, and disposal
- hazardous waste collection and disposal
- laboratory and work area cleanouts
- spill response

The first step in the hazardous waste management program is for you to recognize your responsibilities as a chemical user according to the hazardous waste regulations, understand the hazardous waste management system, and implement the procedures described in this guide. You are also responsible for making every technical and economically feasible effort to minimize the volume of surplus chemicals and the amount of hazardous waste that you generate.

5. 1 Hazardous Waste Regulations

Hazardous waste is regulated by the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (DEC) under the Resource Conservation and Recovery Act (RCRA). Binghamton University is regulated as a Large Quantity Generator (LOG) of hazardous wastes. This guide is intended to provide an overview of managing hazardous wastes on a university campus. The complete regulations and additional environmental compliance assistance information for colleges and universities can be found at the DEC and EPA www sites:

http://www.dec.ny.gov/chemical/8486.html

http://www.epa.gov/region02/waste

6.0 MANAGING HAZARDOUS WASTE

As a generator of hazardous waste, there are specific requirements that must be followed in order to properly handle, store, and dispose of hazardous wastes. These requirements include:

1) Make a determination as to whether the chemical wastes you are generating are considered hazardous (see Section 6. 1).

2) Follow Satellite Accumulation Area requirements (see Section 7.0).

3) Follow proper hazardous waste storage and disposal procedures (see Sections 8 and 9).

6.1 Hazardous Waste Determination (What is Hazardous Waste)

The U.S. EPA and New York DEC consider a waste to be hazardous if it:

(a) is a Listed hazardous waste (see Section 6.2)

OR

(b) exhibits certain hazardous characteristics (see Section 6.3)

In addition to the two criteria above, Environmental Health and Safety also considers chemical waste to be hazardous if it:

(c) has an oral Lethal Dose (LD50) for a rat of less than 500 mg/kg

OR

(d) if the original container identifies the chemical as toxic or poisonous

OR

(e) if the chemical is a known or suspected carcinogen, mutagen, or teratogen

To summarize, a chemical waste exhibiting any one of these five criteria is to be considered as hazardous waste and must be managed accordingly through the hazardous waste system.

When in doubt, dispose of chemical waste through the hazardous waste management program.

6.2 Listed Hazardous Wastes (F, U, and P lists)

The EPA and DEC have several lists of chemical wastes that are regulated as hazardous wastes. Three of the lists that apply to Binghamton University are the F-list, U-list, and P-list.

6.2.1 F-Listed Waste

Chemical wastes found on the F-list are hazardous wastes from nonspecific sources. Although there are 39 listings (F001- F039), the most common F-listed wastes generated on campus are F001, F002, F003, F004, and F005. The chemicals listed are primarily both halogenated and non-halogenated organic solvents. See Appendix B tor a description of the chemicals on the F-list.

Some common examples of F-listed hazardous wastes include:

a) A graduate student working in a science laboratory uses Acetone as a final rinse for cleaning glassware, the Acetone waste that results is considered a F003 listed hazardous waste. This Acetone rinse cannot be disposed of down the drain and must be managed as a hazardous waste.

b) A maintenance worker uses a 10% solution by volume (or greater) of Methylene chloride as a degreasing agent. The waste that results is considered a F001 listed hazardous waste and must be disposed of through the hazardous waste management program.

c) A person working in a Fine Arts department uses a trade name paint brush cleaner that contains 10% or more (by volume) of Toluene. The waste that results is considered a F005 listed hazardous waste and must be managed accordingly.

6.2.2 U and P Listed Waste

The EPA and DEC regulate certain chemical wastes as being Toxic Wastes (U-list) and Acutely Hazardous Wastes (P-list). The U and P codes are assigned to chemicals that are discarded commercial chemical products, oft-specification species, and container residues. The EPA and DEC also regulate any residue or contaminated soil, water, or other debris resulting from the cleanup of a spill involving a U or P listed chemical as hazardous waste. It is also EH&S policy that any mixture of chemicals that contain ANY concentration of U or P listed chemicals is considered to be hazardous waste and must be disposed of through the hazardous waste management program. The U and P lists of chemicals can be found in Appendix C.

A number of commonly used chemicals can be found on the U and P lists. Some examples include:

U-listed		P-listed
Acrylamide	Mercury	Osmium tetroxide
Chloroform	Methanol	Potassium cyanide
Ethyl acetate	Phenol	Sodium azide
Formic acid	Xylene	Sodium cyanide

Please note that if you spill a chemical found on the U or P lists, the resulting cleanup debris is still considered a hazardous waste. For example, if you spill a 100ml bottle of Chloroform, the speedi-dry or paper towels used to clean up the spill are considered as hazardous waste and must be disposed of through the hazardous waste management program.

6.2.3 Polychlorinated Biphenyls (PCBs)

PCBs and PCB contaminated materials are regulated by the DEC as hazardous waste. PCBs and all waste chemicals and contaminated debris containing 50 ppm (parts per million) or greater of PCBs are a New York State listed hazardous waste. Oils in or from electrical equipment whose PCB concentration is unknown or not otherwise clearly marked as “No PCBs”, must be assumed to contain between 50 and 500 ppm of PCBs and must be disposed of through the hazardous waste management program.

Due to the high cost for disposal of PCB waste, it is very important to keep PCB waste clearly identified and separated from other wastes. If PCB waste is added to a container of non-PCB waste, the resulting mixture will have to be treated as PCB waste. Please make every attempt to minimize the amount of PCB waste that you generate.

6.3 Characteristic Waste

In addition to listed hazardous wastes, the EPA and DEC regulate any chemical wastes as hazardous waste if the waste exhibits any one or more of the following characteristics: Ignitability, Corrosivity, Reactivity, and Toxicity.

6.3.1 Ignitability

Ignitable wastes are those that are capable of causing or intensifying a fire during routine handling. Ignitable wastes carry the EPA waste code 0001. A waste exhibits the characteristic of ignitability if it has ANY of the following properties:

1) A liquid, other than an aqueous solution containing less than 24% alcohol by volume, and has a flash point less than 140° F (60° C)

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

3) Is an ignitable compressed gas - aerosols, propane cylinders

4) Is an oxidizer

Examples include most organic solvents such as:

Acetone	Ethyl ether	Paint
Benzene	Heptane	Paint thinner
Ethanol	Hexane	Toluene
Ethyl acetate	Methanol	Xylene

6.3.2 Corrosivity

Corrosive wastes include highly acidic or highly alkaline chemicals. Corrosive wastes carry the EPA waste code 0002. A waste exhibits the characteristic of corrosivity it has ANY of the following properties:

1) Is an aqueous waste that has a pH less than or equal to 2 OR a pH greater than or equal to 12.5

2) Is a liquid that corrodes steel at a rate greater than 6.35mm (0.25 inches) per year

Please note: It is EH&S policy to classify corrosive solid chemicals as hazardous wastes if; when the solid chemical is added to water resulting in an aqueous solution with a pH less than or equal to 2 OR a pH greater than or equal to 12.5. Additionally, if the original chemical container identifies the contents as corrosive, then the chemical waste must be disposed of through the hazardous waste management program.

Examples of corrosive hazardous wastes include:

Hydrochloric acid (Muriatic acid)	Sodium hydroxide solution
Sulfuric acid	Sodium hydroxide pellets
Nitric acid	Ammonium hydroxide solution
Acetic acid	Potassium hydroxide flakes
Hydrofluoric Acid	Calcium hydroxide solution

6.3.3 Reactivity

Reactive wastes include highly reactive and/or unstable chemicals. Reactive wastes carry the EPA waste code 0003. A waste exhibits the characteristic of reactivity if it has ANY of the following properties:

1) It is normally unstable and readily undergoes violent change without detonating

2) It reacts violently with water

3) It forms potentially explosive mixtures with water

4) When mixed with water it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment

5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment

6) Is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement

7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure

8) It is a forbidden explosive or a Class A or Class B explosive

Examples of reactive hazardous wastes include:

Ammonium sulfide	Picric acid (dry)
Benzoyl peroxide (dry)	Sodium cyanide
tert-Butyllithium in solvent	Sodium metal

6.3.4 Toxicity

Toxicity is determined by a laboratory test which measures the concentration of the toxic material which would most likely leach into the ground water if that waste is improperly managed. The test is known as the “Toxicity Characteristic Leachate Procedure,” or TCLP. Toxic wastes carry the EPA waste codes 0004-0043. The list of TCLP contaminants can be found in Appendix D.

Any chemical waste that is identified as toxic in the SDS or on the container must be disposed of through the hazardous waste management program. Common toxic chemicals can be found in Appendix D.

NOTE: Dilution is not allowed as a treatment method for hazardous waste.

Examples of toxic contaminants include:

Barium	Lead
Benzene	Mercury
Chloroform	Pyridine
Chromium	Silver

6.3.5 The Mixture Rule

According to EPA and DEC regulations, the Mixture Rule defines whether a mixture of nonhazardous and hazardous waste results in a hazardous waste. The Mixture Rule states:

1) If ANY amount of a nonhazardous waste is mixed with ANY amount of a listed hazardous waste (see Section 6.2), then the resulting mixture is considered to be a hazardous waste.

2) If ANY amount of a nonhazardous waste is mixed with ANY amount of characteristically hazardous waste (see Section 6.3), then the resulting mixture is not considered to be hazardous if the resulting mixture no longer exhibits one of the hazardous characteristics.

For example:

If you have a container of waste Sodium chloride solution (nonhazardous) and a container of waste Phenol (listed hazardous waste) and mix both chemicals in a larger waste container, the resulting mixture is considered to be a hazardous waste and must be disposed of through the hazardous waste management program.

If you have a container of dilute Sodium Hydroxide solution with a pH=10 (nonhazardous) and a container of Hydrochloric acid solution with a pH=2 (characteristic hazardous waste - corrosive) and mix both chemicals in a larger waste container and the resulting pH of that mixture is greater than 2 or less than 12, then the mixture no longer exhibits the hazardous characteristic of corrosivity and therefore is not considered a hazardous waste.

It is important to note that although the above mixture in example #2 may not be hazardous, the mixture must be disposed of through the hazardous waste program.

7.0 SATELLITE ACCUMULATION AREAS

Satellite Accumulation Area is the name given to the area where hazardous wastes are generated and stored before being moved to the campus 90-day central storage area. Satellite Accumulation Areas can be thought of as the individual rooms, work areas, art studios, and laboratories where hazardous waste is generated.

Hazardous waste can be accumulated in a Satellite Accumulation Area if the following requirements are met:

1) A generator can accumulate up to 55 gallons of hazardous waste or one quart of acutely hazardous waste (P-listed), before having to be removed to the 90-day central storage area.

2) Hazardous waste must be stored at or near the point of generation and under the control of the person who generated the waste.

NOTE: EH&S requires the Satellite Accumulation Area to be in the lab of generation.

Hazardous waste must be kept in the same room, lab, work area, or art studio that it is generated. Under the hazardous waste regulations, you cannot move a container of hazardous waste from one room to another room, down a hallway, to another building, etc.

According to how the regulations are written, by moving hazardous waste from one room to another room or building, you are no longer storing waste under Satellite Accumulation Area rules, you are essentially creating another 90-day central storage area and must comply with all applicable storage requirements. To avoid this, keep hazardous waste stored at or near the point of generation.

A general rule of thumb is to follow the “Frisbee Rule”:
You should be able to throw a Frisbee to your hazardous waste containers in your Satellite Accumulation Area. You can’t throw a Frisbee through walls, out doors, around corners, down hallways, etc. and still reach your hazardous waste containers. Keep your hazardous waste containers in the same room in which the hazardous waste was generated!

NOTE: Satellite Accumulation Area rules DO NOT apply to chemicals that are still in use and therefore not considered hazardous waste. Satellite Accumulation Area rules only apply to hazardous waste containers.

3) Hazardous waste must be properly labeled. ALL containers of hazardous waste MUST be labeled with a yellow “Hazardous Waste” sticker and with a completed hazardous waste chemical tag listing all constituents in the waste container.

EH&S has distributed rolls of yellow stickers that say “Hazardous Waste” for this purpose. The Hazardous Chemical Waste Tag (see Section 9.1) must also be present on each container. Additional rolls of hazardous waste stickers or Hazardous Chemical Waste Tags can be obtained by Science Stores at 7-2551 or hazwaste@binghamton.edu. All stickers and tags are free of charge.

4) ALL containers of hazardous waste MUST be kept closed except when adding removing waste.

5) Hazardous waste must be stored in containers that are compatible with the waste being stored and be free of cracks and leaks. If a container is leaking or in poor condition, then place the degraded container into an “overpack” container such as a 1 gallon plastic jar. Science Stores carries a variety of different types and sizes of containers (see Appendix H).

6) After a hazardous waste container becomes full, contact EH&S to schedule a waste pick up (see Section 9.0). It is recommended that hazardous waste be accumulated in containers large enough to hold the waste being generated, yet small enough so the container can be filled quickly and then removed by EH&S. Do not accumulate excess amounts of full waste containers. Hazardous waste pickups are held once every two weeks.

7) Hazardous waste must be disposed of properly, do not dispose of hazardous waste down sink drains, in the normal trash, or by evaporation in fume hoods > > > all constitute illegal disposal.

8) Do not store hazardous waste containers in or around sinks, including cup sinks in hoods.

9) Hazardous waste containers should be stored in plastic secondary containment trays labeled “Satellite Accumulation Area”. You can obtain one of these specially labeled trays by contacting the hazardous waste manager at 7-2211.

10) Do not overfill containers. Containers with liquid waste should be no more than 95% full.

Please note: These specially labeled trays are for storage of hazardous waste containers only. Do not use them for general purpose storage. Science Stores carries a variety of storage trays and containers (see Appendix H).

8.0 MANAGEMENT PROCEDURES FOR SPECIFIC WASTE TYPES

The following procedures and requirements are for the management of specific types of hazardous waste. Please adhere to these guidelines. If you are routinely generating a large quantity of a particular chemical or waste stream, contact the hazardous waste manager at 7-2211 and special disposal arrangements can be made to accommodate you.

8.1 Concentrated Solutions of Acids and Bases

Concentrated solutions of acids and bases must be disposed of through the hazardous waste management program. EH&S recommends that laboratories using highly concentrated corrosive solutions have written policies and procedures in addition to providing documented training to students and staff.

8.1.1 Neutralization Procedures

Binghamton University does not permit the neutralization of any acid or base solutions. By eliminating neutralization practices, EH&S is attempting to reduce injury or accidental chemical reactions.

8.1.2 Chromic acid

Chromic acid is a powerful oxidizing agent that is both toxic and corrosive and can explode on contact with organic materials. Chromium (VI) is also classified as a carcinogen. Accidents involving Chromic acid cleaning solutions can result in burns to both skin and clothing.

Chromic acid cleaning solutions leave a residue of Chromium (VI) on the glass surface, which is difficult to remove. This residue has been known to interfere with certain research procedures since the material can leach into solution. EH&S highly recommends that you consider using Chromic acid alternatives such as “No Chromix”, “Alconox”, or similar type products which can be ordered through Science Stores (see Appendix H).

8.1.3 Hydrofluoric acid

Hydrofluoric acid is a strong corrosive and highly toxic chemical that causes severe burns from dilute solutions and can be fatal upon exposure of concentrated solutions. Benchtop use of Hydrofluoric acid is not permitted, it must only be used in a fume hood.

Because of Hydrofluoric acid's ability to etch glass, the chemical and waste must be stored in plastic containers. EH&S recommends that PI's of laboratories using HF^{+} have written policies, procedures and training documentation for all students and staff working with the chemical. PI's are also required to provide all necessary PPE including Calcium gluconate for emergencies.

Anyone using Hydrofluoric acid should contact EH&S at 7-2211 and request a tube of Calcium gluconate gel, which is used as an initial response to skin exposure of Hydrofluoric acid. The quantities of Hydrofluoric acid that is used and stored should be kept to an absolute minimum.

8.1.4 Perchloric acid

Perchloric acid is a strong oxidizer and corrosive acid. Perchloric acid can also react with metal to form shock sensitive metal perchlorates. This can occur when Perchloric acid is used in a regular (non-Perchloric acid) fume hood.

Because of this high hazard, Perchloric acid must only be used in a special Perchloric acid fume hood, which has a wash down function. Contact the hazardous waste manager at 7-2211 if you plan to use Perchloric acid so arrangements can be made for the experiment to be conducted in a special Perchloric acid fume hood.

Oxidizing test strips can be purchased to check Perchloric acid for the concentration of peroxides present.

8.2 Organic Solvents

Organic solvents should be collected in special flammable liquid safety cans (Just-Rite). This is a requirement for laboratories that generate more than 2 gallons of flammable solvents within a two week period. Safety cans come in 2.5 gallon and 5 gallon sizes and can be purchased at Science Stores (see Appendix H). Science Stores also carries replacement flame arrestor screens for safety cans.

Do not dispose of organic solvents down the drain. Generators of organic solvents should keep nonhalogenated waste solvents separated from halogenated waste solvents to the fullest extent possible. EH&S bulks organic solvents into 55 gallon drums for fuels blending. It costs approximately three times as much to dispose of a drum of halogenated waste solvents versus a drum of nonhalogenated waste solvents.

Safety cans should only be used for the storage of waste organic solvents. Other wastes are inappropriate for fuels blending, can have a detrimental effect on the integrity of the metal 55 gallons drums used, and represent a serious health and safety issue to EH&S staff.

The following wastes must NOT be collected in safety cans:

- any acid or base solutions (a pH between 4 and 11 is acceptable)
- aqueous solutions of toxic organic chemicals
- heavy metals (Lead, Mercury, Silver, Chromium, Barium, etc.)
- vacuum pump oil
- sulfides or inorganic cyanides
- strong oxidizers or reducers
- water reactive substances
- PCB waste
- unknowns

Be sure to include approximate percentages of all waste solvents placed in safety cans. Do not rely on your memory to label solvents, keep a running list of solvents that you add to the safety can.

8.3 Aqueous Solutions of Toxic Chemicals

Aqueous solutions containing heavy metals and chemicals found in Appendix C and Appendix D must be disposed of through the hazardous waste management program. Do not dispose of this type of waste down the drain.

8.4 Oil

Uncontaminated oil, such as vacuum pump oil, is not considered hazardous waste and can be collected and recycled. Do not mix other chemical wastes with used oil. If a hazardous waste, such as flammable solvents or heavy metals, is added to used oil, then the resulting mixture cannot be recycled and must be handled as hazardous waste. Be sure to note any contaminants on the Hazardous Chemical Waste Tag when disposing of contaminated used oil.

If you remove oil from a piece of electrical equipment, verify whether or not the oil contains PCBs. EH&S has the capability to do a quick test to determine if oil contains PCBs. When in doubt, contact the hazardous waste manager at 7-2211.

8.5 Asbestos

Asbestos is a fibrous material that was once widely used in a number of products that can still be found in laboratories and throughout other buildings. Products that can contain asbestos include: electrical equipment insulation (ovens, heating mantles, heating pads, and wires), older vinyl floor tiles and mastic, pipe fittings, pipe insulation, caulking compounds, fireproofing, and transit (cement-like) panels such as those found in and under fume hoods.

Asbestos is a known human carcinogen and must be disposed of properly. The hazard of asbestos is greatest when the asbestos product becomes “friable” - able to be pulverized from finger pressure - and when the asbestos becomes airborne. For older vinyl asbestos tile (VAT), an additional slipping hazard occurs when these tiles “pop” out of the floor.

If you find any of the above items deteriorating and suspect they may contain asbestos, or you are considering disposing of old electrical equipment with insulation, or if vinyl tiles have “popped” out of the floor, contact the Industrial Hygienist at 7-2211 for more information.

8.6 Silica Gel

Silica gel contaminated with solvents, heavy metals, or other toxic chemicals should be accumulated in leak proof containers such as one gallon plastic wide mouth containers or a five gallon bucket lined with a heavy duty plastic bag. Contact the hazardous waste manager at 7-2211 for these supplies.

When labeling Silica gel waste, be sure to list all of the contaminants, including solvents, and the approximate percentages on the Hazardous Chemical Waste Tag.

8.7 Chemically Contaminated Items

In general, Chemically Contaminated Items (CCIs) can only be put into the normal trash if they are nonhazardous, non-ignitable, nonreactive, noncarcinogenic, non-mutagenic, noninfectious, nonradioactive, and the contaminant is not highly toxic. “Labware” includes disposable items such as gloves, benchtop coverings, pipets, test tubes, etc.

If you feel that the normal trash is not an appropriate disposal route for your CCIs, then package them in a leakproof container or plastic bag and label with a Hazardous Chemical Waste Tag as “Chemically Contaminated Items” and the name and approximate percentage of chemical contaminants.

8.8 Mercury

Metallic mercury is collected and recycled. It should be packaged in a tightly sealed and leak-free container such as a bottle or vial with a screw top lid. Place broken mercury thermometers in a leak proof container or a secured plastic bag. When collecting metallic mercury, DO NOT mix with other chemicals or waste if at all possible.

Do not use the past practice of adding sulfur, nitric acid, or water in an attempt to contain vapors. This only results in more hazardous waste being generated and rendering the metallic mercury as non-recyclable. However, the use of commercial ‘Hg Absorb’ powder found in mercury spill kits is acceptable.

Mercury is a highly toxic chemical and ALL mercury spills, including broken thermometers, must be cleaned up and the spill debris must be disposed of through the hazardous waste management program. Commercial mercury spill kits can be found in the 5-gallon 'Spill Buckets' (see Appendix G) and are also available through many safety supply companies. Never use a regular vacuum cleaner to clean up a mercury spill, this will only cause the mercury to vaporize and disperse into the air. Environmental Health & Safety has a special mercury vacuum designed for cleaning up mercury spills and a mercury vapor analyzer to determine if all mercury has been cleaned up from a spill. Contact the hazardous waste manager immediately at 7-2211 for assistance.

8.9 Fluorescent Tubes

Fluorescent tubes and other mercury bearing lamps such as high pressure sodium lamps, mercury vapor, and metal halide lamps must be disposed of properly. These items cannot be placed in the normal trash. Broken fluorescent tubes must be handled as hazardous waste. Every attempt should be made to keep these items intact and to prevent breakage.

If tubes are broken, place pieces into plastic bags immediately and contact EH&S at 7-2211.

There is a program in place to manage fluorescent tubes and other mercury bearing lamps. Contact the environmental specialist at 7-2211 for more information.

8.10 Batteries

There is a program in place to recycle batteries (Alkaline, Ni-Cad, Lithium, Lead acid, Mercury, and button batteries). There are a number of battery collection containers around campus. If you would like to request a battery collection container for your building/work area or if a battery collection container is full, contact Physical Facilities at 7-2226.

8.11 Computer Equipment

There is a program in place to recycle computer equipment. There are heavy and precious metals in many components of computers. Old computer equipment cannot be disposed of in the normal trash. If you are planning on disposing of these items, contact Physical Facilities at 7-2226.

8.12 Aerosol Cans and Cylinders

Aerosol cans and small Propane cylinders can contain flammable, corrosive, and toxic chemicals and propellants. Aerosol cans and small Propane cylinders are collected during regular hazardous waste pickups (see Section 9.0)

If you find a large (2 or 4 foot) high-pressure gas cylinder and would like to have it removed, contact the environmental specialist at 7-2211 for assistance.

8.13 Paint, Paint Thinner, Adhesives, and Printshop Chemicals

Paint (oil-based), Paint thinner, Adhesives, and resins are flammable and are regulated as hazardous waste. These items cannot be poured down the drain or left out to evaporate. They must be disposed of through the hazardous waste management program.
Latex paint that has solidified completely can be disposed of through the hazardous waste program.

8.14 Photographic Chemicals

Photographic chemicals can contain heavy metals such as Silver, Chromium, and Selenium that may be above regulatory levels and must be handled as hazardous waste. EH&S collects photographic chemicals during regular hazardous waste pick ups and can make special arrangements to return collection containers back to darkroom users. For more information on disposal of photographic chemical disposal, contact the environmental specialist at 7-2211.

Binghamton University recommends the use of eco-friendly photographic chemicals when possible. For information, please contact the hazardous waste manager at 7-2211.

8.15 Reactive and Potentially Explosive Chemicals

Reactive chemicals such as strong oxidizers and reducers, and air/water reactive chemicals must be disposed of through the hazardous waste management program. Because of their reactive nature, it is important to minimize the quantity of reactive chemicals in storage. If the integrity of the container appears to be compromised, then dispose of the chemicals promptly. Never dispose of reactive chemicals, such as Sodium metal, regardless of the quantity, down the drain or in the normal trash. Such practices can result in fires, toxic vapors and gases being released, and injury to people. When disposing of these compounds, please note any special hazards on the Hazardous Chemical Waste Tag.

Some of these compounds can also become unstable and potentially explosive over time due to contamination with air, water, other material, or when the chemical dries out. If you come across any chemical that you suspect could be potentially explosive, do not attempt to move the container as some of these compounds are shock, heat, and friction sensitive. Be sure to let others in the lab or work area know the chemical exists and the potential explosion hazard. Contact the hazardous waste manager immediately at 7-2211 for more assistance.

Examples of potentially explosive chemicals include:

Benzoyl peroxide (dry)	Peroxide forming compounds
Diazo compounds	Picric acid (dry)
2,4-Dinitrophenyl hydrazine (dry)	Sodium amide
Nitrocellulose	Trinitro compounds

8.16 Peroxide Forming Chemicals

Many commonly used chemicals, organic solvents in particular, can form shock, heat, and friction sensitive peroxides upon exposure to oxygen through concentration, evaporation, and distillation. Due to the serious fire and explosion hazards these chemicals can present, the following guidelines must be followed when using peroxide forming chemicals.

1) See Appendix E for a listing of common peroxide forming chemicals. Please note this list is not all-inclusive, there are numerous other chemicals that can form peroxides. Check Safety Data Sheets (SDS) or contact EH&S for more reference sources.

2) All peroxide forming chemicals MUST be dated when received and dated when opened. Chemicals designated as Class III compounds (in Appendix E) should be disposed of within 3 months of opening and Class I and Class II compounds should be disposed of within 12 months of opening.

3) All peroxidizable compounds should be stored away from heat and light. Sunlight is an especially good promoter of peroxidation.

4) Refrigeration does not prevent peroxide formation.

5) As is the case with all hazardous chemicals, and in particular with peroxide forming chemicals, only order the amount of chemical that you need. Do not order excess chemicals that will not be used right away.

6) Be sure to tightly close containers after use. Loose or leaky closures may allow for evaporation of the chemical which can result in peroxide formation.

7) There are a number of inhibitors that can be used to help prevent peroxide formation. Examples include Hydroquinone, Alkyl phenols, and Aromatic amines. Check with the chemical manufacturer to determine which inhibitor is the best to use.

8) Never distill peroxide forming solvents unless they are known to be free of peroxides. Peroxides concentrated in still residue can be a serious explosion hazard.

9) Science Stores carries peroxide test strips that can be used to test tor peroxides (see Appendix H). EH&S also has a number of references that list various methods for testing peroxides. While no definitive amount of peroxide concentration is given in the literature, a concentration of 50 ppm should be considered dangerous and a concentration > 100 ppm should be disposed of immediately.

10) Compounds that are suspected of having very high peroxide levels because of age, unusual viscosity, discoloration, or crystal formation should be considered extremely dangerous. If you discover a container that meets this description, DO NOT attempt to open or move the container. Make other people working in your area aware of the potential explosion hazard and contact the hazardous waste manager immediately at 7-2211.

Due to the extremely high cost of remote openings, special handling, and disposal of chemicals that are considered potentially explosive (> $1000 per container), users of peroxide forming chemicals must follow the guidelines listed above. If a particular container requires special handling or remote opening by an outside environmental company as a result of improper handling and storage by laboratory personnel and failure to follow the guidelines listed above, then all costs associated with the special handling will be charged back to the faculty member responsible for the laboratory.

8.17 Unknowns

You must make every effort to provide an accurate description of all chemicals that you dispose of through the hazardous waste management program. Without an accurate description, the chemical cannot be handled or disposed of safely. Waste disposal companies will not accept unknown chemical waste without an analysis, which can be very expensive.

Many unknown chemicals are generated due to a lack of good housekeeping and good laboratory safety practices. ALL containers used to store chemicals must be labeled. Containers in which the labels are degrading or falling off should be given a new label. There are numerous reference materials with methods and procedures that can be used in identifying unknown chemicals (see Appendix I). Every effort should be made to prevent the occurrence of unknown chemicals and to properly identify any unknowns that are discovered.

8.18 Household Hazardous Waste

Binghamton University cannot accept household hazardous waste for disposal. However, Broome and Tioga County residents can dispose of them at the Broome County landfill. A program is in place to collect household hazardous waste throughout the year.

You can access the schedule by going to the Broome County webpage at; www.gobroomecounty.com/solidwaste/hazwaste

Typical wastes accepted at the facility are:

- auto fluids and oil filters
- paints and solvents
- varnishes, shellacs, and stains
- adhesives, coatings, and sealers
- pesticides and fertilizers
- photo, pool, and lab chemicals
- cleaners and aerosols
- household batteries
- computers, TVs, air conditioners

9.0 HAZARDOUS WASTE DISPOSAL PROCEDURES

Generators are required to email EH&S for a pickup of hazardous waste. The waste will be picked up at your lab or work area on the scheduled pickup day. See the online calendar of the EH&S webpage for the scheduled pickup dates.

When requesting waste pickup, email EH&S at hazwaste@binghamton.edu with the following information:

– name
– phone number
– building and room number
– type and amount of waste to be picked up (# of bottles)
– location of the waste

Generators need not be present during the pickup as long as the above information is provided. All requests need to be made BEFORE the scheduled pickup date.

Please keep in mind that ALL waste containers must have a completed Hazardous Chemical Waste Tag attached, and signed when the container is full. Information on filling out Hazardous Chemical Waste Tags can be found in Section 9.1. Hazardous Chemical Waste Tags can be obtained at Science Stores.

Full waste containers should not be accumulated in labs for longer than 2 weeks.

PLEASE NOTE: Containers that do not have a signed and completed Hazardous Chemical Waste Tag attached will NOT be picked up. A note will be left identifying the necessary corrections that must be completed. The generator must then request another pickup.

Pickups will be held twice a month on Tuesdays, no specific time can be given as to when the chemicals will be picked up. To schedule a waste pickup or ask questions, contact the Hazardous Waste Manager at 7-2211 (leave voice mail) or email hazwaste@binghamton.edu.

9.1 The Hazardous Chemical Waste Tag

The Hazardous Chemical Waste Tag serves many important functions in the proper disposal of chemicals. The obvious function is identifying what exactly is in the container. Often bottles are used for waste collection and the original label on the container does not accurately describe its contents. Be sure to deface any container label that does not accurately describe its contents. The Hazardous Chemical Waste Tag is also used to create an inventory log of hazardous waste generated on campus.

In general every container needs its own tag, unless you have more than one container with exactly the same contents in the same quantity. In this case, note on the tag how many containers you have and place the containers in a box.

The tag must be filled out completely, except the date, and attached to the container. Please be sure to read the directions on the back and completely fill out the front of each tag. Hazardous Chemical Waste Tags can be obtained at Science Stores.

9.2 Completing The Hazardous Chemical Waste Tag

HAZARDOUS CHEMICAL WASTE TAG
(see directions on reverse side)

Print Your Name:_____ Building and Room Number:_____ Phone: _____

Total Amount in Container:_____ Container Size:_____ Generation Code: ____

COMPLETE CHEMICAL COMPOSITION: (List approximate% of each constituent including water/solvent)

1. _____% 5. _____%

2. _____% 6. _____%

3. _____% 7. _____%

4. _____% 8. _____%

Check if applicable:
____ Flammable?
____ Corrosive? pH_____
____ Oxidizer?
____ Highly Toxic?
____ Reactive/Explosive?
____ Stench?

I certify this information is true and that I have done my best to reduce the volume and toxicity of this waste.

Sign Name:_____ Date: _____

PRINT YOUR NAME: This should be the person generating the waste or someone who has knowledge about the waste in case additional information is needed.

BUILDING AND ROOM NUMBER: Where the waste was generated.

PHONE #: This is important in case additional information is needed.

TOTAL AMOUNT IN CONTAINER: Approximate amount of waste present in the container.

CONTAINER SIZE: The size of the container holding the waste.

COMPLETE CHEMICAL COMPOSITION: It is important that ALL chemical names be written out and the approximate percentages of EACH constituent be listed. Chemicals in amounts of < 1 % can be written as “trace”. Also include the percentage of water or solvent present. Final reaction products should be listed instead of chemical equations. Chemical structures, formulas, abbreviations, or acronyms are NOT acceptable. Chemical names MUST be written out.

GENERATION CODE: The type of program under which the waste was generated.
F = Funded Research I = Instructional M = Maintenance O = Other

APPLICABLE HAZARDS: While this can be helpful, if you are unsure or do not know, then leave this section blank. In the case of mixed waste, make sure that all reactions are complete before checking the pH as this can change over a short period of time.

CERTIFICATION: The hazardous waste regulations require that generators of hazardous waste certify that they are practicing waste minimization. In addition, by signing the certification you are assuming the responsibility that the waste generated is accurately described in the chemical composition section. The generator of the waste must sign the tag when the container is full.

Please keep in mind that the hazardous waste management program collects waste throughout the ENTIRE Binghamton campus. Your cooperation in completely and legibly filling out Hazardous Chemical Waste Tags is greatly appreciated.

10.0 WHAT HAPPENS TO THE HAZARDOUS WASTE GENERATED ON CAMPUS

After a chemical waste has been generated, determined to be hazardous, and sent through the hazardous waste management program, there are 3 primary ways in which the waste is handled: bulk drums, lab pack drums and recycling/reclamation.

10.1 Bulk Drums

Certain categories of liquid chemicals can be bulked and combined into drums. Examples include halogenated flammable solvents and non-halogenated solvents. Bulking waste (as opposed to lab packing} can result in significant cost savings tor the University and ultimately your department. Bulking first involves segregating chemicals according to hazard class. Then a small amount of chemical from each container is mixed in a 1-gallon size container - to minimize any potential tire or explosions. If no reactions occur, then the rest of the chemical is poured into a 30- or 55-gallon drum. Accurately labeling chemicals helps to avoid potential reactions, tires, or explosions when chemicals are bulked.

10.2 Lab Pack Drums

Chemicals that cannot be bulked are lab packed. Lab packing first involves segregating chemicals according to hazard class. Chemicals in the same hazard class are placed into various size drums (55-gallon is the most common}, then a packing material, such as vermiculite, is added to prevent the containers from breaking during transportation.

10.3 Recycling/Reclamation

Chemicals such as vacuum pump or engine oil are sent tor recycling/reclamation. Photographic fixer is collected and run through a filtration media to collect the silver before disposal. Items containing mercury, such as thermometers and manometers are collected and the mercury is removed. It is important to minimize the amount of other material that is mixed in with these items. The addition of chemicals or other solid waste to these items can result in the material being unable to be reclaimed and having to be disposed as hazardous waste instead.

10.4 Drain/Trash Disposal

Binghamton University does not permit the disposal of chemical wastes by trash or sanitary sewer..

10.5 Ultimate Disposal

There are a variety of treatment/destruction methods that environmental companies use after they receive the waste generated on campus. Some wastes (bulk flammable liquid drums) are used as a secondary fuel source at cement kilns. Wastes such as acids/bases and oxidizers/reducers can be treated at a facility to render the waste nonhazardous. Most waste will be sent to a hazardous waste incinerator. Any resulting ash from the incineration process is stabilized and then placed into a hazardous waste landfill. While there are other methods that can be utilized, the hazardous waste generated at Binghamton University will generally be handled using the above technologies.

11.0 SAFETY DATA SHEETS

As part of the OSHA (NY PESH) Hazard Communication Standard, employers are required to have Safety Data Sheets (SDS) available to any employee working with hazardous chemicals. The regulations state that the standard is based on the concept "that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring."

Information that can be found in a SDS includes:

- the identity of the chemical substance
- physical and chemical characteristics
- physical and health hazards
- primary routes of entry
- OSHA Permissible Exposure Limits (PELs)
- carcinogenic status
- precautions for safe handling and use (including personal protective equipment)
- spill response
- emergency and first aid procedures
- date of the SDS

Although not required, it is highly recommended that you maintain a file of SDS sheets for all of the chemicals used in your lab/work area. A central campus file is maintained at the EH&S office.

Any chemical shipment received should be accompanied by an SDS. Please send a copy to EH&S to help keep our files up to date and current. If you do not receive a SDS with a shipment or would like to request a SDS for a previously purchased chemical, contact the safety & health trainer/industrial hygienist at 7-2211.

11.1 SDSs On The WWW

Material Safety Data Sheets can also be accessed through a number of WWW sites. Some useful sites are:

1) Interactive Learning Paradigms, Inc.

http://www.ilpi.com/msds/index.html

This site has 85 links to search for SDSs and other related information including:

– general and miscellaneous sites
– government agencies
– chemical manufacturers and suppliers
– agricultural pesticides and herbicides

2) SDS Provider

http://www.MSDSprovider.com

3) **http://www.siri.org**

4) Chemical Manufacturer

➨ **Check your chemical manufacturer's website for SDSs**

12.0 CHEMICAL SPILLS

Many chemical spills can be avoided by good housekeeping and best management practices. Plan out your experiments ahead of time and think about where your apparatus and glassware will be located in relation to where you will be using chemicals. If at all possible, work with chemicals over some form of secondary containment (ie. plastic trays or buckets) and store chemicals in secondary containment. Always read the SDS BEFORE working with a chemical so you are familiar with the chemical hazards, any precautions to take, and what you will need in the event of a spill.

When a spill does occur, it is necessary to take prompt and appropriate action. The type of response to a spill will depend on the quantity of the chemical spilled and the severity of the hazards associated with the chemical. The first action to take is to alert others in your lab or work area that a spill has occurred. Then you must determine if you can safely clean up the spill yourself. Only attempt to clean up minor spills.

12. 1 Minor Spills

A minor spill consists of:

- a small quantity of chemical involved - a rule of thumb is less than 1 liter, this quantity can be less if the chemical is particularly hazardous
- a known chemical of limited danger
- there are no gases or vapors present
- you have the Proper Personal Protective (PPE) equipment on hand
- the spill can be easily cleaned up by the chemical user

12.1.1 Minor Spill Cleanup Procedures

1) Notify other people in the area that a spill has occurred. Prevent others from coming in contact with the spill (ie. walking through the spilled chemical).

2) If working in a science laboratory, spill cleanup supplies can be found in the 5-gallon Spill Buckets (see Appendix G for a list of supplies). If you do not work in a science laboratory and would like assistance in making a

   Spill Bucket for your work area, contact the hazardous waste manager at 7-2211.

3) Wear the Proper Personal Protective Equipment (PPE) such as goggles, gloves, etc. before beginning cleanup.

4) Try to prevent spilled chemicals from entering waterways by building a dike around access points (sink, cup sinks, and floor drains inside and storm drains outside) with absorbent material if you can safely do so.

5) Use the appropriate absorbent material for liquid spills:

   – Calcium carbonate for Acid spills
   – Citric acid for Base spills
   – Hg Absorb powder (found in Mercury kit) for Mercury spills
   – Absorbent clay for oils and most aqueous and organic liquid spills

6) Slowly add the absorbent material on and around the spill and allow the chemical to absorb.

7) Sweep up the absorbed spill from the outside towards the middle.

8) Scoop up and deposit in a leak-proof container.

9) Label the container and dispose of through the hazardous waste management program.

10) Wash the contaminated surface with soapy water.

11) Report the spill to your supervisor.

Remember to restock any supplies that you use from the Spill Bucket. Supplies can be obtained from EH&S by contacting the hazardous waste manager at 7-2211.

12.2 Major Spills

A major spill consists of:

- a large quantity of chemical (> 5 liters) or several chemicals are involved
- highly toxic or unknown chemicals
- gases or vapors are present
- the spill is not confined to the immediate area
- the spill involves a radioactive material

12.2.1 Major Spill Cleanup Procedures

1) Evacuate the room, floor, or building as necessary. In the event of a major situation, do not hesitate to pull the fire alarm to evacuate the building.

2) Report the major spill by **DIALING 911** using one of the emergency hallway phones found in some buildings or by dialing University Police at 607-777-2222.

3) Limit access to the area.

4) Stand by until help arrives while keeping yourself away from danger. This could mean standing outside of the room or in the case of a building evacuation, standing by an outside door waiting for the University Police to arrive.

5) When you report a spill, the University Police will ask for the following information:

    - where the spill occurred (building and room number)
    - the materials involved (SPELL CLEARLY and SLOWLY)
    - the amount of material spilled
    - any immediate actions you took
    - how the spill occurred (if you know or can guess)
    - who first observed the spill and at what time
    - are there any injuries
    - a call back number (if available)

6) If the spill appears to be heading towards a waterway (sink, cup sinks, and floor drains inside and storm drains outside), try to prevent the spilled material from entering waterways by building a dike around access points with absorbent material ONLY if you can do so from a safe distance. DO NOT put yourself in danger, but if possible, try to protect waterways.

12.3 Fire Alarms

If you hear a fire alarm, the most important thing to do is **GET OUT!!!**
Do not assume the fire alarm is just a drill…if you hear an alarm, get out of the building immediately.

When evacuating the building, only use the stairs, Do not use the elevators. During a fire alarm and an actual emergency, power to elevators may be lost and can result in people getting trapped inside.

After you have evacuated the building, remain outside until an “All Clear” is given by the University Police. Do not attempt to reenter the building for any reason until the fire alarms have been turned off and the University Police give an “All Clear”. There are NO exceptions to this policy.

APPENDIX A: Binghamton University Management Procedure - Environmental Health and Safety Policy

Management Procedure Number 807

General Policy

1) It is the policy of Binghamton University to maintain an environment for its faculty, staff, students, and visitors that will not adversely affect their health and safety nor subject them to avoidable risk of injury.

2) The applicable health and safety standards are contained in rules and regulations promulgated by Federal and State agencies which must be followed in establishing campus safety policies. In addition, the published standards of nationally recognized professional health and safety organizations serve as guidelines in areas not covered by the government standards, rules, and regulations.

Environmental Health and Safety Responsibility

1) Management

The President of the University is legally responsible for campus health and safety and must ensure that appropriate health and safety policies are established for environmental protection and prevention of health and safety standards. These responsibilities are delegated to all levels of supervision in order to ensure that campus health and safety objectives are met.

2) Role of Department Chairs/Directors

The chairs or directors of each department are responsible for the health and safety of all students, faculty, staff, and visitors in their area. They have the obligation and authority to prevent or stop any operation they consider unsafe. They are also expected to obtain whatever assistance they may need from the Department of Environmental Health and Safety in order to develop and implement a departmental health and safety program. The chair/director may delegate all or part of these obligations to a departmental safety coordinator. Ideally, the safety coordinator should be a faculty member in an academic department. However, such delegation in no way relieves the chair or director of their responsibility in matters of departmental health and safety.

3) Supervisors

Each supervisor must develop initiatives that will maintain a safe work place and also train employees and students on safe work practices. The training must ensure that employees and students know:

- All the potentially hazardous conditions associated with departmental operations, and methods to control them.
- All applicable safety regulations for the area of operation.
- That they are expected to help all persons unfamiliar with the area to comply with applicable safety regulations.

The goal is tor employees and students to develop awareness and responsibility for safety so they will act in a sate manner when faced with situations not covered by established rules or regulations.

4) Individuals

Many injuries are the result of unsafe working practices rather than unsafe conditions. It is incumbent upon each individual to provide the constant vigilance necessary to avoid unsafe acts. Thinking “safety” is a part of every ones job duties. Each person has an obligation to take all responsible precautions to prevent injury to themself or any other co-worker or student.

Individuals are expected to learn and follow all health and safety policies and standards which apply to their activities. It’s expected that individuals will check with their supervisor when there are doubts concerning potential hazards.

5) Environmental Health and Safety

The University’s Department of Environmental Health and Safety provides guidance and services to campus personnel so that the goals and objectives of the campus environmental health and safety policy may be attained. The responsibility requires the Department of Environmental Health and Safety to:

- Provide the President, or their designee, the information needed to formulate campus health and safety policies.
- Investigate and report health and safety incidents involving campus personnel or visitors.
- Assist campus personnel to plan, establish, and maintain sate work practices and a sate work environment in compliance with the Public Employees Safety and Health Act of 1980.

APPENDIX B: F-List

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; 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.

APPENDIX C: U and P List

Hazardous Waste No.	Chemical Abstracts No.	Chemical Substance
U394	30558-43-1	A2213
U001	75-07-0	Acetaldehyde
U034	75-87-6	Acetaldehyde, trichloro
U187	62-44-2	Acetamide, N- (4-ethoxyphenyl)-
U005	53-96-3	Acetamide, N-9H-fluoren-2-yl -
U240	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-, salts & esters
U112	141-78-6	Acetic acid ethyl ester
U144	301-04-2	Acetic acid, lead(2 +) salt
U214	563-68-8	Acetic acid, thallium(1 +) salt
see F027	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-
U002	67-64-1	Acetone
U003	75-05-8	Acetonitrile
U004	98-86-2	Acetophenone
U005	53-96-3	2-Acetylaminofluorene
U006	75-36-5	Acetyl chloride
U007	79-06-1	Acrylamide
U008	79-10-7	Acrylic acid
U009	107-13-1	Acrylon itrile
U011	61-82-5	Amitrole
U012	62-53-3	Aniline
U136	75-60-5	Arsinic acid, dimethyl-
U014	492-80-8	Auram ine
U015	115-02-6	Azaserine
U010	50-07-7	Azirino(2',3':3,41 pyrrolo[1,2-alindole-4,7-dione, 6-amino- 8-[[(aminocarbonyl) oxy]methyl]-1,1a,2,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta, 8aalpha, 8balpha)]-
U280	101-27-9	Barban
U278	22781-23-3	Bendiocarb
U364	22961-82-6	Bendiocarb phenol
U271	17804-35-2	Benomyl
U157	56-49-5	Benz(j]aceanthrylene, 1,2-dihydro-3-methyl-
U016	225-51-4	Benz(c]acridine
U017	98-87-3	Benzal chloride
U192	23950-58-5	Benzamide, 3,5-dichloro -N-(1,1-dimethyl-2-propynyl)-
U018	56-55-3	Benz(a]anthracene
U094	57-97-6	Benz[a]anthracene, 7,12-dimethyl-
U012	62-53-3	Benzenamine
U014	492-80-8	Benzenamine, 4,4'-carbonimidoylbis[N,N -dimethyl-
U049	3165-93-3	Benzenamine, 4-chloro- 2-methyl-, hydrochloride
U093	60-11-7	Benzenamine, N,N-dimethyl-4- (phenylazo)-
U328	95-53-4	Benzenamine, 2-methyl-
U353	106-49-0	Benzenamine, 4-methyl-
U158	101-14-4	Benzenamine, 4,4'-methylenebis[2-chloro-
U222	636-21-5	Benzenamine, 2-methyl-, hydrochloride
U181	99-55-8	Benzenamine, 2-methyl-5-nitro-
U019	71-43-2	Benzene

U038	510-15-6	Benzeneacetic acid, 4-chloro- alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester
U030	101-55-3	Benzene, 1-bromo-4-phenoxy-
U035	305-03-3	Benzenebutanoic acid, 4-(bis (2-chloroethyl)aminol]-
U037	108-90-7	Benzene, chloro-
U221	25376-45-8	Benzenediamine, ar-methyl-
U028	117-81-7 1,2-	Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
U069	84-74-2 1,2-	Benzenedicarboxylic acid, dibutyl ester
U088	84-66-2 1,2-	Benzenedicarboxylic acid, diethyl ester
U102	131-11-3 1,2-	Benzenedicarboxylic acid, dimethyl ester
U107	117-84-0 1,2-	Benzenedicarboxylic acid, dioctyl ester
U070	95-50-1	Benzene, 1,2-dichloro-
U071	541-73-1	Benzene, 1,3-dichloro-
U072	106-46-7	Benzene, 1,4-dichloro-
U060	72-54-8	Benzene, 1,1'-(2,2- dichloroethylidene) bis[4-chloro-
U017	98-87-3	Benzene, (dichloromethyl)-
U223	26471-62-5	Benzene, 1,3-diisocyanatomethyl-
U239	1330-20-7	Benzene, dimethyl-
U201	108-46-3	1,3-Benzenediol
U127	118-74-1	Benzene, hexachloro-
U056	110-82-7	Benzene, hexahydro-
U220	108-88-3	Benzene, methyl-
U105	121-14-2	Benzene, 1-methyl-2,4-dinitro-
U106	606-20-2	Benzene, 2-methyl-1,3-dinitro
U055	98-82-8	Benzene, (1-methylethyl)-
U169	98-95-3	Benzene, nitro-
U183	608-93-5	Benzene, pentachloro-
U185	82-68-8	Benzene, pentachloronitro-
U020	98-09-9	Benzenesulfonic acid chloride
U020	98-09-9	Benzenesulfonyl chloride
U207	95-94-3	Benzene, 1,2,4,5-tetrachloro-
U061	50-29-3	Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-chloro-
U247	72-43-5	Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy-
U023	98-07-7	Benzene, (trichloromethyl)-
U234	99-35-4	Benzene, 1,3,5-trinitro-
U021	92-87-5	Benzidine
U202	81-07-2	1,2-Benzisothiazol- 3(2H)-one, 1,1-dioxide, & salts
U203	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-
U141	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-
U090	94-58-6	1,3-Benzodioxole, 5-propyl-
U278	22781-23-3	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate
U364	22961-82-6	1,3-Benzodioxol-4-ol, 2,2-dimethyl-,
U367	1563-38-8	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-
U064	189-55-9	Benzo[rst]pentaphene
U248	181-81-2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1- phenyl-butyl)- & salts, when present at concentrations of 0.3% or less
U022	50-32-8	Benzo[a]pyrene
U197	106-51-4	p-Benzoquinone
U023	98-07-7	Benzotrichloride (C,R,T)
U085	1464-53-5	2,2'-Bioxirane
U021	92-87-5	(1,1'-Biphenyl]-4,4'-diamine
U073	91-94-1	(1,1'-Biphenyl]-4,4'- diamine, 3,3'-dichloro-
U091	119-90-4	[1,1'-Biphenyl]-4,4'- diamine, 3,3'-dimethoxy-
U095	119-93-7	[1,1'-Biphenyl]-4,4'- diamine, 3,3'-dimethyl-

U225	75-25-2	Bromoform
U030	101-55-3	4-Bromophenyl phenyl ether
U128	87-68-3	1,3-Butadiene, 1,1,2, 3,4,4-hexachloro-
U172	924-16-3	1-Butanamine, N-butyl- N-nitroso-
U031	71-36-3	1-Butanol
U159	78-93-3	2-Butanone
U160	1338-23-4	2-Butanone, peroxide
U053	4170-30-3	2-Butenal
U074	764-41-0	2-Butene, 1,4-dichloro-
U143	303-34-4	2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy- 2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5, 7a-tetrahydro-1 H- pyrrolizin-1-yl ester,[1S-[1alpha(Z), 7(25*,3R*),7aalpha]]-
U031	71-36-3	n-Butyl alcohol
U136	75-60-5	Cacodylic acid
U032	13765-19-0	Calcium chromate
U238	51-79-6	Carbamic acid, ethyl ester
U372	10605-21-7	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester
U271	17804-35-2	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-,methyl ester
U280	101-27-9	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester
U409	23564-05-8	Carbamic acid, [1,2-phenylenebis (iminocarbonothioyl)]bis-, dimethyl ester.
U373	122-42-9	Carbamic acid, phenyl-, 1-methylethyl ester
U178	615-53-2	Carbamic acid, methylnitroso-, ethyl ester
U097	79-44-7	Carbamic chloride, dimethyl-
U114	111-54-6	Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters
U062	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester
U279	63-25-2	Carbaryl
U372	10605-21-7	Carbendazim
U367	1563-38-8	Carbofuran phenol
U215	6533-73-9	Carbonic acid, dithallium(1+) salt
U033	353-50-4	Carbonic difluoride
U156	79-22-1	Carbonochloridic acid, methyl ester
U033	353-50-4	Carbon oxyfluoride
U211	56-23-5	Carbon tetrachloride
U034	75-87-6	Chloral
U035	305-03-3	Chlorambucil
U036	57-74-9	Chlordane, alpha & gamma isomers
U026	494-03-1	Chlornaphazin
U037	108-90-7	Chlorobenzene
U038	510-15-6	Chlorobenzilate
U039	59-50-7	p-Chloro-m-cresol
U042	110-75-8	2-Chloroethyl vinyl ether
U044	67-66-3	Chloroform
U046	107-30-2	Chloromethyl methyl ether
U047	91-58-7	beta-Chloronaphthalene
U048	95-57-8	o-Chlorophenol
U049	3165-93-3	4-Chloro-o-toluidine, hydrochloride
U032	13765-19-0	Chromic acid H2CrO4, calcium salt
U050	218-01-9	Chrysene
U051		Creosote
U052	1319-77-3	Cresol (Cresylic acid)

U053	4170-30-3	Crotonaldehyde
U055	98-82-8	Cumene (I)
U246	506-68-3	Cyanogen bromide (CN)Br
U197	106-51-4	2,5-Cyclohexadiene- 1,4-dione
U056	110-82-7	Cyclohexane (I)
U129	58-89-9	Cyclohexane, 1,2,3,4, 5,6-hexachloro-, (1alpha,2alpha,3beta, 4alpha,5alpha,6beta)-
U057	108-94-1	Cyclohexanone (I)
U130	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro
U058	50-18-0	Cyclophosphamide
U240	94-75-7	2,4-D, salts & esters
U059	20830-81-3	Daunomycin
U060	72-54-8	DOD
U061	50-29-3	DDT
U062	2303-16-4	Diallate
U063	53-70-3	Dibenz[a,h]anthracene
U064	189-55-9	Dibenzo[a,i]pyrene
U066	96-12-8	1,2-Dibromo- 3-chloropropane
U069	84-74-2	Dibutyl phthalate
U070	95-50-1	o-Dichlorobenzene
U071	541-73-1	m-Dichlorobenzene
U072	106-46-7	p-Dichlorobenzene
U073	91-94-1	3,3'-Dichlorobenzidine
U074	764-41-0	1,4-Dichloro-2-butene
U075	75-71-8	Dichlorodifluoromethane
U078	75-35-4	1,1-Dichloroethylene
U079	156-60-5	1,2-Dichloroethylene
U025	111-44-4	Dichloroethyl ether
U027	108-60-1	Dichloroisopropyl ether
U024	111-91-1	Dichloromethoxy ethane
U081	120-83-2	2,4-Dichlorophenol
U082	87-65-0	2,6-Dichlorophenol
U084	542-75-6	1,3-Dichloropropene
U085	1464-53-5	1,2:3,4-Diepoxybutane
U395	5952-26-1	Diethylene glycol, dicarbamate
U108	123-91-1	1,4-Diethyleneoxide
U028	117-81-7	Diethylhexyl phthalate
U086	1615-80-1	N,N'-Diethyl hydrazine
U087	3288-58-2	0,0-Diethyl S-methyl dithiophosphate
U088	84-66-2	Diethyl phthalate
U089	56-53-1	Diethylsti lbesterol
U090	94-58-6	Dihydrosafrole
U091	119-90-4	3,3'-Dimethoxybenzidine
U092	124-40-3	Dimethylamine
U093	60-11-7	p-Dimethylaminoazobenzene
U094	57-97-6	7,12-Dimethylbenz[a]anthracene
U095	119-93-7	3,3'-Dimethylbenzidine
U096	80-15-9	alpha,alpha-Dimethylbenzylhydroperoxide
U097	79-44-7	Dimethylcarbamoyl chloride
U098	57-14-7	1,1-Dimethylhydrazine
U099	540-73-8	1,2-Dimethylhydrazine
U101	105-67-9	2,4-Dimethylphenol
U102	131-11-3	Dimethyl phthalate
U103	77-78-1	Dimethyl sulfate

U105	121-14-2	2,4-Dinitrotoluene
U106	606-20-2	2,6-Dinitrotoluene
U107	117-84-0	Di-n-octyl phthalate
U108	123-91-1	1,4-Dioxane
U109	122-66-7	1,2-Diphenylhydrazine
U110	142-84-7	Dipropylamine
u 111	621-64-7	Di-n-propylnitrosamine
U041	106-89-8	Epichlorohydrin
U001	75-07-0	Ethanal
U174	55-18-5	Ethanamine, N-ethyl-N-nitroso-
U404	121-44-8	Ethanamine, N,N-diethyl-
U394	30558-43-1	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy -2-oxo-, methyl ester.
U410	59669-26-0	Ethanimidothioic acid, N,N'-[thiobis[(methylimino) carbonyloxy]Jbis - , dimethyl ester
U155	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-
U067	106-93-4	Ethane, 1,2-dibromo-
U076	75-34-3	Ethane, 1,1-dichloro-
U077	107-06-2	Ethane, 1,2-dichloro-
U131	67-72-1	Ethane, hexachloro-
U024	111-91-1	Ethane, 1,1'- [methylenebis(oxy)Jbis[2-chloro-
U117	60-29-7	Ethane, 1,1'-oxybis-
U025	111-44-4	Ethane, 1,1'-oxybis[2-chloro-
U184	76-01-7	Ethane, pentachloro-
U208	630-20-6	Ethane, 1,1,1,2- tetrachloro-
U209	79-34-5	Ethane, 1,1,2,2- tetrachloro-
U218	62-55-5	Ethanethioamide
U226	71-55-6	Ethane, 1,1,1-trichloro-
U227	79-00-5	Ethane, 1,1,2-trichloro-
U359	110-80-5	Ethanol, 2-ethoxy-
U173	1116-54-7	Ethanol, 2,2'- (nitrosoimino)bis-
U395	5952-26-1	Ethanol, 2,2 '-oxybis-, dicarbamate
U004	98-86-2	Ethanone, 1-phenyl-
U043	75-01-4	Ethene, chloro-
U042	110-75-8	Ethene, (2-chloroethoxy)-
U078	75-35-4	Ethene, 1,1-dichloro-
U079	156-60-5	Ethene, 1,2-dichloro-
U210	127-18-4	Ethene, tetrachloro-
U228	79-01-6	Ethene, trichloro-
U112	141-78-6	Ethyl acetate
U113	140-88-5	Ethyl acrylate
U238	51-79-6	Ethyl carbamate (urethane)
U117	60-29-7	Ethyl ether
U114	111-54-6	Ethylenebisdithiocarbamic acid, salts & esters
U067	106-93-4	Ethylene dibromide
U077	107-06-2	Ethylene dichloride
U359	110-80-5	Ethylene glycol monoethyl ether
U115	75-21-8	Ethylene oxide
U116	96-45-7	Ethylenethiourea
U076	75-34-3	Ethylidene dichloride
U118	97-63- 2	Ethyl methacrylate
U119	62-50-0	Ethyl methanesulfonate
U120	206-44-0	Fluoranthene

U122	50-00-0	Formaldehyde
U123	64-18-6	Formic acid
U124	110-00-9	Furan
U125	98-01-1	2-Furancarboxaldehyde
U147	108-31-6	2,5-Furandione
U213	109-99-9	Furan, tetrahydro-
U125	98-01-1	Furfural
U124	110-00-9	Furfuran
U206	18883-66-4	Glucopyranose, 2-deoxy-2-(3 -methyl-3- nitrosoureido)-, D-
U206	18883-66-4	D-Glucose, 2-deoxy-2- [[(methylnitrosoamino)-carbonyl]amino]-
U126	765-34-4	Glycidylaldehyde
U163	70-25-7	Guanidine, N-methyl- N'-nitro-N-nitroso-
U127	118-74-1	Hexachlorobenzene
U128	87-68-3	Hexachlorobutadiene
U130	77-47-4	Hexachlorocyclopentadiene
U131	67-72-1	Hexachloroethane
U132	70-30-4	Hexachlorophene
U243	1888-71-7	Hexachloropropene
U133	302-01-2	Hydrazine
U086	1615-80-1	Hydrazine, 1,2-diethyl-
U098	57-14-7	Hydrazine, 1,1-dimethyl-
U099	540-73-8	Hydrazine, 1,2-dimethyl-
U109	122-66-7	Hydrazine, 1,2-diphenyl-
U134	7664-39-3	Hydrofluoric acid
U134	7664-39-3	Hydrogen fluoride
U135	7783-06-4	Hydrogen sulfide
U135	7783-06-4	Hydrogen sulfide H2S
U096	80-15-9	Hydroperoxide, 1-methyl-1-phenylethyl-
U116	96-45-7	2-Imidazolidinethione
U137	193-39-5	Indeno[1,2,3-cd]pyrene
U190	85-44-9	1,3-Isobenzofurandione
U140	78-83-1	Isobutyl alcohol
U141	120-58-1	Isosafrole
U142	143-50-0	Kepone
U143	303-34-4	Lasiocarpine
U144	301-04-2	Lead acetate
U146	1335-32-6	Lead, bis(acetato-O)tetrahydroxytri-
U145	7446-27-7	Lead phosphate
U146	1335-32-6	Lead subacetate
U129	58-89-9	Lindane
U163	70-25-7	MNNG
U147	108-31-6	Maleic anhydride
U148	123-33-1	Maleic hydrazide
U149	109-77-3	Malononitrile
U150	148-82-3	Melphalan
U151	7439-97-6	Mercury
U152	126-98-7	Methacrylonitrile
U092	124-40-3	Methanamine, N-methyl-
U029	74-83-9	Methane, bromo-
U045	74-87-3	Methane, chloro-
U046	107-30-2	Methane, chloromethoxy-
U068	74-95-3	Methane, dibromo-
U080	75-09-2	Methane, dichloro-

U075	75-71-8	Methane, dichlorodifluoro-
U138	74-88-4	Methane, iodo-
U119	62-50-0	Methanesulfonic acid, ethyl ester
U211	56-23-5	Methane, tetrachloro-
U153	74-93-1	Methanethiol
U225	75-25-2	Methane, tribromo-
U044	67-66-3	Methane, trichloro-
U121	75-69-4	Methane, trichlorofluoro-
U036	57-74-9	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 -octachloro-2,3,3a,4,7,7a-hexahydro-
U154	67-56-1	Methanol
U155	91-80-5	Methapyrilene
U142	143-50-0	1,3,4-Metheno- 2H-cyclobuta[cd)pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-
U247	72-43-5	Methoxychlor
U154	67-56-1	Methyl alcohol
U029	74-83-9	Methyl bromide
U186	504-60-9	1-Methylbutadiene
U045	74-87-3	Methyl chloride
U156	79-22-1	Methyl chlorocarbonate
U226	71-55-6	Methyl chloroform
U157	56-49-5	3-Methylcholanthrene
U158	101-14-4	4,4'-Methylenebis (2-chloroaniline)
U068	74-95-3	Methylene bromide
U080	75-09-2	Methylene chloride
U159	78-93-3	Methyl ethyl ketone (MEK)
U160	1338-23-4	Methyl ethyl ketone peroxide
U138	74-88-4	Methyl iodide
U161	108-10-1	Methyl isobutyl ketone
U162	80-62-6	Methyl methacrylate
U161	108-10-1	4- Methyl-2-pentanone
U164	56-04-2	Mitomycin C
U059	20830-81-3	5,12-Naphthacenedione, 8-acetyl-10- [(3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxy)- 7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-
U167	134-32-7	1-Naphthalenamine
U168	91-59-8	2-Naphthalenamine
U026	494-03-1	Naphthalenamine, N,N'-bis(2-chloroethyl)-
U165	91-20-3	Naphthalene
U047	91-58-7	Naphthalene, 2-chloro-
U166	130-15-4	1,4-Naphthalenedione
U236	72-57-1	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl[1,1'-biphenyl)-4,4'- diyl)bis(azo)bis [5-amino-4-hydroxy)-, tetrasodium salt
U279	63-25-2	1-Naphthalenol, methylcarbamate
U166	130-15-4	1,4-Naphthoquinone
U167	134-32-7	alpha-Naphthylamine
U168	91-59-8	beta-Naphthylamine
U217	10102-45-1	Nitric acid, thallium(1+) salt
U169	98-95-3	Nitrobenzene
U170	100-02-7	p-Nitrophenol
U171	79-46-9	2-Nitropropane
U172	924-16-3	N-Nitrosodi-n-butylamine
U173	116-54-7	N-Nitrosodiethanolamine

U174	55-18-5	N-Nitrosodiethylamine
U176	759-73-9	N-Nitroso-N-ethylurea
U177	684-93-5	N-Nitroso-N-methylurea
U178	615-53-2	N-Nitroso-N-methylurethane
U179	100-75-4	N-Nitrosopiperidine
U180	930-55-2	N-Nitrosopyrrolidine
U181	99-55-8	5-Nitro-o-toluidine
U193	1120-71-4	1,2-0xathiolane, 2,2-dioxide
U058	50-18-0	2H-1,3,2-0xazaphosphorin- 2-amine , N,N-bis (2-chloroethyl)tetrahydro-, 2-oxide
U115	75-21-8	Oxirane
U126	765-34-4	Oxiranecarboxyaldehyde
U041	106-89-8	Oxirane, (chloromethyl)-
U182	123-63-7	Paraldehyde
U183	608-93-5	Pentachlorobenzene
U184	76-01-7	Pentachloroethane
U185	82-68-8	Pentachloronitrobenzene (PCNB)
See F027	87-86-5	Pentachlorophenol
U161	108-10- 1	Pentanol, 4-methyl-
U186	504-60-9	1,3-Pentadiene
U187	62-44-2	Phenacetin
U188	108-95-2	Phenol
U048	95-57-8	Phenol, 2-chloro-
U039	59-50-7	Phenol, 4-chloro-3-methyl-
U081	120-83-2	Phenol, 2,4-dichloro-
U082	87-65-0	Phenol, 2,6-dichloro-
U089	56-53-1	Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-,
U101	105-67-9	Phenol, 2,4-dimethyl-
U052	1319-77-3	Phenol, methyl-
U132	70-30-4	Phenol, 2,2'-methylenebis (3,4,6-trichloro-
U411	114-26-1	Phenol, 2-(1-methylethoxy)-, methylcarbamate
U170	100-02-7	Phenol, 4-nitro-
See F027	87-86-5	Phenol, pentachloro-
See F027	58-90-2	Phenol, 2,3,4,6-tetrachloro-
See F027	95-95-4	Phenol, 2,4,5-trichloro-
See F027	88-06-2	Phenol, 2,4,6-trichloro-
U150	148-82-3	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-
U145	7446-27-7	Phosphoric acid, lead(2+) salt (2:3)
U087	3288-58-2	Phosphorodithioic acid, 0,0-diethyl S-methylester
U189	1314-80-3	Phosphorus sulfide
U190	85-44-9	Phthalic anhydride
U191	109-06-8	2-Picoline
U179	100-75-4	Piperidine, 1-nitroso-
U192	23950-58-5	Pronamide
U194	107-10-8	1-Propanamine
u111	621-64-7	1-Propanamine, N-nitroso-N-propyl-
U110	142-84-7	1-Propanamine, N-propyl-
U066	96-12-8	Propane, 1,2-dibromo-3-chloro-
U083	78-87-5	Propane, 1,2-dichloro-
U149	109-77-3	Propanedinitrile
U171	79-46-9	Propane, 2-nitro-
U027	108-60-1	Propane, 2,2'-oxybis[2-chloro-
U193	1120-71-4	1,3-Propane sultone
See F027	93-72-1	Propanoic acid, 2- (2,4,5-trichlorophenoxy)-

U235	126-72-7	1-Propanol, 2,3-dibromo-, phosphate (3:1)
U140	78-83-1	1-Propanol, 2-methyl-
U002	67-64-1	2-Propanone
U007	79-06-1	2-Propenamide
U084	542-75-6	1-Propene, 1,3-dichloro-
U243	1888-71-7	1-Propene, 1,1,2,3,3,3 -hexachloro-
U009	107-13- 1	2-Propenenitrile
U152	126-98-7	2-Propenenitrile, 2-methyl-
U008	79-10-7	2-Propenoic acid
U113	140-88-5	2-Propenoic acid, ethyl ester
U118	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester
U162	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester
U373	122-42-9	Propham
U411	114-26-1	Propoxur
U194	107-10-8	n-Propylamine
U083	78-87-5	Propylene dichloride
U387	52888-80-9	Prosulfocarb
U148	123-33-1	3,6-Pyridazined ione, 1,2-dihydro-
U196	110-86-1	Pyridine
U191	109-06-8	Pyridine, 2-methyl-
U237	66-75-1	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2- chloroethyl)aminol-
U164	56-04-2	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-
U180	930-55-2	Pyrrolidine, 1-nitroso-
U200	50-55-5	Reserpine
U201	108-46-3	Resorcinol
U202	181-07-2	Saccharin, & salts
U203	94-59-7	Safrole
U204	7783-00-8	Selenious acid
U204	7783-00-8	Selenium dioxide
U205	7488-56-4	Selenium sulfide
U205	7488-56-4	Selenium sulfide SeS2
U015	115-02-6	L-Serine, diazoacetate (ester)
See F027	93-72-1	Silvex (2,4,5-TP)
U206	18883-66-4	Streptozotocin
U103	77-78-1	Sulfuric acid, dimethyl ester
U189	1314-80-3	Sulfur phosphide
See F027	93-76-5	2,4,5-T
U207	95-94-3	1,2,4,5- Tetrachlorobenzene
U208	630-20-6	1,1,1,2- Tetrachloroethane
U209	79-34-5	1,1,2,2- Tetrachloroethane
U210	127-18-4	Tetrachloroethylene
See F027	58-90-2	2,3,4,6-Tetrachlorophenol
U213	109-99-9	Tetrahydrofuran
U214	563-68-8	Thallium(l) acetate
U215	6533-73-9	Thallium(l) carbonate
U216	7791-12-0	Thallium(l) chloride
U216	7791-12-0	Thallium chloride TICI
U217	10102-45-1	Thallium(l) nitrate
U218	62-55-5	Thioacetamide
U410	59669-26-0	Thiodicarb
U153	74-93-1	Thiomethanol
U244	137-26-8	Thioperoxydicarbonic diamide [(H2N)C(S)]2S2, tetramethyl-
U409	23564-05-8	Thiophanate-methyl
U219	62-56-6	Thiourea

U244	137-26-8	Thiram
U220	108-88-3	Toluene
U221	25376-45-8	Toluenediamine
U223	26471-62-5	Toluene diisocyanate
U328	95-53-4	o-Toluidine
U353	106-49-0	p-Toluidine
U222	636-21-5	o-Toluidine hydrochloride
U389	2303-17-5	Triallate
U011	61-82-5	1H-1,2,4-Triazol-3-amine
U227	79-00-5	1,1,2-Trichloroethane
U228	79-01-6	Trichloroethylene
U121	75-69-4	Trichloromonofluoromethane
See F027	95-95-4	2,4,5-Trichlorophenol
See F027	88-06-2	2,4,6-Trichlorophenol
U404	121-44-8	Triethylamine
U234	99-35-4	1,3,5-Trinitrobenzene
U182	123-63-7	1,3,5-Trioxane, 2,4,6-trimethyl-
U235	126-72-7	Tris(2,3-dibromopropyl) phosphate
U236	72-57-1	Trypan blue
U237	66-75-1	Uracil mustard
U176	759-73-9	Urea, N-ethyl-N-nitroso-
U177	684-93-5	Urea, N-methyl-N-nitroso-
U043	75-01-4	Vinyl chloride
U248	81-81-2	Warfarin, & salts, when present at concentrations of 0.3% or less
U239	1330-20-7	Xylene
U200	50-55-5	Yohimban-16- carboxylic acid, 11,17-dimethoxy- 18-[(3,4,5 trimethoxybenzoyl)oxy]-, methyl ester, (3beta,16beta, 17alpha,18beta,20alpha)-
U249	1314-84-7	Zinc phosphide Zn3P2, when present at concentrations of 10% or less

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P023	107-20-0	Acetaldehyde, chloro-
P002	591-08-2	Acetamide, N-(aminothioxomethyl)-
P057	640-19 -7	Acetamide, 2-fluoro-
P058	62-74-8	Acetic acid, fluoro-, sodium salt
P002	591-08-2	1-Acetyl-2 -thiourea
P003	107-02-8	Acrolein
P070	116-06-3	Aldicarb
P203	1646-88-4	Aldicarb sulfone
P004	309-00-2	Aldrin
P005	107-18-6	Allyl alcohol
P006	20859-73-8	Aluminum phosphide
P007	2763-96-4	5-(Aminomethyl)-3-isoxazolol
P008	504-24-5	4-Aminopyridine
P009	131-74-8	Ammonium picrate
P119	7803-55-6	Ammonium vanadate
P099	506-61-6	Argentate(1-), bis(cyano-C)-, potassium
P010	7778-39-4	Arsenic acid H3 As04
P012	1327-53-3	Arsenic oxide As2 03
P011	1303-28-2	Arsenic oxide As2 05
P011	1303-28-2	Arsenic pentoxide

P012	1327-53-3	Arsenic trioxide
P038	692-42-2	Arsine, diethyl-
P036	696-28-6	Arsonous dichloride, phenyl-
P054	151-56-4	Aziridine
P067	75-55-8	Aziridine, 2-methyl-
P013	542-62-1	Barium cyanide
P024	106-47-8	Benzenamine, 4-chloro-
P077	100-01-6	Benzenamine, 4-nitro-
P028	100-44-7	Benzene, (chloromethyl)-
P042	51-43-4	1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl)-,
P046	122-09-8	Benzeneethanamine, alpha, alpha-dimethyl-
P014	108-98-5	Benzenethiol
P127	1563-66-2	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate.
P188	57-64-7	Benzoic acid, 2-hydroxy-, compd. w/ (3aS-cis)-1,2,3a,8,8a-hexahydro-1,3a,8- trimethylpyrrolo[2,3-bJindol-5-yl methylcarbamate ester (1:1)
P001	81-81-2 2H-1	Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%
P028	100-44-7	Benzyl chloride
P015	7440-41-7	Beryllium Powder
P017	598-31-2	Bromoacetone
P018	357-57-3	Brucine
P045	39196-18-4	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[(methylamino) carbonyl) oxime
P021	592-01-8	Calcium cyanide
P021	592-01-8	Calcium cyanide Ca(CN)2
P189	55285-14-8	Carbamic acid, [(dibutylamino)-thio)methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester
P191	644-64-4	Carbamic acid, dimethyl-, 1-[(dimethyl-amino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester
P192	119-38-0	Carbamic acid, dimethyl-, 3-methyl-1(1-methylethyl)-1H-pyrazol-5-yl ester
P190	1129-41-5	Carbamic acid, methyl-, 3-methylphenyl ester
P127	1563-66-2	Carbofuran
P022	75-15-0	Carbon disulfide
P095	75-44-5	Carbonic dichloride
P189	55285-14-8	Carbosulfan
P023	107-20-0	Chloroacetaldehyde
P024	106-47-8	p-Chloroaniline
P026	5344-82-1	1-(o-Chlorophenyl)thiourea
P027	542-76-7	3-Chloropropionitrile
P029	544-92-3	Copper cyanide
P029	544-92-3	Copper cyanide Cu(CN)
P202	64-00-6	m-Cumenyl methylcarbamate
P030		Cyanides (soluble cyanide salts), not otherwise specified
P031	460-19- 5	Cyanogen
P033	506-77-4	Cyanogen chloride
P033	506-77-4	Cyanogen chloride (CN)Cl
P034	131-89-5	2-Cyclohexyl-4,6-dinitrophenol
P016	542-88-1	Dichloromethyl ether
P036	696-28-6	Dichlorophenylarsine
P037	60-57-1	Dieldrin
P038	692-42-2	Diethylarsine
P041	311-45-5	Diethyl-p-nitrophenyl phosphate

P040	297-97-2	O,O-Diethyl O-pyrazinyl phosphorothioate
P043	55-91-4	Diisopropylfluorophosphate (DFP)
P004	309-00-2	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa-chloro-1,4,4a,5 ,8,8a,-hexahydro-, (1alpha,4alpha,4abeta, 5alpha,8alpha,8abeta)-
P060	465-73-6	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa-chloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta, 5 beta,8beta,8abeta)-
P037	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha, 2beta, 2aalpha, 3beta,6beta,6aalpha, 7beta, 7aalpha)-
P051	72-20-8	2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha, 2beta, 2abeta,3alpha,6alpha,6abeta, 7beta, 7aalpha)-, & metabolites
P044	60-51-5	Dimethoate
P046	122-09-8	alpha,alpha-Dimethylphenethylamine
P191	644-64-4	Dimetilan
P047	534-52-1	4,6-Dinitro-o-cresol, & salts
P048	51-28-5	2,4-Dinitrophenol
P020	88-85-7	Dinoseb
P085	152-16-9	Diphosphoramide, octamethyl-
P111	107-49-3	Diphosphoric acid, tetraethyl ester
P039	298-04-4	Disulfoton
P049	541-53-7	Dithiobiuret
P185	26419-73-8	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)-carbonyl]oxime
P050	115-29-7	Endosulfan
P088	145-73-3	Endothall
P051	72-20-8	Endrin
P051	72-20-8	Endrin, & metabolites
P042	51-43-4	Epinephrine
P031	460-19-5	Ethanedinitrile
P194	23135-22-0	Ethanimidothioc acid, 2-(dimethylamino)-N-[[(methylamino) carbonyl]oxy]-2-oxo-, methyl ester
P066	16752-77-5	Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester
P101	107-12-0	Ethyl cyanide
P054	151-56-4	Ethyleneimine
P097	52-85-7	Famphur
P056	7782-41-4	Fluorine
P057	640-19-7	Fluoroacetamide
P058	62-74-8	Fluoroacetic acid, sodium salt
P198	23422-53-9	Formetanate hydrochloride
P197	17702-57-7	Formparanate
P065	628-86-4	Fulminic acid, mercury(2+) salt
P059	76-44-8	Heptachlor
P062	757-58-4	Hexaethyl tetraphosphate
P116	79-19-6	Hydrazinecarbothioamide
P068	60-34-4	Hydrazine, methyl
P063	74-90-8	Hydrocyanic acid
P063	74-90-8	Hydrogen cyanide
P096	7803-51-2	Hydrogen phosphide
P060	465-73-6	Isodrin
P192	119-38-0	Isolan

P202	64-00-6	3-Isopropylphenyl N-methylcarbamate
P007	2763-96-4	3(2H)-Isoxazolone, 5-(aminomethyl)-
P196	15339-36-3	Manganese, bis(dimethylcarbamodithioato-S,S')-,
P196	15339-36-3	Manganese dimethyldithiocarbamate
P092	62-38-4	Mercury, (acetato-O)phenyl-
P065	628-86-4	Mercury fulminate
P198	23422-53-9	Methanimidamide, N,N-dimethyl-N'-[3-[[(methyl amino) carbonyl]oxy]phenyl]-, monohydrochloride
P197	17702-57-7	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[(methylamino)carbonyl]oxy]phenyl]-
P082	62-75-9	Methanamine, N-methyl-N-nitroso-
P064	624-83-9	Methane, isocyanato-
P016	542-88-1	Methane, oxybis[chloro-
P112	509-14-8	Methane, tetranitro- (R)
P118	75-70-7	Methanethiol, trichloro-
P050	115-29-7	6,9-Methano-2,4, 3-benzodioxathiepin,6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide
P059	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-
P199	2032-65-7	Methiocarb
P066	16752-77-5	Methomyl
P068	60-34-4	Methyl hydrazine
P064	624-83-9	Methyl isocyanate
P069	75-86-5	2-Methyllactonitrile
P071	298-00-0	Methyl parathion
P190	1129-41-5	Metolcarb
P128	315-8-4	Mexacarbate
P072	86-88-4	alpha-Naphthylthiourea
P073	13463-39-3	Nickel carbonyl
P073	13463-39-3	Nickel carbonyl Ni(CO) 4, (T-4)-
P074	557-19-7	Nickel cyanide
P074	557-19-7	Nickel cynaide Ni(CN) 2
P075	54-11-5	Nicotine, & salts
P076	10102-43-9	Nitric oxide
P077	100-01-6	p-Nitroaniline
P078	10102-44-0	Nitrogen dioxide
P076	10102-43-9	Nitrogen oxide NO
P078	10102-44-0	Nitrogen oxide NO2
P081	55-63-0	Nitroglycerine
P082	62-75-9	N-Nitrosodimethylamine
P084	4549-40-0	N-Nitrosomethylvinylamine
P085	152-16-9	Octamethylpyrophosphoramide
P087	20816-12-0	Osmium oxide OsO4, (T-4)-
P087	20816-12-0	0smium tetroxide
P088	145-73-3	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
P194	23135-22-0	Oxamyl
P089	56-38-2	Parathion
P034	131-89-5	Phenol, 2-cyclohexyl-4,6-dinitro-
P128	315-18-4	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester)
P199	2032-65-7	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate
P202	64-00-6	Phenol, 3-(1-methylethyl)-, methyl carbamate
P201	2631-37-0	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate
P048	51-28-5	Phenol, 2,4-dinitro-

P047	534-52-1	Phenol, 2-methyl-4,6-dinitro-, & salts
P020	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P009	131-74-8	Phenol, 2,4,6-trinitro-, ammonium salt
P092	62-38-4	Phenylmercury acetate
P093	103-85-5	Phenylthiourea
P094	298-02-2	Phorate
P095	75-44-5	Phosgene
P096	7803-51-2	Phosphine
P041	311-45-5	Phosphoric acid, diethyl 4-nitrophenyl ester
P039	298-04-4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl]ester
P094	298-02-2	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester
P044	60-51-5	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester
P043	55-91-4	Phosphorofluoridic acid, bis(1-methylethyl) ester
P089	56-38-2	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
P040	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester
P097	52-85- 7	Phosphorothioic acid, O-[4-[(dimethylamino) sulfonyl]phenyll 0,0-dimethyl ester
P071	298-00-0	Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester
P204	57-47-6	Physostigmine
P188	57-64-7	Physostigmine salicylate
P110	78-00-2	Plumbane, tetraethyl-
P098	151-50-8	Potassium cyanide
P098	151-50-8	Potassium cyanide K(CN)
P099	506-61-6	Potassium silver cyanide
P201	2631-37-0	Promecarb
P070	116-06-3	Propanal, 2-methyl-2- (methylthio)-, 0-[(methylamino) carbonyl]oxime
P203	1646-88-4	Propanal, 2-methyl-2-(methyl-sulfonyl)-, 0-[(methylamino) carbonyl] oxime
P101	107-12-0	Propanenitrile
P027	542-76-7	Propanenitrile, 3-chloro-
P069	75-86-5	Propanenitrile, 2-hydroxy-2-methyl-
P081	55-63-0	1,2,3-Propanetriol, trinitrate
P017	598-31-2	2-Propanone, 1-bromo-
P102	107-19-7	Propargyl alcohol
P003	107-02-8	2-Propenal
P005	107-18-6	2-Propen-1-ol
P067	75-55-8	1,2-Propylenimine
P102	107-19-7	2-Propyn-1-ol
P008	504-24-5	4-Pyridinamine
P075	54-11-5	Pyridine, 3-(1-methyl- 2-pyrrolidinyl)-, (S)-, & salts
P204	57-47-6	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a, 8-trimethyl-,methylcarbamate (ester), (3aS-cis)-
P114	12039-52-0	Selenious acid, dithallium(1+) salt
P103	630-10-4	Selenourea
P104	506-64-9	Silver cyanide
P104	506-64-9	Silver cyanide Ag(CN)
P105	26628-22-8	Sodium azide
P106	143-33-9	Sodium cyanide
P106	143-33-9	Sodium cyanide Na(CN)
P108	1 57-24-9	Strychnidin-10-one, & salts
P018	357-57-3	Strychnidin-10-one, 2,3-dimethoxy-
P108	57-24-9	Strychnine, & salts

P115	7446-18-6	Sulfuric acid, dithallium(1+) salt
P109	3689-24-5	Tetraethyldithio pyrophosphate
P110	78-00-2	Tetraethyl lead
P111	107-49-3	Tetraethyl pyrophosphate
P112	509-14-8	Tetranitromethane
P062	757-58-4	Tetraphosphoric acid, hexaethyl ester
P113	1314-32-5	Thallic oxide
P113	1314-32-5	Thallium oxide Tl2 03
P114	2039-52-0	Thallium(l) selenite
P115	7446-18-6	Thallium(l) sulfate
P109	3689-24-5	Thiodiphosphoric acid, tetraethyl ester
P045	39196-18-4	Thiofanox
P049	541-53-7	Thioimidodicarbonic diamide [(H2 N)C(S)]2 NH
P014	108-98-5	Thiophenol
P116	79-19-6	Thiosemicarbazide
P026	5344-82-1	Thiourea, (2-chlorophenyl)-
P072	86-88-4	Thiourea, 1-naphthalenyl-
P093	103-85-5	Thiourea, phenyl-
P185	26419-73-8	Tirpate
P123	8001-35-2	Toxaphene
P118	75-70-7	Trichloromethanethiol
P119	7803-55-6	Vanadic acid, ammonium salt
P120	314-62-1	Vanadium oxide V2 05
P120	1314-62-1	Vanadium pentoxide
P084	4549-40-0	Vinylamine, N-methyl-N-nitroso-
P001	181-81-2	Warfarin, & salts, when present at concentrations greater than 0.3%
P121	557-21-1	Zinc cyanide
P121	557-21-1	Zinc cyanide Zn(CN)2
P205	137-30-4	Zinc, bis(dimethylcarbamodithioato-S,S')-,
P122	1314-84-7	Zinc phosphide Zn3 P2, when present at concentrations greater than 10%
P205	137-30-4	Ziram

APPENDIX D: TCLP CONTAMINANT LIST

EPA No.	Hw Contaminant	CAS No.	Regulatory Limit, mg/L
0004	Arsenic	7440-38-2	5.0
0005	Barium	7440-39-3	100.0
0018	Benzene	71-43-2	0.5
0006	Cadmium	7440-43-9	1.0
0019	Carbon tetrachloride	56-23-5	0.5
0020	Chlordane	57-74-9	0.03
0021	Chlorobenzene	108-90-7	100.0
0022	Chloroform	67-66-3	6.0
0007	Chromium	7440-47-3	5.0
0023	o-Cresol	95-48-7	200.0
0024	m-Cresol	108-39-4	200.0
0025	p-Cresol	106-44-5	200.0
0026	Cresol		200.0
0016	2,4-D	94-75-7	10.0
0027	1,4-Dichlorobenzene	106-46-7	7.5
0028	1,2-Dichloroethane	107-06-2	0.5
0029	1,1-Dichloroethylene	75-35-4	0.7
0030	2,4-Dinitrotoluene	121-14-2	0.13
0012	Endrin	72-20-8	0.02
0031	Heptachlor (& its epoxide)	76-44-8	0.008
0032	Hexachlorobenzene	118-74-1	0.13
0033	Hexachlorobutadiene	87-68-3	0.5
0034	Hexachloroethane	67-72-1	3.0
0008	Lead	7439-92-1	5.0
0013	lindane	58-89-9	0.4
0009	Mercury	7439-97-6	0.2
0014	Methoxychlor	72-43-5	10.0
0035	Methyl ethyl ketone	78-93-3	200.0
0036	Nitrobenzene	98-95-3	2.0
0037	Pentrachlorophenol	87-86-5	100.0
0038	Pyridine	110-86-1	5.0
0010	Selenium	7782-49-2	1.0
0011	Silver	7440-22-4	5.0
0039	Tetrachloroethylene	127-18-4	0.7
0015	Toxaphene	8001-35-2	0.5
0040	Trichloroethylene	79-01-6	0.5
0041	2,4,5-Trichlorophenol	95-95-4	400.0
0042	2,4,6-Trichlorophenol	88-06-2	2.0
0017	2,4,5-Tp (Silvex)	93-72-1	1.0
0043	Vinyl chloride	75-01-4	0.2

APPENDIX E: PEROXIDE FORMING COMPOUNDS

(from Prudent Practices in the Laboratory)

Classes of Chemicals That Can Form Peroxides Upon Aging

Class I: Unsaturated materials, especially those of low molecular weight, may polymerize violently and hazardously due to peroxide initiation.

Acrylic acid
Acrylonitrile
Butadiene
Chlorobutadiene (chloroprene)
Methyl methacrylate
Styrene
Tetratluoroethylene
Vinyl acetate
Vinyl acetylene
Vinyl chloride
Vinyl pyridine
Vinylidene chloride

Class II: The following chemicals are a peroxide hazard upon concentration (distillation/evaporation). A test tor peroxide should be performed it concentration is intended or suspected.

Acetal
Cumene
Cyclohexene
Cyclooctene
Cyclopentene
Diacetylene
Dicyclopentadiene
Diethylene glycol dimethyl ether (diglyme)
Diethyl ether
Dioxane (p-dioxane)
Ethylene glycol dimethyl ether (glyme)
Furan
Methyl acetylene
Methyl cyclopentane
Methyl-i-butyl ketone
Tetrahydroturan
Tetrahydronaphthalene
Vinyl ethers

Class III: Peroxides derived from the following compounds may explode without concentration.

Organic
- Divinyl ether
- Divinyl acetylene
- Isopropyl ether
- Vinylidene chloride

Inorganic
- Potassium metal
- Potassium amide
- Sodium amide (sodamide)

NOTE: Lists are illustrative but not exhaustive.

APPENDIX F: BINGHAMTON-JOHNSON CITY JOINT SEWAGE TREATMENT PLANT REGULATIONS

(Taken from The Binghamton-Johnson City Joint Sewage Board, Rules and Regulations)

Article 5

§5.01 Prohibited Discharges

No person shall discharge directly or indirectly into the POTW or into any private sewer drain emptying into the POTW any substances, materials, waters, or wastes in such quantities or concentrations which cause, or are capable of causing either alone or by interaction with other substances, interference with the operation or performance of the POTW treatment plant. No person shall discharge the following into the POTW:

a) Any stormwater, swimming pool water, surface water, roof runoff, subsurface drainage, uncontaminated cooling water, or unpolluted industrial process waters to any sanitary or combined sewer, except as is authorized by the Board.

b) Any liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the treatment works or to the operation of the treatment works. This includes waste streams with a closed-cup flashpoint less than 140°F or 60°C using test methods specified in 40 CFR 261.21. Also, at no time shall two successive readings taken at ten minute intervals on an explosion hazard meter at the point of discharge into the system, or at any point in the system, be more than five percent nor any single reading over ten percent of the Lower Explosive Limit (LEU of the meter. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, fuel oil, benzene, and any other substances which the Joint Sewage Board, the DEC or EPA has notified the user constitute a fire or explosion hazard to the system. Lack of notification by these entities that a substance is a prohibited material does not constitute a defense to the User in and enforcement action for violation of this prohibition.

c) Solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities such as, but not limited to: petroleum oil, non-biodegradable cutting oil, products of mineral oil origin, grease, shredded garbage with particles greater than one-half inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides

of fleshings, entrails, lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, tar, asphalt residues, residues from refining or processing of fuel or lubricating oil, mud or glass grinding or polishing wastes, snow, ice, any other solid objects, materials, refuse, and debris not normally contained in ordinary sewage.

d) Any wastewater containing toxic pollutants in sufficient quantity, either singly or by interaction with other pollutants, to injure or interfere with any wastewater treatment process, constitute a hazard to humans or animals, create a toxic effect in the receiving waters of the treatment works, or to exceed the limitation set forth in a categorical pretreatment standard, found in 40 CFR Chapter 1 Subchapter N, Part 405-471. A toxic pollutant shall include but not be limited to any pollutant identified pursuant to Section 307(a) of the Federal Act.

e) Any noxious or malodorous liquids, gases, or solids which either singly or by interaction with other wastes are sufficient to create a public nuisance or hazard to life or are sufficient to prevent entry into the sewer for their maintenance and repair.

f) Any substance which may cause the treatment works' effluent or any other product of the treatment works such as residues, sludge, or scums, to be unsuitable for reclamation and reuse or to interfere with the reclamation process where the treatment works is pursuing a reuse and reclamation program. In no case shall a substance discharged to the POTW cause the POTW treatment plant to be in non-compliance with sludge use or disposal criteria, guidelines, or regulations developed under Section 405 of the Federal Act; or any criteria, guidelines, or regulations affecting sludge use or disposal development pursuant to the Solid Waste Disposal Act, RCRA, or any state or federal requirements regarding solid or hazardous waste.

g) Any discharge resulting in pass through which will cause the treatment works to violate its State Pollutant Discharge Elimination System (SPDES) Permit or the receiving water quality standards.

h) Any pollutant, including oxygen-demanding pollutants (BOD, etc.,) released in a discharge at a flow rate and/or pollutant concentration, which will cause interference with the POTW.

i) Any wastewater with objectionable color not removed in the treatment process.

j) Any wastewater having a temperature which will inhibit biological activity in the POTW treatment plant resulting in interference, but in no case heated wastewater with a treatment at the introduction into the sewer system which exceeds 150°F (65.5°C) or in such quantities that the temperature of wastewater at the POTW treatment plant exceeds 104° F (40°C).

k) Any wastewater which causes a hazard to human life or creates a public nuisance.

l) Concentrated solutions, such as acid or caustic cleaning solutions or plating baths.

§5.07 Restricted Discharges

No person shall discharge directly or indirectly into the POTW wastewater containing any of the following substances in concentrations exceeding those specified below. Concentration limits are applicable to wastewater effluent at a point just prior to discharge into the POTW.

Substance[1]	Allowable Daily Average Effluent Concentration Limit[2] (MG/L)
Cadmium	0.3
Chromium (Total)	12.0
Copper	8.0
Lead	2.5
Nickel	7.0
Zinc	20.0

[1] All concentrations listed for metallic substances shall be as “total metal” which shall be defined as the value measured in a sample acidified to a pH value of less than 2 without prior filtration.

[2] As determined by a composite sample taken of the User’s daily discharge over the operation and/or production period. Composite samples must consist of grab samples collected at intervals of at least one per hour .

APPENDIX G: SPILL BUCKET CONTENTS

Contents of 5-gallon Spill Bucket:

5 lbs of Absorbent Clay or media - for most liquid spills

5 lbs of Calcium Carbonate - for acid spill neutralization

5 lbs of Citric Acid - for base spill neutralization

Mercury Spill Kit

Wisk Broom and Dust Pan

Sponge

pH Paper

2 - 5 Gallon Bags

2 - 9” x 12” Ziploc Bags

1 pair of Goggles

1 pair of Nitrile Gloves

2 - Dust Masks - for nuisance dust ONLY, not for chemical protection

Hazardous Waste Tags

Yellow Hazardous Waste stickers

Spill Cleanup procedures

APPENDIX H: SCIENCE STORES

STATE UNIVERSITY OF NEW YORK AT BINGHAMTON

SCIENCE STORES

Science Stores is located in the basement of Science II, room B15.

The Stores inventory consist of commonly used items at cost plus a 15% surcharge. The system provides centralized, large quantity purchasing and inventory of many chemicals, glassware, and laboratory supply items.

The Store has a supply of Hazardous Chemical Waste Tags and Yellow Hazardous Waste Stickers.

A Science Stores requisition form is used when withdrawing supplies. The dollar value of withdrawals are charged against the department POETS string or research grants.

Contact 7-2551 with any questions.

APPENDIX I: REFERENCE MATERIALS

Academy of Certified Hazardous Materials Managers, Hazardous Materials Management Desk Reference, McGraw-Hill Publishers, 1999

Alaimo, Robert J., Handbook of Chemical Health & Safety, The American Chemical Society, Oxford University Press, 2001

Armour, Margaret-Ann, Hazardous Laboratory Chemicals Disposal Guide, Lewis Publishers, Inc., 1996

Bretherick, L., Urben, P.G., Pitt, Martin, Bretherick's Handbook of Reactive Chemical Hazards, Butterworth-Heinemann, 1999

Furr, Keith, CRC Handbook of Laboratory Safety, CRC Press, Inc., 1995

Lewis, Richard J., Hawley's Condensed Chemical Dictionary, John Wiley & Sons, 1997

Lewis, Richard J., Sax's Dangerous Properties of Industrial Materials, John Wiley & Sons, 1999

Lide, David R., CRC Handbook of Chemistry and Physics, CRC Press, Inc. 2001

Luxon, S.G., Hazards in the Chemical Laboratory, Springer Verlag, 1992

Merck, The Merck Index, Merck & Co. 2001

National Research Council, Prudent Practices in the Laboratory, National Academy Press, 1995

Patnaik, Pradyot, Properties of Chemical Substances, Van Nostrand Reinhold Publishing, 1992

Safety in Academic Chemistry Laboratories, The American Chemical Society, 1995

New York Codes, Rules and Regulations, 6 NYCRR parts 370-376 Code of Federal Regulations

Code of Federal Regulations
- 29 CFR 1910
- 40 CFR 260-299
- 49 CFR 100-199

WWW Sites

New York State Department of Environmental Conservation
Hazardous Waste Regulations

http://www.dec.ny.gov/regulations/8765.html

U.S. Environmental Protection Agency Waste Programs

http://www.epa.gov/osw/

U.S. Environmental Protection Agency College and University
Compliance Assistance Information

http://www.epa.gov/regions/capp/ca-sites.htm

Interactive Learning Parad igms, Inc - MSDS Site

http://www.ilpi.com/msds/

MSDS Provider

http://www.MSDSprovider.net/Site

University of Vermont - MSDS Site

http://www.siri

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