NEW YORK CITY COLLEGE OF TECHNOLOGY
The City University of New York
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Hazardous Waste Plan

2011

Purpose of this Manual

This manual has been designed to assist all NYC College of Technology faculty, staff, and assistants in the safe and economical management of hazardous wastes generated on campus. The role of the Environmental Health and Safety (EH&S) Office is to act in the capacity of a consultant for the NYC College of Technology 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 guide includes a number of sections to better assist the campus community in managing hazardous waste. Please read the guide carefully and call EH&S at ext. 5858 if you have any questions. Your comments and suggestions are always appreciated!

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1.0 Introduction

It is a policy of NYC College of Technology "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". The Environmental Health and Safety Office was established 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

"The Environmental Health and Safety Office is committed to establishing and maintaining a healthful and safe work environment through the anticipation, recognition, evaluation, and control of environmental, health and safety hazards in the areas of industrial hygiene, regulatory compliance, laboratory and chemical safety, and hazardous waste management.

In keeping with the goals of excellence in customer service, the EH&S Office continually strives to achieve this by responding quickly and effectively to any health, safety and environmental concerns of students, faculty and staff, posting notices online of information that may impact the College community and maintaining a visible presence in all areas of the College campus."

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 NYC College of Technology 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), the New York State Department of Environmental Conservation (DEC) and the New York City Department of Environmental Protection (DEP) 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 Material Safety Data Sheets (MSDS) **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.

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 cost 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. 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 $<73^{o}$ F, boiling point $< 100^{o}$ F) 1 pint
   b) Class IB (flashpoint $<73^{o}$ F, boiling point $> 100^{o}$ F) 1 quart
   c) Class IC (flashpoint $>73^{o}$ F, boiling point $> 100^{o}$ F) 1 gallon
   d) Class II (140^{o} F > flashpoint > 100^{o} F) 1 gallon

6) Do not store corrosive chemicals in flammable liquid 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) Flammable solids (Class 4.1)
- Spontaneously combustible (Class 4.2) Dangerous when wet (Class 4.3)
- Oxidizers (Class 5.1) Organic peroxides (Class 5.2)
- Poisons (Class 6.1) Cyanides
- Bases Organic acids
- Inorganic acids, Other

Be sure to check Material Safety Data Sheets (MSDS) 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 EH&S at ext. 5858.

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

4.0 Disposal of Nonhazardous Waste

Some of the chemical products used at NYC College of Technology may be disposed of safely and legally in the normal trash and sanitary sewer. However, in general it is not advisable to dispose of questionable chemicals by either method. Although a chemical may not be regulated today, the generator of chemical wastes can still be held liable in the future if a particular chemical becomes 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.

In general, nonhazardous waste chemicals are those that have relatively low toxicity, contain no toxic metals, and have no positive determination of carcinogenicity, mutagenicity, or teratogenicity. Chemicals that may be disposed of in the sanitary sewer include chemicals that are NOT regulated as hazardous waste, but ARE water soluble, biodegradable, and of low toxicity. Examples include: sugars, amino acids, simple proteins, aqueous salt solutions, and neutral aqueous solutions. Solid chemicals of this type can be disposed of in the sanitary sewer if they are first dissolved in water. All chemicals poured into the sewer must be followed by at least 20 parts of water.

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.

4.1 Treatment Plant Prohibitions

The following is an abbreviated list from New York City sewer regulations. The following wastes are PROHIBITED from being discharged into the sanitary sewer:

- any liquids or solids that can cause fires or explosions or be injurious to the treatment works or employees of the treatment works either alone or by interaction with other substances
- flammable liquids (flashpoint <140^{o} F)
- solid or viscous substances which may cause obstruction to the flow in a sewer or interference with the operations of the treatment plant
- any wastewater having a pH less than 6.0 or higher than 10.0, or wastewater having any other corrosive property
- toxic pollutants (either singly or by interaction with other pollutants)
- 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 sewers for their maintenance and repair
- any heated wastewater which exceeds 150°F or in such quantities that the temperature of wastewater at the POTW treatment plant exceeds 104° F

Please see Appendix F for excerpts of the New York City Sewer disposal regulations. Complete copies of the Rules and Regulations relating to sewer disposal can be obtained from Environmental Health and Safety. When in doubt, dispose of chemical wastes through the hazardous waste management program.

5.0 Hazardous Waste Management Program

There is a large variety of chemical waste generated at NYC College of Technology. 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:

- other miscellaneous wastes from across campus
- 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). NYC College of Technology is regulated as a Conditionally Exempt Small Quantity Generator (CESQG) 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 websites:

DEC website:
http://www.dec.ny.gov/chemical/292.html

EPA website:
http://www.epa.gov/wastes/hazard/index.htm

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.

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 NYC College of Technology 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 nonhalogenated organic solvents. See Appendix B for a description of the chemicals on the F-list.

Some common examples of F-listed hazardous wastes include:

1. 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.

2. 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.

3. 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, off-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 are:

P Listed	**U Listed**
Methanol	Sodium Azide
Chloroform	Osmium Tetroxide
Phenol	Sodium Cyanide
Methylene Chloride	Potassium 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 D001. 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 fire 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

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 D002. A waste exhibits the characteristic of corrosivity if 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 treat solid chemicals as corrosive hazardous wastes if; when the solid chemical is added to water and results 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
Thionyl chloride	Calcium hydroxide solution

6.3.3 Reactivity

Reactive wastes include highly reactive and/or unstable chemicals. Reactive wastes carry the EPA waste code D003. 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 D004-D043. The list of TCLP contaminants can be found in Appendix D.

Any chemical waste that has concentrations greater than or equal to the regulatory limits listed in Appendix D must be disposed of through the hazardous waste management program.

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 choride 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.

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 (aggregate) 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.

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 the words "Hazardous Waste" and with other words identifying the contents and any hazards present.

EH&S has distributed labels that say "Hazardous Waste" for this purpose. Additional Hazardous Waste labels can be obtained by contacting EH&S at ext. 5858.

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. Lab Safety Supplies carries a variety of different types and sizes of containers (see Appendix H).

6. Hazardous waste containers must be marked with the date the container becomes full. This date can be written on the Hazardous Waste label (see Section 9.1).

7. 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 full waste containers.

8. 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.

9. Do not store hazardous waste containers in or around sinks, including cup sinks in hoods, without using some form of secondary containment.

10. Hazardous waste containers should be stored in plastic trays labeled "Satellite Accumulation Area". You can obtain one of these specially labeled trays by contacting EH&S at ext. 5858.

Please note: These specially labeled trays are for storage of hazardous waste containers only. Do not use them for general purpose storage.

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 EH&S at ext. 5858 and special disposal arrangements can be made to accommodate you.

8.1 Concentrated Solutions of Acids and Bases

Concentrated solutions of acids and bases can be disposed of through the hazardous waste management program OR as a means of waste minimization, can be neutralized first and then disposed of down the drain. Please note that concentrated solutions of acids and bases that contain other chemicals such as heavy metals cannot be disposed of down the drain.

THESE PROCEDURES SHOULD ONLY BE PERFORMED BY TECHNICALLY QUALIFIED AND FULLY TRAINED PERSONNEL.

8.1.1 Neutralization Procedures

Do not attempt to neutralize strong oxidizing acids such as Perchloric acid and Chromic acid.
If you choose to neutralize and dispose of these materials yourself, please follow these guidelines:

1. Only perform these procedures in a fully functioning fume hood in a well-ventilated area and behind a safety shield. Always wear splash goggles, gloves, and splash apron for protection. CAUTION: Vapors and heat are generated during neutralization.

2. Keep containers cool while neutralizing and perform all steps slowly.

3. Solutions should be neutralized to a pH range of 6 to 10, and then flushed down the drain with at least 20 parts of water.

8.1.2 Acid Neutralization

Highly concentrated acids should first be diluted with cold water (***always add the acid to the water!***) to a concentration below 10%. While stirring, add the dilute acid solution to large amounts of an ice water solution of base such as Sodium carbonate, Calcium hydroxide, or 8M Sodium hydroxide for concentrated acids. When a pH between 6 and

10 has been achieved, the solution can be flushed down the drain followed by 20 parts water.

8.1.3 Base Neutralization

Highly concentrated bases should first be diluted with cold water (***always add the base to the water***) to a concentration below 10%. Add the dilute solution to a large container of ice water. While stirring, slowly add a 1M solution of Hydrochloric acid. When a pH between 6 and 10 has been achieved, the solution can be flushed down the drain followed by 20 parts water.

8.1.4 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 Lab Safety Supplies (see Appendix H).

8.1.5 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. As a safety precaution, EH&S recommends that Calcium hydroxide be added to any mixtures or dilute solutions of Hydrofluoric acid waste.

Anyone using Hydrofluoric acid should contact EH&S 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.

8.1.6 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 EH&S at ext. 5858 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.

8.2 Organic Solvents

Organic solvents should be collected in special flammable liquid safety cans. 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 Lab Safety Supplies (see Appendix H). Lab Safety Supplies 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. 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 or 5 gallon carboys 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:

- strong 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 can or containers. Do not rely on your memory to label solvents, keep a running list of solvents that you add to the container.

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 Waste label when disposing of contaminated used oil. Used oil containers should be labeled with a special "Used Oil" label. If you remove oil from a piece of electrical equipment, verify whether or not the oil contains PCBs. in doubt, contact EH&S at xt. 5858.

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 transite (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 EH&S at ext. 5858 or Buildings and Grounds at ext. 5337 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 EH&S at xt. 5858 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 Waste label.

8.7 Chemically Contaminated Items

In general, Chemically Contaminated Items (CCIs) can only be put into the normal trash if they are nonhazardous, nonignitable, nonreactive, noncarcinogenic, nonmutagenic, 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 Waste label as “Chemically Contaminated Items” and the name and approximate percentage of chemical contaminants. Alternatively these items may be placed in a medical waste box for direct incineration. Contact EH&S if you have any questions.

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**. Contact EH&S at xt. 5858 to report a mercury spill.**

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. However, fluorescent tubes with green end caps can 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.
There is a program in place to manage fluorescent tubes and other mercury bearing lamps. Contact Buildings and Grounds at ext. 5337 for replacement or disposal of lamps

8.10 Batteries

There is a program in place to recycle batteries (Ni-Cad, Lithium, Lead-acid, Mercury, and button batteries). If you would like to request a battery collection container for your building/work area, or if a battery collection container is full, contact EH&S at ext. 5858. Alkaline batteries that do not contain mercury are not considered hazardous and may be disposed in the trash.

8.11 Computer and Electronic Equipment

There is a program in place to recycle electronic equipment. Old computer equipment cannot be disposed of in the normal trash due to the presence of toxic metals such as lead and cadmium. If you are planning on disposing of these items, please submit an e-waste requisition form online (https://cisapps.citytech.cuny.edu/ewaste/). After submitting the requisition form, a work order must be submitted via the B&G Archibus system in order to have the electronic devices or equipment collected from the area.

8.12 Aerosol Cans and Cylinders

Aerosol cans and small Propane cylinders can contain flammable, corrosive, and toxic chemicals and propellants. There is a program in place to collect aerosol cans and small propane cylinders. These items will be emptied of their contents, depressurized, and then recycled for scrap metal. 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 EH&S at ext. 5858 for assistance.

8.13 Paint, Paint Thinner, Adhesives, and Printshop Chemicals

Paint (oil-based), paint thinner, adhesives, and many printshop chemicals are flammable and 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 placed in the normal trash.

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. Used photographic fixer contains silver above regulatory levels (5 ppm) and cannot be poured down the drain, however, some photographic chemicals may be disposed of down the drain depending on the chemical constituents. EH&S collects photographic chemicals during regular hazardous waste pickups and can make special arrangements to return collection containers back to darkroom users. Additionally a sample of the silver

recovery system effluent will be sampled once a month to determine the efficiency of the system. For more information on disposal of photographic chemicals, contact EH&S at ext. 5858.

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 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 EH&S immediately at ext. 5858 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 Material Safety Data Sheets (MSDS) 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. Lab Safety Supplies carries peroxide test strips that can be used to test for 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 EH&S immediately at ext. 5858.

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 Medical Waste/Infectious Waste

Spent tissue waste, preserved animal carcasses and any material that may potentially be contaminated with human or animal fluids or vaccines should be collected in Regulated Medical Waste cardboard boxes or drums lined with specially labeled red plastic bags. Note that these containers are not designed to hold liquids so any liquids should be solidified or removed. Items that are contaminated with infectious materials should be disinfected with bleach prior to disposal. Once full, both the liner and the outer box should be closed and taped securely. Both the inner liners **and** the outer box should be labeled with the appropriate information, including the department, the name and address for NYC College of Technology, and phone number of Public Safety (ext. 5555). Contact EH&S at ext. 5858 to arrange a pickup or to order supplies.

8.19 Sharps

Because of the special hazards of sharps (including needles, syringes, scalpels, and broken glassware), these items should be placed inside the rigid sharps disposal containers. Once full these items may then be placed inside the medical waste boxes for disposal. Universal precautions should be observed when handling these items.

9.0 Hazardous Waste Disposal Procedures

Generators should call or email a request for disposal of hazardous waste. The waste will be picked up at your lab or work area on a scheduled pickup day.

When calling or emailing a request for disposal, please include 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. Requests need to be made BEFORE the scheduled pickup dates.

Please keep in mind that ALL waste must have a clearly written, completed Hazardous Waste label attached to each container. Hazardous Waste labels must be signed and dated when the container is full. Information on filling out Hazardous Waste labels can be found in Section 9.1. Hazardous Waste labels can be obtained at Lab Safety Supplies or from Environmental Health & Safety.

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

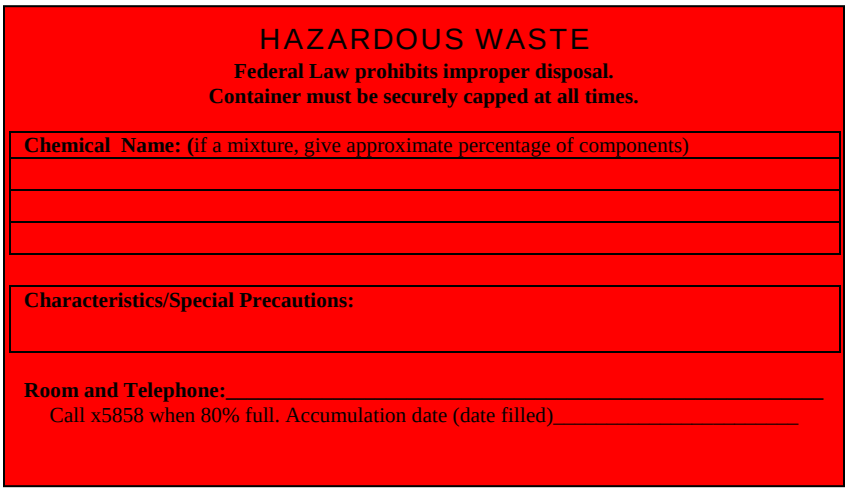
PLEASE NOTE: Containers that do not have a completed, signed, and dated Hazardous Waste label will NOT be picked up. A note will be left indicating the generator needs to attach a Hazardous Waste label and to call and reschedule to have the waste picked up. Pickups will be held on a call in basis, no specific time can be given as to when the chemicals will be picked up. To schedule a waste pickup, contact EH&S at ext. 5858.

9.1 The Hazardous Waste Label

The Hazardous Waste label 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 Waste label 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 and attached to the container. Hazardous Waste labels can be obtained from EH&S.



CHEMICAL NAME: 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.

CHARACTERISTICS/SPECIAL PRECAUTIONS: 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.

BUILDING AND ROOM NUMBER: Where the waste was generated.

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

9.2 Empty Containers

Spent chemical containers that are empty or contain residue may be triple rinsed with a compatible solvent or water prior to disposal as non regulated waste. Residue is defined as <3% by weight of the total capacity of the container. However please note the following prohibitions to this procedure:

- Containers having contained any substance considered "acutely toxic" i.e. a chemical appearing on the P list. (see Appendix C)
- Containers having contained a reactive or peroxidizable substance
- Containers with residue of heavy metals
- Unknown containers

After triple rinsing the original label must be completely removed from the container which can then be disposed in the regular trash. The container may also be reused to store other hazardous waste. Contact EH&S for questions regarding this.

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 4 primary ways in which the waste is handled: bulk drums, lab pack drums, recycling/reclamation, and drain/trash disposal.

10.1 Bulk Drums

Certain categories of liquid chemicals can be bulked and combined into drums. Examples include flammable solvents, acids, bases, and some types of aqueous waste. Bulking waste (as opposed to lab packing) can result in significant cost savings for the College 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 fire or explosions. If no reactions occur, then the rest of the chemical is poured into a 5 or 16-gallon drum. Accurately labeling chemicals helps to avoid potential reactions, fires, 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 oil, free-flowing mercury, and silver from photographic fixer is sent for recycling/reclamation. Photographic fixer is collected and run through a filtration media to collect the silver. 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

Some chemicals are safe to dispose of via the sanitary sewer or normal trash. If solid chemicals that are received through the hazardous waste management program are

determined to be nonhazardous and nonregulated, they are placed in containers that clearly identifies this and then disposed in the normal trash.

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 NYC College of Technology will generally be handled using the above technologies.

11.0 Material Safety Data Sheets

As part of the OSHA (NYS PESH) Hazard Communication Standard, employers are required to have Material Safety Data Sheets (MSDS) 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 MSDS 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 MSDS

Although not required, it is highly recommended that you maintain a file of MSDS 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 MSDS. Please send a copy to EH&S to help keep our files up to date and current. If you do not receive a MSDS with a shipment or would like to request a MSDS for a previously purchased chemical, contact EH&S at ext. 5858.

11.1 MSDSs on the Internet

Material Safety Data Sheets can also be accessed online. Some useful sites are:

Interactive Learning Paradigms, Inc

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

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

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

University of Vermont – MSDS Site

http://siri.org/msds/

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 MSDS 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. All laboratories, chemical stock rooms and other chemical storage rooms have been provided with a chemical spill kit. Always familiarize yourself with the location of the spill kit and contact EH&S should it need replacement or replenishment.

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. **Always contact**

EH&S at ext. 5858 during normal business hours or after hours contact Public Safety ext. 5555 to report a chemical spill or hazardous condition.

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 (i.e. - 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 EH&S at ext. 5858.

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:

    - Citric acid for Base spills
    - Calcium carbonate for Acid 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 calling ext. 5858.

12.2 Major Spills

A major spill consists of:

- a large quantity of chemical 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 calling Public Safety at **ext. 5555** or by using one of the emergency hallway phones found in some buildings.

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 Public Safety to arrive.

5. When you report a spill, the Public Safety 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. Listen to the instructions from your floor Fire Safety Coordinators. After you have evacuated the building, report to your designated assembly area. This location should be posted by the door of your laboratory or office area. Do NOT return to your lab or leave campus 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: NYC College of Technology Management Procedure - Environmental Health & Safety Policy

General Policy

It is the policy of NYC College of Technology 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.

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

I. 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.

II. 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.

III. Supervisors

Each supervisor must develop initiatives that will maintain a safe work place and also develop training employees and students regarding 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 for employees and students to develop awareness and responsibility for safety so they will act in a safe manner when faced with situations not covered by established rules or regulations

IV. Individuals

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 safe work practices and a safe 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

Waste No. / CAS No. / 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 Acrylonitrile
U011 61-82-5 Amitrole
U012 62-53-3 Aniline
U136 75-60-5 Arsinic acid, dimethyl-
U014 492-80-8 Auramine
U015 115-02-6 Azaserine
U010 50-07-7 Azirino[2',3':3,4] pyrrolo[1,2-a]indole-4,7-dione, 6-amino- 8-
[[(aminocarbonyl) oxy]methyl]-1,1a,2,8a,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)amino]-
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-1H- pyrrolizin-1-yl ester,[1S-[1alpha(Z), 7(2S*,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 DDD
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'-Diethylhydrazine
U087 3288-58-2 O,O-Diethyl S-methyl dithiophosphate
U088 84-66-2 Diethyl phthalate
U089 56-53-1 Diethylstilbesterol
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
U111 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]]bis-, 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)]bis[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-Oxathiolane, 2,2-dioxide
U058 50-18-0 2H-1,3,2-Oxazaphosphorin- 2-amine, N,N-bis (2-chloroethyl)tetrahydro-,2-oxide
U115 75-21-8 Oxirane
U126 765-34-4 Oxiranecarboxyaldehyde
U041 106-89-8 Oxirane, (chloromethyl)-
U182 123-63-7 Paraldehyde
U183 608-93-5 Pentachlorobenzene
U184 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, O,O-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-Pyridazinedione, 1,2-dihydro- 76-01-7 Pentachloroethane
U196 110-86-1 Pyridine
U191 109-06-8 Pyridine, 2-methyl-
U237 66-75-1 2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2- chloroethyl)amino]-
U164 56-04-2 4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-
U180 930-55-2 Pyrrolidine, 1-nitroso-
U200 50-55-5 Reserpine

U201 108-46-3 Resorcinol
U202 1 81-07-2 Saccharin, & 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(I) acetate
U215 6533-73-9 Thallium(I) carbonate
U216 7791-12-0 Thallium(I) chloride
U216 7791-12-0 Thallium chloride TlCl
U217 10102-45-1 Thallium(I) 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
****
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 AsO4
P012 1327-53-3 Arsenic oxide As2 O3
P011 1303-28-2 Arsenic oxide As2 O5
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-b]indol-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,
5beta,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 Osmium tetroxide
P088 145-73-3 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
P194 23135-22-0 Oxamyl
P089 56-38-2 Parathion
P034 131-89-5 Phenol, 2-cyclohexyl-4,6-dinitro-
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]phenyl] O,O-dimethyl ester
P071 298-00-0 Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester
P204 57-47-6 Physostigmine
P188 57-64-7 Physostigmine salicylate
P110 78-00-2 Plumbane, tetraethyl-
P098 151-50-8 Potassium cyanide
P098 151-50-8 Potassium cyanide K(CN)
P099 506-61-6 Potassium silver cyanide
P201 2631-37-0 Promecarb
P070 116-06-3 Propanal, 2-methyl-2- (methylthio)-, O-[(methylamino) carbonyl]oxime
P203 1646-88-4 Propanal, 2-methyl-2-(methyl-sulfonyl)-, O-[(methylamino) carbonyl] oxime.
P101 107-12-0 Propanenitrile
P027 542-76-7 Propanenitrile, 3-chloro-
P069 75-86-5 Propanenitrile, 2-hydroxy-2-methyl-
P081 55-63-0 1,2,3-Propanetriol, trinitrate
P017 598-31-2 2-Propanone, 1-bromo-
P102 107-19-7 Propargyl alcohol
P003 107-02-8 2-Propenal

P005 107-18-6 2-Propen-1-ol
P067 75-55-8 1,2-Propylenimine
P102 107-19-7 2-Propyn-1-ol
P008 504-24-5 4-Pyridinamine
P075 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 O3
P114 2039-52-0 Thallium(I) selenite
P115 7446-18-6 Thallium(I) sulfate
P109 3689-24-5 Thiodiphosphoric acid, tetraethyl ester
P045 39196-18-4 Thiofanox
P049 541-53-7 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 O5
P120 1314-62-1 Vanadium pentoxide
P084 4549-40-0 Vinylamine, N-methyl-N-nitroso-
P001 1 81-81-2 Warfarin, & salts, when present at concentrations greater than 0.3%
P121 557-21-1 Zinc cyanide
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. / Contaminant / CAS No. / Regulatory Limit, mg/L

D004 Arsenic 7440-38-2 5.0
D005 Barium 7440-39-3 100.0
D018 Benzene 71-43-2 0.5
D006 Cadmium 7440-43-9 1.0
D019 Carbon tetrachloride 56-23-5 0.5
D020 Chlordane 57-74-9 0.03
D021 Chlorobenzene 108-90-7 100.0
D022 Chloroform 67-66-3 6.0
D007 Chromium 7440-47-3 5.0
D023 o-Cresol 95-48-7 200.0
D024 m-Cresol 108-39-4 200.0
D025 p-Cresol 106-44-5 200.0
D026 Cresol 200.0
D016 2,4-D 94-75-7 10.0
D027 1,4-Dichlorobenzene 106-46-7 7.5
D028 1,2-Dichloroethane 107-06-2 0.5
D029 1,1-Dichloroethylene 75-35-4 0.7
D030 2,4-Dinitrotoluene 121-14-2 0.13
D012 Endrin 72-20-8 0.02
D031 Heptachlor (& its epoxide)76-44-8 0.008
D032 Hexachlorobenzene 118-74-1 0.13
D033 Hexachlorobutadiene 87-68-3 0.5
D034 Hexachloroethane 67-72-1 3.0
D008 Lead 7439-92-1 5.0
D013 Lindane 58-89-9 0.4
D009 Mercury 7439-97-6 0.2
D014 Methoxychlor 72-43-5 10.0
D035 Methyl ethyl ketone 78-93-3 200.0
D036 Nitrobenzene 98-95-3 2.0
D037 Pentrachlorophenol 87-86-5 100.0
D038 Pyridine 110-86-1 5.0
D010 Selenium 7782-49-2 1.0
D011 Silver 7440-22-4 5.0
D039 Tetrachloroethylene 127-18-4 0.7
D015 Toxaphene 8001-35-2 0.5
D040 Trichloroethylene 79-01-6 0.5
D041 2,4,5-Trichlorophenol 95-95-4 400.0
D042 2,4,6-Trichlorophenol 88-06-2 2.0
D017 2,4,5-Tp (Silvex) 93-72-1 1.0
D043 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	Tetrafluoroethylene
Acrylonitrile	Vinyl acetate
Butadiene	Vinyl acetylene
Chlorobutadiene (chloroprene)	Vinyl chloride
Methyl methacrylate	Vinyl pyridine
Styrene	Vinylidene chloride

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

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

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

Organic	Inorganic
Divinyl ether	Potassium metal
Divinyl acetylene	Potassium amide
Isopropyl ether)	Sodium amide (sodamide)
Vinylidene chloride	

NOTE: Lists are illustrative but not exhaustive.

APPENDIX F: NYC Sewage Treatment Plant 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 (LEL) 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 having a pH less than 6.0 Standard Units (SU) or higher than 12.0 SU, or wastewater having any other corrosive property capable of causing damage or hazard to structures, equipment, and/or personnel or the treatment works.

e) 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.

f) 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.

g) 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.

h) 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.

i) 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.

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

k) 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).

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

m) Concentrated solutions, such as acid or caustic cleaning solutions or plating baths, without pretreatment.

§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.
Allowable Daily Average

Substance1 Effluent Concentration Limit2 (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 - for most liquid spills
- spill absorbent pads
- 1 chemical spill bag
- 1 pair of goggles
- 1 pair of nitrile gloves

APPENDIX H: 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
29 CFR 1910
40 CFR 260-299
49 CFR 100-199

Internet Sites

DEC Waste Management website:
http://www.dec.ny.gov/chemical/292.html

EPA Hazardous Waste website:
http://www.epa.gov/wastes/hazard/index.htm

EPA Universal Waste website:
http://www.epa.gov/wastes/hazard/wastetypes/universal/index.htm