Chemicals cycling through Cole Science Center must be tracked in order to provide proper storage, use safety awareness, and disposal. The Laboratory Manager is responsible for monitoring chemical storage and use in the CSC; and will require regular assistance from faculty members carrying out research and course work activities.

6.1 ORDERING AND RECEIVING

Ordering is conducted through the Lab Manager. Before accepting packages, the package should be inspected for visible damage. If there are any signs of damage, the package should not be accepted from the shipper.

Material Safety Data Sheets (MSDS) are requested for each chemical ordered. MSDS are received by Environmental Health & Safety, entered into the MSDS inventory, and given to the Lab Manager. MSDS copies are kept at the CSC and in Environmental Health & Safety.

Upon receipt, the Lab Manager, or designated person, opens the package and tags each chemical container with a unique container number and enters it into the chemical database before being moved to the designated storage area.

If someone other than the Lab Manager opens the package, the Lab Manager must be informed of its receipt and location and given the paperwork (e.g., packing slip and MSDS). The Lab Manager will then locate the container, tag it and enter it into the chemical inventory.

6.2 LABELING

Manufacturer's container labels are the primary source of information on the physical and health hazards of a hazardous chemical. These labels should not be removed or defaced until the container is empty and decontaminated if necessary (see Section 6.4.6 for requirements for acutely hazardous waste). Storage areas should be checked frequently to ensure that labels are tightly affixed to the container. Any loose labels should immediately be taped on using clear packing tape. Labels must be removed or covered prior to using a container for another chemical or waste.

Containers into which hazardous chemicals are transferred, or in which solutions are prepared, must be labeled with, at a minimum: the chemical name (*do not use chemical formulas or abbreviations*), date, and the user's name. Containers in which the hazardous chemical is to be stored must also be labeled with the appropriate hazard warning(s). All labeling should be done with an indelible marker or preprinted labels and containers checked frequently to make sure that the information is legible. Dating is especially important in the case of compounds that degrade to hazardous compounds (e.g., ethers to peroxides) or have limited shelf life, as well as for determining when to best dispose of them.

Chemical Inventory tags must not be removed or defaced. Empty containers must be cleaned and returned to designated locations to ensure the container is removed from the

active chemical inventory. The Lab Manager will then remove the tag and make the containers available for use as waste containers.

Unknowns for instructional use must be identified with a code with a key indicating the chemical content. The key must be kept by the responsible faculty or staff member. When the containers are returned to storage, the key should be kept with the containers. The potential hazards of the constituents must be communicated to those handling the unknowns.

6.3 CHEMICAL STORAGE

Proper storage minimizes the potential for fire or a release of hazardous chemicals due to accidental chemical reactions.

A chemical inventory is kept of all chemicals in Cole Science Center. This inventory provides information on the name of chemicals and products, their manufacturer and storage location. If container is moved to a different storage location, the Lab Manager must be informed, so the inventory can be updated.

To safely store chemicals, the following guidelines should be adhered to:

- Chemicals will not be stored on the floor, on bench tops or in fume hoods.
- Amounts of chemicals stored will be as small as practical.
- Large containers of reagents will be stored only on low shelving.
- Liquids will be stored in chemical resistant trays to contain leakage or spills.
- Chemical storage areas will be separated from offices and laboratory work areas.
- Odorous chemicals must be labeled and stored inside cabinets or underneath fume hoods.
- Storage areas must be ventilated.

While the Lab Manager regularly checks laboratories to assure chemicals are stored properly and kept in their proper storage areas and are not out in the open laboratory space, faculty are responsible for proper handling of materials used in association with their classes or student projects.

Formal inspection of chemical storage areas are conducted annually. Stored chemicals are examined for deterioration and container integrity. Chemical containers without accompanying labels, or those unattended or unneeded items, will be removed by the Lab Manager for disposal (see Section 6.5).

6.3.1 Storage by Compatibility Groups

Hazardous chemicals should always be segregated into compatible groups during storage to prevent hazardous reactions in the event of an accident. Storage areas and shelves should be clearly labeled as to appropriate hazard class. The major laboratory chemical distributors have established colored coded systems for chemical storage based on compatibility. Be

aware that the systems vary somewhat between distributors. Table 6-1 provides examples of incompatible hazardous chemicals. Appendix 6-A provides additional information for specific chemicals.

Chemicals are stored based on compatibility first, and then in alphabetical order within each compatibility class, in accordance with the Guidelines for the National Fire Protection Association: NFPA 49. Any combination of **acids, bases and flammables should never be stored together**. These materials must be stored separately and in appropriate and designated cabinets (e.g., acid storage cabinet). Storage cabinets containing corrosives must have resistant secondary containment, to retain the material in the event of a spill or container failure.

Table 6-1
CLASSES OF INCOMPATIBLE CHEMICALS
CHEMICALS IN COLUMN A AND B SHOULD BE KEPT SEPARATE

A	B
acids	bases
alkali and alkaline earth metals	water
carbides	acids
hydrides	halogenated organic compounds
hydroxides	oxidizing agents
oxides	chromates, dichromates CrO_3
peroxides	halogens, halogenating agents
	hydrogen peroxide and peroxides
	nitric acid, nitrates
	perchlorates and chlorates
	permanganates
	persulfates
inorganic azides	acids
	heavy metals and their salts
	oxidizing agents (see list above)
inorganic cyanides	acids, strong bases
inorganic nitrates	acids, nitrites
	metals, sulfur
inorganic nitrites	acids
	oxidizing agents
inorganic sulfides	acids
organic compounds	oxidizing agents (see list above)
organic acyl halides	bases
organic anhydrides	organic hydroxy compounds
organic halogen compounds	aluminum metal
organic nitro compounds	strong bases
powdered metals	acids
	oxidizing agents (see list above)

Source: National Research Council, 1981. *Prudent Practices for Handling Hazardous Chemicals in Laboratories.*

6.3.2 Compressed Gases and Liquids

Procedures for the handling and storing of compressed gases and liquids are described in Section 5.4.

6.4 MOVING AND SHIPPING CHEMICALS

Secondary containment should be used when chemicals are moved out of the lab area, through corridors, on stairways or in elevators. Using secondary containment means placing the container in another larger, chemically resistant container. **Under no circumstances should anyone transport chemical containers in a passenger elevator without the use of secondary containment.**

All shipments of hazardous materials (e.g., chemicals, biological materials) for Hampshire College to another location must comply with all Department of Transportation (DOT) and International Air Transport Association (IATA) requirements.

6.5 WASTE DISPOSAL

6.5.1 What is Hazardous Chemical Waste?

In order to determine proper handling procedures and disposal, a decision must be made regarding whether a chemical waste is hazardous. Massachusetts Department of Environmental Protection (DEP) and federal Environmental Protection Agency (EPA) regulations define various categories of hazardous chemical waste. Appendix 6-B contains a summary of the hazardous waste typically generated in laboratories.

Faculty members are responsible for determining whether waste generated is defined as a hazardous waste by regulation. Appendix 6-C can be used to assist in that determination. Questions should be addressed to the Lab Manager or the Environmental Health & Safety.

Faculty should make every effort to minimize the amount of hazardous waste produced in the laboratory. Any chemical waste determined to be non-hazardous and destined for sewer or trash disposal must be confirmed by the Lab Manager.

There is also other chemical waste that have not been defined as hazardous waste by DEP or EPA, which should be handled as hazardous waste. These include:

- carcinogens that have not been deactivated (see Section 5.8.7 Select Carcinogens),
- reproductive toxins, e.g., ethidium bromide, that have not been deactivated (see Section 5.7.7 Reproductive Toxins) and
- any other chemical waste that poses a threat to public health or the environment when disposed of as a non-hazardous waste.

Other chemical wastes may be designated to be handled as hazardous based on knowledge of the hazards of the waste. When in doubt, the waste should be collected as hazardous waste. If you need assistance, call the Lab Manager.

6.5.2 Disposal of Non-hazardous Chemical Waste

Liquid wastes which are non-hazardous, are water soluble, and do not contain solids may be flushed to the sewer with copious amounts of water. Liquids that are not water-soluble must be solidified (absorbed) and disposed of as a solid. Non-hazardous solid waste must be labeled "non-hazardous" and can then be put in the laboratory trash.

6.5.3. Hazardous Waste Collection and Lab Accumulation

A poster describing laboratory waste collection requirements is posted in each lab and included as Appendix 6-D.

All hazardous chemical waste must be collected for disposal by an EPA approved method at a licensed facility. Hazardous waste cannot be diluted to make it non-hazardous and cannot be evaporated. Hazardous waste should be collected in each laboratory in screw top containers that are compatible with the waste. Containers must be kept closed except when waste is being added.

Each container should be labeled with a preprinted red and white "Hazardous Waste" label (available from the Lab Manager) at the time waste is first put into the container. The label must contain:

- waste name (specify chemical name if a single element or compound, or generic name, e.g. chlorinated solvents)
- waste components (all chemicals present must be identified, no abbreviations)
- hazards (e.g., flammable, oxidizer, corrosive, reactive, toxic)

The "Date Full or Removed to Storage" space must be completed when the container is full or, if not full but the waste is no longer being generated, when it is moved to storage. Indelible markers should be used for labeling and abbreviations should not be used.

To minimize the hazard of incompatible chemical reactions, wastes should not be mixed in the laboratory without prior approval from Lab Manager. It is also important to keep halogenated and non-halogenated wastes in separate containers whenever possible, as non-halogenated solvents can be processed for reuse and halogenated solvents must be incinerated.

Laboratory waste containers should be kept in the locations designated "Satellite Hazardous Waste Accumulation Areas" which must be appropriate to the hazards of the waste. The area must be near the point of generation and all liquid waste must be in secondary containment. The secondary containment must provide for separation of wastes that are incompatible. The containment should only contain waste, non-waste chemicals can not be kept in the same tray.

The amount of waste accumulated in the laboratory at any time should be minimized. No more than one container of a particular waste can be kept in the lab at one time and all waste containers must fit into the secondary containers provided for those locations. When full, waste containers must be moved to the waste storage area within three days, so notifying the Lab Manager immediately when you have a full container is essential.

6.5.4 Laboratory Waste Removal

When a container of waste is full or when that type of waste will no longer be generated, the Lab Manager should be notified. The container will be removed to the waste storage area within three days.

6.5.5 Waste Storage and Disposal

Hazardous waste storage for laboratory waste is located in the main storage area behind the Cole Science Center. Environmental Health & Safety inspects the waste storage area weekly. Emergency information, including the name and number of the emergency coordinator, is posted in the area.

In the waste storage area, all waste is separated and stored by hazard category. To minimize the potential for releases, all liquid waste containers are placed in secondary containment.

Waste is shipped off-site using a licensed hazardous waste transporter. The majority of the waste is packaged by the transporter into lab packs for shipment. All hazardous waste is taken to licensed facilities that treat, recycle, incinerate, or otherwise dispose of the materials using EPA approved methods for the particular waste type.

6.5.6 Disposal of Empty Containers

Most empty containers can be safely and legally disposed of as laboratory trash with three exceptions.

- Empty ether cans - when empty leave in the hood overnight and then triple rinse with water before disposal in the trash.

- Acutely Hazardous Waste Containers - containers which contained “P listed” wastes, as shown in Appendix 6-E, must either be triple rinsed with an appropriate solvent prior to disposal (and the solvent disposed of as hazardous waste) or the empty container can be labeled and disposed of as hazardous waste.

- Aerosol canisters that are still pressurized must be collected as hazardous waste.

6.5.7 Disposal of Gas Cylinders

Prior to ordering of gas cylinders, arrangements should be made with the distributor for return of empty cylinders. Empty non-returnable cylinders should be capped and the Lab Manager contacted for disposal as hazardous waste.

6.5.8 Disposal of Lab Equipment

The Lab Manager must approve disposal of all equipment. If laboratory equipment is to be discarded, qualified personnel should remove any hazardous materials (e.g., batteries, capacitors, transformers, mercury switches, oil, asbestos linings, radioactive sources, CFCs from refrigerators, etc.) from the equipment before disposal. Contact the Lab Manager for assistance.

6.5.9 Disposal of Unknowns

It is extremely difficult and costly to identify the contents and hazards of unlabeled materials. As discussed in Section 6.2, it is crucial that maintaining labels be a standard laboratory practice. If you have unknowns, please contact the Lab Manager. Please indicate to the best of your knowledge what the material is likely to be, based on its characteristics and the location at which it was found.

6.5.10 Universal Waste

Universal Waste includes mercury containing lamps, CRTs, and certain batteries that would be hazardous if disposed of including: nickel/cadmium, mercury, and silver. These materials should be taken to designated collection (see Lab Manager) to be recycled.

6.5.11 Satellite Area Inspections

The Laboratory Manager inspects the satellite accumulation areas in the labs weekly when waste is present. Deficiencies that could result in a release of waste are corrected immediately, other deficiencies are referred to the responsible faculty member for correction. The Laboratory Manager then confirms that the correction has been completed.

6.5.12 Working Containers

DEP Working Container provisions allow more than one container of a particular waste in the laboratory for immediate use at the bench top. The Working Container must be:

- emptied into the satellite container in the laboratory at the end of each laboratory period or day, or when full, whichever comes first
- closed except during active use
- located on an impervious surface and managed to prevent spills
- labeled as “hazardous waste” with words describing the hazard
- located at or near the point of generation
- under the control of faculty of staff responsible for the laboratory

APPENDIX 6-A

Laboratory Safety Reminders

September 2007 ♦ Hampshire College – Environmental Health and Safety

CHEMICAL STORAGE SEGREGATION GUIDELINES

Incompatible chemicals should always be handled and stored so that they do not accidentally come in contact with each other. This list is not complete, nor are all compatibilities shown. These materials can react to produce excessive heat, harmful vapors, and/or other deadly reactions. Always know the hazards and incompatibilities of a chemical before using it.

Chemicals	Avoid Accidental Contact With
Acetic acid	Chromic acid, nitric acid, permanganates, peroxides
Acetic anhydride	Hydroxyl-containing compounds such as perchloric acid, ethylene glycol
Acetone	Concentrated nitric acid and sulfuric acid mixtures, peroxides (i.e. peracetic acid solution, hydrogen peroxide)
Acetylene	Chlorine, bromine, copper, silver, fluorine, mercury
Alkali, alkaline earth and strongly electropositive metals (powered aluminum, magnesium, sodium, potassium)	Carbon dioxide, carbon tetrachloride and other chlorinated hydrocarbons
Ammonia (anhydrous)	Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrogen fluoride
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrates, sulfur, finely divided organics, combustibles
Aniline	Nitric acid, hydrogen peroxide
Arsenical compounds	Any reducing agent
Azides	Acids
Bromine	Ammonia, acetylene, butadiene, butane, other petroleum gases, sodium carbide, turpentine, benzene, finely divided metals
Calcium oxide	Water
Carbon activated	Calcium hypochlorite, other oxidants
Chlorates	Ammonium salts, acids, metal powders, sulfur, finely divided organics, combustibles
Chromic acid and chromium trioxide	Acetic acid, ethyl alcohol, naphthalene, camphor, glycerol, turpentine, benzene, alcohol, other flammable liquids
Chlorine	Ammonia, acetylene, butadiene, butane, other petroleum gases (i.e. methane, propane, ethane, etc.), sodium carbide, turpentine, benzene, finely divided metals
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids (organic or inorganic)
Cyanides	Acids

Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Fluorine	Isolate from everything
Hydrazine	Hydrogen peroxide, nitric acid, any other oxidant
Hydrocarbons (benzene, butane, propane, gasoline, turpentine)	Fluorine, chlorine, bromine, chromic acid, peroxides
Hydrocyanic acid	Nitric acid, alkalis
Hydrofluoric acid (anhydrous), hydrogen fluoride	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, any flammable liquid, combustible materials, aniline, nitromethane
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (anhydrous or aqueous)
Mercury	Acetylene, fulminic acid (produced in nitric acid-ethanol mixtures), ammonia
Nitrates	Acids
Nitric acid (concentrated)	Acetic acid, acetone, alcohol, aniline, chromic acid, hydrocyanicacid, hydrogen sulfide, flammable liquids, flammable gases, nitratable substances
Nitrites	Acids
Nitrocellulose (wet, dry)	Phosphorus
Nitoparaffins	Inorganic bases, amines
Oxalic acid	Silver and mercury and their salts
Oxygen	Oils, grease, hydrogen, propane, other flammable liquids, flammable solids, flammable gases
Perchloric acid	Acetic acid, acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils (all organics)
Peroxides, organic	Acids (organic or mineral), (also avoid friction, store cold)
Phosphorus (white)	Air, oxygen
Phosphorus pentoxide	Alcohols, strong bases, water
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Acids (see also chlorates)
Potassium perchlorate	Acids (see also perchloric acid)
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid.
Selenides	Reducing agents
Silver and silver salts	Acetylene, oxalic acid, tartaric acid, fulminic acid (produced in nitric acid-ethanol mixtures), ammonium compounds
Sodium	Carbon dioxide, carbon tetrachloride and other chlorinated hydrocarbons
Sodium chlorate	Sulfur in bulk
Sodium nitrite	Ammonium nitrite and other ammonium salts
Sodium peroxide	Any oxidizable substance, such as ethanol, methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerol, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Chlorates, perchlorates, permanganates
Tellurides	Reducing agents

For additional information, ask your faculty advisor and look on the

Material Safety Data Sheets for the chemical.

APPENDIX 6-B

HAZARDOUS WASTE IDENTIFICATION

The following is a summary of the typical wastes generated in laboratories. References cited are to the subsequent sections of this Appendix. The following categories are the regulatory definition of hazardous waste, there may well be other materials which do not meet the regulatory definition that you determine should be handled as hazardous waste because of their toxicity. For a more detailed description of waste definitions refer to Mass. DEP regulations at:

http://www.mass.gov/dep/service/regulations/310cmr30.pdf

Definition of Waste

To be a hazardous waste the material must first meet the definition of a waste: a waste is any material that is no longer useful and is therefore destined for disposal (or storage or treatment in lieu of disposal). Once a material becomes a waste it must be properly classified, labeled and stored. Typically, the end products of an experiment are a waste unless they are going to be used in a future experiment.

Unused Chemicals

Unused laboratory chemicals that are of questionable quality and can no longer be used are hazardous waste if they are listed on the "U" list) or "P" list (see web site referenced in section A), or if they meet the definition of a characteristic waste as described below.

Solvents

The following solvents are specifically listed as "F" waste (see web site referenced in section A). This not only applies to pure solvents but to any mixtures containing the solvents where the total quantity of listed solvents was greater than 10% by volume before use. Materials contaminated with these solvents (e.g., rags, drying agents) are included.

tetrachloroethylene
trichloroethylene
chlorobenzene
1,1,2-trichloro-1,2,2-trifluoroethane
1,1,2-trichloroethane
methylene chloride
1,1,1-trichloroethane
ortho-dichlorobenzene
trichlorofluoromethane

xylene	acetone
ethyl acetate	ethyl benzene
ethyl ether	methyl isobutyl ketone
n-butyl alcohol	cyclohexanone
methanol	cresols
cresylic acid	nitrobenzene
toluene	methyl ethyl ketone
carbon disulfide	isobutanol
pyridine	benzene
2-ethoxyethanol	2-nitropropane

Characteristic Waste

When a waste is not specifically listed, it must be evaluated to determine if it meets the definitions for ignitable, corrosive, reactive, or toxic waste (see web site referenced in section A). Characteristic wastes cannot be intentionally diluted to make them nonhazardous.

Ignitable Waste

1. Liquids with flash points of less than 60^{o}C (approx. 140^{o}F) with the exception of aqueous solutions of ethyl alcohol which contain less than 24 percent alcohol by volume.

2. Flammable solids.

3. Ignitable compressed gases.

4. Oxidizers.

Corrosive Waste

1. Liquids with a pH less than or equal to 2 or greater than or equal to 12.5.

2. Corrodes steel at a specified rate.

Reactive

1. Normally unstable and undergoes violent changes.

2. Reacts violently, forms potentially explosive mixtures, or generates toxic fumes when mixed with water.

3. Cyanide or sulfide bearing wastes.

4. Explosives.

Toxic

Toxic chemicals are defined based on the concentration of certain contaminants in solutions, or, for solids, the concentration in the extract when subject to a TCLP (Toxicity Characteristic Leaching Procedure). Specific concentration limits are listed in the web site referenced in section A. You should use your knowledge of the waste to determine if it may exceed the listed limits. The chemicals for which there are limits are:

arsenic
barium
cadmium
chromium
lead
mercury
selenium
silver

benzene
carbon tetrachloride
chlorobenzene
chloroform
o-cresol
m-cresol
p-cresol
cresol
1,4-dichlorobenzene
1,2-dichloroethane
1,1-dichloroethylene
2,4-dinitrotoluene
hexachlorobutadiene
hexachloroethane
hexachlorobenzene
methyl ethyl ketone
nitrobenzene
pyridine
tetrachloroethylene
trichloroethylene
vinyl chloride

chlordane
2,4-D
endrin
heptachlor
lindane
methoxychlor
pentachlorophenol
toxaphene
2,4,5-trichlorophenol
2,4,6-trichlorophenol
2,4,5-TP (Silvex)

Oil and PCBs

In Massachusetts, waste oil, including oil/water mixtures, and PCBs, concentrations greater than or equal to 50 ppm, are hazardous waste, "M" wastes (see web site referenced in section A).

Spill Clean-Up Debris

Clean-up debris from a spill of any "U", "P", "F" or "M" waste is a hazardous waste. Debris from a clean-up of characteristic waste is a hazardous waste if it still meets the definitions for ignitable, corrosive, reactive or toxic wastes.

Empty Containers

The regulations define an empty container as a container from which all material has been removed using common practices (e.g., pouring) and contains no more than one inch of residue in the bottom. If the material is on the "P" list of acutely hazardous waste the container must also be

triple rinsed. Containers meeting this "empty" definition are not hazardous waste and can be discarded in the trash.

Particular precautions should be taken in disposing of empty ether cans. Once empty, the can should be allowed to evaporate in a hood overnight, it should then be rinsed several times with water and put in the trash. If is very important that empty ether cans be disposed of immediately after use to prevent the formation of peroxides.

Treatment of Waste

In Massachusetts, a special permit is required to treat hazardous waste. The most common example of laboratory treatment is neutralization of acids or bases. It is not acceptable to collect corrosive materials, neutralize them and discharge to the sewer.

Some institutions allow neutralization as part of the experimental procedure performed by each student as an educational activity. Their interpretation is that the material is not yet a waste. The regulations do not address this interpretation. Treatment as part of the experiment can be justified based on safety concerns if the material is reactive and can be deactivated.

Universal Waste

Universal Waste is a special category of materials defined by the EPA that would be hazardous waste if disposed of but are defined as Universal Waste if recycled. They include batteries (lead acid, nickel/cadmium, silver, lithium, mercury) and mercury containing lamps (e.g., fluorescent light bulbs).

Other Regulated Materials

Antifreeze is a regulated waste and must be collected for shipment off-site. Latex paints, while not hazardous waste, can not be put in the trash in liquid form. Dried paints can be put in the regular trash. Liquid latex that can no longer be used is shipped off-site as a non-hazardous waste.

Non-Hazardous Waste

There are other chemicals that have not been defined as hazardous by EPA or the Massachusetts DEP that should be handled using the procedure for hazardous waste. These include:

- carcinogens that have not been deactivated (see Section 5.8.7 Select Carcinogens),
- reproductive toxins, e.g., ethidium bromide, that have not been deactivated (see Section 5.7.7 Reproductive Toxins) and
- any other chemical waste that poses a threat to public health or the environment when disposed of as a non-hazardous waste.

APPENDIX 6-C

Hazardous Waste Determination

Applies to waste generated as the result of chemical use.

Does not apply to evaluation of unused chemicals, or spill clean-up materials.

(contact EH&S with questions about these items)

To determine if a waste is a hazardous waste, answer the following questions. If the answer to any question is yes, then the waste is a hazardous waste. Answer all the questions for each waste to identify all the hazards associated with the waste and required on the label. Information on the characteristics (e.g. flash point) of chemicals can be found on the Material Safety Data Sheet (MSDS).

Area: Faculty/Staff: Date:

Waste Description:

Waste Evaluation	Yes/No	If yes, LABEL
Contains Flammable solvents (flash point $\leq 140^{o}F$) Exception: aqueous solutions of < 24% ethyl alcohol		Flammable
Contains halogenated compounds		Toxic
Is Reactive (unstable materials, reacts with water to form potentially explosive mixtures or toxic gases, contains cyanides or sulfides, explosives)		Reactive
Is an Oxidizer (materials that readily yields oxygen, or accepts electrons, to stimulate combustion)		Oxidizer
Is a Flammable Solid (capable of catching fire through friction, adsorption of moisture, or spontaneous changes)		Flammable
Has a pH ≤ 2 or ≥ 12.5		Corrosive
Contains any of the following metals at or above the conc. in mg/l. Arsenic 5 Barium 100 Cadmium 1 Chromium 5 Lead 5 Mercury 0.2 Selenium 1 Silver 5		Toxic
Contains any of the following pesticides at or above the conc. in mg/l Chlordane 0.03 2,4 D 10 Endrin 0.02 Heptachlor 0.008 Lindane 0.4 Methoxychlor 10 Pentachlorophenol 100 Toxaphene 0.5 2,4,5-TP 1.0		Toxic
Contains any of the following organics at or above the conc. in mg/l Benzene 0.5 Cresol, o-, p-, m- 200 2,4-dinitrotoluene 0.13 Methyl ethyl ketone 200 Nitrobenzene 2 Pyridine 5 Vinyl Chloride 0.2		Toxic
Contains petroleum oil or polychlorinated biphenyls		Toxic

Approved Waste Disposal Method	
Hazardous Waste	
Sewer Disposal	
Trash Disposal	

Comments:

APPENDIX 6-D

Hampshire College

Hazardous Waste Collection

1. Collect waste in a screw cap container and keep the cap on except when waste is being added.

2. Do not mix incompatible materials and keep halogenated solvents separated whenever possible.

3. Put on and fill in a hazardous waste label when you start collecting the waste. Add to the label as necessary as more waste is added.

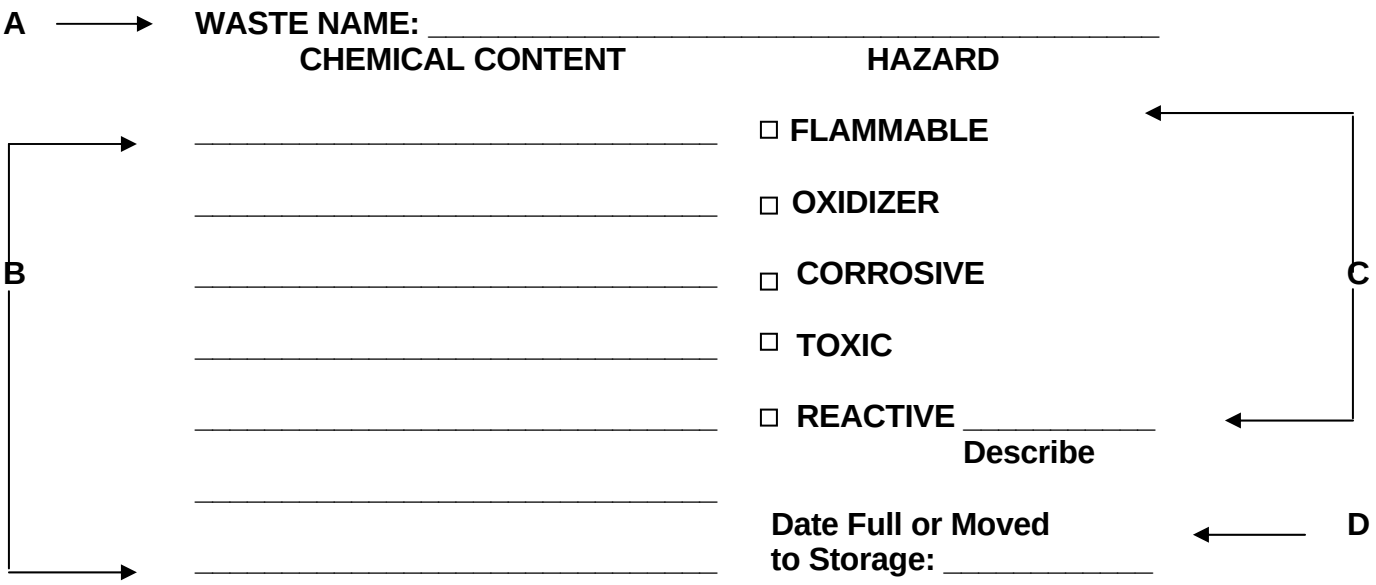
A. A generic waste name (e.g. chlorinated solvents) -- optional

B. **Each chemical present – required** (no chemical formulas, structures or abbreviations)

C. **The hazard of the waste (flammable, oxidizer, corrosive, toxic, reactive) –required --**If the waste is not flammable (flash point $\leq 140^{o}$F), an oxidizer, corrosive (pH $\leq$ 2 or $\geq$ 12.5) or reactive, check toxic.

D. When the container is full, write in the date (month, day, and year).

HAZARDOUS WASTE



4. Keep all waste bottles in secondary containment. The waste containment tray should only contain waste.

5. Do not let multiple bottles of waste accumulate in the laboratory. Only one bottle of a particular type of waste is allowed.

6. Request a pick-up when the container is nearly full, or on the same day the container is filled and dated. Contact Naya Gabriel, Lab Manager (cbgNS, ext. 5386) for pick-up.

7. For more information, contact Nancy Apple, EH & S Director (email: naPP, ext. 6620).

EH&S 10/2006

APPENDIX 6-E

P Listed Hazardous Waste (Acute Toxins)

Hazardous Waste No.	Chemical abstracts No.	Substance
P023	107-20-0	Acetaldehyde, chloro-
P002	591-08-2	Acetamide, N-(aminothioxomethyl)-
P057	640-19-7	Acetamide, 2-fluoro-
P058	62-74-8	Acetic acid, fluoro-, sodium salt
P002	591-08-2	1-Acetyl-2-thiourea
P003	107-02-8	Acrolein
P070	116-06-3	Aldicarb
P203	1646-88-4	Aldicard sulfone
P004	309-00-2	Aldrin
P005	107-18-6	Allyl alcohol
P006	20859-73-8	Aluminum phosphide (R, T)
P007	2763-96-4	5-(Aminomethyl)-3-isoxazolol
P008	504-24-5	4-Aminopyridine
P009	131-74-8	Ammonium picrate (R)
P119	7803-55-6	Ammonium vanadate
P099	506-61-6	Argentate(1-), bis(cyano-C)-, potassium
P010	7778-39-4	Arsenic acid H_2AsO_4
P012	1327-53-3	Arsenic oxide As_2O_3
P011	1303-28-2	Arsenic oxide As_2O_5
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	Benzanamine, 4-nitro-
P028	100-44-7	Benzene, (chloromethyl)-
P042	51-43-4	1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino) ethyl 1]-, (R)-
P046	122-09-8	Benzeneethanamine, alpha,alpha-dimethyl-
P014	108-98-5	Benzenethiol
P127	1563-66-2	7-Benzofuranol, 2,2-dihydro-2,2-dimethyl, methylcarbamate

P188	57-64-7	Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,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
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	Chlorcacetaldehyde
P024	106-47-8	p-Chlorocaniline
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
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-phyrazinyl 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	Edrin
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 (R,T)
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	Maganese, bis(dimethylcarbamodithioato-S,S')-,
P196	15339-36-3	Manganese dimethyldithiocarbamate
P092	62-38-4	Mercury, (acetato-O)phenyl-
P065	628-86-4	Mercury fulminate (R,T)
P082	62-75-9	Methanamine, N-methyl-N-nitroso-
P064	624-83-9	Methane, isocyanato-
P016	542-68-1	Methane, oxybis [chloro-
P112	509-14-8	Methane, tetranitro-(R)
P118	75-70-7	Methanethiol, trichloro-
P198	23422-53-9	Methanimidamide, N,N-dimethyl-N'-[3- [[(methylamino)-carbonyl]oxy]phenyl]- , monohydrochloride
P197	17702-57-7	Methanimidamide, N,N-dimethyl-N'-[2- methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-
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	Methicarb
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
P075	*54-11-5	Nicotine, & salts
P076	10102-43-9	Nitric oxide
P077	100-01-6	p-Nitroaniline
P078	10102-44-0	Nitrogen dioxide
P078	10102-43-9	NItrogen oxide NO
P078	10102-44-0	Nitrogen oxide NO_2
P081	55-63-0	Nitroglycerine (R)
P082	62-75-9	N-Nitrosodimethylamine
P084	4549-40-0	N-Nitrosomethylyinylamine
P085	152-16-9	Octamethylpyrophosphoramide
P087	20816-12-0	Osmium oxide OsO_4, (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-
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 (R)
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
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-(methylamin O)-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, 0-[4-[(dimethyla mino)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)-, 0-[(methylamino) carbonyl]oxime
P203	107-02-8	Propanal, 2-methyl-2-(methy-sulfonyl]- 0-[(methylamino) carbonyl]oxime
P101	107-12-0	Propanenitrile
P027	542-76-7	Propanenitrile, 3-chloro-
P069	75-86-5	Propanenitrile, 2-hydroxy-2-methyl-
P081	55-63-0	1,2,3-Propanetriol, trinitrate (R)
P017	598-31-2	2-Propanone, 1-bromo-
P102	107-19-7	Propargyl alcohol
P003	107-02-8	2-Propenal
P005	107-18-6	2-Propen-1-ol
P067	75-55-8	1,2-Propylenimine
P102	107-19-7	2-Propyn-1-ol
P008	504-24-5	4-Pyridinamine
P075	*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	*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 (R)
P062	757-58-4	Tetraphosphoric acid, hexaethyl ester
P113	1314-32-5	Thallic oxide
P113	1314-32-5	Thallium oxide Tl_2O_3
P114	12039-52-0	Thallium(I) selenite
P115	7446-18-6	Thallium(I) sulfate
P109	3689-24-5	Thiodiphosphoric acid, tetraethyl ester
P045	39196-18-4	Thiofanox
P049	541-53-7	Thioimidodicarbonic diamide $[(H_2N)\ C(S)]\ _2NH$
P014	108-98-5	Thiophenol
P116	79-19-6	Thiosemicarbazide
P026	5344-82-1	Thiourea, (2-chlorophenyl)
P072	86-88-4	Thioreau, 1-naphthalenyl-
P093	103-85-5	Thiourea, phenyl-
P185	264-73-8	Tirpate
P123	8001-35-2	Toxaphene
P118	75-70-7	Trichloromethane thiol
P119	7803-55-6	Vanadic acid, ammonium salt
P120	1314-62-1	Vanadium oxide V_2O_5
P120	1314-62-1	Vanadium pentoxide
P084	4549-40-0	Vinylamine, N-methyl-N-nitroso-
P001	*61-61-2	Warfarin, & salts, when present at concentrations greater than 0.3%
P205	137-30-4	Zinc, bis(dimethylcarbamodithioato- S,S')-,
P121	557-21-1	Zinc cyanide
P121	557-21-1	Zinc cyanide $Zn(CN)_3$
P122	1314-84-7	Zinc phosphide Zn_3P_2, when present at concentrations greater than 10% (R,T)
P205	137-30-4	Ziram

*CAS Number given for parent compound only.