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.