Revision Responsibility: Vice President for Business Affairs
Responsible Executive Officer: Vice President for Business Affairs

Source/Reference: Health & Safety Manual

PURPOSE

The following outlines the steps taken to maintain regulatory compliance in regard to hazardous chemical waste management.

POLICY

CHAPTER 25 HAZARDOUS CHEMICAL WASTE MANAGEMENT

25.01. INTRODUCTION

25.01.01. Objectives

The proper disposal of chemical wastes is essential to the health and safety of Walters State Community College personnel as well as to the surrounding community. It is imperative, therefore, to dispose of all chemicals in a safe, efficient, and cost-effective manner. To achieve these goals, the following procedures have been developed to help college personnel provide for the safe and proper disposal of chemical waste. The objectives of these procedures are:

1. To maintain a healthful and safe work environment through scheduled, periodic removal of chemical waste from Walters State facilities,
2. To aid in assuring the health and safety of the surrounding community by disposing of chemical waste in compliance with local, state and federal regulations, and
3. To reduce cost of chemical waste disposal through proper identification and disposal procedures.

With a cooperative effort on the part of the Walters State Community College faculty and staff, and through adherence to the procedural guidelines contained herein, the attainment of these objectives can be realized.

25.01.02. Functions and Responsibilities

The management of hazardous chemical waste at Walters State consists of the coordination and direction of the waste generated in laboratories and other campus facilities. To manage this program effectively, it is necessary to use the services and technical expertise of specialized external agencies and faculty and staff members. This part briefly describes the function of each group and its relation to hazardous chemical waste management.

1. Walters State Community College - The president of the college is responsible for the administration of policy pertaining to institutional safety and health related matters. The president oversees the administration of safety policies through the normal chain of authority within the institution, delegating to deans, department chairpersons, and supervisors, the responsibility for ensuring safe work practices of those under their supervision and adherence to established policy and guidelines.

2. College Development and Safety & Health Committee - This committee advises the president and deans on matters pertaining to chemical safety within the college. The committee periodically reviews safety guidelines and the chemical safety educational activities of the college. The committee also advises the Safety Administrator on issues relating to the criteria for development and implementation of new chemical and biological safety programs.
3. The Safety Administrators are responsible for facilitating surveillance of all laboratory activities involving the use of toxic agents and all additional chemical and biological problem areas within the confines of the college. Specific duties of the Safety Administrators include:
   a. Implementation of policies set by the College,
   b. Design and improvement of disposal procedures for chemical waste materials,
   c. Preparation, submission and maintenance of records, reports, and manifests as required by government regulations,
   d. Preparation of applications for state and federal permits to generate and properly dispose of hazardous chemical waste, and
   e. Assuring that college policy and guidelines regarding proper disposal of hazardous chemical waste are followed.
4. The Laboratory Worker and Other Individuals - The success of the hazardous chemical waste management program at Walters State is dependent on the conscientious efforts of the individual laboratory worker and other employees. Since the laboratory worker frequently handles hazardous chemicals, it is essential that he or she follow the advice, policies and procedures of the Hazardous Waste Management Program. All college individuals are expected to:

   a. Dispose of all chemical wastes in accordance with established procedures set forth in this disposal guide,
   b. Make a concerted effort to identify all unknown surplus chemicals, utilizing the technical knowledge of faculty members or other appropriate staff members, if necessary,
   c. Package and label surplus and waste chemicals in accordance with established procedures set forth in this disposal guide, and
   d. Seek the advice, when necessary, of the Safety Administrator concerning the proper handling and disposal of hazardous chemicals.

25.02. MANAGING CHEMICAL WASTES AND SURPLUS CHEMICALS

25.02.01. General

Generation of chemical wastes at Walters State Community College each month presents a serious and complex problem for the entire college community. Unless it is understood that chemical waste is everyone's problem and responsibility, teaching and research efforts may be severely compromised. The key to solving this problem lies in recognizing the responsibility, understanding the management system, and reducing the volume of surplus and waste chemicals.

25.02.02. Everyone's Problems and Responsibilities

Surplus and waste chemicals are everyone's problem. When hazardous chemicals are mishandled or mismanaged they have the potential to contaminate the environment and threaten human health.

Whether waste chemicals are generated in organic synthesis, chemistry experimentation, or creating ceramics, understanding your responsibility or those wastes or unwanted chemicals is the most important first step in sound chemical waste management. See the previous section of this manual for the responsibilities of the laboratory worker and individual staff member.

25.02.03. Chemical Waste Management System

The success of the management system depends upon cooperation between college individuals and the Safety Administrators. College individuals will use this disposal guide to identify chemical waste and determine the appropriate route of disposal for that waste. This guide outlines the following three routes of disposal for surplus or waste chemicals:

1. Disposal to the normal trash or sanitary sewer system,
2. Chemical treatment, followed by disposal to the sanitary sewer system, or
3. Communication with the Environmental Health & Sustainability Coordinator for disposal in accordance with local, state, and federal regulations.

When surplus or waste chemicals become the responsibility of the Safety Administrator, first a check is made to see if the chemical is a waste or can be recycled. Then the degree of hazard and appropriate route of disposal are determined. Non-hazardous waste and minute quantities are disposed of in the sanitary sewer or local sanitary land fill. Waste solvents and other hazardous wastes are disposed of through a commercial hazardous waste disposal company. These wastes will either be incinerated or packaged into 55 or 30 gallon drums and sent to an EPA approved hazardous waste landfill. Due to the nature and type of chemical wastes, this is a very costly procedure.

Throughout this process, the college is required to keep complete records which account for hazardous wastes “from the cradle to the grave”, a concept which holds the generator of the waste liable for that waste, essentially forever.

25.02.04. Everyone’s Job in Waste Reduction

The act of Congress which makes it illegal to improperly manage hazardous wastes is entitled “The Resource Conservation and Recovery Act”, or RCRA. The emphasis of this act is on waste reduction, hazardous waste identification and recycling. Of the disposal methods described above, hazardous waste landfilling is the least desirable. The college embraces this philosophy and has designed its management system around waste reduction and recycling methods. This makes sense, because the handling, transportation, treatment and disposal of chemical waste are expensive.

The following recommendations should be adhered to in an effort to minimize waste being generated:

1. Order only what is needed. The economy of larger size orders may cost the college in disposal of unneeded excess, often more than the original cost. Be sure to check current stock before ordering chemicals. It may also be possible to borrow small amounts of chemicals from other laboratories. Take the time to check.
2. Substitute non-hazardous or less hazardous materials for hazardous ones whenever possible. Dichloromethane is much less toxic than carbon tetrachloride and can be substituted satisfactorily in most cases. Investigate other possible substitutions through the literature or call the Safety Administrator for assistance.
3. Chemicals that can be safely disposed of in the normal trash (i.e., see following section 25.04) or in the sanitary sewer system (i.e., see following section 25.05) should not be put into solvent collecting bottles or mixed with hazardous chemicals.
4. Minute quantities of some chemicals need not be disposed of as hazardous waste. In some instances small quantities or low concentrations of hazardous chemicals may be disposed

of with the normal trash or in the sanitary sewer system. With some hazardous chemicals this is a difficult decision. It is important that small quantities of very hazardous chemicals not be mixed with non-hazardous waste, as this may cause the entire waste to be listed as hazardous. The Safety Administrator is to be contacted if there is the slightest doubt concerning the appropriate disposal method to be used.

5. Use recycled chemicals whenever possible. The Safety Administrator is available for assisting in recycling useable, but unwanted chemicals. Before disposing of an unwanted but useable chemical, check to see if other laboratories or departments can use it.
6. When chemicals are ordered, the responsibility for disposal of the chemicals becomes that of the individual ordering the chemicals. Whenever possible, waste chemicals should be treated and disposed of by the laboratory worker. Acids and bases should be neutralized and put into the sewer system. Appropriate procedures are given in this guide (i.e., see following section 25.06). Other treatments which can be completed in the laboratory include metal precipitations and safe reduction of strong oxidizers.
7. Waste solvents are most properly disposed of by incineration. The solvent collection in some laboratories is for the disposal of flammable organic solvents.
8. When planning experiments, consider the disposal of leftover starting materials and of the products and by-products which will be generated. Consider the following questions in planning experiments:
   a. Can any material be recovered for reuse?
   b. Will the experiment generate any chemical that should be destroyed by a laboratory procedure? If so, what procedure?
   c. Can any unusual disposal problems be anticipated? If so, inform the Safety Administrator beforehand.
   d. Are chemicals being acquired only in needed quantities?
   e. Is there a possibility of replacing a hazardous reagent or solvent with one that is less hazardous and easier to dispose of?
9. Consider the reduction of the scale of experiments. The use of micro-technology in the study of chemical and biochemical reactions can lead to significant savings in costs of chemicals, energy, apparatus, and space. It is now technically feasible to run many reactions with much smaller quantities of chemicals than were needed in the past
   In addition to reduction of waste volumes, today's economics dictate investigation of micro techniques for use in laboratory operations.
10. Exercise care in the control of reagents that can deteriorate. Indefinite and uncontrolled accumulations of excess reagents create storage problems and safety hazards. These problems can be alleviated, and purchase costs saved, by instituting an excess-chemicals store, to which laboratory workers can go for chemicals, instead of ordering new material.
    Reagents that react readily with oxygen or water are prone to deteriorate when stored for long periods of time after the original container has been opened. A laboratory labeling program for chemicals which deteriorate over time, such as water reactive chemicals and pyrophoric chemicals, or which can create severe hazards, such as peroxide forming chemicals, should be instituted to prevent accumulation of dated chemicals which pose an increased risk to the laboratory and personnel.
11. Care should be exercised in the prevention of orphan reaction mixtures. All reaction mixtures stored in laboratory glassware should be labeled with the chemical name, the date they

were formed, the name of the laboratory worker responsible, a notebook reference, if needed, and other appropriate hazardous chemical information (i.e., see previous Section 23.04.02). This procedure can provide the information necessary to guide the disposal of the mixture if the responsible laboratory worker is not available.
Departments may need to initiate a checkout procedure which requires departing laboratory workers and faculty to identify any reaction mixtures that they have not disposed of and to provide the information necessary for their safe disposal.

25.03. WHAT IS HAZARDOUS CHEMICAL WASTE?

25.03.01. General

The information in this section will aid the laboratory worker in determining the hazards associated with chemicals which are encountered during instructional classes. The State Department of Health and Environment, the agency responsible for the regulation of hazardous chemical waste generated in this state, uses the following criteria to determine if a waste should be listed as hazardous waste:

1. It exhibits any of the characteristics of hazardous waste identified in following section 25.03.02.
2. It has been found to be fatal to humans in low dose or, in the absence of data on human toxicity, it has been shown in studies to have an oral LD toxicity (rat) of less than 50 milligrams per kilogram, an inhalation LC toxicity (rat) of less than 2 milligrams per liter, or a dermal LD toxicity (rabbit) of less than 200 milligrams per kilogram, or is otherwise capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible, illness. (Waste listed in accordance with these criteria will be designated Acute Hazardous Waste.)
3. It contains any of the toxic constituents listed in the following section 25.03.03.

There is some overlap between the chemicals included in following sections 25.03.02 and 25.03.03, as some chemicals fit the criteria of both sections. Lists of chemicals which may be disposed of in the normal trash or the sewer system are referenced in following section 25.04 and 25.05 respectively. If, after reading these sections, there is doubt about the proper method of disposal or hazard associated with a specific substance, the Safety Administrator should be contacted for assistance.

25.03.02 Hazardous Characteristics

Chemicals which have any of the following four characteristics are considered to be hazardous by the State Department of Public Health.

1. Ignitibility - A liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, which has a flash point of less than 60 C is considered ignitable. This category includes almost all organic solvents. Some examples are:

   acetone methanol ethanol
   toluene benzene pentane
   hexane xylenes heptane
   ethyl acetate dioxane petroleum ethers
   This is only a small number of examples. Instructions for the disposal of organic solvents are given in following section 25.07.

2. Corrosive - An aqueous solution that has a pH of less than or equal to 2, or greater than or equal to 12.5 is considered corrosive. Corrosive materials also include substances such as thionyl chloride, solid sodium hydroxide and some other non-aqueous acids or bases.
3. Reactivity - Chemicals which react violently with air or water are considered hazardous. Examples are sodium metal, potassium metal, phosphorus, etc. Reactive materials also include strong oxidizers such as perchloric acid, and chemicals capable of detonation when subjected to an initiating source, such as dry, crystalline picric acid, benzoyl peroxide, or sodium borohydride. Instructions for the disposal of these reactive materials are given in the following section 25.10.

   Solutions of certain cyanides or sulphides which could generate toxic gases are classified also as reactive. Disposal instructions for these types of compounds are given in following section 25.08.07.
4. Extraction Procedure Toxicity (EP) - Chemicals characterized as EP toxic are those that may leak hazardous concentrations into the groundwater if their wastes are improperly managed. EP toxic wastes include concentrated toxic metal solutions (i.e., see following section 25.08.03 for disposal instructions) and the following list of pesticides:

   Endrin Lindane 2,4,D Methoxychlor Toxaphene 2,4,5-TP Silvex

   Disposal instructions for pesticides are given in following sections 25.07, 25.08, or 25.09 depending on their physical form.

25.03.03. List of Hazardous Constituents

The list of substances contained in Appendix 25.03.03.A have been shown in scientific studies to have toxic, carcinogenic, mutagenic, or teratogenic effects on humans or other life forms and are designated as toxic wastes. Materials containing any of the toxic constituents listed in this appendix are to be considered hazardous waste, unless, after considering the following factors it can reasonably be concluded that the waste will not pose a substantial present or potential hazard to public health or the environment when properly treated, stored, transported or disposed of, or otherwise managed.

1. The nature of the toxicity presented by the constituent,
2. The concentration of the constituent in the waste,
3. The potential of the constituent or any toxic degradation product of the constituent to migrate from the waste into the environment under the types of improper management considered in item 7 below,
4. The persistence of the constituent or any toxic degradation product of the constituent to degrade into non-harmful constituents and the rate of degradation,
5. The potential for the constituent or any toxic degradation product of the constituent to degrade into non-harmful constituents and the rate of degradation,
6. The degree to which the constituent or any degradation product of the constituent bioaccumulates in ecosystems,
7. The plausible types of improper management to which the waste could be subjected,
8. The quantities of the waste generated at individual generation sites or on a regional or national basis,
9. The nature and severity of the public health and environmental damage that has occurred as a result of the improper management of wastes containing the constituent,

10. Actions taken by governmental agencies or regulatory programs based on the health or environmental hazard posed by the waste or waste constituent, and
11. Such other factors as may be appropriate.

25.04. CHEMICALS FOR THE NORMAL TRASH

Many chemicals can be safely disposed of in the normal trash in solid form if the containers are tightly capped and of good integrity. Examples are given on the list shown in Appendix

25.04.00.A. These chemicals were selected because they are generally used in laboratories and have oral-rat LD values higher than 500 mg/Kg (i.e., a ten fold safety factor for toxicity over values for determining risk for hazardous constituents) and no positive determination for carcinogenicity according to the National Institute of Occupational Safety and Health (NIOSH) 1979 Registry of Toxic Effects of Chemical Substance, in addition to other negative determinations for environmental toxicity. If the intention is to dispose of more than five pounds of any one of these chemicals, contact the Safety Administrator for an evaluation.

25.05. CHEMICALS FOR THE SANITARY SEWER SYSTEM

Persons generating chemical waste as the result of experimentation must consider that waste an integral part of the experiment. If a procedure exists whereby the initial chemical by-product can readily be converted to a less hazardous chemical, or can be neutralized, this procedure also must be a part of the experimental process.

Many chemicals can be disposed of safely into the sanitary sewer system. Some college facilities have dual sewage disposal systems; however, all discharge from college facilities eventually flows into the sanitary sewer leading to the combined sewage system of the local community.

The lists shown in Appendices 25.05.00.A and 25.05.00.B comprise compounds that are suitable for disposal down the drain only in quantities less than 100 grams at a time with adequate dilution (i.e., 20 to 50 fold). Compounds on both lists are water soluble to at least 3% and present low toxicity hazard. Those on the organic list (i.e., Appendix 25.05.00A) are readily biodegradable and amenable to treatment by the wastewater treatment process. As always, if you have any question regarding the proper procedure, call the Safety Administrator for assistance.

25.06. CONCENTRATED SOLUTIONS OF ACIDS OR BASES

25.06.01 General

Surplus concentrated solutions of acids band bases should be neutralized to within a pH range of 5.0 to 10.0 and then disposed of into the sanitary sewer system, followed by twenty (20) parts of water. Special care should be taken when neutralizing strongly oxidizing acids such as perchloric acid and fresh chromic acid. Additionally, corrosive solutions should never be stored in metal containers.

25.06.02. General Neutralization Procedures

CAUTION: FUMES AND HEAT ARE GENERATED

1. Neutralization procedures should take place in a well ventilated hood and behind a safety shield,
2. Keep containers cool while neutralization is being carried out,
3. The person performing the neutralization procedure should be properly equipped with an apron, goggles, or face shield, and gloves, and
4. All steps should be performed slowly.

25.06.03. Acid Neutralization

While stirring, add acids to large amounts of an ice solution of base such as sodium carbonate (soda ash), calcium hydroxide (slaked lime), or 8M sodium hydroxide (for concentrated acids). When a pH of 5.0 is achieved, dispose of the solution into the sewer system followed by 20 parts water.

25.06.04. Base Neutralization

Neutralize by first adding the base to a large vessel containing water. Slowly add a 1M solution of hydrochloric acid (HCL). When a pH of 10.0 is achieved, dispose of the neutralized solution into the sewer system followed by 20 parts of water.

25.06.05. Chromic Acid

1. Alternatives to Chromic Acid Cleaning Solutions - The use of sodium or potassium dichromate dissolved in concentrated sulfuric acid as a cleaning solution presents special handling and disposal problems. Chromic acid is a powerful oxidizing agent, and as such, has the potential to explode on contact with certain oxidizable organic materials. In addition, it is both toxic and corrosive.

   Instances of burns to both skin and clothing due to spillage of chromic acid cleaning solutions have occurred. The following list of cleaning agents has been proven to be satisfactory as cleaners and significantly less toxic and hazardous.

   Alconox (powder) or similar detergents NoChromix or similar products Pierce RBS 35 or similar detergent
2. Disposal of Chromic Acid Solutions - Spent chromic acid solution should be adjusted to pH 5.0 by slowly pouring it into a stirred 8M NaOH/ice solution in a large container. **CAUTION: fumes and heat are generated!** Upon neutralization, reduce Cr(VI) to blue-green Cr(III) by addition of saturated sodium bisulfate solution. (Hexavalent chromium is highly oxidizing and toxic, and is strictly regulated in wastewater). The neutralized, reduced solution should then be disposed of into the sewer system followed by twenty (20) part of water.

25.07. ORGANIC SOLVENTS

25.07.01. General

Waste organic solvents that are free of solids and corrosive or reactive substances may be collected in a common bottle or can, preferably in the original container, which then must be properly labeled.

Separated and well-defined waste is easier and also less expensive to dispose of. High levels of halogens in the organic solvents cannot readily be handled in most incinerators and are not acceptable for incineration. Therefore, it is essential to indicate the composition of the waste liquid and, if a mixture, the approximate percentage by volume of each constituent. The percentage composition and the hazards associated with the waste (i.e., most original container labels provide this information and/or the material safety data sheet) must be provided when requesting disposal of the liquid.

25.07.02. Separation of Halogenated and Non-Halogenated Wastes

The objective of the solvent separation program is to keep the halogen content of the organic solvents for incineration below 1.0% by volume. The following provide guidelines for placing waste in the differing waste solvent containers.

1. Acceptable as non-halogenated waste solvent:
   a. Non-halogenated organic solvents, or
   b. Small amounts of halogenated solutes.

2. To be placed in halogenated waste solvent containers:
    a. Halogenated organic solvents,
    b. Solvent mixtures with more than 1% halogenated solvent by volume, or
    c. Organic solvents with large amounts of halogenated solute.

When large volumes of an individual solvent are involved, consideration should be given to recycling methods such as distillation, rather than costly disposal methods. The amount of money saved in solvent purchase costs usually far exceeds the capital expense for such equipment and the success of such programs is well documented, as is the purity of recovered solvent. Please notify the Safety Administrator if generation of such waste is planned.

25.07.03. Substances Which Should Not Be Put In Waste Organic Solvent Bottles

The following substances are inappropriate for incineration and should not be put in containers with organic solvents:

1. Solutions of Acids or Bases (i.e., see previous section 25.06 of this manual)
2. Aqueous Solutions of Toxic Organic Chemicals (i.e., see following section 25.08.02)
3. Metals (e.g., Ag, As, Ba, Cd, Cr, Hg, Ni, Pb, Sb, Se; see following section 25.08.03)
4. Vacuum Pump Oil (i.e., see following section 25.08.06)
5. Sulfides or Inorganic Cyanides (i.e., see following section 25.08.07)
6. Strong Oxidizers or Reducers (i.e., see following section 25.10.02)
7. Water Reactive Substances (i.e., see following section 25.10.03)
8. Unknowns (i.e., see following section 25.13)
9. Large Amounts of Water

25.07.04. Waste Solvent Storage Precautions

The acids formed when halogenated solvents are left moist can corrode metal containers, as can any dissolved corrosive in a discarded mixture. It is necessary to assure proper storage containers are used for waste solvents.

To avoid unnecessary exposure to toxic fumes, waste containers should be tightly capped when in storage. Heated solvents must be cooled to room temperature before being placed in a closed container. The transfer of highly toxic waste materials should be done in a chemical fume hood. However, storage of closed containers in fume hoods is not advised as this can impede the protection performance of the hood.

25.08. OTHER LIQUIDS

25.08.01. General

Section 25.06 of this chapter deals with concentrated solutions of acids or bases. Section 25.07 of this chapter discusses the disposal of organic solvents. This section deals with six other types of liquid chemicals. For liquids not covered by these sections, use previous section 25.03 “What Is Hazardous?” to determine if the liquid is hazardous. Package hazardous liquids according to the instructions in following section 25.15. Dispose of non-hazardous, water soluble liquids into the sewer system.

25.08.02. Aqueous Solutions of Toxic Organic Chemicals

The decision as to whether an aqueous solution should be incinerated, treated in some way, or put into the sewer depends upon the toxicity and concentration of the solute. In general, aqueous solutions of organic chemicals can be put into the sewer system if they are neutral, non-reactive, non-ignitable, and the organic solute is not highly toxic.

If the sewer system is not selected as an appropriate route of disposal for an aqueous solution (i.e., because the organic solute is highly toxic), package the solution according to the instructions in following section 25.15. The Safety Administrator will facilitate evaluation of the solution for its appropriate route of disposal.

25.08.03. Aqueous Solutions of Toxic Metals
The following toxic metals are regulated in the sanitary sewer system above the concentrations given below. Faculty and staff should understand that these metals require special precautions for disposal. Discharge of these metals, their compounds or aqueous solutions into the sanitary sewer must be negligible. It is preferred that concentrated aqueous solutions of these metals be treated to precipitate the metal prior to filtering discharge to the sanitary sewer. The filtered precipitate is then disposed of as hazardous waste. Negligible Concentrations That May Be Discharged Substances Into the Sanitary Sewer

Iron 15.0 milligrams/liter
Chromium 5.0 “
Copper 3.0 “
Zinc 2.0 “
Lead 2.0 “
Cadmium 2.0 “

Arsenic, lead, mercury, and silver are especially important pollutants and filtering, precipitation, or some other type of collection must be routine procedures for laboratories using them. Even when silver recovery units are employed, it has been found that instances of high discharge result from poor maintenance.

25.08.04. Solutions of Non-Metallic Pesticides
Solutions of non-metallic pesticides should be placed in five gallon cans and then contact the Safety Administrator.

25.08.05. Free Flowing Metallic Mercury
Package according to instructions found in section 25.15. Individual broken thermometers with small amounts of metallic mercury should be placed in a closed container of good integrity and given to the Safety Administrator.

25.08.06. Vacuum Pump Oil
Package according to the directions found in section 25.15. Silicon based diffusion pump oil should be segregated for separate disposal.

25.08.07. Solutions of Cyanide or Sulfide Compounds
Solutions containing cyanide or sulfide compounds will release toxic gas under acidic conditions. These solutions must be packaged separately from acids and given to the Safety Administrator.

25.09. SOLID CHEMICALS
Package tightly capped containers of hazardous solid chemicals according to the instructions given in following section 25.15. To determine whether or not a chemical is hazardous see section 25.03. Section 25.04 of this chapter lists chemicals that may be disposed of in the normal trash.

Small amounts of hazardous organic solids can be dissolved in an organic solvent. Only dissolved solids, and no residue, should be placed in the waste organic solvent containers. See previous section 25.07 for further information on the disposal of organic solvents.

25.10. POTENTIALLY EXPLOSIVE AND OTHER REACTIVE CHEMICALS

25.10.01. Potentially Explosive Chemicals

Each container of potentially explosive chemicals must be packaged separately. Label clearly as to hazardous characteristics and special handling precautions. In addition, inform the Safety Administrator that you have potentially explosive materials for disposal.

Potentially explosive chemicals include:

Ammonium Nitrate Diazo and Diazonium Compounds Peroxide forming agents (See below)
Picric Acid (dry and crystalline) Hydrazine Compounds Nitrocellulose (dry)
(Note: Weak aqueous solutions of picric acid may be disposed of to the sewer system and the rinsed container disposed of as normal trash.)

Peroxides are low power explosives and very sensitive to shock and heat. A variety of organic compounds react with oxygen to form unstable peroxides. Well known peroxide forming agents include:

Diethyl Ether Tetrahydrofuran Isopropyl Ether Other Ethers (e.g., Dioxanes)

Other peroxide forming agents include:

Aldehydes Compounds with benzylic hydrogens Vinyls Compounds with allyl groups

Exposure of any of the peroxide forming agents to light or air increases the rate of peroxide formation. Therefore, store these agents in full, light-tight containers. Order small amounts frequently to decrease storage time. Date all new containers when opened. Refrigeration does not prevent peroxide formation and, unless the refrigerator used is explosion safe, these materials should not be refrigerated.

Be particularly cautious with materials of unknown vintage. Do not attempt to remove caps from containers that may cause sparks or excess friction (e.g., old metal cans or fritted glass stoppers). Call a Safety Administrator when such containers are found.

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

Before beginning work with a peroxide forming agent, determine its peroxide content. Dispose of agents containing greater than 80 ppm peroxide. Easy to use quantitative “peroxide test strips” are available from the Lab Safety Supply Company.

Materials found to contain peroxides (i.e., greater than 80 ppm) can usually be treated prior to disposal. Methods for removal of peroxides commonly involve addition of a reducing agent such as ferrous sulfate (for diethyl ether peroxides).

The treated solvent should be placed in a waste organics container and the empty container rinsed with water and placed in the normal trash. Peroxides are usually water soluble and the rinsate can be put in the sanitary sewer.

25.10.02. Strong Oxidizers and Reducers

These materials should be chemically treated in the laboratory for disposal. Strong oxidizers and reducers include the following:

1. Strong Oxidizers Chromic acid (fresh) Metallic chlorates Metallic nitrates Metallic perchlorates Metallic permanganates Perchloric acid

Strong Reducers

n-Butyllithium (also water reactive) Calcium hydride Stannous chloride Metallic sulfides Sodium hydride

25.10.03 Other Reactives (Including Water Reactives)

Package liquids separately from solids. Please note special hazards and/or handling precautions on each box. See following section 25.15 for additional packaging and labeling instructions. Other reactives include the following:

Acetyl chloride Phosphorous (yellow)
Benzoyl peroxide Potassium metal
Bromine Sodium metal
Calcium metal Thionyl chloride
Lithium metal

25.11. PERCIPITATES, SEMI-SOLIDS, RESIDUES, GELS, ETC.

Precipitates, semi-solids, residues, or gels of any kind must not be placed in with the waste organic solvents since they cannot be pumped for incineration. Use previous section 25.03 "What is Hazardous Chemical Waste?" to determine if the material is hazardous or call the Safety Administrator for assistance. If separable, the liquid phase should first be removed by decantation, filtration, evaporation, or absorption. Hazardous materials should be packaged in leak-proof containers according to following section 25.15.

25.12. LABWARE CONTAMINATED WITH TOXIC CHEMICALS

Disposal of labware (i.e., which would usually be put into the normal trash) becomes of concern when it is contaminated with chemicals which are highly toxic. The term "labware" pertains to disposable laboratory items, aprons, etc. The decision as to whether contaminated labware should be placed in a secure landfill, treated in some way, or put into the normal trash depends upon the toxicity and concentration of the contaminant. This decision is made by the Safety Administrator through consultation with appropriate resources.

If the normal trash is not an appropriate route of disposal for contaminated labware (i.e., because the contaminant possesses a high degree of toxicity) package according to following section 25.15. The Safety Administrator will facilitate evaluation of the labware for its appropriate route of disposal.

All labware contaminated with PCB's of 50 ppm or greater must be given to the Safety Administrator for disposal.

In general, labware contaminated with chemicals should be put into the normal trash if it is non-reactive, non-ignitable and the contaminant does not possess a high degree of toxicity. Call the Safety Administrator if you are unsure or have any questions.

25.13. UNKNOWN CHEMICALS

25.13.01. General

Faculty and staff must make every effort to provide an accurate description of all surplus chemicals. Unknown chemicals present serious problems for the college. Without a description, chemicals can neither be handled nor disposed of in a safe manner. Disposal companies will not accept chemical waste without an analysis, and analysis of one sample is expensive.

25.13.02. Investigation of Unknown Chemicals

The Safety Administrator will provide assistance in investigating the identity of unknown chemicals. Any information provided by individuals wishing to dispose of unknown chemicals will

greatly aid investigation and identification. Whether a chemical is organic or inorganic is an example of information which is very useful in the investigation process.

25.13.03. Procedure

Call the Safety Administrator upon discovery of an unknown chemical. Do not move unknown chemicals from the source of generation if possible.

25.13.04. Reducing the Problem

The problem presented by unknown chemicals can be reduced if lab personnel are thorough in maintaining labels on chemical containers. Periodic review of chemical stock, and careful recordkeeping will less the chance of discovering containers with missing labels.

25.14. GENERAL LABORATORY CLEANUP

The Safety Administrator can become responsible for unknown and unwanted chemicals when laboratories change hands. The ensuing cleanup and disposal of chemicals are time consuming and costly. To alleviate this problem, the Safety Administrator aids individuals planning to leave their laboratory. This assistance includes proper sorting of unwanted chemicals. Before a faculty member, that has been responsible for chemicals, leaves the college, either the departing individual or the department head should contact the Safety Administrator. This will save both time and resources of the individual and/or department.

25.15. PACKAGING AND LABELING CHEMICALS FOR DISPOSAL

Good packaging provides safety in transporting chemicals and the labeling of materials is essential for proper disposal. Use the following guidelines when reassigning material to the Safety Administrator for disposal:

1. Minimize the quantity of chemicals reassigned to the Safety Administrator. Items which can be disposed of in the trash or into the sewer should not be reassigned. If there is more than one container of the same chemical, assure that the containers are filled to capacity. If there are doubts about a chemical, check previous section 25.03 “What is Hazardous Chemical Waste?”.
2. Liquid and solid chemicals should be in closed, labeled containers. Each container must have a copy of the Materials Safety Data Sheet (MSDS) for the chemical attached securely to the container. In addition, the date, the department, and the name of the responsible department representative must be provided with the MSDS.

25.16. RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

In 1976, Congress passed the Resource Conservation and Recovery Act (RCRA) which directed the U.S. Environmental Protection Agency (EPA) to develop and implement a program to protect human health and the environment from improper hazardous waste management practices. The program is designed to control the management of hazardous waste from its generation to its ultimate disposal (i.e., from “cradle-to-grave”). EPA first focused on large companies, which generate the greatest portion of hazardous waste. Business establishments producing less than 1000 kilograms (i.e., 2,200 pounds) of hazardous waste in a calendar month (i.e., known as small quantity generators) were exempted from most of the hazardous waste management regulations published by EPA in May 1980.

In recent years, however, public attention has been focused on the potential for environmental and health problems that may result from mismanaging even small quantities of hazardous waste. For example, small amounts of hazardous waste dumped on the land may seep into the earth and contaminate underground water that supplies drinking water wells.

In November 1984, the Hazardous and Solid Waste Amendments to RCRA were signed into law. With these amendments, Congress directed EPA to establish new requirements that would bring small quantity generators who generate between 100 and 1000 kilograms (kg) of hazardous waste in a calendar month into the hazardous waste regulatory system. EPA issued final regulations for these 100 to 1000 kg/mo generators on March 24, 1986. In addition, generators of no more than 100 kg hazardous waste and no more than 1 kg (i.e., about 2 pounds) per month of acutely hazardous waste were defined as conditionally-exempt small quantity generators. Thus, Walters State Community College became classified as a conditionally-exempt small quantity generator of hazardous waste.

In this regard Walters State is required to:

1. Identify all hazardous waste generated,
2. Send this waste to a hazardous waste facility, or a landfill or other facility approved by the state for industrial or municipal wastes, and
3. Never accumulate more than 1000 kg of hazardous waste on college property. (If the college does, it becomes subject to all the requirements applicable to 100-1000 kg/mo generators).