The University of Texas at El Paso

Hazardous Materials Handling and Disposal Policy and Procedures

The use of hazardous materials is required in numerous work places and educational facilities on the University campus. Almost all areas on campus may also produce some type of unwanted or no longer needed material. Many of these materials are hazardous and cannot be legally washed down the drain or thrown into the regular trash disposal. A few examples of these materials include solvents, oils, paint thinners, residues from laboratory experiments, batteries, fluorescent light bulbs, some ceiling tiles, and cleaning products and waste. These potentially hazardous materials must be handled as directed by federal, state and local laws and regulations.

The Federal Resource Conservation and Recovery Act of 1976 (RCRA) sets strict standards for the "cradle-to-grave" management of hazardous waste. These standards are written and enforced by the U. S. Environmental Protection Agency (EPA). The EPA has delegated to the Texas Commission on Environmental Quality (TCEQ) the responsibility of tracking hazardous waste generation and disposal within the state of Texas. Hazardous wastes must be shipped by licensed waste hauling companies to permitted treatment, storage and disposal (TSD) facilities. The regulations require the generator maintain detailed documentation concerning the generation, composition, and fate of all hazardous wastes. In 1984, the Hazardous and Solid Waste Amendments (HSWA) to RCRA tightened the hazardous waste regulations. It also brought the concept of waste minimization to the forefront as the preferred method for controlling hazardous waste production.

In order to comply with the various environmental laws, nurture good safety practices, and to avoid future liabilities, the University will follow a conservative approach in the handling of all hazardous materials and waste produced on campus. The person, laboratory, shop, studio, or any other work area that produces any unwanted material is responsible for ensuring that the material is properly identified, handled and labeled in accordance to University policy. The Environmental, Health and Safety (EH&S) Department at the University is charged with determining the classification of the material and then ensuring that all classified waste generated on campus are disposed of in a proper and responsible manner. The University's EH&S Department is defined as the "waste generator."

Any questions concerning the protocol and procedures for generation, handling, minimization, or disposal of waste and unwanted materials should be directed to the Environmental Health and Safety Department, phone 747-7124.

APPLICABILITY:

This policy applies to all personnel (faculty, staff, and students) in all divisions, colleges and departments of the University. Any laboratory, shop, studio, work area or individual that handles hazardous materials on campus must comply with these procedures. The "campus" is defined as all property of The University of Texas at El Paso.

WASTE MINIMIZATION:

The most efficient and cost-effective method of handling waste material is to not produce the waste. The EPA has mandated all facilities that generate waste have a waste minimization plan. According to the EPA, waste minimization is defined as any method that reduces the volume or toxicity of a waste that requires disposal. Governmental regulations, as well as internal cost effectiveness, require that the production and therefore the disposal of all wastes, particularly hazardous wastes, be kept to a minimum. Waste minimization suggestions for academic research laboratories can be found in Appendix I.

MATERIALS ACCUMULATION:

All hazardous material stored within a room or facility shall be inventoried. Materials should be stored in an appropriate space, away from the immediate area of work. Improperly stored containers of liquids can pose a fire or spill hazard, as well as occupy valuable hood and bench space.

At least once a year, each laboratory should review their chemical inventory and dispose of unwanted or expired materials. At the end of a project, or prior to the departure of a principal investigator or faculty member, all material shall be clearly identified. When a graduate student completes their research, all material associated with their work should be properly identified and labeled. Materials that are no longer needed in a particular laboratory or that have gone beyond the expiration date should be reported the EH&S Department. EH&S will either place these items into the waste handling program for disposal, or inquire with other laboratories throughout the campus if they can use the material in question. Depending on the value of the product and whether or not the product can be used by another laboratory on campus it will be transferred to the laboratory who can use the material.

MATERIALS SEGREGATION:

When feasible, hazardous materials should be segregated into different hazard classifications, as defined by the EH&S Department and regulatory standards. Materials of different chemical composition, but the same hazard classification, can be combined. The mixing of chemically incompatible materials pose dangers to students, employees, and facilities. Mixing of regulatory incompatible waste can result in large disposal cost penalties. For example, a small amount of a "listed" hazardous waste added to a large amount of non-hazardous waste renders the entire waste mixture hazardous. Contact the EH&S Department for guidance in segregating of unwanted materials.

A material exhibiting more than one hazard characteristic would be placed in the container of the higher hazard class (e.g. a material which is both flammable and highly toxic would be classified as flammable). The addition of a small amount of halogenated solvent to the container of non-halogenated solvent will make the waste classification "halogenated waste."

Various reactive material should always be segregated from other material. Any material that may contain a "P" waste as defined by EPA in the Appendix II should be stored in separated containers.

DANGER: Only chemically compatible materials should be mixed together! If you are unsure to the chemical compatibility, consult your laboratory supervisor. If there is any doubt in the regulatory classification of a waste, place the material in a separate container. EH&S will then make the decision as to proper the waste classification.

WASTE IDENTIFICATION:

Disposal regulations for chemical wastes require an accurate accounting of the chemical identification and amount of each in the waste material. A general material name should be given to the material. This name will be used on the Laboratory Waste Pickup and Disposal Request form and the container label. The form will identify the chemical or product name, and quantity of each material added to the collection container. A process name, such as "photo waste," is not acceptable. The material identification should reflect the composition of material actually put into the container, not the starting materials of the process. For example, in the titration of sodium hydroxide with hydrochloric acid, the material added to the collection container will be the reaction products sodium chloride and water, not the starting materials.

When assigning a general material name, remember that the term "Hazardous Waste" has a very specific regulatory definition. The determination of the regulatory waste classification can be complicated and is the responsibility of the EH&S Department. Because of this, DO NOT use the wording "hazardous waste" when describing the material on either the label or pick up request form.

Before a material can be disposed of, a determination of the waste classification is required. This determination can be a complicated process if the composition of the waste is unknown. Remember, a small amount of hazardous waste added to a large amount of non-hazardous wastes, by definition, renders the waste hazardous. If there are any questions involving disposal of a material, contact the EH&S Department for assistance.

By EPA definitions, some wastes are considered as "Listed Wastes." These particular wastes must be handled and disposed of by prescribed methods. Listed Wastes contain any of the chemicals in Appendix II, or are from a designated industrial process. Materials containing any of the listed chemicals should be segregated from other materials. Other materials may be considered as "Characteristic Waste." These wastes are usually mixed materials that are classified as hazardous because they contain physical characteristics or a leachate of the waste contains certain toxic chemicals exceeding regulatory amounts.

The laboratory, shop or studio is responsible for the complete and accurate identification of the material to the best of their knowledge and ability. Deliberate or willful omissions from material identifications cannot be tolerated. In the event the material cannot be positively identified, the EH&S Department will sample the material and send it to a contract laboratory for analysis and waste characterization. The material will then be disposed of in the prescribed manner.

Collection containers shall be clearly marked and identify the material. Labels, Figure 1, should be completed and secured to the container. Labels are available from the EH&S Department. The log sheet number and number assigned to the corresponding hazardous material container shall be marked on the label.

Any unused materials that can be recycled or placed back into the chemical inventory for usage by other investigators should be marked as "UNUSED" in the material name portion of the label. Affix the label to the container with a rubber band or tape; do use the adhesive on the label.

Use only the labels provided by the EH&S Department to label the containers. Do not use "BioHazard" or "Radioactive" labeled tape or bags for chemical wastes. Materials with this special hazard labeling, tapes and bags are considered to contain the special hazard waste and have to be treated as such. Disposal of these materials is very expensive.

Figure 1 - Container labels

COLLECTION CONTAINERS:

Containers must be compatible with the materials stored in them. Use a container made of, or lined with, a material that is compatible with the hazardous materials to be stored. This will prevent the material from reacting with, corroding, or dissolving the container.

Keep all containers holding hazardous materials closed during storage, except when adding or removing material. Do not open, handle, or store (stack) containers in a way that might cause them to rupture, leak, fall or otherwise fail.

The containers should be capable of being transported. Each container must be properly labeled. Collection containers shall be constructed of polypropylene. Polypropylene containers shall not exceed five gallons. Larger containers or containers of other materials may be used with the prior approval of the EH&S Department.

Make sure that the containers are in good condition. If a container leaks, put the hazardous material in another container, or contain it in some other way that complies with University procedures.

Lachrymatory, highly malodorous, pyrophoric or air sensitive substances should be handled with particular concern. The container should be double-bagged in plastic bags, if necessary. A second label shall be placed on the outer bag with the special hazard noted.

Do not fill containers completely. Allow for expansion. Always leave an air gap (about 5 to 10% of the container volume) in all containers. This precaution will minimize the risk of exploding containers or other accidents than can occur when over-filled containers are transported from air-conditioned laboratories to the waste handling facility. The containers will be securely capped when transported to the waste handling facility.

Visually inspect the areas where collection containers are stored. Look for leaks and for deterioration caused by corrosion or other factors.

The residues remaining in a container after it is “empty” when commonly used methods of emptying, e.g. pouring, were employed are not considered as hazardous waste except when residue is p-listed as per the EPA.

Caution: Rinsate may be hazardous and should be disposed of properly.

HAZARDOUS MATERIALS COLLECTION:

The EH&S Department is responsible for picking up hazardous materials from the individual laboratories and work activities on campus. Work areas requiring a hazardous material pick-up should notify the EH&S Department by calling the office at 747-7124 or by contacting their local EH&S safety consultant by phone or email. Material identification, hazard information and quantities to be collected should be indicated on the Laboratory Waste Pick-up and Disposal Request form. An EH&S representative will pick-up the material at a scheduled date and time and

transport the material to the University chemical waste handling area usually within 0 to 3 business days. The EH&S Department is responsible for preparing and packaging the waste for shipment to an EPA-approved hazardous waste management facility. If appropriate, trained EH&S personnel will bulk these accumulated chemicals in accordance to U.S. Department of Transportation (DOT) and EPA regulations.

Federal and state regulations require the EH&S Department to bulk the hazardous materials in appropriate containers for transport. Regulations also require that each container be listed with their specific chemical constituents on an EPA waste manifest form. If the specific chemical identification is unknown, disposal of the material cannot proceed. Because of these legal requirements, the EH&S Department cannot accept unlabeled or generically labeled materials. Generically labeled materials include such things a "titration waste," "painting solvents," or "heavy metal contaminated samples." If the material is known only by the commercial product or trade name, a copy of the material safety data sheet should be attached to the pick-up form. It is the responsibility of the principal investigator or work area supervisor to ensure that all hazardous materials containers are permanently and correctly labeled.

Before the material is picked up by the EH&S Department, the *Laboratory Waste Pick-up and Disposal Request* form, Figure 2, must be completed in full. The name, and phone number of the work area supervisor or principal investigator are required on the form. The chemical identification of contents of the container is required. Process descriptions and abbreviations are not acceptable. Safety Data Sheets (SDS) are required for any material identified by a trade name. Forms and labels are available from the EH&S Department at 747-7124 or your EH&S safety consultant.

Figure 2- Laboratory Waste Pick-up and Disposal Request Form

EH&S
ENVIRONMENTAL HEALTH & SAFETY

Laboratory Waste Pick-Up & Disposal Request
The University of Texas at El Paso
Environmental Health and Safety

				EH&S Only	
				Log #:	
Requested by:		Supervisor:		Name:	
Bldg./Rm#:		Phone:		Date:	

Waste Information (Requester Only)						EH&S Only:			
				Check one					
Item #	Chemical/Waste Name / Description / Concentration	Amount #	Amount Unit	Mixed Content	Pure Content	1º Waste CODE	2º Waste CODE	3º Waste CODE	Waste Status

DEFINITIONS:

The following definitions, characteristics and examples are provided for the purpose of educating laboratory, shop and studio personnel as to the legal definitions of the hazardous waste categories. These definitions are adapted from the EPA guide for small quantity generators

"Waste" is any solid, liquid, or contained gaseous material that is to be discarded, disposed of, burned/incinerated, or recycled. That being said, there are some exceptions in regards to recycled material. Waste can be the by-product of a manufacturing process, a laboratory experiment, or a commercial product that is used on campus such as a cleaning fluid or battery acid. Even materials that are recyclable or can be reused in some other way (such as burning used oil for fuel) may be considered waste.

"Listed waste" is waste that is considered hazardous as it appears on one of four lists published in the Code of Federal Regulations (40 CFR Part 261), see Appendix II. Currently, more than 400 wastes are listed. Wastes are listed as hazardous because they are known to be harmful to human health and the environment when not managed properly.

Even when managed properly, some listed wastes are so dangerous that they are called "acutely hazardous wastes." Examples of acutely hazardous wastes include wastes generated from some pesticides that can be fatal to humans even in low doses.

"Characteristic wastes." If the waste does not appear on one of the hazardous waste lists, it still might be considered hazardous if it demonstrates one or more of the following characteristics:

An **"ignitable"** waste can catch fire under certain defined conditions. Specifically, flammable liquids with a flash point less than 60° C (140°F), flammable compressed gases, and solids that are capable of igniting under normal atmospheric conditions through friction, absorption of moisture, or spontaneous chemical change. Examples are paints, certain solvents, linseed oil, and gasoline.

An **"oxidizing waste,"** although not classified as a reactive waste, presents a storage problem and should be segregated from other wastes. Oxidizers are substances that yield oxygen and can readily accelerate the combustion of organic materials. Because of this definition, chlorine and other chemical oxidizing agents may or may not be considered oxidizing waste. Examples are perchlorates, nitrates, permanganates, and organic and inorganic peroxides.

A **"corrosive"** waste corrodes steel or aluminum, causes visible destruction of living tissue, or has a very high or low pH. Substances with pH less than 2 or greater than or equal to 12.5 are defined as corrosive materials. Examples are mineral acids, strong bases, rust removers, acid or alkaline cleaning fluids, and battery acid. Although not considered a hazardous waste by EPA definition, the City of El Paso Water Utilities Public Service Board, in accordance with US EPA, will not allow substances with a pH less than 5 or greater than or equal to 10.5 to be poured into the sanitary sewer system.

A **"reactive"** waste is unstable and explodes or produces toxic fumes, gases, or vapors when mixed with water or under other conditions such as heat or pressure. If a substance or a mixture vigorously decomposes, polymerizes, detonates, condenses or becomes self-reactive due to shock, pressure or temperature it is considered reactive. Examples include sodium metal, certain cyanides or sulfide-bearing wastes, explosives, ethylene oxide, and any organo-peroxide.

A **"toxic"** waste is harmful or fatal when ingested or absorbed, or it leaches toxic chemicals into the soil or ground water when disposed of on land. Examples are wastes that contain high concentrations of heavy metals, such as cadmium, lead, or mercury, or certain pesticides.

To determine if a waste is toxic, it can either be tested using the Toxicity Characteristic Leaching Procedure (TCLP), designated as Hazardous Wastes D-numbers, or by simply knowing that the waste contains a EPA listed “toxic U-waste” or “acutely hazardous chemical P-waste,” or that the processes generates a listed hazardous waste.

The National Institute of Occupational Health and Safety (NIOSH) defines toxic as having properties that cause adverse chronic or acute health effects when a body is exposed to the substance. The EPA only lists a few chemicals that are toxic or hazardous to life and human health. Many substances that are not listed by EPA but meet the toxicological definition of toxic or poisonous may be present or generated in campus locations. The *NIOSH Registry of Toxic Effects of Chemical Substances (RTECS)* provides a comprehensive list of toxic substances and the dose level. It is recommended that any substance that is harmful to life and health should be disposed of through the University Hazardous Waste Program.

HAZARDOUS MATERIALS HANDLING PROCEDURE SUMMARY

The proper handling of all hazardous materials is the responsibility of all University students and employees. The detailed handling procedures are summarized below. A copy of this procedure summary should be posted near the collection point in each work area. Technical assistance, containers, pick-up forms, pre-numbered log sheets and container labels are all available from the EH&S Department at 747-7124 or via email at eh&s@utep.edu.

1. All chemicals and other hazardous materials produced in the laboratory, shop, studio or other work area must be collected for proper disposal.
2. No material can be dumped down the sanitary sewer drain or thrown in the dumpsters without prior approval of the EH&S Department.
3. All materials are to be stored in chemically compatible containers. EH&S provides 1-gallon and 5-gallon polypropylene containers.
4. Waste should be segregated according to the type of waste.
5. A log sheet is required of all materials placed in a container. The pre-numbered log sheet identifies the material name, quantity, solvent and approximate concentration (if applicable) of each material added to the container.
6. A label sticker identifying the log sheet number and the corresponding letter or number of the item on the log sheet shall be attached to each container.
7. When the container is full, or otherwise needs disposal, complete a *Laboratory Waste Pick-up and Disposal Request* form. The form must be complete and accurate.
8. Properly labeled containers will be picked up by calling or emailing the EH&S Department at 747-7124 or via email at eh&s@utep.edu.

Appendix I

WASTE MINIMIZATION IN THE RESEARCH LABORATORY

All employees and students should aim to minimize waste produced at the University. In academic and research institutions, the challenge of waste minimization can be great, but it can be accomplished. There are numerous types of waste associated with the research process and these are usually produced in small quantities. Because of the nature of research, the type of waste material changes frequently requiring changes in handling and disposal methods. Researchers need to be aware of the waste that their projects may generate. Incorporating the waste minimization philosophy into their project at the very beginning (i.e. when the grant is written) insures a more efficient use of research funds.

The following recommendations are provided to assist in implementing waste minimization practices without restricting the research and academic activities of the University.

- Determine the hazards and potential waste associated with a material or process before beginning a project. Consider less hazardous substitutes when possible.

- Use a small batch or micro-scale reactions when possible.

- Order and maintain only the minimum amount of the materials required for the project. It may appear cost effective to order in bulk however waste disposal costs are often more than the original material cost.

- Because of certain properties, some chemicals require special disposal methods and may be difficult and/or costly to dispose. Examples of these are:

    ◊ Any heavy (toxic) metal (e.g. mercury, barium, cadmium, chromium, beryllium, selenium, tellurium, arsenic) compounds.
    ◊ Chlorophenols, dioxins and cyanides.
    ◊ Compressed gases (including lecture bottles) or liquids under pressure, especially if the material is toxic. When possible, arrange for the supplier to accept the "empty" container after the project is complete. Remember, always insure the valves are closed even after the cylinder is considered empty.
    ◊ When requesting manufacturer samples, make prior arrangements for the return of the unused material. Make sure that all samples are properly labeled and safety data sheets are obtained.
    ◊ Do not accept "free" gifts from companies or other institutions of any hazardous materials or equipment without first checking with the EH&S Department. Organizations often use donations to reduce chemical inventories without the disposal expense. Remember that the Radiation Safety Officer must pre-approve the acquisition of any radioisotope sealed source or radioactive material.
    ◊ Good housekeeping procedures generally save money, as well as preventing accidents and waste. Safely store hazardous products and containers.

- ◊ Avoid creating hazardous waste by preventing spills or leaks. Store hazardous product and waste containers in secure areas, and inspect them frequently for leaks. When leaks or spills occur, materials used to clean them up also become hazardous waste. Be familiar with the appropriate spill clean-up procedures and use the minimum amount of clean-up material possible.

The University is not permitted to treat hazardous waste. However, laboratory treatment of unwanted material is allowed if the treatment is a part of the experimental process. For instance, writing into the experimental procedure 1) a material that maybe hazardous because of toxicity could possibly be made non-toxic by a simple chemical reaction, or 2) removal by evaporation of water from an aqueous solution of heavy metals. However, because of air pollution regulations, evaporation of organic solvents is not permitted.

Making waste minimization an integral part of the experimental process is of considerable educational value to any researcher.

Appendix II

Listed Wastes

P-wastes: EPA Acutely Toxic Materials. These substances are considered hazardous regardless of their concentration and should be segregated from other wastes whenever possible. Examples of these are:

allyl alcohol	nickel cyanide	sodium azide
barium cyanide	osmium tetroxide	sodium cyanide
calcium cyanide	potassium cyanide	strychnine
copper cyanide	silver cyanide	zinc cyanide

U-Wastes: These wastes are materials that appear on EPA's Toxic list. Examples of these are:

acetone	1-butanol	mercury
acrylamide	cyclohexane	methanol
aniline	ethyl ether	phenol
benzene	lead acetate	toluene

D-numbers: Waste numbers and the regulatory concentrations that determine whether a waste is a characteristic toxic waste. Examples of these are:

acetone	ethyl ether	methanol	perchloric acid
benzene	glacial acetic acid	nitric acid	picric acid
1-butanol	hydrochloric acid	sulfuric acid	old ethers
cyclohexane	hydrofluoric acid	toluene	sodium metal

Carcinogens: Substances that have been identified as a carcinogen by either the International Agency for Research on Cancer, the National Toxicology Program, or the National Cancer Institute. Examples of these are:

benzene	nickel	arsenic	silica
toluene	beryllium	lead	arsenic trioxide
cadmium	chromium	hydrazine	1,3-butadiene
asbestos	vinyl chloride	formaldehyde	ethylene oxide