

**TEXAS A&M UNIVERSITY**

**HAZARDOUS CHEMICAL WASTE  
MANAGEMENT PROGRAM**

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Environmental Health & Safety

Updated:  
September 2012

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## **I. Introduction**

The purpose of this document is to inform faculty, staff, contractors, and students at Texas A&M University regarding Federal and State hazardous waste disposal regulations and to define the Texas A&M Chemical Waste Management Program. This Program applies to Texas A&M and Texas A&M System Components at College Station and in the Brazos County. The Program pertains to hazardous chemical waste and does not include procedures for the management of radioactive, infectious, and biological waste. Texas A&M Environmental Health and Safety (EHS) administers the Chemical Waste Management Program at Texas A&M. Compliance with the program is critical and requires full cooperation by all campus entities.

Texas A&M University is a "Large Quantity Generator" of hazardous waste and must comply with the State and Federal regulations on waste disposal associated with that classification. Presently, both the Texas Commission on Environmental Quality (TCEQ) and the Environmental Protection Agency (EPA) inspect the Texas A&M's Hazardous Chemical Waste Management Program for compliance. The University's generator permit is applicable to all System Components at College Station and in Brazos County.

The "Large Quantity Generator" permit requires that once a chemical is declared hazardous chemical waste, it must be removed from the campus within 90 days. Texas A&M is not permitted to treat or dispose of waste locally. All waste must be transported to a permitted off-site facility for further storage, treatment, and/or disposal. It is illegal to dispose of hazardous chemical waste by dilution, evaporation, or dumping into the sanitary or storm sewers or into the local landfill. EHS personnel collect, transport, and accumulate hazardous chemical waste prior to final disposal. In addition, they provide technical information and assistance to individual generators and maintain records of all hazardous chemical waste movement on the main campus.

Unlike the main campus, other System Components may be "Small Quantity Generators" or "Conditionally Exempt Small Quantity Generators". Since each classification has specific requirements and regulations, each Component must determine the regulations that apply to their site and obtain the correct permit. EHS will assist any Texas A&M Department or System Component in determining and meeting their hazardous chemical waste disposal needs. Additional information on specific responsibilities and procedures may be obtained by calling **845-2132**.

## **II. Hazardous Waste Disposal Regulations**

Since Federal and State regulations govern hazardous chemical waste disposal at Texas A&M, failure to comply with any hazardous chemical waste regulation may result in substantial fines and penalties for the University; individual generators (e.g., principal investigators, employees) causing the violation may be personally liable. Violations may range from failure to properly label a container of hazardous waste to intentionally disposing of hazardous chemical waste into the air, down the drain, or in the garbage.

The Resource Conservation and Recovery Act (RCRA) is administered by the U. S. Environmental Protection Agency (EPA). Under this Act, the EPA has the responsibility for regulating hazardous chemical wastes. RCRA established a "cradle to grave" hazardous chemical waste management requirement to protect public health and the environment from improper disposal of hazardous chemical waste. The law went into effect in November 1980.

The Texas Commission on Environmental Quality (TCEQ) administers an equivalent to RCRA for the State of Texas under Industrial Solid Waste and Municipal Hazardous Waste Regulations (Title 31, Part IX, Chapter 335).

As a "Large Quantity Generator" of hazardous chemical waste, Texas A&M has been issued an EPA Identification Number (TXD000789800) and a Texas Solid Waste Registration Number (66015) for storing (less than 90 days) and transporting hazardous chemical waste. Before transporting or offering hazardous chemical waste for transportation to an off-site facility, all requirements of packaging, labeling, marking and placarding must be met.

A waste generator never totally loses liability for environmental damage; therefore, the selection of a reliable disposal facility is very important. In Texas, penalties for non-compliance may be civil, criminal, or administrative violations with penalties ranging from fines of up to \$25,000 per day to a 15-year prison term for individuals.

### **III. Hazardous Waste Disposal Program**

Generators are responsible for following the University disposal procedures, for assuring that their employees are trained in proper disposal procedures, and for properly identifying the hazardous chemical waste generated. The following procedures are intended to assure compliance with applicable Federal and State regulations for the proper management of hazardous chemical waste and to reduce adverse effects to human health and the environment.

#### Hazardous Waste Training

The law requires that employees of "large quantity generators" who manage or handle hazardous waste be trained. It also requires those employees to have annual refresher training. This training shall include:

1. Overview of the both federal and state regulations;
2. Generators responsibilities;
3. Hazardous waste determination;
4. Waste classification, labeling, segregation, and storage;
5. Spill cleanup procedures; and
6. Disposal procedures.

These topics are discussed in detail in the following paragraphs.

## Hazardous Chemical Waste Determination

A material becomes "waste" when the individual generator determines that it is no longer useful and should be discarded. If the material is to be discarded, EHS must determine whether the chemical waste is non-hazardous or hazardous. Because the primary source for waste determination is the generator's process knowledge, EHS utilizes the Waste Analysis Plan (Appendix B) for determining the accuracy of waste determination methods used by individual generators and for identification/characterization of unknown or improperly labeled wastes.

A material is "non-hazardous chemical waste" if it does not meet the definition of "hazardous chemical waste". A material is "hazardous chemical waste" if it meets one or more of the following:

1. It is a chemical listed on one of the Chemical Tables in Appendix F.
2. It is a mixture or solution containing a listed (Appendix F) chemical and a non-hazardous chemical.
3. It meets the definition of one of the following:
  - A. Ignitability (flashpoint  $<60^{\circ}$  C ( $140^{\circ}$  F) or supports combustion);
  - B. Reactivity (e.g., responds violently to air or water, cyanides, explosives, unstable chemicals);
  - C. Corrosivity (pH  $<4$  or  $>10$ );
  - D. EP toxicity (e.g., pesticides, heavy metals, poisons);
4. It is a Universal Waste per 30TAC 335.261; or
5. Material is excluded from the regulations.

## General Information

1. Non-hazardous waste may be disposed using the sanitary sewer or regular trash. Additional information about non-hazardous waste disposal can be obtained from EHS.
2. Hazardous chemicals can be treated to reduce the hazard or the quantity of waste in the laboratory if the treatment procedure is included as part of the written experimental protocol.
3. Gas cylinders should be returned to the manufacturer or distributor whenever possible. Non-returnable cylinders should be tagged as chemical waste.
4. "Mixed Waste" (includes both radioactive material and hazardous chemicals) should be initially routed through the EHS Division of Radiological Safety.
5. Chemical waste that is "unknown" will be picked up by EHS. Place a waste disposal tag on the container using "unknown" for the chemical description. Generators will be charged for the cost of analysis necessary to determine the chemical identity for proper disposal.

## Classification and Segregation of Hazardous Chemical Waste

1. Hazardous chemical waste is categorized into the following hazard classes.

- A. Halogenated solvents
  - B. Non-halogenated solvents
  - C. Acids (inorganic or organic)
  - D. Bases (inorganic or organic)
  - E. Heavy metals (silver, cadmium, lead, mercury, etc.)
  - F. Poisons (inorganic or organic)
  - G. Reactives (cyanides, sulfides, water reactive chemicals, peroxides, etc.)
2. Certain chemical waste will be classified as Universal Waste:
    - A. Batteries (including lead acid),
    - B. Fluorescent lamps, and
    - C. Paint or paint related material.
  3. Different classes of hazardous chemical waste must not to be commingled in the same waste container.
  4. Do not combine inorganic heavy metal compounds and organic waste solvents.
  5. Do not combine non-hazardous waste with hazardous chemical waste.
  6. Dry materials (paper, rags, towels, gloves, or Kim Wipes, etc.) contaminated with flammable or extremely toxic chemicals must be double-bagged in heavy-duty plastic bags and must be treated as hazardous chemical waste. **Do not use biohazard bags.**

#### Containment and Storage of Hazardous Chemical Waste

1. Individual hazardous waste generators shall:
  - A. Maintain custody and control of their container storage areas within the hazardous waste generation area
  - B. Ensure the waste containers are accessible to EHS personnel.
  - C. Accumulate their waste in safe, transportable containers that are properly labeled and stored to prevent human exposure to or environmental release of the waste materials.
  - D. Provide their own waste containers that are compatible with the chemical contents (e.g., do not use metal containers for corrosive waste or plastic containers for organic solvent).
  - E. Use containers that are in good condition and do not leak. All containers must have suitable screw caps or other means of secure closure. When large waste containers (i.e. 5 gallons or 55 gallon, total volume) are required, contact EHS for assistance on selection and placement of appropriate container type and size.
2. Never overfill hazardous waste containers. Expansion and excess weight can lead to spills, explosions, and extensive environmental exposure.
  - A. Containers of solids must not be filled beyond their weight and volume capacity.
  - B. Jugs and bottles should not be filled above the shoulder of the container.
  - C. Closed head cans (5 gallons or less) should have at least two inches of headspace between the liquid level and the head of the container.
  - D. Closed head drums (larger than 5 gallons) should have at least four inches of

- headspace.
3. Containers must be closed or sealed to prevent leakage. ***All waste collection containers must be kept closed except when adding or removing material.***

### Container Storage Areas

An integral part of any hazardous waste management program is the container storage areas. These areas are used to hold the waste prior to shipment to a permitted disposal site. Once the waste leaves the generation area, Satellite Accumulation Areas and Central Container Storage Areas are used to store the waste at Texas A&M. Each area has specific requirements set forth in the regulations.

The following requirements pertain to *Satellite Accumulation Areas*:

1. The area is secured from "Unauthorized Entry".
2. Warning signs and emergency contacts are posted.
3. Hazardous waste is stored in a designated and marked area.
4. Containers are properly labeled. Full containers are properly labeled and marked with an accumulation start date.
5. Areas must be accessible to EHS personnel.
6. Hazardous waste is separated from non-waste chemicals.
7. Less than 55 gallons of any one hazard class of waste or one quart of acutely hazardous waste is being stored.
8. Spill Control Equipment is available.

The following requirements pertain to the *Central Accumulation Area*:

1. The area is secured from "Unauthorized Entry".
2. Warning signs and emergency contacts are posted.
3. Hazardous waste containers stored in the container storage area are:
  - A. Properly labeled and marked with an accumulation start date.
  - B. Closed except when adding or removing waste.
  - C. In good condition and not leaking.
  - D. Properly segregated according to hazard class and separated from non-hazardous waste chemicals.
4. Drums in the drum storage area must:
  - A. Be marked with a complete and dated RCRA sticker and DOT hazard class labels;
  - B. Properly segregated according to hazard class and separated from non-hazardous waste chemicals.
  - C. Be stored so that they can be inspected;
  - D. Closed except when adding or removing waste;
  - E. In good condition and not leaking; and
  - F. Not have been stored for more than 90 days.
5. Area is inspected weekly (Appendix D). Records of the inspections are maintained.
6. Spill prevention and control measures are established (Appendix E).

## Labels and Labeling

1. The original chemical label on containers used for waste accumulation must be destroyed or defaced.
2. EPA regulations require that waste containers be labeled with the chemical contents **when the chemical waste is first added.**
3. Containers at Texas A&M can be labeled in one of three methods:
  - A. Using string, attach a completed **Chemical Waste Disposal Tag** **except do not fill in the accumulation start date** (available from EHS) to each new waste container when the chemical is first added. **Print the information on the tag legibly.**
  - B. For containers larger than 5-gallons, a **Chemical Waste Label** (available from EHS) can be used. These labels have an adhesive back and are placed on the container when the chemical is first added. Identify the contents on the label, but **do not fill in the accumulation start date**
  - C. Lamps and batteries that managed as universal waste may also be managed in prelabelled containers provided by EHS.

**Follow the example below to properly complete your hazardous waste label:** When the container is full, the **Accumulation Start Date** is written in and a completed waste disposal tag is attached.

<b>CHEMICAL WASTE</b>	
ACCUMULATION START DATE	_____
CONTENTS	<u>acetone, chloroform, hexane</u> <u>oil, water</u>
<b>HANDLE WITH CARE!</b>	

**Follow the example below to properly complete your chemical waste disposal tag:**

Attach An Individual Chemical Waste Disposal Tag To **Each** Waste Container

Both upper and lower sections of the tag must be filled out completely and legibly **except for the accumulation date** when chemical is first added to a waste container. (This information is essential for record keeping).

\* Fill in the **Accumulation Start Date** when the waste container is full and/or ready for pickup.

Secure the top part of the tag with a string that encircles the top of the container - **rubber bands, tape, and wire are not acceptable.**

\*\* The "REQUESTOR" is the Principal Investigator (PI) or person in charge of the lab or division that generated the waste.

\*\*\* Chemical name/Common name. **Chemical formulas or abbreviations are not acceptable.**

\*\*\* List all chemical components in a waste container (including water). Lists may be continued on the back of the tag.

\*\*\*Tags for containers of potentially explosive materials such as picric acid, silanes, nitro compounds, and ethers must indicate the percent concentration of these chemicals.

Place any additional Hazard Information about container contents in **REMARKS**.

<input type="checkbox"/>	602
(ATTACH TAG TO CONTAINER WITH STRING)	
<b>CHEMICAL WASTE DISPOSAL TAG</b>	
REQUESTOR: <u>** John Doe</u>	
DEPT/PART: <u>Chemistry</u>	
PHONE: <u>5-3140</u>	
CHEMICAL (S): <u>*** Methylene Chloride, Toluene</u>	
602	
<b>CHEMICAL WASTE DISPOSAL TAG</b>	
ACCUMULATION START DATE: <u>* 5/22/96</u>	
REQUESTOR: <u>** John Doe</u>	
DEPT/PART: <u>Chemistry</u>	
BLDG.NAME & NO: <u>Chemistry - 376</u>	
ROOM NO. <u>2002</u> PHONE: <u>5-3140</u>	
CHEMICAL (S): <u>*** Methylene Chloride, Toluene</u>	
PHYSICAL PROPERTY: <input type="checkbox"/> Liquid <input type="checkbox"/> Solid <input type="checkbox"/> Gas <input type="checkbox"/> Other	
QUANTITY: <input type="checkbox"/> Pint <input type="checkbox"/> Quart <input type="checkbox"/> Gallon <input type="checkbox"/> 5-Gallon <input type="checkbox"/> Other <u>4 liter</u>	
CONTAINER TYPE: <input type="checkbox"/> Glass <input checked="" type="checkbox"/> Metal <input type="checkbox"/> Other	
REACTS WITH: <input type="checkbox"/> None <input type="checkbox"/> Air <input type="checkbox"/> Water <input type="checkbox"/> Other	
HAZARDS: <input type="checkbox"/> Flammable <input type="checkbox"/> Explosive <input type="checkbox"/> Carcinogen <input type="checkbox"/> Toxic <input type="checkbox"/> Corrosive <input type="checkbox"/> Other	
<b>REMARKS:</b>	
Mail lower portion of tag to Environmental Health & Safety when container is ready for pickup.(MS 4472, Campus; 845-2132)	

## Disposal

1. Waste containers that are full and/or ready for disposal are either:
  - A. Tagged with a Chemical Waste Disposal Tag. **Fill in the accumulation start date on the disposal tag**, separate the bottom part of the tag, and mail it to **MS 4472**. Upon receiving the bottom part of the tag, EHS will schedule to collect the waste.
  - B. Placed in a Satellite Accumulation Area with a regular scheduled collection time and labeled with a Chemical Waste Label. Attach a completed Hazardous Waste Disposal Tag **including the accumulation start date**, leave complete tag intact attached to the container. EHS makes weekly pickups at these designated areas.
2. EHS will not pickup containers with improper caps, leaks, outside contamination, or improper labeling.
3. It is illegal to dispose of hazardous chemicals in any of the following ways:
  - A. Disposal through the sanitary drain.
  - B. Intentional evaporation in a fume hood.
  - C. Disposal in the regular trash.
4. Empty containers should be placed in a dumpster for disposal with other non-hazardous trash when the following requirements are satisfied. EPA regulations stipulate that **an empty chemical container** must:
  - A. not contain free liquid or solid residue,
  - B. be triple rinsed,
  - C. have the label removed or defaced,
  - D. have the lid or cap removed, and
  - E. have a hole punched in the bottom (metal or plastic containers).Empty chemical containers not handled in this manner must be treated as hazardous chemical waste (very expensive). It is not necessary to break empty glass containers when placed in a dumpster.

## **IV. Source Reduction and Hazardous Waste Minimization**

Hazardous waste regulations have evolved from emphasis on reduction to the prevention of environmental pollution. The Pollution Prevention Act of 1990 (Federal Regulation) made the prevention of pollution and reduction of waste generation, a national priority. The Texas Waste Reduction Policy Act (Senate Bill 1099 of 1991) required Texas A&M University prepare and implement a Source Reduction and Waste Minimization Plan. The Plan (Appendix C) was developed and is coordinated by the Texas A&M Environmental Health & Safety. The key to the Plan is "front-end minimization". Front-end minimization means reducing hazardous waste by reducing the quantities of hazardous chemicals used and by substituting less hazardous materials. Research and teaching laboratories and other working groups (Physical Plant, Power Plant, etc.) that generate hazardous waste should review their purchasing practices and systems, chemical usage

patterns, and workplace activities to identify potential points of their operations where source reduction and waste minimization can be implemented.

## **V. Emergency Procedures**

Texas A&M Hazard Communication Program requires that employees be informed of hazardous materials that they may use or be exposed to at work. In addition, the program includes training on handling spills and other emergencies. Material Safety Data Sheets are a source of this information and should be maintained for all chemicals used or stored within a workplace. Special cleanup supplies should be available and employees should be trained on how to use these supplies. Texas A&M Environmental Health & Safety can provide additional information on handling specific chemical spills. The Texas A&M Hazardous Materials Response Team is equipped and trained to assist with hazardous chemical spills. Contaminated clothing, rags, absorbent materials, or other waste from cleanup of spills or leaks must be properly disposed. All labs should post emergency numbers to be used and develop a response scenario for emergencies.

### **Emergency telephone numbers of importance are listed below:**

Campus Emergency Number	911
Texas A&M Environmental Health & Safety Chemical, Radiological, and Fire	845-2132 or 845-4227
Texas A&M Hazardous Materials Response Team	862-1111 (after hours)
University Health Center	845-1511
University Police Department	845-2345
Physical Plant Radio Room	845-4311
Poison Control Center (Scott & White, Temple)	1-800-764-7661

## APPENDIX A

### DEFINITIONS

*Central Accumulation Area* - Site designated by the Environmental Health & Safety Department to be used for the storage of hazardous wastes prior to shipment to permitted disposal facilities.

*Disposal* - The discharge, deposit, injection, dumping, spilling, or placing of any solid waste or hazardous waste (whether containerized or non-containerized) into or on any land or water so that such solid waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any water, including ground waters.

*EPA Identification Number* - The number assigned by the Environmental Protection Agency to each generator, transporter, and processing, storage or disposal facility.

*Facility* - Includes all contiguous land, and structures, other appurtenances, and improvements on the land used for storing, processing, or disposing of municipal hazardous waste or industrial solid waste.

*Generator* - Any *person*, by site, who produces municipal hazardous waste or industrial solid waste; any person who possesses municipal hazardous waste or industrial solid waste to be shipped to any other person; or any person whose act first causes the solid waste to become subject to regulation. *Person* refers to an individual, trust, firm, corporation, Federal Agency, State, political subdivision of a State, municipality, or any interstate body.

*Hazardous Material* - a substance or material, including a hazardous substance, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated.

*Hazardous Waste* - Any solid waste material listed or identified in Title 40 Code of Federal Regulations, Part 261, Subpart C and D or exhibiting the characteristics of ignitability, corrosivity, reactivity, or E.P. toxicity also defined in Part 261. Tables containing the listing and characteristics of hazardous wastes are shown in Appendix B.

*Manifest* - A legal document containing required information, which must accompany shipments of Municipal Hazardous Waste or Class I-Industrial Solid Waste transported on public roads or thoroughfares.

*Mixed Waste* - A radioactive waste that is also a hazardous waste.

*Permit* - A written document issued by EPA or TCEQ that, by its conditions, authorizes the construction, installation, modification, or operation of a specified municipal hazardous waste or industrial solid waste storage, processing, or disposal facility in accordance with specified limitations.

*Processing* - The extraction of materials, transfer, volume reduction, conversion to energy, or other separation and preparation of solid waste for reuse or disposal, including the treatment or neutralization of hazardous waste, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or as to recover energy or material from the waste or so as to render such waste non-hazardous or less hazardous; safer to transport, store, and dispose; or amenable for recovery, amenable for storage, or reduced in volume.

*Recyclable Materials* - Wastes that are recycled. Recycled material is used, reused, or reclaimed.

*Reclaimed material* is processed or regenerated to recover a usable product. Examples:  
Recovery of lead from spent batteries, or regeneration of spent solvent.

*Satellite Accumulation Area* - An area, system, or structure used for temporary accumulation of hazardous waste prior to transport to the central accumulation area.

*Solid Waste* - Any garbage, refuse, sludge from a waste treatment plant, water treatment plant, or air pollution control facility or other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, municipal, commercial, mining and agricultural operations, and from community and institutional activities.

*Storage* - The holding of solid waste for a temporary period, at the end of which the waste is processed, disposed of, recycled, or stored elsewhere.

*Texas Solid Waste Number* - The number assigned by the TCEQ to each generator, transporter, and processing, storage, or disposal facility.

*Transporter* - Any person who conveys or transports municipal hazardous waste or industrial solid waste by truck, ship, pipeline or other means.

*Universal Waste* – any hazardous waste subject to 40CFRPart273 and 30TAC335.261 to include:

- A. Batteries including lead-acid as described in 40CFR 273.2;
- B. Lamps as described in 40CFR 273.5; and
- C. Paint and paint related waste as described in 30TAC 335.262(b).

*Waste* - Any material for which there is no use and is to be discarded as valueless.

## APPENDIX B

### **Waste Analysis Plan For Hazardous Waste Operations**

The Waste Analysis Plan establishes procedures for determining the accuracy of waste determination methods used by individual generators and for identification/characterization of unknown or improperly labeled wastes. These procedures conform to the requirements set forth in Federal regulations, 40 CFR 264.13 (Attachment A of Appendix B). Individual hazardous chemical waste generators at Texas A&M University are responsible for correct identification, classification, and proper labeling of their waste. The generators use approved procedures (product knowledge) to determine if the waste being generated is hazardous and RCRA regulated as outlined in the Texas A&M Hazardous Chemical Waste Management Program. If the material is identified as a hazardous waste, the generator completes a chemical waste label (*Texas A&M Hazardous Chemical Waste Disposal Tag*). A completed Disposal Tag must be attached to each hazardous chemical waste container prior to transport to the Central Accumulation Area (Building 1165). The Disposal Tag contains the necessary information for appropriate segregation, storage, treatment, and disposal.

#### Visual Inspections

Environmental Health and Safety (EHS) uses the following procedures on hazardous chemical wastes to verify the information on the Disposal Tag is consistent with the container contents and to determine the need for confirmatory characterization or analysis.

1. First, containers are visually inspected as they are removed from satellite accumulation areas and placed on the hazardous waste truck for transport to the storage area. The primary purpose for this inspection is to assure container integrity and that a completed Disposal Tag is attached.
2. After the containers are unloaded at the storage area, they are segregated by hazard class and placed on storage shelves. During this operation, the contents of the container are again visually inspected for physical state, texture, layering, etc. and compared to the Disposal Tag information.
3. If inconsistencies or discrepancies are observed, the container is set aside for further confirmation. The confirmation process begins with the generator being contacted for additional information. If the generator is unable to provide the necessary information to correct the inconsistency or discrepancy, further chemical characterization and/or analysis is conducted.

## Random Sampling and Analyses

During each 90-day disposal cycle, hazardous chemical waste containers are randomly sampled for confirmatory chemical characterization. This is used to verify the consistency and accuracy of chemical identification information placed on the Disposal Tag. Hazardous chemical waste containers from at least two different generators are selected for sampling. The same generators' waste is generally not sampled in consecutive 90-day cycles. However, if a problem existed with verifying a generator's content information on the Disposal Tag of the container with the actual container's contents, the particular generator is notified that his waste will be sampled several times during consecutive 90-day cycles. EHS also includes in the notification, a request for the generator to review the identification process used and make corrections as necessary.

The sampling method used will follow the guidelines of Samplers and Sampling Procedures for Hazardous Waste Streams (EPA-600 2-80-018, January 1980). Randomly selected, grab samples are taken using a *COLIWASA* or an equivalent Pipette method for laboratory containerized waste. A chain of custody form is completed identifying the source of the samples and the analytical parameters requested. A form accompanies all samples to the laboratory and their subsequent analyses. A copy of the completed forms is returned to Texas A&M EHS.

At a minimum, an analysis for the parameters considered necessary for chemical identification using the Test Methods Section is conducted quarterly to verify the consistency of the labeled containerized waste. In addition, analyses are conducted any time unknown or unlabeled wastes are encountered. All analytical results and chain of custody forms for the samples submitted to the laboratories are kept on file.

## Quality Assurance/Quality Control (QA/QC)

The individual laboratories used for analysis include, but not limited to, *Mega Lab, Inc., Bryan, Texas*, and *Energy Labs, College Station, Texas*, for analytical and environmental assessment. These laboratories are located near the Texas A&M University campus. Both laboratories maintain general Association of Official Analytical Chemists, QA/AC, procedures as well as standard American National Standard Institute, quality assurance/quality control procedures. These include the use of quality control samples throughout all phases of sampling and analysis to insure the quality level of data that will meet the requirements of the intended use(s). A careful review of each outside laboratories' current quality assurance/quality control program will be approved before the final work contract.

### Unknown Analysis

Hazardous chemical waste containers tagged as "unknown", containers identified by EHS technicians as "unknown", and /or containers having inconsistencies or discrepancies that can not be corrected are segregated and stored on a shelf in the Hazardous Waste Facility. EHS staff characterizes the "unknown waste" for hazard class, storage compatibility, proper shipment name, and disposal method. The primary tool used by EHS staff to identify unknown wastes as well as to verify contents of labeled wastes is called "HAZCAT Chemical Identification System". During a scheduled waste shipment, the contracted disposal company will characterize the "unknown waste" that have not been identified by EHS staff.

### Test Methods

The following techniques are used to identify unknown wastes and to verify contents of labeled hazardous chemical wastes:

1. Initial analyses techniques that are used on unknown laboratory wastes are discussed in the book, Prudent Practices in the Laboratories (Committee on Prudent Practices for Handling, Storage, and Disposal of Chemicals in the Laboratory, National Academy Press, Washington, D.C., 1995).
2. HAZCAT Chemical Identification System - series of tests that are used to identify and classify chemicals into hazard class groups, i.e., flammables, corrosives, oxidizers, reactives, and poisons. The tests follow the analysis parameters listed below.
3. Mass Spectrometry (MS) and Gas Chromatography (GC) - identifies:
  - A. Specific groups of PCBs, dioxin, organics containing chlorine, metal hydrides, hydrazine, etc.
  - B. hydrocarbons (alkanes, alkenes, alkynes, arenes, alcohols, phenols, aliphatic, or aromatic esters, acid halides and anhydrides, esters, amines, nitrites, aldehydes, ketones, and azides).
4. Liquid Chromatography (LC) - identify hydrocarbons destroyed by the heat of gas chromatography (carboxylic and sulfonic acids).
5. Atomic Absorption (AA) and Neutron Activation (NA) - identify heavy metals (antimony, arsenic, barium, cadmium, chromium, cyanides, lead, mercury, nickel,

- selenium, silver, bromines, and chlorine).
6. Gas Chromatography - identify pesticides.
  7. Acid/Base Titration - evaluate corrosiveness.
  8. ASTM Specification D-56 - the Tagliabue closed tester for liquids with flash points below 175<sup>0</sup> F (80<sup>0</sup> C).

Analysis parameters for Texas A&M University's wastes and the rationale for analyses are identified below:

1. Acidity/Basicity/pH - evaluate corrosiveness of the waste.
2. Flash Point - determine flammability and ignitability of the waste. (See 40 CFR 264.17).
3. Water Reactivity – determine if the waste exhibits any of the following properties:
  - A. heat generation,
  - B. gas generation,
  - C. internal pressure through expansion, or
  - D. ignition.
4. Oxidizer Test – determine if the waste is should be classified as an oxidizer.
5. Specific Screen Tests – determine if the waste contains organic peroxides, cyanides, and/or sulfides.
6. Elemental Analysis (including organic chlorine) - determine potential reactivity, toxicity, or other hazards.
7. Organic Constituents - determine what organic compound or reactive groups are contained within the waste.
8. Heavy Metals - identify metals contained in the waste.

### **Additional Requirements for Handling Ignitable, Reactive, or Incompatible Wastes**

All liquid wastes are assumed to be (and handled as) ignitable materials. Proper precautions are taken to separate all incompatible and reactive wastes, to reduce hazards.