Grambling State University (GSU) Chemical Hygiene Plan (CHP).

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1. Introduction

As part of the Grambling State University (GSU) Laboratory Safety Program, the Grambling State University Grambling State University Chemical Hygiene Plan (CHP) is a document that establishes protocols, in accordance with the Occupational Safety & Health Administration (OSHA) Laboratory Standard, 29 CFR 1910.1450, to ensure employees are protected from exposure to chemical hazards in the laboratory. Each Science Department (Biology, Chemistry, Physics, Nursing, Fine Art as well as, Principal Investigator of a Research Program (PI))) is to maintain a copy of the CHP, which contains general requirements implemented by the Environmental Health and Safety (EHS) Department and laboratory-specific documents such as hazard assessments, Standard Operating Procedures (SOP), accident and spill reports.

The CHP applies to any GSU laboratory that engages in the use of hazardous chemicals.
The CHP must be made readily available to all employees and regulatory officials. All laboratory employees are expected to use and comply with the CHP. The CHP documentation is available at: www.gram.edu site under GSUNET, **Safety and Risk Management** link.

2. Regulations and Standards

Listed below is summary description of significant Federal regulations and industry standards, related to laboratory safety.

29 CFR 1910.1450, "Occupational Exposures to Hazardous Chemicals in Laboratories"
The Standard dictates that employers limit worker exposure to hazardous chemicals. The Standard requires that employees be apprised of the hazard of chemicals present in their work area through information and training.

29 CFR 1910.1200, "Hazard Communication"
The Standard provides employees with hazard information based on the concept that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working.

29 CFR 1910.132, "Personal Protection "listed
The Standard requires the use of personal protective equipment (PPE) to reduce employees' exposure to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. Employers are required to determine all exposures to hazard in their workplace and determine if PPE should be used to protect their workers. Details are listed under GSUNET.

29 CFR 1910.151, "Medical Services and First Aid"
The Standard states that where the eyes or body of any person may be exposed to injurious corrosive material, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

29 CFR 1910.133, "Eye and Face Protection"
The Standard states the employer shall ensure that each affected employee uses appropriate eye or face protection where there are exposure to eye or face hazards caused by liquid chemicals, acid or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

ANSI Z9.5, "Laboratory Ventilation Guidelines"
The American National Standard Institute (ANSI) in this Standard establishes minimum requirements and best practices for laboratory ventilation systems to protect personnel from overexposure to harmful or potentially harmful airborne contaminants generated within the laboratory.

ANSI Z358.1, "Emergency Eyewash and Shower Equipment"
This standard establishes minimum performance and use requirements for eyewash and shower equipment for emergency treatment of the eyes or body of a person who has been exposed to injurious materials.

ANSI Z87.1, "Occupational and Educational Eye and Face Protection"
This standard establishes minimum requirements for eye and face protective devices and guidance for the selection, use, and maintenance of these devices.

3. DEFINITION OF RESPONSIBILITIES

Chemical Hygiene Responsibilities
Responsibility for chemical hygiene rests at all levels including the:

1) President of the University, who has ultimate responsibility for chemical hygiene within the University and must, with other administrators, provide continuing support for institutional chemical hygiene.
2) The University Safety and Risk Management Coordinator is responsible for the implementation of the University Safety Program
3) The Dean of the college who is responsible for ensuring that all aspects of the University Safety Program are implemented within the college.
4) Department Head, who is responsible for chemical hygiene within the department and serves as the Chemical Hygiene Officer (CHO) and who must:

(a) Work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices;
(b) Monitor procurement, use, and disposal of chemicals used in the lab;
(c) See that appropriate audits are maintained;
(d) Help Principal Investigators (PI) develop precautions and adequate facilities;
(e) Know the current regulatory requirements; and
(f) Seek ways to improve the chemical hygiene program.
(g) ensuring the department remains in compliance with the CHP
(h) providing the instructors within the department with the support necessary to implement and maintain the CHP

5). Laboratory supervisor, who has overall responsibility for chemical hygiene in the laboratory including responsibility to:

(a) Ensure that students and instructors are aware and follow the chemical hygiene rules, that protective equipment is available and in working order, and that appropriate training has been provided;
(b) Provide regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment;
(c) Know the current legal requirements concerning regulated substances;
(d) Determine the required levels of protective apparel and equipment; and
(e) Ensure that facilities and training for use of any material being ordered are adequate.

Chemical Hygiene Officer (CHO) - an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. The CHO is the Environmental Health and Safety Director. This individual is the Safety and Risk

Management Director at GSU.
Hazard – any existing or potential condition in the workplace that can result in death, injury, or property damage.

Hazard assessment -- determination of the health hazards associated with a process or task and the appropriate controls to implement to reduce the hazards.

Hazardous chemical - a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems and agents which damage the lungs, skin, eyes, or mucous membranes.

Laboratory use of hazardous chemicals - handling or use of such chemicals in which all of the following conditions are met:

- Chemical manipulations are carried out on a "laboratory scale;"
- Multiple chemical procedures or chemicals are used.
- The procedures involved are not part of a production process.

PI - Principal Investigator - the individual in charge of directing research in a particular laboratory.

The Principle Investigator is responsible for controlling hazards in his/her laboratory. These responsibilities include:

- performing a hazard assessment for hazardous procedure
- instructing laboratory personnel on potential hazards
- providing written Standard Operating Procedures (SOP) for laboratory activities involving hazardous chemicals
- ensuring employees have received required training
- training employees and students in safe practices, on SOP's, and on the specific hazards within the lab
- training employees and students on appropriate spill response measures and the use of the spill kit
- correcting work errors and dangerous conditions
- investigating accidents or spills to determine cause and implement corrective action, as appropriate
- selecting and providing the proper personal protective equipment (PPE) for the hazard
- ensuring personnel wear appropriate attire and proper PPE.

4. ADMINISTRATIVE CONTROLS

Administrative controls are procedural measures that can be taken to reduce or eliminate hazards associated with the use of hazardous materials. Administrative controls include the following:

- Careful planning of experiments and procedures with safety in mind.
- Planning includes the development of written work procedures for safe performance of the work.
- Restricting access to areas in which hazardous materials are used.
- Using signs or placards to identify hazardous areas (designated areas).
- Use of labels on hazardous materials.
- Substitution of less toxic materials for toxic materials.
- Good housekeeping
- Good hygiene (e.g. washing hands and other areas of possible chemical contact).
- Prohibiting eating, drinking, and smoking in areas of chemical use, and providing break areas for this purpose.
- No mouth pipetting.
- Assuring employees are provided adequate training for safe work with hazardous materials.
- Scheduling so that employees are not alone when working with hazardous materials.

The Chemical Hygiene Officer is responsible for:

- providing technical guidance in the establishment of hazard assessments and SOP's
- presenting OSHA mandated training applicable to laboratory personnel
- inspecting laboratories annually to identify any deficiencies and to verify compliance with the CHP.

Individual laboratory workers are responsible for:

- complying with the SOP's and the CHP
- ensuring that hazards are minimized and controlled
- wearing appropriate attire and proper PPE
- caring for their personal protective equipment (PPE)
- appropriately respondent to and reporting any chemical spills.

5. General Laboratory Rules

1. Laboratories shall be outfitted with safety equipment including safety showers, eyewash fountains, fire extinguishers, fire blanket, and access to emergency alarms and telephones.

2. Laboratories shall be provided with sufficient general ventilation for input to laboratory hoods to ensure that laboratory air is continually replaced and to prevent the increase of air concentrations of toxic substances. The exhaust air must pass directly to the exterior of the buildings

3. Personnel, whether working in or visiting the lab, shall wear appropriate attire and personal protective equipment relevant to potential hazards in the work area. **Note: Safety glasses are not designed to protect against chemical splash, only flying fragments, objects,**

particles, etc. Proper eye protection, i.e., goggles, shall be used when the potential hazard of the splashing of hazardous liquids, including acids, exists.

4. Employees shall be aware of the location and proper operation of laboratory safety equipment including: fire extinguishers; safety showers; eyewash fountains; and, fire blankets in the laboratory.

5. Work areas shall be maintained clean and uncluttered with chemicals and equipment properly labeled and stored.

6. All employees shall avoid unnecessary exposure to chemicals.

7. The PI must approve laboratory work in which a worker will be performing alone, such as during the weekend or late at night. The approval of such work will be based on the associated hazard, i.e. the toxicity of the material and the potential for exposure.

8. Chemicals shall be dated when received and also when opened to prevent exceeding the manufacturer's recommended shelf life limitation. All containers containing chemicals shall be properly labeled.

9. The contents of waste containers must be identified on the container to preclude mixing of incompatible chemicals and to facilitate disposal. Disposal of any chemical waste in sanitary drains is prohibited. Unknown waste may be refused or billed for laboratory analysis of constituents. Refer to the Hazardous Materials Management Policy for guidance on hazardous waste.

10. Malfunctioning laboratory equipment shall be labeled or tagged "out of service" and shall **not be used until repairs have been performed.**

11. Warning signs shall be posted at areas or on equipment where special or unusual hazards exist.

12. Laboratory and non-laboratory areas shall be sufficiently segregated to minimize the potential for chemical exposures in office areas.

13. Designated areas for eating or drinking shall be clearly identified and separated from work areas.

14. Refrigerators or ice machines that are currently or have been used for storage of chemicals shall not be used for food or beverage storage and must be labeled appropriately.

15. Flammables shall not be stored in refrigerators or freezers not designed for such storage.

16. Any spills or accumulations of chemicals on work surfaces shall be removed as soon as possible using techniques that minimize residual surface contamination.

17. Floors shall be cleaned regularly.

6. Hazard Identification - postings, labels, signs

Signage

Laboratories and other potentially hazardous work areas will have signage at all doors leading into the workspace. These signs shall have completed and current posting that identifies the general hazards within the room and lists the phone numbers of persons to be contacted in case of an emergency. Specific hazards, such as UV Radiation (mercury Arc Lamp) should be identified on the piece of equipment or at the source and, also, at the entrance to the room.

Labels

Chemical containers shall be labeled with the full chemical or trade name of the contents. The manufacturer's label will provide personnel with specific information regarding the physical and health hazards of the substance. Directions found on the label shall be followed. Substances transferred from an original container to a secondary container shall be labeled with the full trade or chemical name of the contents, any dilution of the chemical, the date of the transfer, appropriate physical and health hazards. An exception is made to the secondary labeling requirements in cases where one worker, during a process or task, completely uses the chemical in the secondary container. No abbreviations or codes of the chemical name are acceptable, unless they are prominently displayed in the work area. Chemical symbols are allowable only if the compound is a product of the research.

Chemical Inventory

Each laboratory shall maintain an inventory of their stored chemicals including approximate quantities. The inventory shall be maintained in the CHP and updated annually.

Material Safety Data Sheets (MSDS)

The MSDS provides valuable information regarding hazardous characteristics, incompatible materials, and recommendations for storage and spill response. As required by the Hazard Communications Standard and Right-to-Know Laws, an MSDS must be available for each chemical used in the laboratory. These must be available in the workplace for laboratory staff review. The MSDS for all hazardous chemicals should be used during the SOP training of lab staff.

7. Hazard Assessment

Each PI is responsible for assessing the hazardous situations, chemicals, biological materials, and energy sources. The Hazard Assessment (Appendix A), which is a requirement of OSHA for PPE selection, is to be used to develop the SOP's. The purpose of the Hazard Assessment is to identify the potential hazards and then implement applicable measures to control such hazards. See Appendix B for an example of a Hazard Assessment.

Determining hazards is a subjective activity that is made clearer when looking at the two components of workplace hazards: the health effect potential and the frequency potential. The health effects could

range from a trivial outcome such as irritation or a minor cut to the more serious result of a catastrophic injury or death. The frequency potential is the likelihood of an occurrence.

8. Standard Operating Procedures for Hazardous Work

OSHA mandates the development of the SOP for the lab scale use of hazardous chemicals. The SOP is a simple document that identifies a process or the use of a chemical, the associated hazards and hazard controls, special handling and storage requirements, and proper contingency response. There are two types of SOPs: a task or activity specific SOP (Appendix C) and an SOP that relates to a specific chemical. Either type of SOP can be selected and written. If a particular chemical is used in the same manner for multiple tasks then one SOP is sufficient for all work involving that chemical. If a more complicated activity involves multiple chemicals or other types of hazards the task specific SOP would be appropriate. The SOP must include the following elements:

- **General identification**, including name of PI and location
- **Job or process identification or name of specific chemical**
- **Hazard information**, as identified on the Hazards Assessment
- **Required engineering controls and/or special precautions**
- **Required PPE** to be worn during the process
- **Transportation / storage requirements**
- **Accident / spill response**

These laboratory-specific SOPs must be included in the Chemical Hygiene Plan, as a separate section. The CHO will review these SOPs. The PI must ensure that laboratory personnel are trained on the use of the SOPs applicable to their activities.

9. Personal protective equipment

PPE must be worn whenever required as determined by posted areas, hazard assessments, the SOP, MSDS or the PI/Laboratory Supervisor. PPE is not a substitute for engineering controls, but should be used in conjunction with engineering controls and safe practices. Refer to ANSI Z87.1, "Occupational and Educational Eye and Face Protection" for guidance in selecting proper PPE for eye and face protection. All eyewear must meet the requirements of ANSI Z87.1.

- Laboratory personnel are responsible for the care and cleaning of assigned PPE, such as eyewear and for the proper disposal of PPE, as appropriate.
- Chemical goggles shall be worn when a splash hazard exists. Such hazards include pouring of corrosive materials or processes where component failure may release hazardous chemicals with velocity. The additional use of a face shield may be necessary based on the hazard assessment.
- The appropriate gloves, laboratory coats, aprons, shoes or chemical resistant suits shall be used during work where a dermal exposure potential exists, as determined by the hazard assessment and during any chemical spill clean up.
- If a laboratory procedure requires respiratory protection, employees must have, prior to use, (1) respiratory protection training, (2) medical certification, and (3) documentation of fit testing. Contact the CHO for assistance.

Documented Links on GSUNET under **Safety and Risk Management are as listed on the page 10.**

Safety and Risk Management Documentation available on GSUNET are as listed below.

- Visitor/Client Post Incident/Accident Analysis (DA 3000)
- NEW! 2016-2017 Authorized Driver List
- NEW! 2015 GSU Annual Water Quality Report
- 2014 GSU Annual Water Quality Report
- 2013 GSU Annual Water Quality Report
- Insect Sting Prevention and Treatment
- GSU Gas Awareness Information 2012-13
- Lockout/Tagout Procedures Presentation (PDF)
- Laboratory Safety Presentation (PDF)
- Job Safety Analysis (PDF)
- Personal Protection Equipment Training
- Chemistry Chemicals & Safety Information
- 2010 Annual Water Quality Report
- Natural Gas Awareness and Responding Information
- J Public Awareness Program (PAP) for Master Meter Natural Gas Systems
- Hold Harmless Agreement
- H1N1 Information for Higher Education
- First Aid Guide
- Swine Flu Information
- Safety Meeting Report Form (pdf) (doc)
- Fire Drill Report Form (pdf)
- Vehicle Glass Repair Loss Notice (MS Word) (PDF)
- Blood borne Pathogen Exposure Control Plan
- General Safety Manual
- Procedures for Securing University buildings
- Transitional Duty Program
- Violence in the Workplace

Forms:

- **UPDATED!** Authorization and Driving History Form
- **UPDATED!** Vehicle Accident Report Form (DA2041)
- **NEW!** Quarterly Building Inspection Form
- Hold Harmless Agreement
- Incident/Accident Investigation Form(DA2000)
- Employer Report of Injury Form
- Employer Supplemental Report of Injury Form
- General Liability Claim Form

10. Laboratory Hood Operation

Every laboratory fume hood used for the control of air contaminants shall be tested annually to assure that adequate airflow is being maintained to provide continued protection against employee exposure. The hood shall be tested using a calibrated airflow anemometer and/or indicator smoke. The ANSI guideline of 80 to 120 feet per minute (fpm) as an average face velocity, at the working sash height, will be used as acceptance criteria. A sticker will be affixed to the side of the hood indicating the hood has adequate airflow. Any hood that does not meet the acceptable airflow criteria shall be removed from service until repairs can be completed. Signs shall be posted indicating the hood is "Out of Service".

11. Use of Laboratory Hoods

1. Laboratory equipment that may discharge hazardous chemicals shall be vented to local exhaust devices.

2. Laboratory fume hoods shall be used when working with any material that might release hazardous chemical vapors or dust. Work activities that would require the use of a fume hood would include:

    - handling chemicals with significant inhalation hazard, i.e. a chemical with an OSHA permissible exposure limit (PEL) of 100 parts per million (ppm) or less which has appreciable volatility
    - performing procedures with chances of splatter or splash of hazardous chemicals
    - operating processes where component failure may release hazardous chemicals with velocity
    - handling of heated chemicals
    - handling of corrosive materials
    - carrying out reactions with strong exothermic reaction
    - handling chemicals with significant vapor pressure
    - where monitoring shows significant exposure

3. Personnel using a fume hood shall confirm that it is operating properly prior to use. For hoods without static pressure or airflow gauges, an airflow indicator (tell tale) such as an eight-inch strip of light material dangling from the sash can be used to verify airflow into the hood.

4. Equipment in fume hoods shall be kept to a minimum to avoid blockage of airflow or hood face turbulence effects.

5. Laboratory hood sashes shall be kept in the down or closed position when not in use. Hood sashes should be kept as low as practicable during actual use to utilize the barrier capabilities of the sash.

12. Chemical Storage

1. Both the storage amounts and working amounts of toxic, flammable or hazardous chemicals in a laboratory shall be kept to a minimum.
2. Chemicals shall only be stored in a cool, dry, well-ventilated location and in containers with which they are chemically compatible.

3. No chemicals shall be brought into or stored in laboratory offices, equipment storage rooms or other locations not specifically intended for chemical storage.
4. Each lab shall maintained adequate control of known or suspected carcinogens and highly toxic materials. The lab shall post a warning sign, which is highly visible, that depict the carcinogens and highly toxic materials that are used within the lab.
5. Larger capacity storage containers shall be stored on lower shelves.
6. Use of laboratory hoods as permanent storage devices is not permitted.
7. Where under-hood cabinets are used for chemical storage, venting of the cabinet to the fume hood is desirable.
8. Metal containers involved in the transfer of a flammable or combustible liquid shall be grounded and bonded together to minimize potential for ignition by a static electricity discharge.
9. Flammable materials shall not be stored with water reactive, explosive or self-igniting materials or next to strong oxidizing agents.
10. Flammable liquids shall be stored in approved flammable liquid storage cabinets, in accordance with NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals, (see Appendix H). Flammable storage cabinets shall **not** be vented to the laboratory. The cabinet shall have the port hole closed or be vented directly into an exhaust system.
11. Concentrated reagents and other chemicals which could be harmful on skin contact shall be stored below eye-level, well back on properly constructed shelves where they are not likely to be knocked off.
12. Chemical reagents shall be kept in closed containers when not in use.

Below is a concise guide to the storage of most lab scale chemicals.

- perchloric acid is separated from all other materials
- hydrofluoric acid is separated from all other materials
- concentrated nitric acid is separated from all other materials
- inorganic acids (except bulleted items above) are stored separately
- highly toxic materials (LD_{50} of 50 mg/kg or less) are stored separately
- carcinogenic chemicals are stored separately.
- bases are stored separately
- strong oxidizing agents are stored separately
- strong reducing agents are stored separately
- water reactive, pyrophoric and explosive materials are stored separately
- flammable organic materials (solvents, organic acids, organic reagents) are stored separately.

The easiest and most efficient way to separate chemicals by compatibility group is to use secondary containments. Place the chemicals to be stored separately in a heavy gauge Nalgene (or similar plastic) tub. Plastic secondary containers must be compatible with the material being stored. Strong acids, especially perchloric, nitric and hydrofluoric are best stored in plastic containers designed to store strong mineral acids. Small containers of compatible chemicals may be stored in a dessicator or other secure container. This is especially useful for highly toxic materials and carcinogens.

13. Eyewash Stations, Emergency Showers, and Other Safety Equipment Installation and Operability

All laboratories must be equipped with eyewashes and safety showers wherever chemicals have the possibility of damaging the skin or eyes. ANSI Z358.1, "Emergency Eyewash and Shower Equipment" provides for minimum performance requirements (see below).

- The units should be marked with a highly visible sign.

- The units should be located in areas that will be immediately accessible (reachable within 10 seconds).
- The units should be free of obstructions at all times.
- The eyewash units should be checked weekly by a designated lab worker, by flushing for 60 seconds. Emergency showers should be tested every six months, by Facilities Maintenance, to be certain that water flows through it and to clear the lines of stale water and debris.
- Water flow should be 1.5 liters per minute (lpm) for 15 minutes for eyewash stations and 20 gallons per minute for safety showers.
- Safety equipment, including fire extinguishers, fire blankets, emergency respiratory protection, and spill cleanup equipment should also be inspected monthly. Inspections shall be documented on the monthly inspection sheet (see below).

14. Inspections

Each laboratory will perform a monthly inspection that will cover general safety, safety equipment checks, housekeeping, condition and availability of PPE, chemical waste and fire safety. Stored chemicals shall be examined periodically for replacement, deterioration, and container integrity. Any problems noted with regard to any laboratory safety equipment shall be reported to the laboratory supervisor. Unneeded items shall be discarded or returned to the control storage location. The monthly inspection will be signed and dated and should be appended to the CHP.

Additionally, the CHO will perform an annual laboratory inspection, to ensure compliance with the Standard. The inspection report will be submitted to the PI who is responsible for correcting identified deficiencies.

15. Training

The CHO will provide generic laboratory safety training to all laboratory employees on the contents of the OSHA Laboratory Standard, the Chemical Hygiene Plan, and other applicable regulatory and industry standards. Laboratory personnel should take this training within 30 days of initial assignment to a laboratory. Listed in the appendix is a table indicating required training per OSHA. The required frequency that is denoted may be increased at the discretion of the PI. Additionally, the PI will provide specific training to their employees on the associated hazards in their laboratory. This training shall include:

- health information on all hazardous chemicals used in the laboratory
- instruction on all Hazard Assessments
- instruction on SOP's

16. Accidents and Spills

Each lab is responsible for implementing measures to prevent accidents and spills and to appropriately respond to any spill that occurs. Spills should be treated as potentially dangerous until it is cleaned up or evidence exists indicating no hazard is present. In the event of a large or uncontrolled spill activation of the Denver Hazardous Material response team shall be considered. Requirements for the lab include the following:

- Written accident and spill response procedures shall be implemented for tasks or processes involving hazardous chemicals
- Laboratories shall have a spill response kit available in the laboratory to adequately mitigate or control the spill

- Personnel shall be trained by the PI on spill procedures and the use of the spill kit

In the event of a spill or accident the following steps should be taken:

1. Alert associated laboratory personnel of the event. If it is safe to do so, stop the source of the spill and turn off any ignition sources. If spill is uncontrolled the room or building may need to be evacuated.

2. Assist individuals who may have been injured. If someone has been splashed with a chemical take him or her to an eye wash station or shower, as appropriate. Flush exposed tissue continuously for 15 minutes. Remove any clothing that may potentially be contaminated.

3. Call emergency services at **(318) 274-2222** or GSU Safety office **318-274-2419** if an individual is injured or if the spill is too hazardous to abate locally.

4. Before attempting to clean up a spill, personnel must confirm the identity of the material, the appropriate mitigation procedures and material, i.e. appropriate absorbent to use, and the appropriate ppe to use. The CHO and the Hazardous Materials Manager should be consulted with to determine the best course of remediation. If feasible, read and follow the chemical's MSDS recommendation for spill cleanup procedures.

5. Spills, accidents, and near accidents should be investigated by the PI for the purpose of determining corrective actions and preventing like instances in the future. The CHO should be contacted for all investigations. Written findings and any recommendations should be distributed to all relevant departments as a safety to reduce future mishaps.

6. All injuries or exposures must be reported within 24 hours to Risk Management (1-2354). Refer to the Employee Workers Compensation Policy.

17. Hazardous Waste

Labeling:
All hazardous waste must be properly labeled. The label must be completely filled out and include:

1. Accumulation start date reflecting when accumulation begins, not before or after. Full dates must be used on this label (**DD/MM/YY**).
2. Full chemical names must be used; acronyms and chemical formulas are not acceptable
3. Concentrations

Segregation of Chemical Waste:
All chemical waste should be segregated by hazard class using appropriate secondary containment.

Secondary Containment:
Proper secondary containment must be used when incompatible chemicals are stored in the same area. The secondary containers must be of sufficient capacity to contain the contents of the primary container in case of breakage and must be chemically compatible.

Chemical waste Containers securely capped or sealed:
Securely capped means if the bottle is tipped, no leakage occurs. Aluminum foil and parafilm do not constitute a secure cap. If zip-top bags are used to contain contaminated pipette tips, the bag must be securely closed. Chemical waste containers should only be open during filling. Evaporating waste is never allowed.

Container Less than 1 Year Old:
Chemical waste containers must be removed by EH&S within one year of the start date on the waste label. Please contact EH&S for evaluation and/or removal of all expired or unused chemicals

Removal:
Do not put hazardous waste down the sink or in the trash. If you are not sure if a chemical is hazardous, call the Hazardous Waste Manager. The following information must be provided on the waste disposal label:

18. Exposure Monitoring

Personal exposure monitoring will be performed if EH&S or the lab staff has reason to believe that the exposure level of any chemical may exceed the action level or Permissible Exposure Limit **(PEL**).

19. Medical Consultation and Examination

The employer must provide all employees who work with hazardous chemicals an opportunity to receive medical attention, under the following circumstances.

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.
- Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.
- Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.

20. Recordkeeping

The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

Appendix A: Standard Operating Procedures for Laboratory Chemicals

I. Chemical Procedures

A. It is the policy of the Science Department to aggressively and continually evaluate current inventory and properly dispose of unnecessary chemicals.
B. It is policy of the Science Department not to procure extremely hazardous (e.g. mutagenic, carcinogenic, teratogenic), extremely flammable and/or explosive, or different to dispose of chemicals.
C. Chemical containers shall not be accepted without accompanying labels.
D. All chemical labels must be dated and inventoried when received and opened.

II. Chemical Storage

A. Received chemicals shall be immediately moved to the designed Chemical Storage.
B. Chemicals must be stored in accordance to chemical compatibility in a chemical facility compatible with the specific chemical.
C. Chemicals requiring cold storage must be stored in a facility devoted solely for that purpose, and under no circumstances shall food or beverages be allowed to be stored in that facility.
D. Chemical inventories shall be kept to a minimum in working laboratories.
E. No food or beverage may be stored in the laboratory. If a laboratory experiment involves food or beverages, then they must be clearly labeled "Not for Human Consumption" (or equivalent).
F. Stored chemical shall be inspected at least annually or containers integrity and/or deterioration by the CHO. Any suspected problems shall be reported to the CHO for any remedial action. The CHO shall determine whether any corrosion, deterioration or damage has occurred to the storage facility as a result of leaking chemicals and shall arrange for remedial action by the Physical Plant.

III. Chemical Handling Precautions

A. Skin contact with chemicals shall be minimized by adhering to standard laboratory techniques such as appropriate use of spatulas, weighing gloves, etc.
B. After handling any chemical substance all persons shall wash their hands with soap prior to leaving laboratory or work area.
C. The use of mouth suction for pipfitting or starting a siphon is strictly prohibited.
D. Eating, drinking, chewing gum, chewing tobacco, or the application of cosmetics, hand lotion, lip balm, in the laboratory or chemical workroom is strictly prohibited.
E. Any chemical mixture shall be assumed to be as hazardous as the most hazardous component in the mixture.
F. When working with flammable chemicals, the worker must be certain that there are no sources of ignition near enough to cause a fire or explosion in the event of a vapor release or liquid spill.
G. Whenever exposure by inhalation is likely to exceed the TLV described in MSDS, a hood must be used.

IV. Laboratory Equipment and Glassware

A. All laboratory equipment shall be used only for its intended purpose.
B. All chipped or broken glassware shall be disposed of in a broken glass container.
C. Glass apparatus that is to be used under reduced pressure conditions shall be shielded in the event of an implosion.
D. Electrical equipment with frayed power cords shall not be used until appropriate repairs have been made.

Eye protection

Routine hazards

1) All employees, visitors and students must wear safety goggles when in a laboratory or workroom where chemicals are being used.
2) The use of contact lenses is discouraged. When the use of safety goggles is required.

Special hazards

a) The use of a face shield is strongly recommended, when working with concentrated acids, bases and cleaning bats for glass wear.
b) In addition to a face shield, a hood with a safety window may be appropriate for experiments involving either high or low pressure, Low risk conditions
c) Eye protection will not normally be required in the following situations:
d) Balance rooms
e) Instrument rooms
f) Laboratories during a lecture presentation or a testing situation or during an exercise that does not use chemicals or during an exercise that uses only very small amounts of dilute solutions for sustaining purposes.

Gloves

a) The use of gloves for handling chemicals may be worse that no glove at all. The presence of strongly caustic solutions on the skin generally do not cause pain; thus, the use of a glove that springs a leak may go undetected causing severe skin damage.
b) Most chlorocarbon solvents dissolve rubber with the evolution of heat. The use of rubber containing gloves for these substances is not recommended. Only special made for these chemicals should be used.
c) Disposable type gloves should be worn when handling chemicals that represent a specific hazard above that normally associated with chemicals.
d) Thermal resistant gloves shall be worn for operations involving the handling of heated materials, reactions, and cryogenic materials.

Clothing

a) Normal clothing should be comfortable and not restrict motion yet not so loose (esp. sleeves) as to catch on equipment.
b) The use of aprons is recommended, and they should be either washed or discarded upon the discovery of significant contamination.
c) Leather shoes that cover the feet should be worn. Canvas or athletic type shoes that could allow liquids to rapidly pass through do not provide the necessary protection and are not recommended. Sandals and open-toed shoes are potentially dangerous and are forbidden.
d) No Shorts shall be worn in the Laboratory

VI. Personal Work Practices

a) No solitary work by students or student laboratory assistants is permitted unless supervised by a responsible faculty member.
b) Long hair shall be confined close to the head to avoid contact with Bunsen burners or chemicals.
c) Never taste a chemical while in a laboratory setting.
d) Check a chemical for odor only by gently wafting some of the vapor from the open container with your hand toward your nose.
e) Encourage safe work practices in coworker by setting the proper example. Report unsafe practices or conditions to the CHO or laboratory instructor.

VII. House Keeping

a) Access to emergency equipment, showers, eyewashes, and exits should never be blocked by anything, not even a temporarily parked chemical cart.
b) All chemical containers must be labeled with at least the identity of the contents and the hazardous those contents present to users.
c) Keep all work areas, especially laboratory benches, clear of clutter.
d) Keep all aisles, hallways, and stairs clear of all chemicals.
e) All chemicals should be placed in their assigned storage area at the end of each workday.
f) At the end of each workday, the contents of all unlabeled containers are to be considered wastes.
g) Wastes should be properly labeled and kept in their proper containers.
h) Promptly clean up all spills, properly dispose of the spilled chemical and clean up material.
i) All working surfaces and floors should be cleaned regularly.
j) No chemical are to be stored in aisles or stairwells, on desks or laboratory benches, on floors or in hallways, or to be left overnight on shelves over workbenches.

VIII. Emergency Response for Chemical Spills

Liquid Spill

1) Evacuate personnel from the area if a noxious or lachrymatory gas is produced via evaporation or reaction with moisture. Public Safety will be responsible for "sweeping" the building(s) to ensure all affected areas are evacuated.
2) Provide and first aid if necessary to affected personnel. Liberally use eyewash station or safety shower to flush affected areas for at least 15 minutes.
3) If the chemical highly flammable, eliminate ignition sources such as hot plates, Bunsen burners, etc.
4) Notify Campus Safety, Physical Plant, Fire Department, First Aid personnel if necessary.
5) If the spill is relatively small (<2 liters), liberally cover the spill with the appropriate absorbent material from the chemical spill clean-up kit. The three absorbent materials are labeled "Acid Spills", "Base Spills" or "Organic Spills". Place absorbent material in a container for disposal by the CHIf the spill is a relatively large (2-5 liters) an inorganic acid or base, utilize a mop and water with a mop bucket and wringer to pick up as much of the spilled material as possible. Contact the CHO to report the spill and obtain advice on how to neutralize the mop bucket contents and how to dispose of the mop contents.

Solid Spill

1) For small spills such as those that occur around balances sweep the solid into the garbage can.
2) For large spills sweep as much of the solid a possible into a dustpan and place into a labeled recovered chemical container for disposition by the CHO.

Mercury Spills

1) Clean up as much as possible with a mercury vacuum.
2) Liberally spread area with spill clean-up kit absorbent for mercury.
3) Sweep up the absorbent material and place in a labeled recovered chemical container for disposition by the CHO.

Incident Report

- For all major spills an incident investigation will be conducted by the CHO. The CHO will send a written report to the University Safety Committee.

IX. Compressed Gas Cylinders

1) Compressed gas cylinders must be securely strapped to a bench top or wall at all times.
2) Whenever a gas cylinder is moved, the regulator must be removed and the protective cap must be in place.
3) If a cylinder is moved more than a few feet, a cylinder cart must be used. The cylinder must be strapped down to the cart and the protective must be in place.

X. Neutralization Procedures

General

1. Do neutralizations in a fume hood behind a safety shield, as fumes and heat may be generated. Wear lab coat or apron, gloves and goggles.
2. Keep containers cool during process.
3. Work slowly.
4. Once neutralization is complete, flush to sewer with 20 parts water.

Acid Neutralization

1. While stirring, add acids to large amounts of an ice water solution of base such as sodium carbonate, calcium hydroxide, or sodium hydroxide for concentrated acids.
2. When a pH of at least 5.5 is achieved, dispose of the solution into the sewer, followed by 20 parts water.

Base Neutralization

1. Add the base to a large vessel containing water. Slowly add a 1M solution of HCI.
2. When a pH of 9 or less is achieved, dispose of solution into sewer system followed by 20 parts water.
3. Keep track of amount and pH of neutralized substance and provide this information to the Hazardous Waste Coordinator on a semester by semester basis.

XI. Chemical Waste Accumulation and Storage

1. Choose the right container for the waste

When selecting a container to accumulate or store hazardous waste, these questions must be answered..

1) **Is the container compatible with the waste?** You must ensure that a container will not react with, be affected by, or absorb its contents. Containers that will be used for transporting waste must comply with U.S. Department of Transportation (DOT) regulations. Refer to the DOT Hazardous Materials Table at 49 CFR 172.101 for guidance and requirements. Access the table through the Government Printing Office Web site at: http://ecfr.gpoaccess.gov/
2) **Is the container sufficiently strong?** Ensure containers are sturdy and strong enough to withstand side or bottom shock, when full, without leaking waste. Rust, other corrosion, or dents in seam areas indicate a container may not be strong enough to use.
3) **Is the container able to fully contain the waste when closed?** Ensure that a full container will not release waste even when dropped or overturned. To meet this requirement, any containers that hold free liquid must be liquid-tight, even when overturned.

Close the container except when adding or removing waste

Hazardous waste containers must be closed at all times except when waste is being added or removed. *Closed* means bungs are fully screwed in, open-head drums are fully bolted or 'snapped' retaining rings, and snap-lid buckets lids are fully locked. Open funnels and lids that shut by gravity alone do not meet this requirement. Funnels with latchable lids or integral shut-off valves may meet the requirement.

2. container labeling

a) Labeling allows personnel and emergency responders to identify the contents of a container and determine a response to any incident.

b) When labeling a container holding hazardous waste that is fully regulated, you must include the following information and ensure it is legible:

c) a hazardous waste label (provided by the Hazardous Waste Coordinator)
d) a clear description of the waste – Reactive; Toxic; Flammable; Corrosive
e) the *accumulation start date* – the date you begin collecting waste in a container*

A form provided by the Hazardous Waste Coordinator will be started for each container. This form will have the amounts of each specific constituent on it. The lab technician will give each container a unique number, writing that number on the container and the corresponding space on the Chemical Mixture form. These forms will be kept in a folder at the site where the waste is located until disposal period.

Standard Operating Procedure for Chemicals Worksheet

Principal Investigator: _____ Dept.: _____

Building: _____ Room(s): _____

Author: _____ Date: _____

Chemical name: _____

Description of Chemical Hazard: _____

_____

Engineering controls to be implemented: _____

_____

PPE to be worn: _____

Transportation / Storage Requirements: _____

_____

Exposure / Accidental Contact: _____

_____

Spill Response: _____

_____

Appendix B: Procedure-Specific Safety Procedure

I. General Instruction

1) The laboratory is responsible to put into place the appropriate experimental design and procedure required for working with carcinogens, teratogens, or chemicals, which have the potential to become acute hazardous wastes.
2) Typical design and procedures for such work require work practices and engineers controls to isolate such substances from the environment. Such practices could include additional closed containment systems such as glove boxes.
3) All experimental procedures must contain written description specific safety practices incorporating the applicable precautions described in this section. Employees should be read and understood these practices before commencing a procedure.

II. Procedures for handling extremely Toxic Chemicals

1) OSHA's definition of Acutely Toxic Chemicals includes: 1) A chemical that has a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each; 2) A chemical that has a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each; 3) A chemical that has a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each. The MSDSs for many of the chemicals used in the laboratory will state recommended limits or OSHA-mandated limits, or both, as guidelines for exposure. Typical limits are the TLV, PEL and action levels. When such limits are stated, they will be used to assist the CHO in determining the safety precaution, control measures, and safety apparel that apply when working with toxic chemicals.
2) When a TVL or PEL value is less than 50 ppm or 100 mg/m3, the user of the chemical must use it in an operating fume hood, glove box, vacuum line to similar device, which is equipped with appropriate traps and or scrubbers. If none are available, no work should be performed using that chemical.
3) If a TLV, PEL or comparable value is not available for that substance, the animal or human median inhalation lethal concentration information, LC50, will be assessed. If that value is less than 200 ppm or 2000mg/m3 (when administer continuously for one hour or less), then the chemical must be used in an operating fume hood, glove box, vacuum line, or similar device, which is equipped with appropriate traps and/or scrubbers. If none are available, no work should be performed using that chemical.
4) Whenever laboratory handling of toxic substances with moderate or greater vapor pressure will be likely to exceed air concentration limits, laboratory work with such liquids and solids will be conducted in an operating fume hood, glove box, vacuum line, or similar device, which is equipped with appropriate traps and/or scrubbers. If none are available, no work should be performed using that chemical.

III. Procedures for Flammable Chemicals

A. In general, the flammability of a chemical is determined by its flash point, the lowest temperature at which an ignition source can cause the chemical to ignite momentarily under certain controlled conditions.

B. Chemicals with a flash point below 93.3 ‘C (200 ‘F) will be considered “fire-hazard chemical:

C. OSHA standards and the NFPA guidelines on when a chemical is considered flammable apply to the use of flammable chemicals in the laboratory. In all work with fire hazards chemicals, follow the requirements of 29 CFR, subparts H and L; NFPA manual 30, “Flammable and Combustible Liquids Code”; and NFPA Manual 45, “Fire Protection for Laboratories Using Chemicals”.

D. Fire-Hazard chemicals should be stored in a flammable-solvent storage area or in storage cabinets designed for flammable material.

E. Fire-hazard chemicals should be used only in vented hoods and away from sources of ignition.

IV. Procedures for Reactive Chemicals

A reactive chemical is one that:

a) Is described as such in the MSDS data ,
b) Is ranked by the NFPA as 3 or 4 for reactivity
c) Is identified by the DOT as:
d) An oxidized
e) An organic peroxide, or
f) An explosive, Class A, B, or C
g) Fits the EPA definition of reactive in 40 CFR 261.23
h) Fits OSHA definition of unstable in 29 CFR 1910.1450
i) Is known or found to be reactive with other substances.

C. Handle reactive chemicals with all proper safety precautions, including segregation in storage and prohibition on mixing even small qualities with other chemicals without prior approval and appropriate personal protection and precautions.

V. Procedures for Corrosive Chemicals and Contact-Hazard chemicals

Corrosively, allergenic, and sensitizer information is sometimes given in manufacture’s MSDSs and on labels. Also, guidelines on which chemicals are corrosive can be found in other OSHA standards and in regulations promulgated by DOT in 49 CFR and EPA in 40 CFR.

A corrosive is one that:

a) Fits the OSHA definition of corrosive in Appendix A of 29 CFR 1910.1200
b) Fits the EPA definition of corrosive in 40 CFR 261.22 (has a pH greater than 12.5 or less than 2.0)
c) Is known or found to be corrosive to living tissue.

A contact-hazard chemical is an allergen or sensitizer that:

a) Is so identified or described in the MSDS or on the label,
b) Is so identified or described in the medical or industrial hygiene literature, or

c) Is known or found to be an allergen or sensitizer.

Handle corrosive chemicals with all proper safety precautions, including wearing both safety goggles and face shield, gloves tested for absence of pin holes and known to be resistant to permeation or penetration, and laboratory apron or laboratory coat.

Appendix C: Control Measures and Equipment

I. Ventilation

Laboratory ventilation should be not less than eight air changes per hour (calculated). This flow is not necessarily sufficient to prevent accumulation of chemical vapors. Work with toxic chemicals that have low air concentration limits, or that have high vapors pressures, should always be done in a hood.

Fume hoods should provide 70 to 90 linear feet per minute of airflow.

C. Laboratory employees should understand and comply with:

a) A fume hood is a safety backup for condensers, traps or other devices that collect vapors and fumes. It is not used to "dispose" of chemical by evaporation unless the vapors are trapped and recovered for proper waste disposal.
b) The apparatus inside the hood should be placed on the floor of the hood at least six inches away from the front edge.
c) Fume hood windows should be lowered (closed) at all times except when necessary to raise (open) them to adjust the apparatus that is inside the hood.
d) The hood fan should be kept "on" whenever a chemical is inside the hood, whether or not any work is being done in the hood.
e) Personnel should be aware of the steps to be taken in the event of power failure or other hood failure.
f) Inspect hood vent duct and fans at frequent intervals to be sure they are both clean and clear of obstructions.
g) Hoods should never be used as storage areas for chemicals, apparatus, or other material.

II. Flammable-Liquid Storage

Fire-Hazard chemicals in qualities greater than 500 mL should be kept in metal safety cans designed for such storage. The cans should be used only as recommended by the manufacture. Including the following safety practices.

a) Never disable the spring-loaded closure
b) Always keep the flame-arrestor screen in place; replace if punctured or damaged.
c) Cabinets designed for storage of flammable materials should be properly used and maintained. Read and follow the manufacture's information and also these safety practices.
d) Store only compatible material inside a cabinet.
e) Do not store paper or cardboard or other combustible packaging material in a flammable-liquid storage cabinet.
f) The manufacture establishes quantity limits for various sizes of flammable-liquid storage cabinets; do not overload a cabinet.

III. Eyewash Fountains and Safety Showers

A. Equip all laboratories with eyewash and safety showers. These must be located so they can be reached from any point in the laboratory, as specified in ANSI Z358.1.
B. Check the functioning of eyewash fountains and safety showers and measure the water flow at intervals specified in ANSI Z358.1. Promptly repair any facility that does not meet the water flow requirements of ANSI Z358.1.

C. Be sure that access to eyewash fountains and safety showers is not restricted or blocked by temporary storage of objects or in any other way.

IV. Vapor Detection

A. Do not use odor as a means of determining that inhalation exposure limits are or are not being exceeded.

B. Whenever there is reason to suspect that a toxic chemical inhalation limit might be exceeded, whether or not a suspicious odor is noticed, notify the supervisor.

C. Laboratory workers should vacate the premises until measurements of the concentration of the suspect vapor in the air show that the limit is not exceeded. Under this circumstance and if there is no reason to anticipate an increase in the concentration of the chemical, and the supervisor approves, the work may continue.

Appendix D: Hazardous Waste Management Plan

PROCEDURE STATEMENT: The purpose of Hazardous Waste Management is to prevent the procurement of hazardous materials and the creation of all hazardous waste, but if that cannot be accomplished, the campus must be able to minimize and properly dispose of the waste that is generated. **Grambling State University, (GSU)** is required to manage hazardous wastes in a safe and environmentally sound manner by Federal, State, and local regulations. As a generator of hazardous waste, we are responsible for ensuring that employees follow University guidelines concerning management and disposal of hazardous waste within the laboratory, shop or service areas.

PROCEDURES: The following procedures explain the steps needed to comply with the University policy concerning management and disposal of hazardous waste within the laboratories, shops, or service areas. The following procedures also explain the steps needed to comply with University rules on how to handle hazardous waste, and how to prepare for chemical spill emergencies. They are presented to give GSU employees a better understanding of how to manage chemical wastes.

1. The "8" Steps at **GSU** for Hazardous Waste Compliance"
   - **GSU** has evaluated our waste streams.
   - **GSU** hazardous waste containers are clearly marked.
   - **GSU** stores hazardous waste correctly.
   - **GSU** hazardous waste is transported and disposed of correctly.
   - Manifests are prepared for collection and disposal of hazardous waste.
   - **GSU** has a plan for hazardous waste emergencies.
   - **GSU** trains their employees on Hazardous Waste.
   - **GSU** keeps records of hazardous waste.

   Department's (Head of Department,-- the Chemical Hygiene Officer-CHO) responsibility of managing waste.
   a. The CHO in each department will conduct an inventory of the products in their area for disposal.
   b. Weekly inspections will be performed on all hazardous waste storage containers. **(See attached Hazardous Waste Weekly Inspection Form (1).)**
   c. Primary Departments Contact:

2. **Who is covered in this policy:**
   Any employee who:
   - Uses chemicals and may have the need to dispose of chemical waste.
   - Supervises employees or students that work with chemicals.
   - Fills out waste packing forms or labels for hazardous waste containers.
   - Transports hazardous waste.
   - Trains others in proper hazardous waste management at GSU
   - Responds or assists in the response to chemical releases or spills.

3. **Waste Minimization:**

GSU is committed to the protection of human health and the environment. To meet these commitments, the University strongly encourages its employees to utilize chemical waste minimization techniques to reduce the volume and toxicity of chemical wastes produced at **GSU**. An important benefit from waste minimization is that it will help reduce the University's escalating chemical disposal costs. The following sections describe common waste minimization techniques.

a. Inventory Management and Control:

- Audit chemical supplies and use inventory control.
- Survey all the chemicals in your labs, shops and storerooms and dispose of those chemicals that have not been used within the past year or two.
- Purchase only the quantity of chemical required for specific projects.
- If you have chemicals stored in a "shared" storeroom, take responsibility to redistribute or dispose of those old chemicals left by personnel or students no longer at the University.

b. Ways to reduce Hazardous Waste at GSU:

- Waste-stream segregation: Mixing hazardous waste with other waste creates a bigger waste problem. Waste-stream segregation is an extremely easy way and important method to cut back on the amount of hazardous waste generated. Waste segregation also makes it easier to reuse and recycle wastes.
- Practice good housekeeping: Careful operating and transferring chemicals can help prevent spills and leaks. Careful monitoring can help keep down waste generation from preparing excess raw materials or from careless use of products and materials. Check to see if all of the equipment is running properly. Are there leaks in the system that causes waste?
- Substitution: Whenever possible, substitute non-hazardous materials for hazardous materials. Substitute water based paints for oil or solvent based paints. Often a product that creates a hazardous waste is used simply because it is more convenient, traditional, or is promoted by a certain supplier. When a variety of products can be used to perform the same job, the least hazardous product should be chosen. Encourage suppliers to provide products that do not become hazardous wastes.
- Improved Operations and Process Modifications: Have production and maintenance staff members look for ways to improve the efficiency of the current operations and reduce waste. We should always be on the lookout for new processes that do not create hazardous waste. If there is thought of purchasing new machinery or a change of process in some way, factor waste generation into your decision. A process that creates less hazardous waste or that recycles hazardous waste as an integral step in the process can result in significant savings. At the same time, liabilities will be limited..
- Do not dispose of hazardous waste by evaporation, sewer, trash:
  Caution: Never throw hazardous chemicals in the trash! Never pour hazardous chemicals down sinks, toilets, floor drains or onto the ground! You can be held criminally liable for purposely misrepresenting the contents of your wastes and improperly disposing of your wastes! No matter how "harmless"

the chemical NEVER throw chemicals down the drain, out in the trash, or out in the environment. Remember, you will be held liable.

C. What must be done:

- Use pollution prevention techniques to reduce the amount of hazardous waste generated.
- Use microscale techniques, non hazardous chemical substitutes, or process modification to reduce the amount of waste generated.
- Contact your peers, professional organizations, or vendors to learn about the latest pollution prevention techniques.
- Share unused chemicals within your department.
- Train your employees and students in pollution prevention techniques.
- Use the Chemical Redistribution Program to recycle unused chemicals.

d. Listed Hazardous Waste:

- EPA and MPCA regulations list approximately 450 commercial or off-specification chemicals, waste streams, or their spill residues which must be handled as hazardous wastes due to their acute or chronic toxicity. Of special interest are those chemicals with an EPA Waste Code beginning with the letter "P." when these chemicals are disposed of, there are more stringent on-site storage requirements and the empty containers must be triple-rinsed before discarding as trash.

e. Neutralization and Deactivation:

- Some laboratories generate a simple, pure chemical stream, such as a dilute acid or base that can be rendered nonhazardous by simple neutralization. Other labs may generate a dilute aqueous that contains a metal which can be easily precipitated.

Segregation and Characterization:

- Do not mix wastes. Especially do not mix hazardous wastes with nonhazardous wastes.
- Accurately label the waste bottles as to their exact content.
- Segregation and characterization allows waste to be redistributed for reuse if someone else in the University system can use the chemicals; if the waste cannot be redistributed, segregation simplifies chemical recycling, such as distillation or reclamation, and minimizes costs.

4. **Expired and obsolete product determined to be hazardous waste:**
   Those products that have been determined to be hazardous waste will be placed in a satellite drum marked "hazardous waste." Disposal of used floor dry materials, oil rags, absorbent pillow, etc., must be collected and managed by the maintenance department for disposal.

   Properly label waste containers:
   Label each bottle with the words "Hazardous Waste," and the exact contents of the bottle (including percentages and water content). Do not use abbreviations or chemical formulas, as emergency responders may not recognize these.
   - Add the start date and fill date.
   - Add your name and phone number.
   - Satellite accumulation areas are located in each science lab and prep area. Any waste placed here will be picked up on a weekly basis.

5. **Keep waste in compatible containers and closed at all times:**
   - Containers and lids must be compatible with the waste chemicals stored in them.
   - Keep waste containers closed at all times except when adding or removing waste.
   - Caution: do not leave a solvent bottle, drum, or any bottle of waste open with a funnel in it for the sake of convenience! This is one of the most common citations from inspectors.

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6. **Segregate incompatible waste:**
   - Especially separate acids from bases, oxidizers away from organics, water away from any water sensitive compound, cyanides from acids, and organic acids from oxidizing acids (nitric, fuming sulfuric, perchloric).

7. **Use secondary containment for liquid waste**:
   - Use containment trays or safety cabinets to store waste containers and boxes (high density polyethylene trays).
   - Caution: Use compatible containers for your waste. For example, use glass jugs for organic solvents or polyethylene for strong caustic solutions! Make sure the containers and caps will not react with your waste!

8. **Initial and Annual Training Requirements**
   - Students must be trained by their instructors on how to manage hazardous waste in their teaching laboratories or research areas. At this time, training documentation is not required for students.

9. **Training and Awareness**:

a) Train your employees when they are first hired and annually. Training should include:
b) The concepts described above.
c) Annual documentation of the training signed by both the employee and supervisor.
d) New Employee Training should include the following:
e) Hazardous waste definitions.
f) Who to call for hazardous waste information.
g) Preparing waste for collection:
h) Hazardous waste evaluation – using the Waste Registry.
i) Closure of containers.
j) Labeling of hazardous waste storage containers.
k) Storage of incompatible wastes – separate by tray, cabinet, room, etc.
l) Completion of the waste packing forms.
m) Other compliance issues:
n) Container inspections
o) Secondary containment for free liquid wastes
p) No hazardous waste allowed in trash or salvage dumpsters
q) Evaporation of chemical residues is not allowed
r) Emergency chemical spill response procedures
s) Management of problem wastes – unknowns, batteries, etc.
t) Pollution prevention techniques
u) Self auditing procedures
v) Training Documentation Requirements

w) Document initial and annual update training includes
x) Copies of the signed initial and annual update hazardous waste generator training records should be kept in your department's head office.
y) Records must be kept for at least three years past the termination date of a GSU employee's employment.
z) Alternative methods of documenting training are acceptable, e.g. electronic files, scanned files, microfiche, etc.
aa) Records must be made available upon request by Federal, State, or local hazardous waste inspection officials, or GSU Safety Officer.