SAFETY PLAN
GEOTECHNICAL LABORATORY
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
UNIVERSITY OF UTAH

INTRODUCTION

The University of Utah and the Department of Civil and Environmental Engineering encourage and support all programs that promote safety, good health, and well-being of University faculty, staff, students, participants in University sponsored programs, and visitors. It is the policy of the University of Utah and the Department of Civil and Environmental Engineering to provide safe and healthful conditions and to reduce injuries and illnesses to the lowest possible level. No task is so important and no service so urgent that it cannot be done safely. In keeping with this commitment, this Laboratory Safety Plan has been developed.

The Laboratory Safety Plan is designed to protect laboratory personnel from potential hazards associated with the use of the geotechnical laboratory. The University requires that general standard operating procedures are outlined for all laboratories. Specific standard operating procedures developed by each lab for operations posing a special hazard must be developed by each department.

EMERGENCY CONTACTS

Fire/Ambulance/Police ................................................................. 801-585-2677
Utility Failure ................................................................. 801-581-7221
Utility Failure (off hours)) ................................................................. 801-581-8101
Poison Control ................................................................. 801-581-2151
University Hospital Emergency Department .................. 801-581-2291
Spill Control ................................................................. 801-585-2677

You are located at HEDCO Room 108. The nearest telephone is in the hallway of the CME building 1st Floor by the elevators.

Stay on the telephone line if possible with the dispatcher. If you cannot stay on the line, tell the dispatcher the exact location of the emergency and the type of help needed.
I. GENERAL INFORMATION AND PROCEDURES

Maintaining a safe and healthy environment in the laboratory is ultimately the responsibility of the Supervisor of the Laboratory or Principal Investigator using the laboratory. However, each individual is expected to conduct all operations and procedures in a safe and prudent manner.

A. ROLES AND RESPONSIBILITIES

Lab Supervisor: Dr. Steven F. Bartlett phone: 801-587-7726
Alternate: Dr. Evert Lawton phone: 801-585-3947
Alternate: Civil Engineering Administrative Assistant phone: 801-581-6931

The laboratory supervisor has responsibility for implementation of the Safety Plan in his/her laboratory. The laboratory supervisor shall:

- ensure that workers are trained and follow the plan outlined in this document;
- ensure that the necessary protective and emergency equipment is available, in working order, and that appropriate training has been provided;
- ensure that periodic laboratory inspections are performed;
- know current legal requirements concerning regulated substances;
- review and evaluate the effectiveness of the laboratory specific Standard Operating Procedures (SOP) at least annually and update as necessary.

The laboratory employees or students are responsible for:

- planning and conducting each operation in accordance with practices and procedures established in this Safety Plan.
- using equipment only for its designed purpose;
- being familiar with emergency procedures, including knowledge of the location and use of emergency equipment for the laboratory, as well as how to obtain additional help in an emergency;
- knowing the types of protective equipment available and using the proper type for each procedure;
- being alert to unsafe conditions and actions and calling attention to them so corrections can be made as soon as possible.
B. INFORMATION AND TRAINING

The laboratory supervisor shall ensure that information and training are provided at the time of an employee's or student’s initial assignment to a hazardous work area. Refresher information and training shall be conducted at least annually and documented.

Information

All laboratory personnel shall be informed of:
- Requirements of the OSHA Standard, "Occupational Exposure to Hazardous Chemicals in Laboratories",
- The location of reference materials on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets (MSDS's).

Training

Employee training or student training shall include:
- The physical and health hazards associated with devices, materials or chemicals stored and used in their work area,
- The contents of this Chemical Hygiene Plan, (if applicable)
- Methods and observations that may be used to detect the presence or release of a hazardous chemical; e.g., exposure monitoring conducted by the CHO, visual appearance or odor of hazardous chemicals when being released, etc. (if applicable)

C. PRIOR APPROVAL CIRCUMSTANCES

- Employees and students must obtain prior approval to proceed with a laboratory task from the laboratory supervisor or his/her designee when:
  - Devices with open flames or combustible materials are used,
  - Radioactive materials are used,
  - Hazardous chemicals are used,
  - Safety equipment has failed or is not present,
  - Other hazardous or unsafe conditions are noted
II. STANDARD OPERATING PROCEDURES

General Rules

A. Laboratory Experiment Procedures

- Employees and students are required to follow laboratory procedures as outlined in ASTM (American Society of Testing and Materials) or other procedures given to them by the Laboratory Supervisor or his/her designee.

B. Incident Reporting

- All injuries shall be reported to the Lab Supervisor or Teaching Assistant using the University Incident Report. The form is available on Environmental Health and Safety website (see Incident/Hazard Reporting).

- All “near misses” shall be reported to the Lab Supervisor and shall be analyzed by the affected personnel to determine the cause of the event and what controls, equipment or procedures should be implemented to prevent future occurrences.

C. Personal Protective Equipment and Dress

- Carefully inspect all protective equipment prior to use. Do not use defective equipment.

- Eye protection (safety glasses) shall be worn at all times when operating laboratory equipment or when standing near operating equipment. This includes visitors. Ordinary prescription glasses are not considered effective eye protection since they lack necessary shielding.

- When working with corrosive, toxic, allergenic, or sensitizing chemicals, rough or sharp-edged objects, very hot or very cold materials, gloves made of material known to be resistant to permeation by the substance shall be worn. Leather gloves shall be worn when handling items from the ovens.

- Low-heeled shoes with fully covered uppers shall be worn at all times in the laboratory. Shoes or sandals with open toes shall not be worn.
• Long pants and long sleeves should be worn when working with or around chemicals.

• Long hair should be held in place behind the head.

• Loose clothing, especially loose trouser legs and sleeves, should not be worn in the laboratory.

• A full-body-length rubber, plastic, or neoprene apron appropriate for the material being handled should be worn if there is risk of chemical splash or spill.

• Employees and students are required to wear safety glasses while operating equipment in the laboratory. Gloves shall be worn when working with items stored in the drying ovens.

• Jewelry and loose clothing shall not be worn while operating equipment with moving parts.

• Shoes, shirts, pants and/or shorts shall be worn at all times in the laboratory.

• Safety glasses, protective gowns, overalls and gloves will be made available upon request by the laboratory supervisor.

D. Personal Conduct

• Horseplay or practical jokes will not be tolerated in the laboratory. Such actions are grounds from dismissal from the laboratory or termination.

E. Crush and Pinch Hazards

• Know the procedure and methods for correct use of all tools that you will be using in the laboratory. Do not operate tools and equipment that you are not familiar, or for which you have had no training.

• Know the pinch points and crush hazards for laboratory equipment that you will be operating.
• Establish a safety zone around equipment with a pinch or crush hazard. Do not allow others to infringe the safety zone while the equipment is operating.

F. Cuts

Cuts from broken glass objects or cutting instruments are among the most common injury in laboratories. Cuts can be minimized by the use of correct procedures, appropriate use of personal protective equipment, and by paying careful attention to handling and manipulations.

• Glass ware must be stored properly on its shelf or in containers
• Broken glassware and sharp objects must be disposed in designated containers to prevent injury to lab personnel and custodial staff.

G. Electrical Safety

• Do not operate electrical equipment that has frayed or damaged power cords or connectors.

• All electrically operated equipment should be grounded.

• All strip outlets and surge protectors shall be UL listed and electrical equipment shall not exceed the amperage rating.

• Extension cords are only permissible for hand tools and cannot be placed near water or where they create a trip hazard.

• Except when running an experiment, computers and data acquisition systems should be turned off.

H. Fire Prevention and Safety

• Know the location of the nearest fire alarm. The nearest fire alarm is located in the ramp hallway between the HEDCO building and the CME building

• If an alarm occurs, evacuate immediately. Close the doors to the lab as you leave. Ask visitors and guests to leave also.
• Know the location of the nearest fire extinguisher. The nearest fire extinguishers are located in the structural laboratory, just outside the geotechnical laboratory room. You must be educated in the proper use before using a fire extinguisher. Do not attempt to extinguish a chemical fire. Evacuate the lab and call 801-585-COPS (801-585-2677 or from a university telephone 5-2677).

• If you have determined that you are capable of fighting the fire (no chemicals and the fire is not larger than trash can size), activate the fire alarm before attempting to fight the fire.

I. Chemical and Soil Handling and Disposal

• **No reactive, toxic or gaseous chemicals shall be used in the geotechnical laboratory** with the approval of the laboratory supervisor and the development of a chemical hygiene plan for the specific use of the chemical.

• No flammable liquids shall be stored within the laboratory.

• Handle reactive chemicals with all proper safety precautions. This includes designating a separate storage area, monitoring periodically for degradation, and using appropriate personal protection.

• For chemicals they are working with, all employees and students should know: (1) the chemical's hazards, as determined from a MSDS and other appropriate references; (2) appropriate safeguards for using that chemical, including personal protective equipment; (3) how to properly store the chemical when it is not in use; (4) proper chemical waste disposal procedures, (5) proper personal hygiene practices; (6) Appropriate procedures for emergencies, including first aid, evacuation routes, and spill cleanup procedures.

• Chemical containers should be regularly monitored for proper labeling and container integrity. Labels which are fading, falling off, or deteriorating must be promptly replaced. If abbreviations are used, they should be kept to a minimum and clearly identify the contents of the container as well as hazards associated with use. Improperly labeled or unlabeled chemicals make hazard identification and disposal difficult, and may create a hazard.

• Soil and chemicals shall not be washed down the sink, but shall be disposed of in approved containers
• All equipment and chemicals should be placed in their proper storage areas at the end of each workday. Equipment and chemicals shall not be stored on desks, laboratory bench tops, floors, fume hoods or in aisles.

E. Spills

• Mercury, which is contained in thermometers, is a hazardous chemical and prompt action is required if released by dropping a thermometer. In addition to mercury, the following should be followed if a spill of a hazardous substance is suspected:

  • Attend to anyone who may have been contaminated.

  • Notify occupants in the immediate area about the spill.

  • Evacuate all nonessential personnel from the spill area.

  • If the spilled material is flammable, turn off all ignition and heat sources; this includes magnetic stirrers.

  • Avoid breathing vapors of the spilled material.

  • Evacuate and contact EHS at 801-581-6590 (from a university telephone 5-6590) or call University Police at 801-585-COPS (801-585-2677 or from a univ. telephone 5-2677) after 5:00pm.

  • Open windows where possible to increase exhaust ventilation.

  • Secure cleanup supplies.

  • Ensure protective apparel is resistant to the spill material.

  • Confine or contain the spill to a small area.

F. Operating Hours

• Operating hours of the laboratory are 8:00 to 5:00 p.m., unless prior approval has been obtained from the laboratory supervisor.
Employees and students should avoid working alone. Arrangements should be made between individuals working in separate laboratories outside of regular working hours to cross check each other periodically. Experiments known to be hazardous should not be undertaken by an employee who is alone in the laboratory.

G. Personal Hygiene

- Wash promptly whenever a chemical has contacted your skin. Flush for at least 15 minutes prior to seeking medical attention.
- Avoid inhalation of chemicals. Do not "sniff" to test chemicals.
- Do not use mouth suction to pipette anything. Pipetting aids must be used at all times.
- Do not bring food (including gum and candy), beverages, tobacco, or cosmetic products into chemical storage or use areas.
- Eating, drinking, and applying cosmetics is allowed in desk or study areas only.
- Smoking is prohibited in all University facilities.
- Wash well with soap and water before leaving the laboratory. Avoid the use of solvents for washing skin. Solvents remove the natural protective oils from skin and can cause irritation and inflammation. In some cases, washing with solvent may facilitate absorption of toxic chemicals.

H. Housekeeping

Housekeeping is directly related to safety and must be given importance of equal value to other procedures. Lack of good housekeeping reduces work efficiency and may result in accidents. Laboratory personnel must adhere to the following:

- Access to emergency equipment, showers, eyewashes, fire extinguishers, exits and circuit breakers shall never be blocked or obstructed.
• Laboratory glass where (hydrometers and thermometers) must have a puncture resistant (e.g., cardboard) container specifically designated for glassware disposal.

• At the end of each workday, the contents of all unlabeled containers are to be considered waste and disposed of appropriately.

• Collection containers for wastes must be clearly labeled including hazard identification.

• All work areas, especially laboratory bench tops, should be kept clear of clutter.

• All aisles, corridors, stairs, and stairwells shall be kept clear of chemicals, equipment, supplies, boxes, and debris.

• Food and drink for human consumption shall not be kept in the same refrigerator used to store chemicals and laboratory samples. Eating and office areas must be clearly separated from laboratory and chemical storage areas.

I. Compressed Gas Cylinders

Use of compressed gases in the laboratory requires anticipating chemical, physical, and health hazards. Cylinders that are knocked over or dropped can be very dangerous. If a valve is knocked off, the cylinder can become a lethal projectile. Accidental releases may result in an oxygen depleted atmosphere or adverse health effects. In short, improper handling and use can cause structural damage, severe injury, and possibly death. The following guidelines will help ensure safe handling, use, and storage of compressed gas cylinders.

1. Receiving and Storage

• Be sure to arrange a return agreement with suppliers prior to purchase since disposal of compressed gas cylinders is difficult and very expensive.

• Cylinders should not be accepted unless the cylinder contents are clearly labeled. Color code only should not be accepted, since it does not constitute adequate labeling.
Do not accept cylinders which are damaged or do not have a valve protection cap.

All gas cylinders in use shall be secured in an upright position in racks, holders, or clamping devices. When cylinders are grouped together, they should be individually secured and conspicuously labeled on the neck area.

Oxygen cylinders shall never be placed near highly combustible materials, especially oil and grease, or near stocks of carbide and acetylene or other fuel gas cylinders, nor near any other substance likely to cause or accelerate a fire. Systems and components used for other gases and purposes must never be used for oxygen or interconnected with oxygen.

Cylinders should have current hydrostatic test date (normally less than 5 years old for steel and 3 years old for aluminum) engraved on the cylinder. Cylinders should be returned to the supplier for servicing prior to the expiration date.

Do not place cylinders near heat, sparks, or flames or where they might become part of an electrical circuit.

Do not store cylinders in exit corridors or hallways.

2. Handling and Use

Only Compressed Gas Association fittings and components are permitted for use with gas cylinders. Only use regulators approved for the type of gas in the cylinder. Do not use adapters to interchange regulators.

Open cylinder valves slowly and away from the direction of people (including yourself). Never force a gas cylinder valve. If the valve cannot be opened by the wheel or small wrench provided, the cylinder should be returned.

No attempt shall be made to transfer gases from one cylinder to another, to refill cylinders, or to mix gases in a cylinder in the laboratory.

All cylinders are to be considered full unless properly identified as empty by the user. Empty cylinders must be returned to the supplier and not accumulated.

Compressed gases must not be used to clean your skin or clothing.
• Never heat cylinders to raise internal pressure.
• Do not use copper (>65%) connectors or tubing with acetylene. Acetylene can form explosive compounds with copper, silver, and mercury.

• Always leave at least 30 psi minimum pressure in all "empty" cylinders.

• Do not leave an empty cylinder attached to a pressurized system.
The course instructor or laboratory teaching assistant has given me a safety briefing regarding safe conduct and my responsibilities to promote and ensure safety within the laboratory.

This has included:

- planning and conducting operations in accordance with practices and procedures established in the Safety Plan
- using equipment for its designed purposes only
- being familiar with emergency procedures, including knowledge and location of emergency equipment for the laboratory, as well as how to obtain additional help in an emergency
- knowing the type of protective equipment available and using the proper type for each procedure
- being alert to unsafe conditions and actions and calling attention to them so corrections can be made a soon as possible

_______________________________   ______________________________
Student’s Name (Print)               Student’s Signature