



# Natural Resources Conservation Service Soil Survey Office Laboratory Safety Guide

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## Disclaimer

The mention of the name of any resource, including Web sites, products, or product types, does not constitute endorsement by the U.S Department of Agriculture (USDA) or the Natural Resources Conservation Service (NRCS).

## Introduction

Since the passage of the Occupational Safety and Health Act (OSHA) in 1970 for employee health and safety, laboratory safety has greatly improved as a result of regulation. Careful pre-planning has been shown to mitigate the potential health hazards of the laboratory environment. NRCS Soil Survey Office Laboratory workers need to assess potential hazards before executing any laboratory method or procedure, always making safety a fundamental consideration. The purpose of this document is to help NRCS Soil Survey Office Laboratory personnel prevent unwanted events from occurring, to mitigate them if they do occur, and to improve the personnel's knowledge and understanding of the requirements for a safe environment.

One section of this document is devoted to the Chemical Hygiene Plan of the laboratory. An individual directly involved with laboratory operations should be designated as the Chemical Hygiene Officer, who will be responsible for developing and implementing the Chemical Hygiene Plan. The Chemical Hygiene Officer can also serve as a general Laboratory Safety Officer.

## Laboratory Setup

The floor plan and organization of NRCS Soil Survey Office Laboratories will be as unique as the buildings in which they are located.

Some important features should include:

- A dedicated vented space, separated from the office areas by an interior door.
- An exterior door or window or alternative interior exit opposite the main interior entrance that can be opened and used for emergency egress.

Organize the workspace, including bench and instrument location, to maximize efficiency and minimize the risk of Work-related Musculoskeletal Disorders (WMSDs). Refer to the section **Ergonomic Issues: Preventative Measures for Laboratory Bench Work**.

## Laboratory Workbenches

Ideally, lab workbenches should be at the following heights:

- Precision work (e.g., instrument repair or maintenance): Workbench height should be above elbow height (37 to 43 inches above the floor).
- Light work (e.g., taking pH or EC readings): Workbench height should be just below elbow height (34 to 37 inches above the floor).
- Heavy work (e.g., grinding or processing soil): Workbench should be 4 to 6 inches below elbow height (28 to 35 inches above the floor).

# Ergonomic Issues: Preventive Measures for Laboratory Bench Work

## General

Observing the following can reduce the risk of injury:

- Always assume proper sitting or standing posture.
- When sitting, use only an adjustable stool or a chair with a built-in footrest to ensure lower back, thigh, and foot support, or use an external footrest.
- If leg clearance is not available, the workbench must not be used for seated work.
- When standing for extended periods of time, use an anti-fatigue mat and a footrest for propping one foot up at a time to reduce joint strain and muscle fatigue.
- Take frequent short breaks to interrupt repetition, awkward body posture, and static muscle work.

## Pipetting

Pipetting involves thumb force, repetitive motion, and awkward postures for the wrists, arms, and shoulders. Observing the following can reduce the risk of injury:

- Perform your work only at appropriate heights.
- When sitting, ensure lower back and thigh support by using an adjustable stool or chair with a built-in footrest, or use an external footrest.
- Be sure to work with wrists in neutral positions (straight).
- Adjust height and position of sample holders, solution container, and waste receptacle to prevent twisting and bending of your wrist and neck. Keep items close to avoid reaching.
- Reduce shoulder strain by arranging work to keep elbows and arms close to the body.
- Use short pipettes and shorter waste receptacles for used pipette tips in order to reduce reaching.
- Use electronic pipettes for highly repetitive pipetting tasks or for larger workloads to reduce or eliminate contact pressure on thumb.
- Use ergonomic pipettes when possible.
- Alternate continuous pipetting with other tasks, or take short rest breaks every 20 minutes.

## Microscopy

Operating a microscope for long hours puts strain on the neck, shoulders, eyes, lower back, arms, and wrists. Observing the following can reduce the risk of injury:

- Make sure leg and knee clearance under workbench is adequate.
- Always assume proper sitting position. Ensure proper lower back and thigh support. Maintain neutral curves of spine.
- Ensure that feet are flat on floor or supported by a footrest.

- Adjust the microscope's eyepiece height to allow for neutral posture of the head and neck. The vertical position of the eyepiece should be a little high for comfort, so that your head is upright.
- Position microscope as close to you as possible to ensure upright head position.
- Do not work with your elbows winged. Keep your elbows close to sides.
- Make sure to work with wrists in a neutral (straight) position. Avoid forearm and wrist contact pressure. Pad sharp edges with foam, or pad wrists and forearms to reduce pressure.
- Use a video display terminal when appropriate to view sample, reducing eye and neck strain.
- Make sure that scopes remain clean all the time and that lighting is of proper intensity.
- Take mini-breaks often to allow muscles to relax and to stretch.

## **Fume Hoods**

If your laboratory does not have a fume hood, in instances where work requires a fume hood, a local college or university can often serve as a useful resource by providing access to one. Working in fume hoods requires personnel to assume a variety of awkward postures because of limited work access. These restrict arm movement and therefore significantly increase the amount of stress on joints of the upper limbs, neck, and back. Observing the following can reduce the risk of injury:

- Prevent over-extension by placing materials as close as possible. Perform your work at least 6 inches back into the hood to maintain optimal airflow containment for material and personal protection.
- Always assume a proper posture. Use only an adjustable chair or stool, and use a footrest if your feet do not rest firmly on the floor.
- Avoid contact pressure of the forearm and wrists on sharp edges. Apply foam padding to the front sharp edge of the fume hood to reduce pressure.
- Use a turntable to store equipment near the worker. This reduces excessive reaching and twisting, which place an increased load on the lower part of the back.
- When standing for extended periods of time, use anti-fatigue mats and a footrest for propping one foot up at a time to reduce joint strain and muscle fatigue.
- Take short breaks to alter repetitive forearm and wrist motion and to relieve joint pressure and contact pressure caused by sharp edges.
- Reduce eyestrain and awkward posture by keeping the viewing window of the hood clean and your line of sight unobstructed.

## **Regulated Soils**

Domestic soils from specific areas and all foreign soils are regulated by the Animal and Plant Health Inspection Service (APHIS) because of the potential presence of undesirable biological components. Before collecting, transporting, and/or analyzing regulated soil for analysis in the Soil Survey Office Laboratory, verify compliance with APHIS regulations regarding the movement and handling of regulated soil. For more information, consult the following Web sites:

[http://www.aphis.usda.gov/plant\\_health/permits/organism/soil/index.shtml](http://www.aphis.usda.gov/plant_health/permits/organism/soil/index.shtml)

and

[http://www.aphis.usda.gov/plant\\_health/permits/organism/soil/downloads/soil-circular.pdf](http://www.aphis.usda.gov/plant_health/permits/organism/soil/downloads/soil-circular.pdf).

Check whether particular soils are regulated by contacting the local Plant Protection and Quarantine (PPQ) office, the PPQ, Permits, Registrations, and Imports staff in Riverdale, Maryland, at 301-734-8645.

Existing Federal quarantines are subject to change, and new quarantines will be established as the need arises. These and other significant and timely changes to phytosanitary regulations or emerging phytosanitary issues are announced by the PPQ Deputy Administrator in State Plant Regulatory Official (SPRO) Letters. These letters are available on the National Plant Board (NPB) Web site at:

<http://nationalplantboard.org/laws/spro.html>.

## Important Laboratory Safety Guidelines

### General Safety

- Never work alone in the laboratory; use the buddy system.
- Train all new personnel.
- Do not eat or drink in the laboratory.
- Do not deviate from written protocols or perform untested procedures.
- Know emergency procedures and evacuation plans. Placard plans in visible locations.
- Document any spills, accidents, or injuries. For chemical spills, refer to the section **General Guidelines to Follow in the Event of a Chemical Accident or Spill**.
- Exercise care when handling hot glassware. Use appropriate heat-resistant gloves if necessary.
- Never point the open end of a vessel at anyone.
- Never pipette by mouth. Always use a pipetting device.
- Make sure no flammable solvents are in the surrounding area when lighting a flame.
- Turn off heating apparatus and water faucets when not in use.
- Do not remove any equipment or chemicals from the laboratory to an office area.
- Keep laboratory floor dry and clear of all objects.

### Laboratory Wear

- Always use eye protection (safety glasses with side shields) in the laboratory.
- Use disposable gloves when handling hazardous materials. Remove the gloves before exiting the laboratory or going to an office area.
- Wear a long-sleeved laboratory coat or chemical-resistant apron.
- Wear shoes that cover the whole foot.
- Wear shirts that completely cover chest and pants that completely cover legs.
- Use rubber bands or string to tie back long hair or loose clothing.
- Do not wear contact lenses.

## Chemicals—Storage and Handling

- Maintain an inventory of chemicals on hand. Update annually. Provide a copy of the inventory to the local fire department. Refer to the section **How Should Chemicals Be Stored?**
- Do not store food and drink with chemicals.
- Make sure all chemicals are labeled, preferably in their original containers.
- Store chemicals in designated, locked storage areas.
- Know the storage, handling, and disposal requirements for each chemical. Consult the Material Safety Data Sheet (MSDS) for disposal information. Refer to the section **What Is a Material Safety Data Sheet (MSDS)?**
- Check container label to verify chemical contents before using.
- Wear chemical-resistant gloves appropriate to the chemicals being used before handling them.
- When transporting a chemical, place the container in a secondary container or bucket that is designed to be carried and is large enough to hold the chemical.
- Never handle bottles or drums that exceed the weight limit imposed by your position description.
- If you transfer a chemical from its original container, label the container with contents, hazard, date, and initials.
- Always use a spatula or scoop to remove a soil or chemical from a container.
- Use a hot water bath to heat flammable liquids, and **never** use a flame.
- Add concentrated acid or base to water. Do not add water to concentrated acid or base.
- Weigh out or remove only the chemical needed, and do not return excess to its original container but dispose of it in the appropriate waste container.
- Do not touch, taste, or smell reagents.
- Do not mix or use chemicals in ways not called for by the laboratory method or procedure.
- Use a chemical fume hood at a local college or university if there is a possibility of release of toxic chemical vapors, dust, or gases. Keep your head and body outside of the hood face.
- Clean up all spills promptly.
- Dispose of chemicals properly. Refer to the section **What Is the Recommended Procedure for Chemical Disposal?**

## General Hygiene

- Keep hands away from face, eyes, mouth, and body while using chemicals. Never touch chemicals with your hands.
- Never eat or drink in the laboratory or chemical-storage area.
- Never use laboratory glassware for eating or drinking purposes.
- Wash hands after removing gloves and before leaving the laboratory.
- Remove protective equipment (gloves, lab apron, etc.) before leaving the laboratory.

## Prior to Procedure or Method Execution

- Understand the potential hazards, the process, and the equipment involved in the method or procedure.

- Inspect all equipment before use.
- Wear appropriate Personal Protective Equipment (PPE), including safety glasses, gloves, protective sleeves, and aprons.

## Safety and Emergency Procedures

- Locate and understand the exact application of safety and emergency equipment (first-aid kit, spill kit, etc.) **before** any laboratory procedure. Signage should indicate locations.
- Be familiar with emergency or accident procedures.
- Know the location of shutoff switches for all utilities serving the laboratory.
- Know how to use safety and emergency equipment.
- Keep emergency phone numbers near the laboratory telephone.
- Conduct semiannual safety and evacuation drills.
- Know the location of and how to operate the following:
  - Fire extinguisher
  - Fire alarm
  - Fire blanket
  - Eyewash
  - First-aid kit
  - Safety shower
- Know the location of all exits in the laboratory and building.
- In case of emergency, be prepared to notify personnel in the office area as appropriate, and evacuate the building via the nearest exit.
- Have injury-related forms CA-16 and CA-1 on hand.

## Housekeeping

- Keep work area free of unnecessary objects.
- Tidy work area at end of procedure.
- Verify that all containers are properly labeled. Refer to the section **How Should Chemical Containers Be Labeled?**
- Do not block sink drains.
- Do not block access to safety equipment or emergency exits.
- Do not pour chemical waste into sinks or garbage cans.
- Dispose of broken glassware and other sharp objects in a designated, approved container.

## Routine Inspections and Recordkeeping

- Inspect safety and first-aid equipment on a monthly basis, including eyewashes, deluge showers, and fire extinguishers. Keep a record of the inspections, showing date of the inspection and initials of the inspector.
- If a potentially hazardous condition is observed, notify the supervisor in writing. Follow up.
- Maintain a record of laboratory incidents.
- Maintain a record of any safety training of laboratory personnel.

## What Is a Material Safety Data Sheet (MSDS)?

- Material Safety Data Sheets contain information regarding the proper procedures for handling, storing, and disposing of chemical substances.
- An MSDS accompanies all chemicals or kits that contain chemicals.
- If an MSDS does not accompany a chemical, many Web sites and science-supply companies can supply one or one can be obtained from <http://www.msdsonline.com>.
- **Save all of the data sheets, and store them in an easily accessible, designated file or binder, using a system that is organized and easy to understand.**
- Place the MSDS collection in a central, easily accessible location known to all workers and emergency personnel. The location should be just outside the laboratory area.

## Understanding MSDS in American National Standards Institute (ANSI)

### Standardized Format

- Section 1 gives details on what the chemical or substance is, CAS number, synonyms, the name of the company issuing the data sheet and commonly gives an emergency contact number.
- Section 2 identifies the OSHA hazardous ingredients and may include other key ingredients and exposure limits.
- Section 3 lists the major health effects associated with the chemical. Sometimes both the acute and chronic hazards are given.
- Section 4 provides first-aid measures that should be initiated in case of exposure.
- Section 5 presents the fire-fighting measures to be taken.
- Section 6 details the procedures to be followed in case of an accidental release. The instructions may not be sufficiently comprehensive in all cases, and local rules and procedures should be used to supplement the information given on the MSDS sheet.
- Section 7 addresses the storage and handling information for the chemical. This is an important section because it includes information on the flammability, explosive risk, propensity to form peroxides, and chemical incompatibility of the substance. Also, it addresses any special storage requirements for the chemical (i.e., special cabinets or refrigerators).
- Section 8 outlines the regulatory limits for exposure, generally the maximum permissible exposure limits (PEL). Refer to Appendix G. The PEL, issued by the Occupational Safety and Health Administration, indicates the concentration of air contamination a person can be exposed to for 8 hours a day (40 hours per week) over a working lifetime (30 years) without suffering adverse health effects. It also provides information on personal protective equipment.
- Section 9 gives the physical and chemical properties of the chemical, such as the evaporation rate, specific gravity, and flash points.
- Section 10 indicates the stability and reactivity of the chemical and gives information about chemical incompatibilities and conditions to be avoided.
- Section 11 describes both the acute and chronic toxicity of the chemical and any health effects that may be attributed to the chemical.

- Section 12 identifies both the ecotoxicity and the environmental fate of the chemical.
- Section 13 offers suggestions for the disposal of the chemical. Local, State, and Federal regulations should be followed.
- Section 14 gives the transportation information required by the Department of Transportation. It commonly identifies the dangers associated with the chemical, such as flammability, toxicity, radioactivity, and reactivity.
- Section 15 outlines the regulatory information about the chemical. It indicates the hazard codes for the chemical and the principal hazards associated with the chemical. A variety of country- and/or State-specific details may be given.
- Section 16 provides additional information, such as the label warnings, preparation and revision dates, name of the person or firm that prepared the MSDS, disclaimers, and references used to prepare the MSDS.

## **Recommended Safety and Emergency Equipment for the Laboratory**

### **Personal Protective Equipment (PPE)**

- Chemical splash goggles
- Face shields
- Lab coat
- Lab apron
- Gloves (selected on the basis of the material being handled and the particular hazard involved)

### **Safety and Emergency Equipment**

- Hand-free eyewash stations (not eyewash bottles) that conform to ANSI Z358.1-2004
- Deluge safety showers that conform to ANSI Z358.1-2004
- Safety shields with a heavy base
- Fire extinguishers (dry chemical and carbon dioxide extinguishers)
- Sand bucket
- Fire blankets
- Emergency lights
- Emergency signs and placards
- Fire-detection or alarm system with pull stations
- First-aid kits
- Spill-control kit (absorbent and neutralizing agents)
- Chemical-storage cabinets (preferably with an explosion-proof ventilation system)
- Gallon-size carrying buckets for chemical bottles
- Laboratory chemical hood (60-100 ft/minute capture velocity, vented outside). If necessary, use a fume hood at a local college or university for procedures requiring one.
- Ground-fault interrupter electrical outlets

- Container for broken glass and other sharp objects
- Material Safety Data Sheets for all chemicals in the laboratory
- Emergency Action Plan for the Soil Survey Office Laboratory

## How Should Chemical Containers Be Labeled?

No unlabeled substance should be present in the laboratory at any time!

### Labeling Basics

- Use labels with a good adhesive.
- Use a permanent marker (waterproof and fade-resistant) or laser (not inkjet) printer.
- Type characters large enough to be clearly visible, and use a contrasting background.
- Replace damaged, faded, or only partly attached labels.

### Commercially Packaged Chemicals

Verify that the label contains the following information:

- Chemical name (as it appears on the MSDS)
- Name of the chemical manufacturer
- Necessary handling and hazard information
- **Add:**
  - Date received
  - Date first opened
  - Expiration or "use by" date (if one is not already given)

### Secondary Containers and Prepared Solutions

When one transfers a material from the original manufacturer's container to other vessels, these vessels are referred to as "secondary containers." Label all containers used for storage with the following:

- Chemical name (as it appears on the MSDS)
- Name of the chemical manufacturer or person who prepared the solution
- Necessary handling and hazard information
- Concentration or purity
- Date prepared
- Expiration or "use by" date as dictated by the manufacturer or other source

### Containers in Immediate Use

These hold chemicals that are to be used within a work shift or laboratory session.

Label all containers in immediate use with the following:

- Chemical name (as it appears on the MSDS)
- Necessary handling and hazard information

## Chemical Waste

All containers used for chemical waste should be labeled with the following:

- "WASTE" or "HAZARDOUS WASTE"
- Chemical name (as it appears on the MSDS) and concentration
- Accumulation start date
- Hazard(s) associated with the chemical waste

## Peroxide-Forming Substance (e.g., diethyl ether)

A peroxide-forming chemical must be labeled with the following:

- Date received
- Date first opened
- Date to be disposed of according to the manufacturer

## How Should Chemicals Be Stored?

Following are general rules for chemical storage.

### Criteria for Storage Area

- Store chemicals inside a closeable cabinet or on a sturdy shelf with a front-edge lip to prevent chemical spills and other accidents; a  $\frac{3}{4}$ -inch front edge lip is recommended.
- Secure shelving to the wall or floor.
- Ensure that all storage areas have doors with locks.
- Keep chemical-storage areas off limits to all unauthorized personnel.
- Ventilate storage areas adequately.

### Organization

- Organize chemicals first by COMPATIBILITY rather than by alphabetic succession. Refer to the section **Compatible Families**.
- Store alphabetically within compatible groups.
- Chemical segregation
  - Store acids in a dedicated cabinet. Nitric acid should be stored alone unless the cabinet provides a separate compartment for the storage of this acid.
  - Store highly toxic chemicals in a dedicated, lockable cabinet that has been labeled with a highly visible sign.
  - Store volatile and odor-causing chemicals in a ventilated cabinet. Store flammable liquids in an approved cabinet. Refer to the section **Compatible Families**. Store water-sensitive chemicals in a water-tight cabinet in a cool and dry location segregated from all other chemicals in the laboratory.

### Storage Don'ts

- Do not place heavy materials, liquid chemicals, and large containers on high shelves.
- Do not store chemicals on the top of cabinets.
- Do not store chemicals on the floor, even temporarily.

- Do not store items on bench tops or in laboratory chemical hoods, except when in use.
- **Do not store chemicals on shelves above eye level.**
- Do not store chemicals with food and drink.
- Do not store chemicals in personal staff refrigerators, even temporarily.
- Do not expose stored chemicals to direct heat or sunlight or to highly variable temperatures.

### Proper Use of Chemical Storage Containers

- Never use food containers for chemical storage.
- Make sure all containers are properly closed.
- After each use, carefully wipe down the outside of the container with a paper towel before returning it to the storage area. Properly dispose of the paper towel after use.

### Compatible Families

Compatible chemical families should be arranged on shelves in a chemical-storage room.

- First sort chemicals into organic and inorganic classes. Store organic and inorganic chemicals separately.
- Next, separate into the following compatible families.

#### Inorganic Chemicals

1. Metals, hydrides
2. Halides, halogens, phosphates, sulfates, sulfites, thiosulfates
3. Amides, azides, nitrates (except for ammonium nitrate), nitrites, nitric acid
4. Carbon, carbonates, hydroxides, oxides, silicates
5. Carbides, nitrides, phosphides, selenides, sulfides
6. Chlorates, chlorites, hydrogen peroxide, hypochlorites, perchlorates, perchloric acid, peroxides
7. Arsenates, cyanates, cyanides
8. Borates, chromates, manganates, permanganates
9. Acids (except for nitric acid, which should be stored away from other acids unless the cabinet provides a separate compartment for this acid)
10. Arsenic, phosphorous, phosphorous pentoxide, sulfur

#### Organic Chemicals

1. Acids, anhydrides, peracids
2. Alcohols, amides, amines, glycols, imides, imines
3. Aldehydes, esters, hydrocarbons
4. Ethers, ethylene oxide, halogenated hydrocarbons, ketenes, ketones
5. Epoxy compounds, isocyanates
6. Azides, hydroperoxides, peroxides
7. Nitriles, polysulfides, sulfides, sulfoxides
8. Cresols, phenols

## How Should Compressed Gas Cylinders Be Stored, Maintained, and Handled?

Compressed gases can be hazardous because each cylinder contains large amounts of energy and may also be highly flammable and toxic.

Following is a list of recommendations for storage, maintenance, and handling of compressed gas cylinders:

- Make sure that an indication of the contents of the compressed gas cylinder is clearly stenciled or stamped on the cylinder or on a durable label.
- Do not identify a gas cylinder by the manufacturer's color code.
- Never use cylinders with missing or unreadable labels.
- Check all cylinders for damage before use.
- Be familiar with the properties and hazards of the gas in the cylinder before using.
- Wear appropriate protective eyewear when handling or using compressed gases.
- Use the proper regulator for each gas cylinder.
- Do not tamper with or attempt to repair a gas cylinder regulator.
- Never lubricate, modify, or force cylinder valves.
- Open valves slowly using only wrenches or tools provided by the cylinder supplier and directing the cylinder opening away from people.
- Check for leaks around the valve and handle using a soap solution, "snoop" liquid, or an electronic leak detector.
- Close valves and relieve pressure on cylinder regulators when cylinders are not in use.
- Label empty cylinders "EMPTY" or "MT," and date the tag; treat the cylinder in the same manner that you would if it were full.
- Always attach valve safety caps when storing or moving cylinders.
- Transport cylinders in an approved cart with a safety chain; never move or roll gas cylinders by hand.
- Securely attach all gas cylinders (empty or full) to a wall or laboratory bench with a clamp or chain, or secure in a metal base in an upright position.
- Store cylinders by gas type, separating oxidizing gases from flammable gases by either 20 feet or a 30-minute firewall that is 5 feet high.
- Store gas cylinders in cool, dry, well-ventilated areas away from incompatible materials and ignition sources.
- Do not subject any part of a cylinder to a temperature higher than 125 °F or lower than 50 °F.
- Store empty cylinders separately from full cylinders.

## What Is the Recommended Procedure for Chemical Disposal?

Any chemical discarded or intended to be discarded is chemical waste. For chemical waste, use a log book that includes detailed lists of materials in a container labeled "organic waste," for example. HAZARDOUS chemical waste as designated by the U.S. Environmental Protection Agency (EPA) or State authority is waste that presents a danger to human health and/or the environment. According to EPA regulations, waste is hazardous if it has one or more of the following characteristics:

- Ignitability
- Corrosivity
- Reactivity
- Toxicity

There are lists of hundreds of chemicals that EPA has determined to be hazardous waste.

Because of particular differences within some States, NRCS Soil Survey Office Laboratories are directed to consult with FedCenter for environmental regulation compliance assistance: Go to <http://www.fedcenter.gov>, or contact Steve Luzzi at [Stephen.T.Luzzi@erdc.usace.army.mil](mailto:Stephen.T.Luzzi@erdc.usace.army.mil) (217-373-5894) or Mike Shields at [Shields.Mike@epa.gov](mailto:Shields.Mike@epa.gov) (202-564-9035). Even if EPA declares a particular chemical to be nonhazardous for disposal down a drain, it is still necessary to contact the local Publically Owned Treatment Works (POTW) or sewer authority to ascertain whether it is permissible to do so in your area. Therefore, always check with the local POTW to ascertain whether disposal down the drain of particular chemicals is permissible.

### Storing Chemical Waste

- Store all waste in containers that are in good condition and are compatible with their contents.
- Clearly and permanently label each container as to its contents and label as hazardous waste. Refer to the section **How Should Chemical Containers Be Labeled?**
- Store waste in a designated area that is away from normal laboratory operations and is not susceptible to unauthorized access.
- Store waste bottles away from sinks and floor drains.
- Do not completely fill waste bottles; leave several inches of space at the top of each waste container.
- Cap all waste bottles.

### Proper Disposal of Chemical Waste

- The EPA has written a comprehensive set of regulations that govern the management of hazardous waste from the point of generation to ultimate disposal.
- Generators of hazardous waste are responsible for ensuring proper disposal of their hazardous waste and can incur liability for improper disposal of their hazardous waste.
- Disposal procedure:
  - Do **not** pour chemicals down the drain (unless authorized to do so by a local sewer authority).

- Do not treat hazardous waste onsite.
- Contact professional, licensed hazardous waste haulers or transporters, who can ensure appropriate disposal. Alternatively, many local health departments sponsor disposal events for entities with Conditionally Exempt Small Quantity Generator (CESQG) status. NRCS Soil Survey Office Laboratories with CESQG status are encouraged to make use of such events as economical alternatives to contracting directly with a private waste hauler.

## General Guidelines to Follow in the Event of a Chemical Accident or Spill

- Assess the overall situation.
- Determine the appropriate action to resolve the situation.
- Follow the preexisting, approved local emergency plan.
- Act swiftly and decisively.
- Below are some recommended actions for specific emergencies.
  - Chemical in the eye
    - Flush the eye immediately with water while holding the eye open with fingers.
    - If wearing contact lens, remove and continue to rinse the eye with water.
    - Continue to flush the eye and seek immediate medical attention.
  - Acid/base spill. For a spill not directly on human skin, do the following:
    - Neutralize acids with powdered sodium hydrogen carbonate (sodium bicarbonate, or baking soda) or bases with vinegar (5% acetic acid solution).
    - Avoid inhaling vapors.
    - Spread diatomaceous earth to absorb the neutralized chemical.
    - Sweep up and dispose of as hazardous waste.
  - For acid/base spills directly on human skin, do the following:
    - Flush the area with copious amounts of cold water from the faucet or drench shower for at least 5 minutes.
    - If spill is on clothing, first remove clothing from the skin and soak the area with water as soon as possible.
    - Seek medical attention.
    - If hydrofluoric acid is used in the laboratory, be sure to have a calcium gluconate kit available to treat hydrofluoric acid burns.
  - Mercury spill, such as from a broken thermometer
    - Evacuate the affected area.
    - Close off interior doors and windows and heating and air-conditioning vents in the incident room.

- Open exterior doors and windows to move the inside air outside.
  - Follow specific cleanup instructions detailed by the EPA at <http://www.epa.gov/epawaste/hazard/tsd/mercury/index.htm> or by your State. If the laboratory uses mercury, print these instructions out in advance of any accident that might occur.
- If an injury has occurred or might have occurred, notify your supervisor within 24 hours of the date of injury. Before you obtain medical treatment, use form CA-16 to ask your supervisor to authorize medical treatment. Emergency medical treatment may be obtained without prior authorization. Take the CA-16 to the provider you select. Supervisors should go to <http://www.tandtmanagement.com/OWCP/owcp.asp> and click on “Step by Step Procedures” to follow in the event of employee injury.

## Do You Have a Chemical Hygiene Plan (CHP)?

Each NRCS Soil Survey Office Laboratory should prepare a CHP and also designate a Chemical Hygiene Officer within your organization, someone who will be directly involved with laboratory deployment and operations. A CHP is a written program stating the policies, procedures, and responsibilities that serve to protect employees from the health hazards of hazardous chemicals used in the workplace. OSHA’s Occupational Exposure to Hazardous Chemicals in Laboratories Standard (Title 29, CFR, Part 1910.1450) details the requirements of a CHP to protect persons from hazardous chemicals. Appendix A of 29 CFR 1910.1450 provides nonmandatory recommendations to assist in developing a CHP. Required elements of a CHP:

1. Defined standard operating procedures relevant to safety and health considerations for each activity involving the use of hazardous chemicals.
2. Criteria to determine and implement control measures, such as Personal Protective Equipment (PPE), to reduce exposure to hazardous materials, with special attention given to control measures for unusually hazardous materials.
3. A requirement to ensure that protective laboratory equipment is installed and functioning properly.
4. Information for employees working with hazardous substances detailing the hazards of the chemicals, the location of the CHP, signs and symptoms associated with hazardous chemical exposure, the permissible or recommended exposure limits of the chemicals, and the location and availability of information on the hazards, safe handling, storage, and disposal of hazardous chemicals, such as an MSDS.
5. Training for persons working with hazardous substances that includes method and observations to detect the presence or release of hazardous chemicals, the physical and health hazards of the chemicals used, the measures to be taken to protect against these hazards, and applicable details of the CHP.
6. The circumstances under which a particular laboratory operation or procedure requires prior approval from the appropriate administrator.
7. Requirements for medical consultation and medical examination whenever (1) a person develops signs or symptoms associated with a hazardous chemical, (2) exposure

monitoring reveals an exposure level routinely above the action level, or (3) a spill, leak, explosion, or other event in the work area results in the likelihood of a hazardous exposure.

8. Designation of personnel responsible for the implementation of the CHP, including the Chemical Hygiene Officer.
9. Requirements for additional protection when employees work with particularly hazardous substances, including "select carcinogens," reproductive toxins, and substances with a high degree of acute toxicity.
10. Provisions for yearly reevaluation of the CHP.

## Technical Support

If you need technical support regarding this document, contact Rich Ferguson at 402-437-5332 or [rich.ferguson@lin.usda.gov](mailto:rich.ferguson@lin.usda.gov) or Patty Jones at 402-437-4012 or [patty.jones@lin.usda.gov](mailto:patty.jones@lin.usda.gov).

## Additional Resources

Department of Health and Human Services Centers for Disease Control and Prevention (CDC)

<http://www.cdc.gov>

National Institute for Occupational Safety and Health (NIOSH)

<http://www.cdc.gov/niosh/homepage.html>

Department of Health and Human Services National Toxicology Program (NTP)

<http://ntp-server.niehs.nih.gov>

U.S. Consumer Product Safety Commission (CPSC)

<http://www.cpsc.gov>

U.S. Department of Labor Occupational Safety and Health Administration (OSHA)

<http://www.osha.gov>

U.S. Department of Transportation (DOT)

<http://www.dot.gov>

U.S. Environmental Protection Agency (EPA)

<http://www.epa.gov>

American Chemical Society (ACS)

<http://www.acs.org>

Laboratory Safety Institute (LSI)

<http://www.labsafety.org>

MSDS Online

<http://www.msds-online.com>

National Fire Protection Association (NFPA)

<http://www.nfpa.org>

National Safety Council (NSC)

<http://www.nsta.org>

Safety Information Resources, Inc. (SIRI) MSDS Collection

<http://www.hazard.com>

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