Responsibilities

The Chancellor delegates responsibility to the Vice Chancellor for Research (OVCR) and the Executive Director of Facilities & Services (F&S) for establishing University safety and health standards and guidelines, and for monitoring and evaluating acceptable safety and health performance.

Deans, Directors and Heads of Academic and Administrative Units

Unit heads should establish environmental, safety, and regulatory compliance as a priority. Unit Head’s responsibilities include, but are not necessarily limited to, the following:

- Provide adequate resources to meet safety and regulatory needs.
- Implement programs to comply with applicable environmental health and safety rules, regulations and standards.
- Ensure that General Laboratory Safety training is completed by all incoming faculty and staff who will work in laboratory space, belonging to the unit, where biological, chemical or radiological materials are used.

Principal Investigators (PIs) and laboratory supervisors have specific responsibilities to provide a work environment free from environmental health and safety hazards for those supervised. PI/lab supervisor responsibilities include:

- Implement campus safety policies in his/her laboratories to ensure the safety and health of all laboratory personnel.
- Provide information about relevant environmental, health, and safety rules, regulations, standards, or practices.
- Ensure that required safety-related equipment and personal protective devices are provided, maintained, and used.
- Develop standard operating procedures for work with hazardous materials.
- Provide or arrange for environmental health and safety training and education as needed.
- Take prompt action when unsafe acts or hazardous conditions are reported or noted.
- Promptly investigate and report all on-the-job accidents and/or job-related health problems and request medical treatment, if needed.
- Request the assistance of the next higher level of supervision regarding budget requests for environmental health and safety improvements.

The Division of Research Safety (DRS) and the Division of Safety and Compliance (S&C) are the primary University units that are responsible for providing safety and health programs, guidance, and regulatory oversight of campus activities. DRS and S&C, in partnership with campus safety oversight committees, support the mission of the University by developing, implementing, and overseeing comprehensive safety programs and policies designed to promote the safety and health of faculty, staff, students, and
visitors. The Director of DRS fulfills the campus role of Chemical Hygiene Officer for compliance with the OSHA Laboratory Standard. Responsibilities for DRS and S&C include:

- Develop campus safety policies.
- Develop campus environmental health and safety compliance programs.
- Develop campus environmental health and safety training programs.
- Maintain liaison with regulatory agencies.
- Provide laboratory safety audits and consultations on safety concerns for university staff and students who work in campus laboratories.

**Laboratory personnel** (staff, students, paid or unpaid) are responsible for complying with all environmental health and safety regulations, standards and guidelines. Each individual accepts personal responsibility for ensuring his or her own safety and health and accepts that he or she has a duty to protect the safety and health of other members of campus. Laboratory personnel responsibilities include:

- Follow all policies and regulations as outlined in the Laboratory Safety Guide, laboratory specific policies, the campus administrative manual, and other applicable documents.
- Wear and use required personal protective equipment as specified by their supervisor and university policies.
- Refrain from operating any mechanical equipment that has the potential to harm personnel or property unless they have proper instruction, training or authorization to safely use the equipment.
- Report unsafe acts or hazardous conditions to the supervisor.
- Attend and understand prescribed environmental health and safety training and education.
- Report all on-the-job accidents and/or job-related health problems to the supervisor and requesting medical treatment, if needed.

**General Laboratory Safety Audits**

General Laboratory Safety Audits should be performed and documented annually. A General Laboratory Safety Audit is an important quality assurance tool to help the PI/laboratory supervisor assess the safety of their laboratory and provide information relevant to the annual evaluation of the Laboratory Safety Plan. DRS provides this type of audit, and typically arranges audits on a per department basis. However, individual consultations including auditing of laboratory groups new to campus or new facilities for existing groups will be arranged upon request.
General Laboratory Safety Policies

Electrical Safety

Access to electrical equipment (e.g. plugs, switches and electrical panels) should be unobstructed to allow immediate access in an emergency. All receptacle outlets in laboratory spaces should be the polarized grounding type. Ground Fault Circuit Interrupters (GFCI’s) should be used in those locations involving wet processes or outdoor work, including electrical outlets within six feet of sinks. All electrical hand tools used inside laboratories should be grounded or double insulated. All electrical extension cords used should be visible and inspected on a periodic basis for damage and/or defects. Cords should not run in aisles or corridors where they might be damaged or create a tripping hazard. Cords should not run through doors, walls or partitions, under rugs, or above dropped ceilings. They should not be wrapped around fixtures, tied in knots, or draped over pipes, lights, or ventilation ductwork.

Extension cords should not be used as substitution for fixed receptacle outlets. Cords used for 110-120 volt service should be UL listed standard heavy-duty three-wire equipped with a polarized three prong plug. Two-wire type extension cords should not be used.

Eating and Drinking

Eating, drinking, and the application of cosmetics should be prohibited in areas where hazardous materials are used and are allowed only in well-defined, designated non-work areas. Food must not be stored in the same refrigerator with chemicals, biohazards or radioactive materials. Refrigerators and freezers used for research material or other potentially hazardous samples should bear a sticker indicating that no food storage is allowed.

Housekeeping

Exits, aisles, and safety equipment must not be obstructed. Aisles within the laboratory should be at least 28 inches in clear width. Work areas and floors are not to be used for excessive storage. For sprinklered laboratories, an unobstructed vertical clearance of 18” from sprinkler heads or deflector is mandatory. Doors which are not in use but which are accessible from a corridor or adjacent room should be appropriately labeled if they are blocked on the interior of the room. Hallways are not to be used as storage areas. Any storage of non-hazardous material in corridors requires prior approval from the Office of Project Planning and Facilities Management.

Labels

In accordance with the Hazard Communication Standard (29CFR 1910.1200) labels on chemical containers should not be removed or defaced. All secondary and temporary containers (including water) must be clearly labeled with at least the name of the chemical (no abbreviations).

For more information, refer to the DRS guidance document Labeling of Chemicals in Laboratories.

Mouth Pipetting

Mouth pipetting should be forbidden.
Hand Washing

Hands should be washed with soap and water frequently throughout the day. Hands should be washed after handling any hazardous materials, after the removal of gloves, and before leaving the laboratory.

Signs

Laboratories where hazardous materials or operations are present must follow good signage practices. A door sign must be present on the outside of all doors leading from a public space to a laboratory space. Safety contact information and hazards present in the laboratory should be updated by the laboratory group on the DRS website at least annually so that DRS can issue an updated sign.

Waste

DRS offers disposal services related to hazardous waste (chemical, biological and radioactive) for all campus units. No hazardous waste should be disposed of in the regular trash or poured down the sink. Details and procedures can be found on the DRS website at the Waste Management link on the main menu.

Exposure Control Measures

Engineering Controls

Engineering controls are designed to remove the hazard out of a person’s breathing area, reducing the exposure. A chemical fume hood, glove box, ventilated gas cabinet, or good general ventilation of a laboratory space will be utilized to keep exposures below permissible exposure levels. All procedures where a hazardous exposure to vapor, dust or aerosol is expected under normal conditions or in a foreseeable emergency should be conducted in a chemical fume hood or other adequately vented work area. All users of chemical fume hoods at the University of Illinois at Urbana-Champaign campus should be trained on and comply with the DRS guidance document Chemical Fume Hoods.

Fume Hood Maintenance

Chemical fume hoods and other engineering controls, such as vented gas cabinets, should be surveyed annually by a qualified person with a written report of the results maintained by the unit in charge of the laboratory.

Chemical fume hood velocities for all hoods on campus are evaluated on an annual basis by Facilities and Services (F&S) at no charge to the users. The face velocity of the hoods should fall between 80 and 120 feet per minute (fpm) with the sash positioned at approximately half open, unless specified otherwise. If the face velocity is between 80 and 120 fpm on the day of the evaluation, the fume hood will bear a green sticker on the fume hood cabinet with an arrow pointing to the appropriate sash position. If the face velocity is between 60 and 79 fpm or above 120 fpm, the hood will have an orange sticker with an arrow indicating sash position. Contact F&S for fume hood flow adjustments. The orange sticker indicates that the hood is "Restricted" and should not be used for protection from highly toxic or flammable chemicals. Finally, if the face velocity of the fume hood is below 60 fpm, the hood will display a 5" x 7" DANGER sign, which states that the fume hood should not be used. In this case, users should work with their facility manager to have the chemical fume hood repaired.

Because the status of the chemical fume hood can change within one year, continuous air flow indicators are recommended. New chemical fume hoods should be equipped with air flow monitoring
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devices which will alert the user if there is a problem with air flow. For older hoods without air flow monitoring devices, a simple visible test to ensure flow into chemical fume hoods and other ventilating devices is to tape a tissue to the hood and note its movement when the exhaust fan is turned on.

Work Practices

Work practices to mitigate the risk of exposure should be implemented by the PI adequate for the hazards in the laboratory. The following work practices apply to all laboratories on campus:

- **Working alone:** Working alone in a laboratory is discouraged. It should be prohibited when working with highly toxic (e.g. HF, cyanides) or very dangerous chemicals such as pyrophorics.

- **Prior Approval:** The PI/lab supervisor has to decide if the use of a particularly hazardous chemical or a highly hazardous procedure needs prior approval. Such chemicals and procedures should be clearly addressed in initial laboratory training of laboratory personnel.

- **Unattended Experiments:** If operations involving hazardous substances are carried out with no one present, procedures must be developed that prevent the release of hazardous substances in the event of interruptions in utility services such as electricity, cooling water, and inert gas. Lights should be left on, and signs should be posted identifying the nature of the operation and the hazardous substances in use. If appropriate, arrangements should be made for other workers to periodically inspect the operation.

Personal Protective Equipment (PPE):

The PI/laboratory supervisor should determine which personal protective equipment (PPE) is required to protect laboratory personnel from the hazards they are exposed to and provide such equipment without cost to the personnel. DRS can assist with the selection. The following basic PPE should be worn at all times when entering a laboratory:

- Close toed shoes, clothing that covers the legs, a lab coat, and safety glasses.

- Lab coats should be chosen based on the hazard present. Certain lab coat materials may be better suited for fires, aqueous splashes, biological agents, or solvent splashes. Consult the manufacturer or DRS with questions about lab coat materials.

- Gloves should be worn for performing any procedure that requires the handling of hazardous chemicals. Glove materials vary widely in effectiveness in protecting against chemical hazards. Consult a chemical resistance chart, a glove manufacturer, or contact DRS for assistance in appropriate selection.

- Additional PPE that may be required for certain procedures include a face shield, apron, acid smock, or shoe covers.

For more information, refer to the DRS guidance document [Personal Protective Equipment](#).

**Respiratory protection:** The use of respirators should be avoided as much as possible by using engineering controls. If engineering controls are technically impossible or insufficient, a respirator may be required. Contact Safety and Compliance (S&C) for an assessment. If a respirator is required, compliance with the UIUC Respiratory Program administered by S&C is mandatory. The program includes a medical assessment, fit testing, and instructions on proper use.
Exposure Evaluation and Monitoring

For procedures that cannot be performed inside a fume hood or other well ventilated enclosure, and where an exposure to hazardous chemicals is likely, an exposure evaluation should be performed. S&C conducts evaluations upon request. Depending on the result of the evaluation, exposure monitoring may be recommended. Monitoring can also be conducted by S&C.

Chemical Safety

The following is a list of basic policies for certain groups of hazardous chemicals. The provided information is NOT sufficient to safely handle those chemicals. Refer to the Safety Library at the DRS website and Standard Operating Procedures developed by your laboratory group for safe handling procedures for hazardous chemicals.

Acutely Toxic Liquids and Solids\(^1\)

Chemicals with a high degree of acute toxicity can cause serious injury or even death upon exposure to small amounts. In particular the handling of highly toxic chemicals (GHS classification of acutely toxic category 1 and 2) requires extra care:

- Quantities of these chemicals used and stored in the laboratory should be minimized, as should their concentrations in solution or mixtures.
- Work should only be performed within a functioning fume hood, ventilated glove box, sealed system, or other system designed to minimize exposure to these substances. (The exhaust air from the ventilation systems may require scrubbing before being released into the atmosphere.)
- Where appropriate, an area within the laboratory should be designated for work with highly toxic chemicals. This area should be marked with an appropriate hazard warning such as "DANGER, specific agent, AUTHORIZED PERSONNEL ONLY" or comparable warning sign.
- The designated working area should be cleaned after each work procedure and thoroughly decontaminated at regular intervals determined by the laboratory supervisor depending upon the frequency of usage and level of hazard.
- All laboratory workers with access to a designated area for use with extremely toxic chemicals must be trained about the deleterious effects of these substances, signs and symptoms regarding exposure, and how to respond in an emergency situation like a spill or exposure. This training is required even for those who do not actually work with the substances.
- Highly toxic chemicals should be transported in secondary containment.

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\(^1\) Acutely toxic category 1 and 2 chemicals have previously been referred to as particularly hazardous substances (PHS)
Compressed Gases

Gas cylinders should be stored in well ventilated areas with their protective caps on. They should be secured in an upright position at or slightly above midpoint to a secured surface at all times. Gas cylinders must not be stored near heat or high voltage sources. Compressed gas cylinders containing flammable, corrosive, oxidizing, or toxic gases should not be stored near egress routes.

Compressed gas cylinders that contain acutely toxic gases, such as arsine and nitrogen dioxide, must be stored in a ventilated gas cabinet. Leak detectors should be utilized as a warning system. Compressed gas cylinders that contain pyrophoric gases must be stored in a ventilated and sprinklered gas cabinet. Special plumbing and fittings are also required.

Please note that there is a limit on the number of compressed gas cylinders that can be stored in a laboratory space.

For moving compressed gas cylinders, appropriate carts should be used. The cylinder must be capped and securely strapped to the cart.

For more information, refer to the DRS guidance document Compressed Gas Cylinder Safety.

Corrosives

Corrosive chemicals can cause severe irritation and permanent destruction of the skin and respiratory tract. They are particularly hazardous to the eye. Besides mineral acids and bases, other chemicals such as some inorganic salts, phenols, amines, halogens, and some halogenated organic compounds are also highly corrosive. The use of any liquid corrosives requires wearing splash goggles and gloves at a minimum. Depending on the amount handled, a face shield, chemically resistant gloves and an apron / acid smock may be required.

Consult the Safety Library at the DRS website for information on specific materials covered by this category.

Cryogens

Cryogenic material should not be stored in poorly ventilated rooms such as cold rooms. Cryogens should be stored in well ventilated places to avoid asphyxiation hazards caused by oxygen depletion. Containers holding cryogens should not be transported in elevators at the same time as people. The handling of liquid cryogens requires wearing cryogenic gloves and splash goggles at a minimum.

For more information, refer to the DRS guidance document Cryogens and Dry Ice.

Explosive Materials

Compounds that may explode upon heat, friction or shock pose a serious safety hazard even for laboratory-scale quantities. Heavy metal azides, organic azides and organic peroxides are often shock sensitive explosives. Chemicals that become explosive when dry (e.g. picric acid), should be monitored quarterly for their water content and always be kept wet. Potentially explosive chemicals and procedures should only be performed in a chemical fume hood and behind a blast shield.
Consult the Safety Library at the DRS website for information on specific materials covered by this category.

Flammables

Flammable chemicals should be stored in a flammable cabinet whenever possible. They should never be stored or used near ignition sources. Bunsen burners are not permitted to heat flammable solvents. There is a limitation of the amount of flammable solvent that be stored in a laboratory space.

For more information, refer to the DRS guidance document Flammable Liquids.

Health Hazard Chemicals\(^2\)

Chemicals that are classified as carcinogens, mutagens or reproductive toxins are referred to as health hazard chemicals. Use of these chemicals should be minimized; if possible they should be substituted with less hazardous chemicals.

- Quantities of these chemicals used and stored in the laboratory should be minimized, as should their concentrations in solution or mixtures.
- Work should only be performed within a functioning fume hood, ventilated glove box, sealed system, or other system designed to minimize exposure to these substances. (The exhaust air from the ventilation systems may require scrubbing before being released into the atmosphere.)
- Where appropriate, an area within the laboratory should be designated for work with chemicals dangerous to health. This area should be marked with an appropriate hazard warning such as "DANGER, specific agent, AUTHORIZED PERSONNEL ONLY" or comparable warning sign.
- The designated working area should be cleaned after each work procedure and thoroughly decontaminated at regular intervals determined by the laboratory supervisor depending upon the frequency of usage and level of hazard.
- All laboratory workers with access to a designated area for use with health hazard chemicals must be trained about the deleterious effects of these substances, signs and symptoms regarding exposure, and how to respond in an emergency situation like a spill or exposure. This training is required even for those who do not actually work with the substances.
- Health hazard chemicals should be transported in secondary containment.

Mercaptans

To avoid false reporting of natural gas leaks, mercaptans should not be used in such a manner (e.g. scrubbers for effluent) that persons outside of the laboratory could smell the mercaptan and suspect a natural gas leak in the building. All persons using mercaptans should report these uses to people in the area (including facility managers) that may notice a malodor.

\(^2\) Reproductive toxins, and “select carcinogens” have previously been referred to as particularly hazardous substances (PHS).
Mercury

Mercury and mercury compounds are extremely toxic and difficult to dispose of. The use of mercury and its compounds should be minimized. Mercury containing thermometers and other devices should be replaced unless no appropriate substitute is available. Mercury thermometers should not be used in ovens. If metallic mercury is present in a laboratory, a mercury spill kit must be available.

For more information, refer to the DRS guidance document Mercury.

Nanomaterials

The health hazards of nanomaterials are not yet fully understood. There is evidence that they can penetrate intact skin, deposit in the lungs, enter the blood stream and travel through the whole body including the central nervous system. Any handling where an exposure to nanomaterials is likely (handling dry powders, agitating suspension or mechanically working on materials with embedded nanoparticles) should be performed in a well-ventilated enclosure adequate for nanoparticle use.

For more information, refer to the DRS guidance document Nanomaterials.

Oxidizers

Strong oxidizers promote combustion of flammable materials and often react vigorously with organic compounds. They should be stored away from reducers, heat sources, organic chemicals, and any other combustible material.

Perchloric Acid

If procedures require the heating of perchloric acid, a perchloric acid fume hood with a water wash down system or a local scrubbing or trapping system must be used. Evaporation of perchloric acid and condensation of potentially explosive peroxides on ductwork can lead to a severe explosion hazard.

For more information, refer to the DRS guidance document Perchloric Acid.

Peroxide Forming Chemicals

The two most serious hazards associated with peroxides are fires and explosions when exposed to heat, shock, or friction. Peroxide decomposition can initiate explosive polymerization reactions. Peroxides can also oxidize human tissue, cotton, and other materials.

For more information, refer to the DRS guidance document Peroxide-Forming Chemicals.

Pyrophorics

Pyrophoric materials ignite spontaneously in air and are therefore extremely hazardous. Training for handling pyrophorics should include practical instructions from someone experienced in using such chemicals. Laboratory personnel should only handle pyrophorics once they feel comfortable that they can perform the procedure safely. All handling of pyrophorics requires wearing a flame retardant lab coat.

For more information, refer to the DRS guidance document Handling Pyrophoric and Highly Reactive Materials.
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**Water Reactives**

Water reactive chemicals react violently with water often liberating highly flammable or toxic gas. They should be stored safely away from any source of water and should only be used after receiving adequate training.

For more information, refer to the DRS guidance document *Handling Pyrophoric and Highly Reactive Materials*.

**Storage of Chemicals**

Chemicals should be stored safely in cabinets and on shelves in an upright position. Toxic or corrosive liquids and any fragile containers (glass) should not be stored above 5 feet.

Chemicals should be segregated based on chemical categories and compatibilities. The specific storage guidelines include:

**Acids**

Store acids separate from bases and other acid sensitive chemicals that may liberate toxic or flammable gas upon contact with acid such as: azides, bleach, carbides, cyanides, nitrides, sulfides and metals. Separate nitric acid from organics such as acetic acid.

**Strong Oxidizers**

Store away from reducers, heat sources, organics (including organic acids) and other combustible material.

**Flammables**

Preferably store in a flammable cabinet. Always keep flammables away from any ignition sources.

A special refrigerator or freezer must be used for flammables that must be stored in a cool atmosphere. Refer to the DRS guidance document *Flammable Liquids*.

**Pungent smelling (stench) chemicals and lacrymators** should be stored in ventilated storage cabinets.

For more information, refer to the DRS guidance document *Chemical Storage*.

**Training**

All laboratory personnel who work with and around hazardous materials must receive training prior to starting work. See the Safety Training Checklist on the DRS website for specific training and documentation requirements.
Medical Consultation

Accidents Involving Chemicals

In the event of a chemical exposure, students and staff should go to the emergency room either at Presence Covenant Medical Center or Carle Foundation Hospital. Bring with you a (Material) Safety Data Sheet (SDS) of the chemical you were exposed to if it is readily available. Do NOT delay seeking medical attention to find a SDS. The emergency rooms are located at:

**Presence Covenant Hospital Emergency Department**
1400 W. Park Street, Urbana, IL 61801, (217) 337-2131

**Carle Hospital Emergency Department**
602 W. University Avenue, Urbana, IL 61801, (217) 383-3313

Students may also seek basic medical care at the McKinley Health Center or with their personal physician. Costs associated with most injuries incurred during these activities are the responsibility of the individual through their personal insurance or student insurance.

Supervisors should ensure that an Employee's Injury Report is completed for all work-related injuries or illnesses, however slight, involving activities for which campus persons are paid.

If a person suffers an injury during activities for which they are not paid, a Public Injury Report should be completed. These reports should be completed regardless of where the injury occurred or whether the person received medical follow-up. For more information on Worker's Compensation, contact the Claims Management Office.

Medical Surveillance

S&C coordinates the development and implementation of the campus Medical Surveillance Program. The program includes the routine medical examination of employees over a period of time to evaluate occupational exposure to a potential work-related hazard.

Employees are eligible for inclusion in this program if they perform work-related tasks that might be reasonably anticipated to cause occupational exposure to a potential hazard. The program does not include pre-employment medical examinations. The medical examinations and tests are provided without cost to the employee and at a reasonable time and place. It is the responsibility of the individual campus unit to bear the full cost associated with the medical examination of its employees.

For more information, contact S&C at (217) 265-9828.

Emergency Preparedness and Procedures

Emergency Assistance

In case of an emergency, assistance can be reached by dialing 911. Call for assistance in the following kinds of emergencies:

- Medical assistance for injuries
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- Fires
- Explosions
- Chemical spills for which assistance is required (complicated spill)

METCAD will dispatch the Fire Department and/or ambulances as appropriate. The fire department has the capability to mitigate chemical spills that cannot be managed without assistance.

Emergency Eye Wash/Safety Showers

Every laboratory where laboratory personnel may be exposed to corrosive, severely irritating or toxic chemicals should adhere to the [Campus Emergency Eyewash and Shower program](#). Safety showers and eyewashes should be located in areas where they can be reached within 10 seconds. They must be accessible and unobstructed at all times. According with campus policies eyewashes should be flushed and tested weekly and showers should be tested annually.

Fire Extinguishers

All laboratories working with flammable or combustible material must be equipped with fire extinguishers appropriate for the chemicals in use. They must be charged and hung in a location which is immediately accessible (reachable within 10 seconds). There should be no obstructions that might inhibit the accessibility and use of this equipment. Each extinguisher should be replaced annually by Campus Code Compliance and Fire Safety, and have a tag indicating the date it was last checked. Laboratory groups should designate personnel to be responsible for conducting monthly checks to ensure the extinguisher has not been tampered with or used. If you need a replacement extinguisher, inform your facility manager so that F&S can be notified.

Spills

Every laboratory should be equipped with appropriate material to clean-up any spill of the chemicals present. Small spills that can be cleaned up by laboratory personnel safely without threatening the health of laboratory staff or visitors should be cleaned up immediately. DRS can give advice on proper clean up procedures, consult in the event of a simple spill, and advise on what materials should be in a laboratory spill kit.

If the spill is too complicated to be safely handled by laboratory personnel, call for assistance by dialing 911. METCAD will dispatch a hazardous materials crew from the nearest city fire station. There is no direct charge for this service.

Emergency assistance should be called in any case where the spill cannot be contained, the spilled chemical is unknown, a fire is started, and / or someone is injured.