Environmental Health and Safety & Risk Management Support
UNIVERSITY of ALASKA ANCHORAGE

2025

Chemical Hygiene Plan

PREPARED BY THE CHEMICAL SAFETY COMMITTEE
MAY 2025

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1 LETTER OF PROMULGATION

The University of Alaska Anchorage (UAA) Chemical Hygiene Plan (CHP) is designed to provide the University with a written program which sets forth procedures, equipment, and work practices that are designed to protect employees from health hazards presented by hazardous chemicals used in the workplace and meets the requirements of 29 CFR 1910.1450(e), and the physical hazards presented by chemicals and / or equipment in hands-on activity spaces.

The CHP consists of the purpose and scope of the plan, university responsibilities, safety training and information, hazardous equipment operation, standard operating procedures, control measures for reducing chemical exposures, chemical exposure assessment and medical exams, emergency situations and evacuations, references, definitions, a list of abbreviations, and appendices.

The CHP is a dynamic plan and will be reviewed annually to evaluate the effectiveness of the plan in protecting employees from physical hazards, health hazards associated with using hazardous chemicals in the hands-on activity spaces / laboratories, and keeping chemical exposures below the permissible exposure limits as defined by the Occupational Safety and Health Administration (OSHA) in 29 CFR 1910, subpart Z. The CHP will be updated, as necessary.

This Letter of Promulgation recognizes that the Chemical Hygiene Plan is a working document and is subject to updates and revisions of OSHA standards and UAA's organizational structure. This plan is actionable regardless of the status of the Chemical Hygiene Plan.

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May 14, 2025

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2 PURPOSE

The Chemical Hygiene Plan (CHP) for the University of Alaska Anchorage (UAA) provides written policies for the establishment of a Safety-First Approach (SFA) and is designed to meet the requirements outlined in the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), 29 CFR Parts 1910.1450 - Occupational Exposure to Hazardous Chemicals in Laboratories, and other applicable regulations. In addition, this plan shall comply with any requirements outlined in *Occupational Exposures to Hazardous Chemicals in Laboratories* as adopted by the State of Alaska. These regulations are commonly known as the Laboratory Standard.

The SFA will encourage and support the use of Prudent Practices in the Laboratory (2011 updated edition) in all laboratory facilities and classrooms where hands-on style learning occurs, including studios and shops, hereafter referred to as *laboratories* or *labs*, where paints, solvents, and compressed gases are used and physical hazards are present, and / or that use chemicals on a laboratory scale in accordance with definitions provided in 29 CFR 1910.1450. Refer to the Controlled-Space Access Plan (CSAP) for additional examples of laboratory facilities. The use of chemicals in quantities other than a laboratory scale or for purposes other than laboratory protocols shall follow 29 CFR 1910.1200, the Hazard Communication standard. The SFA warrants the use of personal protective equipment (PPE), and safe and prudent practices in the handling, use, storage, and disposal of chemicals to minimize exposure risks. In addition, the SFA dictates the proper training in and employment of all equipment in hands-on activity / laboratory environments to minimize physical hazards associated with their use. Online training through UAA's learning management system (LMS) is available for all employees, students, and non-affiliated persons. The Department of Environmental Health & Safety and Risk Management (EHSRM) can provide additional information on accessing the online training.

In labs or other environments where chemicals that are not classified as hazardous per the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as per 29 CFR 1910.1200 - Hazard Communication are used or present, the applicable portions of the CHP will be followed, e.g., Section 8.6.12, Compressed Gas SOP.

A Safety-First Approach shall be an integral part of the educational and employment experience at UAA.

3 RELATED POLICIES

Refer to the following policies for additional information and guidance:

- Administrative Services: Building Access and Hours Policy
- Accommodating Students with Service Animals in Teaching Laboratories
- Controlled-Space Access Plan (CSAP)
- Emergency Operation Plan (EOP)

The CSAP and Building Access and Hours Policy are intended to work together, with the Building Access and Hours Policy providing the overarching campus policy, and the CSAP providing procedures for access exceptions in controlled spaces. All the listed policies work together with the CHP to provide an overarching policy for hands-on activity spaces and to help ensure the safety of lab occupants. Campus Status information from the Building Access and Hours Policy is available in section 14 Definitions.

4 SCOPE

For this document, the following users are identified:

4.1 Employee

An employee is any person receiving a paycheck directly from UA.

The CHP covers all employees who use or are exposed to chemicals in laboratories / hands-on activity spaces at UAA under the Laboratory Standard. Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures sections at Safety Policies Laboratory Safety Standards.

Non-laboratory employees (custodial, facilities maintenance, etc.) are covered under the OSHA Hazards Communications requirements, 29 CFR 1910.1200. Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policy Hazard Communications. The current UAA program is located at Safety Programs Hazard Communication.

4.2 Student

A student is any person enrolled in a course, regardless of age. This includes graduate, undergraduate, and Alaska Middle College School enrollees.

While OSHA regulations cover employees only, students are expected to follow the same hierarchy of controls (engineering controls, administrative controls, and personal protective equipment use) and follow safety procedures as outlined in this CHP and as instructed by university personnel.

4.3 Non-employee / Non-student

Everyone else that does not fall under 4.1 or 4.2 is a non-employee / non-student. This includes collaborating or visiting faculty/ researchers, visitors, volunteers, minors (under 18 years old and not enrolled as a student), guest lecturers, vendors, contractors, special users, passive observers, tour groups, etc.

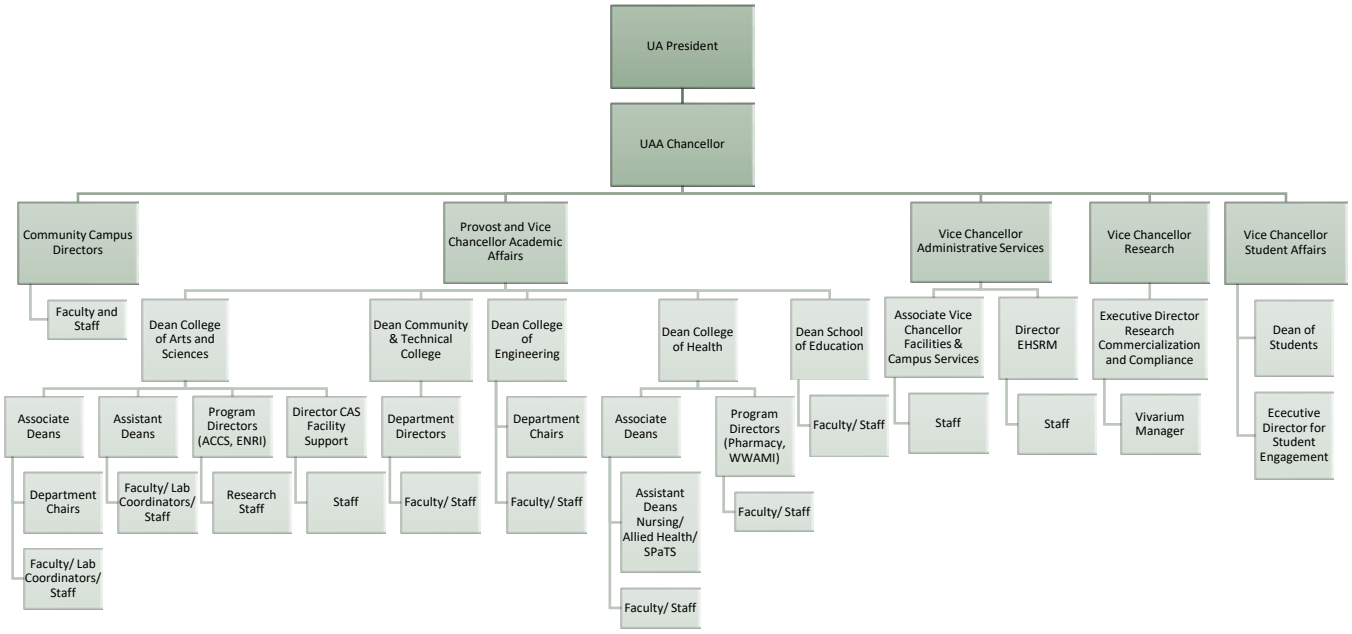
While OSHA regulations cover employees only, non-employee / non-students are expected to follow the same hierarchy of controls (engineering controls, administrative controls, and personal protective equipment use) and follow safety procedures as outlined in this CHP and as instructed by university personnel. The type of training varies for this group, from a briefing of the hazards that are present in the lab to training on par with training for employees and students, and depends on the activities they are performing in the lab.

5 UNIVERSITY RESPONSIBILITIES

5.1 Command Structure

Each individual in the chain of command has the responsibility of establishing, maintaining compliance of, and enforcing the UAA CHP and all applicable Environmental Protection Agency (EPA), Department of Homeland Security (DHS), Drug Enforcement Agency (DEA), Centers for Disease Control (CDC), National Institute of Health (NIH), Occupational Safety and Health Administration (OSHA), Department of Environmental Conservation (DEC), Alaska Occupational Safety and Health Administration (AKOSH), and Municipality of Anchorage (MOA) regulations based on their level of responsibility as indicated by the following chain of command reporting structure.

5.1.1 *Figure 1 – Chain of Command Reporting Structure*



5.2 *Chancellor*

Federal regulations require the employer to develop and implement a chemical hygiene plan. As the chief executive officer of the university, the Chancellor has the legal responsibility for the development and implementation of the CHP. Through the Board of Regents policies and regulations, this responsibility is delegated to UAA's office of Environmental Health & Safety and Risk Management.

5.3 *Chemical Safety Committee [29 CFR 1910.1450(e)(3)(vii)]*

The Chemical Safety Committee has the delegated responsibility of developing the university CHP and to promote the adoption of an SFA. This committee has the added responsibility of reviewing the effectiveness and updating the CHP at least annually or as changes in EPA, DHS, DEA, CDC, NIH, OSHA, DEC, AKOSH, and MOA regulations require. The UAA Chemical Hygiene Officer (CHO) in the department of EHSRM serves as the subject matter expert in the development of the UAA CHP.

Additional information about committees and a current membership and contact list for the Chemical Safety Committee can be found at the Office of Research Integrity and Compliance website.

Current UAA policy for the establishment of rules governing safety committees is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Safety Committees.

5.4 *Environmental Health & Safety and Risk Management (EHSRM)*

The EHSRM department is responsible for compliance assurance of EPA, DHS, DEA, CDC, NIH, DEC, OSHA, AKOSH, MOA, and Nuclear Regulatory Commission (NRC) regulations and policies. Deans and Community Campus Directors are responsible for enforcement of all pertinent regulations and policies. EHSRM reviews research and teaching standard operating procedures (SOPs) for chemical use and job hazard analyses (JHAs) for equipment use to ensure that appropriate chemical and physical risk / hazard assessments are completed. EHSRM assists and advises departments, committees, teaching faculty, and researchers with selection of appropriate PPE, evaluation of the suitability of facilities for performing projects, approving waste generation plans, and disposition of approved waste streams. The CHO represents EHSRM in all matters related to chemicals. The authority of EHSRM

is vested through Deans and Community Campus Directors except in cases of imminent threats to life, limb, and property when it may become impractical or impossible to consult with normal administrative chains of command in a timely manner. An EHSRM representative will serve on the chemical, biosafety, and radiation safety committee(s) in an ex-officio capacity to provide advice and to assist with identifying physical and training resources as well as to review topics for regulatory compliance.

5.5 Employees

5.5.1 Laboratory Employees

Employees must be made aware of the health hazards and safety risks presented by the chemicals and equipment in their work environment.

Employees are required to participate in the following annually and as required when assignments or projects change:

- OSHA-mandated training,
- Laboratory-Specific training, and
- SOP / JHA training.

As related to their work assignments, employees shall follow all applicable:

- UAA policies and procedures (including the CHP),
- Laboratory-Specific training stipulations
- SOPs / JHAs.

For the purpose of this document, *the authority* is the employee who is considered the subject matter expert on the research, instruction, and / or other laboratory activities in which they, their staff, and their students engage.

As the subject matter expert, they can choose someone as their designee to perform specific tasks. The designee will have a similar level of responsibility as *the authority*. The *authority* is and the designee may be responsible for:

- themselves and all others that use and / or enter their labs;
- ensuring that faculty, students, staff, volunteers, and visitors have completed all appropriate safety training;
- providing requisite safety briefings to non-laboratory personnel;
- the required safety training records, liability waivers, and other documents for the above specified individuals to be filed with EHSRM or designee *before work by those specified individuals in their laboratory facilities shall be permitted*;
- appropriate hazard and risk analysis, SOP / JHA creation, and training;
- enforcing this plan.

The authority or their designee is responsible for ensuring the safety training for themselves as well as the staff and students they supervise is completed. See the Controlled-Space Access Plan for additional details.

Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures sections, at Safety Policies Supervisor & Employee Responsibilities.

5.5.2 Responsibilities of the Authority in Teaching Labs

Each department Chair/ Assistant Dean or the teaching *authority* will be responsible for creating / providing written SOPs and / or JHAs for all curricula followed in teaching laboratories within their department, as required by OSHA regulation 29 CFR Part 1910.1450 and other applicable sections known as the 'Laboratory Standard.' In

addition, SOPs / JHAs must follow the guidelines outlined in section 8.2 Teaching Lab SOPs/ JHAs. Ultimate responsibility for SOP / JHA compliance and training rests with each department Chair / Assistant Dean or the teaching *authority*; whichever is most applicable.

5.5.3 Responsibilities of the Authority in Research Labs

Each research *authority* will be responsible for creating / providing written SOPs and / or JHAs for all projects within their research lab as required by OSHA regulation 29 CFR Part 1910.1450 and other applicable standards known as the 'Laboratory Standard.' In addition, SOPs / JHAs must follow the guidelines outlined in section 8.3 Research Lab SOPs/ JHAs. Ultimate responsibility for SOP / JHA compliance and training rests with *the authority* of each lab.

5.5.4 Non-Laboratory Employees

Non-laboratory employees (UAA Facilities, contracted custodial personnel) are required to have training under 29 CFR 1910.1200 Hazard Communication for the chemicals with which they work as part of their job duties, and a briefing on the chemical, physical, and health hazards in the specific lab they may be performing their duties in.

5.6 Students

Students shall observe and follow all policies and procedures outlined in the UAA CHP, and any SOP / JHA they have received training on. Students should be fully aware of the health hazards and safety risks presented by the chemicals and equipment in their laboratory environment. Student safety training shall occur as outlined in the CSAP.

5.7 Non-employee / Non-student

Non-employee / non-student persons shall have training appropriate to the level of their activity in the lab. Passive observers, tour, groups, and other persons not actively participating in lab procedures shall have a safety briefing and be provided PPE appropriate to the hazards with which they are exposed. In most cases, eye protection is the minimum PPE needed.

Non-employee / non-student persons actively involved in lab procedures shall have training commensurate with the type of chemical, physical, and health hazards with which they are engaging.

In both cases, *the authority* or their designee is responsible for ensuring non-employee / non-student persons have the appropriate training.

5.8 Vendors, Contractors, and UAA Facilities Personnel

Vendors, contractors, and UAA Facilities personnel shall be made aware of all safety and emergency procedures, outlined in the UAA CHP, relevant to their activities and presence while in any UAA laboratory. Workers must be made aware of the health hazards and physical hazards presented by the chemicals and equipment with which they may come in contact in the laboratory. All workers should be escorted by appropriately trained lab-specific (i.e., Biology, Chemistry, Ceramics, Welding, etc.) individual(s) during their working hour(s) to any UAA laboratory. Prior to accessing any UAA laboratory facility / controlled-space all workers are required to participate in Lab-Specific training provided by the *authority* or designee.

6 SAFETY TRAINING AND INFORMATION [29 CFR 1910.1450(e)(3)(iv)]

Safety training must be ongoing throughout the employee's career. All employees are required to attend safety training as specified by their supervisor and EHSRM, including OSHA-mandated training, Laboratory-Specific training, and chemical-specific training (where required). The objective of the training is to inform all employees

of the associated health and physical hazards they may encounter when working with hazardous chemicals, performing hazardous procedures, or using hazardous equipment. This training in an abbreviated form is also necessary for facilities personnel, vendors, and / or contractors who, upon entering any lab, might be exposed to a hazardous chemical or an on-going hazardous procedure.

All general safety training for each employee shall be documented and records shall be kept in a readily retrievable form for the length of employment plus 3 years.

6.1 OSHA-Mandated Training

The training of an employee shall take place:

- immediately upon hire,
- annually,
- prior to the teaching of any laboratory class,
- prior to starting a research project,
- upon occurrence of a reportable incident,
- upon regulation changes, and
- upon direction from EHSRM.

Training must occur for any current employee:

- initiating a new laboratory procedure or hands-on activity,
- in a new exposure situation, and / or
- operating new or unfamiliar equipment.

OSHA's Lab Standard (29 CFR 1910.1450) mandates employee training and shall include, but not be limited to:

- Physical and health hazards
- Safe handling, storage, and disposal of chemicals
- Location and availability of reference materials
- Selection and use of appropriate PPE

Training on specific topics, such as compressed gas cylinder handling or respiratory protection and using certain chemicals, such as phenol and phenol-chloroform solutions or dichloromethane, are also mandated by OSHA, 29 CFR Subpart Z – Toxic and Hazardous Substances. This is in addition to the training stated above and is based on the inventory of *the authority* or chemicals used in specific teaching labs.

6.2 Laboratory-Specific (Lab-Specific) Training

The authority is responsible for identifying, addressing, and reviewing with those employees they oversee:

- UAA and Lab-Specific policies and procedures that apply to that lab
- General emergency procedures
- Emergency evacuation procedures
- Location and use of emergency equipment in or near the lab
- Location and use of safety equipment and PPE required for lab activities
- SOP / JHA employment
- Any additional topics *the authority* deems relevant for the safe occupation and use of the lab

The authority or their designee is to provide this training to all students and employees working for them. They may request that EHSRM provide the training or assign a qualified senior member of their lab, such as a post-doc or graduate student, to give the training. The CSAP should be consulted for additional information.

6.3 Information Pertinent to all Employees Working in Proximity to Chemicals [29 CFR 1910.1200]

Employees shall be informed of the content and shown the location of the UAA CHP and CSAP, any departmental CHP, Lab-Specific policies and procedures, and SOPs / JHAs.

Employees shall be informed of the content and shown the location of reference materials on the hazards, storage, and handling of chemicals as related to their work assignments.

Employees shall be shown the location of personal protective equipment and trained in the selection of appropriate PPE as provided in the UAA CHP, department CHP, Lab-Specific policies and procedures, and / or SOPs / JHAs, as related to their work assignments.

Employees shall be shown the location of and trained on the reading, interpretation, and understanding of Safety Data Sheets (SDSs) as related to their work assignments.

Employees shall be informed of the permissible exposure limits for all OSHA-regulated substances that they may use or come in contact with prior to initiating work. For those hazardous substances not regulated by OSHA, employees shall be informed of the recommended exposure limits.

Employees shall be informed of the signs and symptoms associated with exposure to hazardous chemicals as related to their work assignments. Hazardous Chemical Exposure Information documents for each AKOSH-listed chemical present in UAA's chemical inventory can be found on the EHSRM Intranet.

All training for using chemicals must be documented, especially for those chemicals covered in sections 8.6.4 - Particularly Hazardous Chemicals, 8.6.5 - Restricted Chemicals, 8.6.11 - Cryogenic Liquids and Dry Ice, and 8.6.12 - Compressed Gases, of the CHP, and any chemicals posing hazards not addressed in generated standard operating procedures (8.4 Generating an SOP / JHA).

The authority or their designee shall keep training documents in a readily retrievable form.

Training and documentation retention requirements are dictated by the OSHA Lab Standard.

7 HAZARDOUS EQUIPMENT OPERATION

The operation of all equipment shall follow all recommended safety precautions prescribed by the manufacturer as well as any additional safety precautions warranted by the use of standard and prudent practices outlined in any Lab-Specific operations documents such as equipment operation manuals, standard operating procedures (SOPs), or job hazard analyses (JHAs).

Individuals should be aware of any chemical processes occurring within and the intrinsic hazards that the equipment may pose including high voltage (electrical), high pressure, fluid, sound, and mechanical parts.

Equipment that may fall under OSHA authority due to required safety devices, such as belt guards, must comply with these regulations as well. Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Tool Safety.

Training requirements are outlined in specific subparts of OSHA's General Industry Standard, 29 CFR 1910. Some pertinent subparts are listed below. Check the 1910 Table of Contents for other subparts that are applicable to your activities.

- Subpart H – Hazardous Materials, including compressed gases, acetylene, hydrogen, and oxygen, flammable liquids, and anhydrous ammonia
- Subpart O – Machinery and Machine Guarding
- Subpart P – Hand and Portable Powered Tools and Other Hand-Held Equipment
- Subpart Q – Welding, Cutting, and Brazing

Retention of training records may or may not be specified in a particular subpart. If no retention time is mentioned, best practice is to keep the 3 most current records for each subpart.

8 STANDARD OPERATING PROCEDURES (SOPs) [29 CFR 1910.1450(e)(3)(i)]

All employees, students, and non-employee / non-students must adopt an SFA by following the general laboratory SOP outlined below to minimize their overall health and safety risks, and to decrease the probability of incidents.

8.1 General Laboratory SOPs

This section applies to all laboratory spaces as defined by the CSAP. Some items apply to specific situations (e.g, the presence of safety showers) and some apply to all situations (wearing appropriate clothing and personal protective equipment). In hands-on activity / lab spaces where described elements are not present those elements do not apply.

a) Laboratory facilities may be used only by individuals who have the proper documented qualifications and training.

b) Emergency eyewash / shower stations are to remain free and clear (36” radius) of all obstructions to permit their use when the need arises.

c) Exit doors and aisles between work benches shall remain clear of all obstructions to permit an orderly escape in the event of an emergency, natural disaster, or an ordered building evacuation. See section 11, Emergency Situations and Evacuations, of this document.

d) The maximum number of students in any hands-on activity space / laboratory shall not exceed the number of workstations in said laboratory.

e) All injuries and incidents shall be reported to the appropriate staff and EHSRM. Online (Origami) reports must be completed as soon as practical. Depending on the type of injury, the university may have federal reporting requirements within an 8-hour or 24-hour timeframe. [29 CFR 1904.39]

f) In teaching labs, the dissemination of all relevant or pertinent safety data, chemical hazard warnings, and waste disposal procedures for each assignment or project shall be an integral part of the verbal presentation and / or written documentation provided to students.

   For research labs, the dissemination of all relevant or pertinent safety data, chemical hazard warnings, and waste disposal procedures for all research experiment(s) shall be through written SOPs or other well-established research protocols.

   This includes the location and operation of the following safety equipment: SDS weblink and/or binder, emergency shower, eyewash, first aid kit, fire alarm, fire blanket, fire extinguisher, fume hoods, broken glass disposal box, sharps container, gas shut-off valve, and lab phone. Information should be updated as required or needed in both teaching and research venues.

g) Chemical exposure must be minimized by using all appropriate methods of PPE such as section 9.3.1 Eye Protection, section 9.3.2 Hand Protection, and section 9.3.3 Hearing Protection. The wearing of lab coats (section 9.3.5 Body Protection) is highly recommended.

h) All books, backpacks, coats, and other personal items must be stored in a designated area and should not be placed on the floor, bench tops, or in cabinets under sinks where possible chemical and /or microbial contamination can occur.

i) In labs where chemicals or biological agents are in use, the consumption of food or drinks, chewing of tobacco, gum, or mints, and the application of make-up is prohibited. One should avoid placing anything in one's mouth or touching any mucous membranes with bare hands or gloves while in a lab.

j) Pets are not allowed in any laboratory. Refer to the CSAP and Accommodating Students with Service Animals in Teaching Laboratories for Service Animal allowances.

k) Chemical spills (section 11.3) should be cleaned up immediately using the appropriate materials and PPE.

l) EHSRM should be consulted for special safety precautions needed when changing or scaling up procedures that may increase the hazards or risks to laboratory occupants.

m) Clothing and safety equipment appropriate to the hazards present in the laboratory are required. Departmental policy needs to be as specific / restrictive as needed to help prevent injury to people and damage to equipment. OSHA / AKOSH regulations, industry standards, union directives, prudent practices, and common sense should dictate specifics. Exceptions for religious or ethnic attire may be granted following a safety discussion with *the authority*.

The following should serve as general guidelines for determining what to wear before entering the hands-on learning space:

1. Wear proper "street clothes".
    a. In labs where physical hazards are present, avoid baggy / dangling clothes that can get caught on equipment / tools / pinch points.
    b. In labs where chemical and/ or biological hazards are present, wear clothing that completely covers the torso, arms, and legs; and, avoid baggy / dangling and skin-tight clothing. Chemicals may damage skin. Baggy clothing can knock over glassware / chemicals or biological specimen containers. Skin-tight clothing can trap chemicals next to the skin and increase the risk of adverse effects due to prolonged chemical contact. Cotton and wool are less reactive to chemicals than some synthetic materials. Synthetics such as rayon and nylon react with or dissolve in certain chemicals.
    c. In labs where fire / flames are present, clothing made of natural fibers are preferred. Synthetics such as rayon and nylon can melt when exposed to flames.
2. Wear proper footwear.
    a. In labs where physical drop hazards are present, steel-toed boots or other reinforced footwear should be worn.
    b. In labs where chemical and/ or biological hazards are present, closed-toe, closed-heel footwear that completely covers the foot up to the ankle provides maximum protection to skin. Footwear with a low heel may prevent tripping and getting heels stuck in safety mats.
3. Properly restrain long hair.

   a. In labs where physical hazards are present, unrestrained hair can obscure vision. It can also get caught on turning / spinning equipment or caught in pinch points. This can lead to scalping and death.
   b. In labs where chemical and/ or biological hazards are present, loose hair can obscure vision, land in chemicals or specimens, and knock over glassware / equipment.
4. Remove dangling or loose-fitting jewelry.
   a. In labs where physical hazards are present, dangling jewelry / accessories can get caught on equipment, leading to injury and equipment damage.
   b. In labs where chemical hazards are present, dangling jewelry / accessories can break glassware or get submerged in chemicals, leading to glassware breakage and / or accessory damage.
5. Remove watches and / or accessories below the elbow.
   a. In labs where physical hazards are present, rings can get caught in equipment, leading to degloving or amputation of the finger(s). Bracelets and watches can catch on equipment, leading to injuries and equipment damage.
   b. In labs where chemical hazards are present, accessories can react with chemicals leading to skin burns, irritation, and / or accessory damage.
6. Remove “street” hats / head gear.
   a. In labs where physical hazards are present, hats can obscure vision and / or hearing. A loose-fitting hat can fall off a person’s head and damage equipment or ruin a project.
   b. In labs where chemical and/ or biological hazards are present, hats can obscure vision and / or hearing. A loose-fitting hat can fall off a person’s head and knock over glassware / chemicals or specimen containers.
   c. Cloth head coverings should be securely attached and loose ends restrained or tucked into the shirt or lab coat to prevent the ends from knocking over glassware/ chemicals or specimen containers, or getting caught in equipment, moving parts, or pinch points. Cloth head coverings must also be constructed from a fabric compatible with (resistant to) the hazards present, e.g. natural fibers or fire-resistant material if open flames are present.
7. Replace cloth face coverings with a disposable style.
   a. Cloth face coverings, including but not limited to face masks, can become contaminated by chemicals or biological materials if worn in a lab, and the contaminants might not be removed by normal laundering.
   b. Cloth face coverings, including but not limited to face masks, can become soiled by materials that splatter or fly through the air, such as paint, ceramic clays, and sawdust. These materials may be difficult to remove by normal laundering.

The following should serve as general guidelines for suiting up before starting hands-on work. Protective equipment should be geared toward specific hazards present in the hands-on learning space.

1. Don a lab coat, apron, or other protective clothing.
2. Don protective gloves.
3. Don a hard hat or other safety head gear.
4. Don safety goggles or other appropriate eye protection.
5. Don protective gear specified by other industry standards not mentioned here, specific to the activity in question (e.g., safety harness, hearing protection, or respiratory protection).

n) Permission from the appropriate university authority must be obtained prior to the removal of any chemicals, culture specimens, equipment, or other university property from laboratory facilities.

o) Laboratories should be kept in clean and orderly condition. Equipment and supplies stored in the laboratory should be neatly organized and not pose any tripping or falling-object hazards, and not violate fire code. The accumulation of trash is to be avoided. Keep in mind that we are in a seismically active area – anything left on the benchtops can end up on the floor and broken. Consider secondary containment for all chemicals and secure storage for glassware (i.e., bins, trays, in cabinets, etc.).

p) All malfunctioning facilities equipment (e.g., eyewashes, fume hoods, leaking sinks, burnt-out light bulbs) should be reported immediately to the appropriate personnel to schedule repairs or testing. Malfunctioning equipment should be tagged with an 'out of order' sign, caution tape, or something similar.

q) Facilities personnel, vendors, and contractors should be informed of any lab-specific hazards prior to their working on or repairing any building facilities (electrical, plumbing, etc.) or specialized equipment (refrigerators, freezers, etc.). Any identified hazard should be minimized to provide a safe working environment.

r) Contact the University Police Department (UPD) at 907-786-1120 to remove individuals who pose a danger to themselves or others by being under the influence of any drug, inhibiting medication, or who becomes violent or threatening from any laboratory. See the current UAA Incident Action Plan for employees and students 'Disorderly or Disturbed Person'.

s) In the event of an emergency, 2 (two) or more persons may be needed to respond, with one person on the phone making an emergency call and the other person(s) addressing the incident. If only 1 (one) person is available, it is preferable to use a mobile phone to call 911. Dispatch will keep the caller on the line while sending emergency responders. Do not hang up until dispatch lets you know the call is complete. When making an emergency call, dispatch will need to know:
    - Your name and location (building, room number, building address). Refer to the yellow Emergency sign located in the room for this information.
    - Nature of the emergency
    - Type and severity of any injuries
    - Suspect description and direction of travel (if applicable)

t) Review the UAA CSAP carefully to determine when it is appropriate to work autonomously and / or unsupervised.

8.2 Teaching Lab SOPs / JHAs

SOPs / JHAs should be generated for all hands-on curricula taking place in laboratories at the Anchorage and community campuses and is the responsibility of the *authority* or the department Chair / Assistant Dean, whichever is most appropriate.

Procedures in project / experiment-specific SOPs shall not violate established professional ethics pertaining to the health, safety, privacy, and other personal rights of human beings or to the treatment of animals.

8.3 Research Lab SOPs / JHAs

SOPs / JHAs should be generated for all research projects of faculty, employee(s), student(s), and visiting research professionals undertaken at UAA, including community campuses and field research locations that do not fall under other jurisdictions.

Safe and effective research requires attention to all responsibilities that the *authority* has to the university, research sponsors, employees, student researchers, visiting research professionals, and all other occupants of those locations where research is conducted.

Research techniques shall not violate established professional ethics pertaining to the health, safety, privacy, and other personal rights of human beings or to the treatment of animals.

Research must comply with all Federal, State, MOA, and any recognized governing body rules and regulations covering specific areas of research, such as the Centers for Disease Control (CDC), Institutional Animal Care and Use Committee (IACUC), National Institute of Health (NIH), National Science Foundation (NSF) and the Nuclear Regulatory Commission (NRC), as it pertains to each research project.

8.4 Generating an SOP / JHA

Example of how to complete a JHA

a) SOPs / JHAs should be thorough enough to serve as a training guide for incoming researchers / assistants / students.

b) JHAs are typically generated for equipment and processes.

c) SOPs are generally accepted practices for the use of chemicals in particular situations and can be based on any of the following:

- Processes (e.g., distillation, synthesis, chromatography, instrumental)
- Individual chemicals (e.g., benzene, nitric acid, potassium cyanide)
- Hazard classifications of the chemical (e.g., flammable, corrosive, toxic)
- Procedures (e.g., steps to carry out an experiment that uses the above processes, individual chemicals, hazard classifications, et al.)

d) Externally published protocols (e.g., laboratory manuals, journal articles, etc.) typically do not adequately address safety requirements, equipment failures, etc. but can be used as a starting point from which to write an SOP / JHA.

e) An adequate SOP / JHA should be fully compliant with the CHP and address the following:

- The steps required to accomplish the project / task / experiment.
    - Where feasible, methods should be micro-scaled and procedures and instrumental methods used that decrease exposures, usage, waste generation, and cost.
- The procedures to safely carry out all activities, including PPE needs, engineering controls, and emergency procedures.
- Chemical usage (where applicable). Note that substance-specific SOPs are required for all hazardous chemicals that fall outside the CHPs general or hazard-specific SOPs. SDSs should be included with these. They are substances that are:
    - acutely hazardous
    - extremely hazardous
    - radioactive
    - carcinogenic (or select carcinogens)
    - reproductive toxins
    - infectious biological material
- Risk / hazard assessment (see the CSAP).
- Spill response (where applicable).

- Waste generation and disposal (where applicable).
- Equipment failure procedures.
- What to do during / after natural disasters.

f) SOPs / JHAs:

- Can be part of a traditional manual or exist as stand-alone documents.
- Must be reviewed periodically and updated as needed to reduce risks / hazards. Periodicity should not extend beyond three years.
- Must be reviewed by EHSRM for waste generation and disposal compliance.

See the Controlled-Space Access Plan for additional information on JHAs and SOPs.

8.5 Modifying SOPs / JHAs

SOPs / JHAs should be modified in specific instances, when appropriate.

Modifications that **do not require** EHSRM review include, but are not limited to:

- varying solvent ratios,
- scaling down volumes / concentrations, and
- substituting chemicals with the same hazards as those already part of the SOP.

Modifications that **require** review by EHSRM and the appropriate committee include, but are not limited to:

- Upscaling of any chemical reaction
- Substituting chemicals with different hazards than those already part of the SOP
- Modifications that entail additional risks
- Changes to engineering controls

The reasons for such modifications must be documented and signed by *the authority* or their designee and approved through EHSRM, Chemical Safety Committee, Biosafety Committee, or the Radiation Safety Committee, as necessary, prior to commencing with such modifications.

8.6 Standard Operating Procedures for Lab Materials [29 CFR 1910.1450(e)(3)(i), 29 CFR 1910.1450(e)(3)(viii)]

The standard and prudent practices outlined below must be followed to ensure the safety of employees and students, and to minimize the risks associated with the ordering, possession, usage, storage, handling, and disposal of chemicals. The use of chemicals in the research labs should be addressed in the lab-specific policies and procedures and /or written SOPs.

8.6.1 Chemical Procurement

a) Prior to purchasing any chemical, the current UAA chemical inventory should be checked to see if the chemical is in stock. UAA uses a web-based Chemical Inventory Management System (CIMS). Chemicals more than 2 years past the received date may be transferred to another user.

b) Chemicals should be purchased in quantities that will be consumed in a twelve-month period or less. Exceptions can be granted by the Chemical Hygiene Officer. A note will be placed in the CIMS reflecting the exception.

c) Purchase of chemicals using a UAA ProCard is prohibited except by individuals who receive pre-authorization from EHSRM and the Procurement Services ProCard Administrator. See UA Procurement for the ProCard program details and a link to the waiver form.

d) EHSRM must be consulted prior to ordering any chemicals in sections 8.6.4 Particularly Hazardous Substances, or 8.6.5 Restricted Chemicals.

e) All chemical orders must be approved by the CHO.

f) The CHO shall be notified before any chemicals or hazardous materials that have an SDS are shipped to or brought onto campus, including but not limited to:
   - Household chemicals brought on campus for inclusion in an experiment
   - Free chemical samples
   - Donated chemicals
   - Paints and stains
   - Compressed gas cylinders (full or empty)

Exceptions to the notification policy are made for small quantities of household cleaning supplies that are used for their original intended purpose and at the same frequency and quantity as those in a home (e.g., disinfecting wipes, dishwashing detergent, or hand soap).

8.6.2 Chemical Inventories

a) All hands-on activity spaces / laboratories that use or store chemicals, except for household cleaning supplies, will have a complete online chemical inventory.

b) Chemical inventories should be updated annually, and chemicals tracked from 'cradle to grave' i.e., from receipt to disposal.

c) Annually completed chemical inventories are to be submitted to EHSRM via the CIMS. These are forwarded to the EPA, DHS, and local emergency response teams for regulatory compliance and reporting requirements. Responsibility for chemical inventories for the teaching labs lies with each department, while responsibility for the research labs is with each respective *authority*.

8.6.3 Chemical Storage and Labeling

8.6.3.1 Table 1 – Chemical Storage Colors (based on a system developed by J.T. Baker Co.)

Storage Code	Definition	Example
Orange	General storage; non-reactive or comparatively non-hazardous chemicals.	Sodium chloride, agars, broths, sugars, buffers
Blue	Toxic, Poisonous – store locked up.	Sodium azide, Sodium fluoride
Blue Stripe	Toxic, Poisonous – segregate from other chemicals in this category.	
Red	Flammable – store in flammable cabinet.	Ethanol, Acetone
Red Stripe	Flammable – segregate from other chemicals in this category.	Magnesium turnings
White	Corrosive – acid. Separate acids from bases. Store in corrosives cabinet.	Hydrochloric acid

Storage Code	Definition	Example
White Stripe	Corrosive – base. Segregate from other chemicals in this category. Store in corrosives cabinet.	Sodium hydroxide, Bleach solutions
Yellow	Oxidizer – store away from everything else.	Ammonium nitrate, Sodium perchlorate
Yellow Stripe	Oxidizer – segregate from other chemicals in this category.	Organic peroxides

a) Chemical storage is determined by chemical storage code, class, and compatibility.

b) Chemical storage facilities should be approved by EHSRM for the type of chemicals to be stored, such as flammable chemicals in flammable cabinets, corrosive chemicals in corrosive cabinets, etc. Chemicals should be stored according to all applicable uniform / local building codes, OSHA, and NFPA guidelines.

c) The type and size of container used for holding various categories of flammable liquids will adhere to all applicable OSHA, NFPA, and IBC (International Building Code) guidelines, with the maximum size for any one container being 4 L or 1 gallon. See Tables 2 and 3 below for details. Consideration should be given to the expected volume of flammable liquid needed and any incompatible chemical or physical hazard that is in the immediate vicinity.

8.6.3.2 Table 2 – Maximum Container Size [NFPA 45 Table 9.1.2 Fire Protection for Laboratories Using Chemicals]

Container Type	GHS Flammability Category			
	1	2	3	4
Glass or approved Plastic	500 mL (1 pt.) *	1 L (1 qt.) *	4 L (1 gal)	4 L (1 gal)
Metal (DOT spec)	4 L (1 gal)	4 L (1 gal)	4 L (1 gal)	4 L (1 gal)

** Glass or plastic containers of no more than 4 L (1 gallon) capacity may be used for category 1 and 2 flammable liquids if: 1) such liquid would be rendered unfit for its intended use by contact with metal or 2) the process either would require more than 500 mL (1 pint) of a category 1 or more than 1 L (1 quart) of a category 2 flammable liquid of a single assay lot to be used at one time.*

8.6.3.3 Table 3 – Flammable Liquid Classification: GHS vs. NFPA

GHS			NFPA		
Category	Flash Point (°C)	Boiling Point (°C)	Class	Flash Point (°C)	Boiling Point (°C)
1	<23	<35	IA	<22.8	<37.8
2	<23	>35	IB	<22.8	>37.8
			IC	>22.8 - <37.8	
3	>23 - <60		II	>37.8 - <60	
4	>60 - <93		IIIA	>60 - <93.4	
			IIIB	>93.4	

The maximum total volume of flammable liquids for each lab shall not exceed the total capacity of the flammable storage cabinets, which is 60 gallons per flammable cabinet.

d) Flammable chemicals that require refrigeration shall be stored in explosion-proof refrigerators, an Underwriters Laboratories (UL) listed flammable liquids refrigerator, or other refrigerator meeting or

exceeding NFPA standards. Household refrigerators shall not be used for the storage of flammable chemicals. [NFPA 70 National Electrical Code]

e) Secondary containment should be used in addition to any other required storage facilities for acid, base, and flammable solvent bottles larger than 500 mL. Cardboard boxes or other porous materials are not suitable as secondary containment. Proper secondary storage should be geared toward the specific chemical. Rubber safety carriers (boots) work well for most types of chemicals.

f) Secondary containment is recommended for all chemical containers to minimize the effects of earthquakes or other unexpected events. An example is the use of chemically-resistant trays or bins made from MGF (fiberglass), HDPE, or LDPE.

g) All chemicals in primary (manufacturer's) containers shall be labeled with the date received, name of *the authority*, and inventory barcode/ QR code sticker.

h) Chemicals transferred to a secondary (in-house) container, stored samples, and in-house prepared solutions and materials must be labeled with:
- Product identifier or chemical name(s)
- Signal word – when applicable
- Owner's name – *the authority*, Department, person who did the transfer or made the solution, etc.
- Date of transfer or preparation, when appropriate

If the container is sufficiently sized to allow for a larger label, the pictograms and as many hazard statements as practicable should be included. A label template is available on the EHSRM Intranet Laboratory Safety page under Labels & Signage. The CIMS CampusOptics has a feature to create secondary labels from the inventory container page.

i) When transferring large bottles (1 liter through 4 liters) of hazardous liquids between labs, secondary containment vessels shall be used (e.g., a rubber safety carrier / boot). Multiple bottles or containers larger than 4 liters shall be moved on a chemical resistant, 4-wheeled cart.

j) Chemical waste shall be stored separately from other stored chemicals unless secondary containment is utilized, and EHSRM is notified.

k) Chemical safety labeling on any container should not be defaced while the original chemical is in it.

8.6.4 Particularly Hazardous Substances (PHS) [29 CFR 1910.1450(e)(3)(viii)(A-D)]

High-risk materials are those with the following properties or characteristics:
- highly or acutely toxic
- select carcinogens as specified in OSHA regulations, 29 CFR 1910.1003, 13 Carcinogens
- reproductive toxins as specified in the SDS for each chemical.

These are classified as particularly hazardous substances (PHS) that require additional provisions to ensure employee and student safety when working with these types of chemicals.

To ensure the safety and minimize the risks associated with the usage, storage, handling, and disposal of PHS and other carcinogenic chemicals, the standard and prudent practices outlined below are required. Where warranted, the use of special PPE, techniques, or protocols should be addressed in the chemical-specific SOPs.

a) Use only the minimum amount of chemical needed for the procedure.

b) Perform all work in a fume hood, glove box, or a designated area when performing the following operations:
   - Volatilizing or dissolving PHSs.
   - Any manipulation that produces aerosols, fines, particulates, or mists.
   - Weighing out PHSs.

c) Use HEPA filters, carbon filters, or scrubber systems with containment devices to protect effluent and vacuum lines and pumps.

d) Use appropriate containers for disposal of PHS and contaminated materials (e.g., pipet tips, wipes, paper towels). Label the container with all contents, date first drop was added to the container, and lab group or class.

e) Decontaminate the area using recommended methods, when done.

Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Use of Chemical Carcinogens.

Report all exposures of carcinogenic or acutely toxic materials immediately through Origami.

8.6.5 Restricted Chemicals

Chemicals that fall under the restricted category are all P-listed chemicals, controlled substances, and other chemicals that require very specialized safety / hazard assessments to ensure safety of employees and students when used. Restricted chemicals must be inventoried in the current CIMS and have an inventory sticker (QR code or barcode) affixed to the primary container.

a) DEA-Controlled Substances
   DEA-controlled substances, which include Schedule I-V drugs and List I and II regulated chemicals, shall be stored in a limited-access controlled area. Additionally, Schedule I-V substances shall be stored inside a locked lockbox, inside a locked cabinet. The keys to the cabinet and lockbox shall be kept in a location separate from the cabinet and lockbox and both shall remain locked unless in immediate use.

   Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Controlled Substances Use in Research.

b) DHS Chemicals of Interest
   Certain chemicals have been identified as security issues by the Department of Homeland Security's Chemical Facility Anti-Terrorism Standards (CFATS) program if they are 1) released at a facility, 2) diverted or stolen from a facility, or 3) used for sabotage. These chemicals of interest can be converted into weapons or used for nefarious reasons and must be stored securely. While Congress allowed the statutory authority to expire as of July, 2023, it is prudent to keep chemicals on the CFATS Chemicals of Interest list secured.

c) EPA P-Listed Chemicals
   P-listed chemicals are acutely hazardous and can cause significant harm in small amounts and shall be stored in a limited-access controlled area.

8.6.6 Transportation and/or Shipment of Chemicals

a) All chemicals must be shipped according to current Department of Transportation (DOT) regulations using a DOT-certified shipping company.

b) The use of a shipping company is required for the shipping of chemicals to ensure proper packaging and limited liability in case of an exposure.

c) For chemicals or newly synthesized compounds for which hazards are unknown, the compounds should be assumed hazardous, and a shipping company should handle the shipment.

d) The transportation of chemicals for work purposes may be covered under the "Materials of Trade" exception, 49 CFR 173.6. This exception covers small quantities of hazardous materials used for activities such as preserving field samples or educational demonstrations. Specific amounts and packaging are required for different materials; in general, the total gross weight of all materials of trade on a motor vehicle cannot exceed 220 kg (440 lbs.). Contact the CHO for specific information.

8.6.7 Radioactive Chemical or Isotope Use

The use of any radioactive chemicals, compounds, or isotopes shall meet all of the requirements given in the NRC license to UAA, those of the UAA Radiation Safety Officer (RSO), and the UAA Radiation Safety Committee. The disposal of any radioactive chemicals, compounds, or isotopes (RAM, or radioactive materials) shall follow the UAA Radioactive Waste Policies. For all radiation training and regulatory questions, contact the UAA RSO at (907)-786-1268.

8.6.8 Chemical Reassignment

Chemicals that are not completely consumed within 2 years from the date of receipt should be physically transferred to the stockroom and made available to any lab that can use them. To set up such a transfer before or at the 2-year mark, please contact your School / College / divisional lab manager and the UAA chemical stockroom manager. Exceptions to the 2-year rule can be granted by the CHO. A note can be placed in the CIMS reflecting the exception. Refer to 8.6.1 Chemical Procurement for chemical purchasing details.

8.6.9 Chemical Hazard Assessment

Laboratory personnel and students must have a clear understanding of the physical, chemical, and toxicological properties of any chemical they will use or come in contact with. All employees and students must review the SDS for each new chemical they will be using or come in contact with **PRIOR** to actually beginning any work.

The authority or their designee is responsible for completing Chemical Hazard Assessments (CHA) for their research laboratory. Each lab coordinator or the *authority* or their designee in charge of a teaching lab is responsible for completing CHAs for their teaching lab. A CHA must be completed for each chemical with any GHS Health Hazard Category 1, 2, or 3, as identified in section 2 of the SDS for the chemical and must be submitted to the CHO for review.

A template for CHAs is located on the EHSRM Intranet Hazardous Chemical Exposure Information page.

8.6.10 Biological Agent Use

8.6.10.1 Biological Agents

All laboratories that use biological agents, biological toxins, or recombinant materials must be registered with EHSRM in order to comply with federal guidelines and regulations. *The authority* is responsible for ensuring that their lab is registered with the UAA Biosafety Committee and EHSRM, and that the lab is in compliance with all federal guidelines and regulations. *The authority* is responsible for determining if the recombinant DNA molecules

used in their research are exempt from NIH guidelines and if registration with the UAA Biosafety Committee and EHSRM is not required.

8.6.10.2 Select Agents [7 CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73]

The federal government (USDHHS / CDC) and USDA have restricted certain biological agents and toxins and have designated these as 'select agents'. The possession, use, and transfer of the restricted or select agents must be registered with UAA EHSRM and the appropriate federal authorities. EHSRM can assist with this procedure. There are some exclusions to these regulations.

8.6.11 Cryogenic Liquids and Dry Ice SOP

These compounds have both chemical and physical hazards and the PPE listed below must be used when transferring cryogenic liquids, removing samples from Dewars, or using dry ice / acetone solutions.

- Cryo-gloves
- Safety goggles and face shield
- Lab coat and long pants

A specific policy covering dry ice purchase and transportation can be found in UAA's 'Dry Ice Policy'. Workers must be familiar with State of Alaska Physical Agent Data Sheets and OSHA's cryogen / dry ice quick-fact sheet prior to cryogenic liquid use. Do not store cryogenic liquids in a cold room. Sufficient ventilation must be available in the room in which the cryogenic liquid is stored since release of a cryogenic liquid or dry ice can displace oxygen in the immediate area.

8.6.12 Compressed Gas SOP

Compressed gases are both mechanically and chemically hazardous depending on the type of compressed gas. The following SOPs must be followed when working with compressed gas cylinders in any laboratory setting. Compressed gas cylinders should not be stored or used in offices or other spaces that have recirculated air as part of the ventilation system. Cylinders are best used in spaces that have 100% fresh / outside make-up air.

a) Cylinders must have a vendor label and end user or department name.

b) Cylinders must have a collar or tag indicating its status – full or empty (MT).

c) Both full and empty cylinders should be secured by two straps or chains spaced 1/3 distance from the top and bottom of the cylinder. Two straps are highly recommended in seismically active areas such as Alaska. Alternate security is the use of a cylinder stand and a single strap mounted to a secure bench, wall, or dolly. If there is no manner in which two straps/chains are feasible, one strap/chain is the minimum required by OSHA regulation.

d) All cylinders not in use must have the valve cap screwed in place.

e) When bringing a cylinder into or out of service, the cylinder should be moved using a cylinder dolly, with the valve cap in place. Do not hand roll any cylinder.

f) When a cylinder is taken out of service, at least 50 psi should be left in the cylinder. Below 25 psi, the residual contents in the cylinder may become contaminated if the valve is left open. If moisture enters the cylinder, it can result in corrosive damage. The pressure in any cylinder should never drop to zero.

g) Flammable and reactive compressed gas cylinders should be stored separately from oxidizing compressed gas cylinders. Cylinders must be separated by a minimum of 20 feet or by a non-combustible barrier (wall) at least 5 feet high with a 30-minute fire resistance rating. [29 CFR 1910.253 and NFPA 55]

h) Disposal arrangements for small lecture bottle gas cylinders must be made through EHSRM prior to them being ordered. If they are ordered prior to making disposal arrangements with EHSRM, the cost of disposal will be the responsibility of the ordering department.

i) Lines leading from a compressed gas cylinder to any piece of equipment using the compressed gas should be labeled with the type of gas and hazards of the gas, e.g., 'Hydrogen Gas – Flammable'.

j) Lines leading from a compressed gas cylinder to any piece of equipment should be checked for leaks once a semester or if indicated by any unusual pressure changes at the regulator using 'snoop' – a mild soap and water solution.

k) The use of small in-lab gas generators for hydrogen or nitrogen is to be encouraged as they omit the hazards associated with the use of high-pressure cylinders.

l) Non-refillable, nominal 1 lb. containers of compressed propane or butane gas shall be stored:
- In a flammable gas cabinet, vented flammable liquids cabinet, or secured on an open shelf.
- The maximum quantity of 1 lb. cylinders in any storage area is 20 cylinders.
- Cylinders shall be stored in areas protected from tampering and away from exits, stairways, or areas used or intended for use as safe egress for building occupants.

8.6.13 Regulator Maintenance

Compressed gas regulators have a finite service life that can last several decades, depending on the environmental conditions to which they are exposed and the frequency of regular maintenance.

Regulator maintenance includes users checking for external leakage and internal leakage (creep or crawl) on a regular basis. It is recommended that regulators be taken out of service and returned to either the manufacturer or a competent agent for inspection and necessary refurbishment when leak checks uncover a leak that cannot be corrected by tightening or reconnecting.

Regulators should be replaced when they are suspected of being at the end of their service life.

9 CONTROL MEASURES FOR REDUCING CHEMICAL EXPOSURES [29 CFR 1910.1450(e)(3)(ii)]

The following steps shall be utilized to minimize the exposure to hazardous chemicals and mitigate the associated health risks due to their use in UAA laboratories. Controlling chemical exposures shall be accomplished by applying administrative and engineering controls, the wearing of lab-appropriate clothing, and the use of PPE. All employees must adopt an SFA concerning their work.

9.1 Administrative Controls

9.1.1 Faculty Research Proposal Review

A Faculty Research Review Committee has the delegated responsibility of reviewing faculty research grants / proposals. This committee ensures that each proposal has a complete SOP, as outlined in 8.3 Research Lab SOPs / JHAs, prior to the ordering or release of any hazardous chemicals, as indicated on the 'Proposal Transmittal Form'.

9.1.2 Student Research Proposal Review

A Student Research Review Committee has the delegated responsibility of reviewing undergraduate / graduate student research grants / proposals. This committee ensures that each proposal has a complete SOP outlining

chemical usage, methodology, waste generation and disposal. The student's project advisor must be a member of their committee.

9.1.3 Required Laboratory Contact Lists and Signage

a) Emergency contact lists will be placed on the outside of every laboratory door and inside each laboratory by the phone.

b) All laboratories will have the appropriate signage to identify the location of all emergency equipment such as emergency showers, eyewash stations, first-aid kits, fire blankets, and fire extinguishers.

c) All laboratories will have the appropriate signage to identify the specific hazards as required by law (e.g., cancer [formaldehyde] or rad propeller [radioactive isotope work] and biohazard sticker [infectious agents]).

9.1.4 Laboratory Inspections

Laboratory inspections are essential to an SFA program in the identification and addressing of potential health and safety deficiencies. Lab inspections will be done on a routine basis by EHSRM.

Completed inspection checklists and actions to correct identified unsafe conditions or equipment must be maintained by *the authority* or their designee for the time specified by EHSRM. Follow-up inspections to assess corrective measures will ensure compliance and timely corrections of any deficiencies.

9.2 Engineering Controls

9.2.1 Chemical Fume Hoods

All laboratories using any chemicals that have any of the properties or characteristics listed below shall have a fully functional chemical fume hood, chemical spill kit, safety shower, and eyewash station.

- Flammable
- Corrosive
- Reactive or instability
- Toxic or poisonous
- Carcinogenic, mutagenic, or a reproductive toxin
- Specific target organ toxicity (STOT)
- Volatility or offensive odor

Fume hoods are to be tested annually and as needed. Hood sash cables are to be checked every 3 to 5 years. Documentation of test results will be kept on file in the CHO office. Each hood will have the test result displayed on a sticker affixed to the front edge. Each hood will have the maximum sash height (**RED** arrow) displayed on a sticker affixed to the front edge. When a hood fails or has cubic foot per minute (cfm) readings below recommended values, it will be tagged **OUT OF SERVICE**; it will not be used for any procedure that requires ventilation to control any type of chemical exposure, and the unit and location will be reported for immediate repair. End-users will be notified of the situation as soon as possible.

Hood users must check the status of the hood prior to each use by observing the continuous airflow meter on the side of the hood with a recommended face velocity of 90-100 cfm, or the appropriate indicator light on the face of some hoods. Do not assume a hood is working properly without first checking its status.

All work should be done as least six (6) inches from the back side of the front sash to prevent turbulence and possible escape of hazardous vapors from inside the hood. Any large piece of equipment used inside a hood must be elevated and placed as far back as possible in the hood without blocking the rear or side exhaust openings.

Large pieces of equipment placed inside a fume hood will likely affect the flow of air and result in the user unknowingly being exposed to fumes.

Laboratory fume hoods are not to be used for storage of chemicals or equipment, except in the case of continuous procedures that are being carried out in the hood. Do not allow debris such as paper, latex / nitrile gloves, or small objects to be sucked up into the exhaust ducting as this may cause serious damage to the exhaust fan and impair fume hood performance resulting in a hazardous chemical exposure or inadvertent hood failure.

9.2.2 Biological Safety Cabinets

Currently UAA has a BSL-2 research capability. Biological safety cabinets are to be tested annually by an outside vendor. Documentation of test results will be kept in a readily retrievable manner.

9.2.3 Safety Showers and Eye Wash Stations

All safety showers and eyewash stations are to be tested and maintained according to the ANSI/SEA Z358.1-2014 standard. All safety showers and eyewash stations are to be activated weekly and tested annually and after major seismic events. They must deliver tepid water (60-100°F) at the appropriate flow rates. All test results and recorded temperature data for safety showers and eyewash stations shall be kept in a readily retrievable manner.

9.3 Personal Protective Equipment (PPE)

Since most chemicals used in laboratories present various types of hazards, users should follow all generally recommended precautions outlined in the UAA CHP and any additional precautions referenced in experimental SOPs, research-specific SOPs, other reference material, and SDSs. *The authority* or their designee shall recommend additional PPE for specific hazards / risks related to their individual research and teaching projects.

Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Personal Protective Equipment. The current UAA program is located at Safety Programs - Personal Protective Equipment (PPE).

9.3.1 Eye Protection

Prudent measures shall be taken to prevent chemical contact when entering a lab and while performing data entry. If in close proximity, safety glasses with side shields are permissible PPE.

All persons engaged in chemical transfers and the handling of glass objects must wear splash-proof, indirectly vented, impact-resistant (ANSI Z87.1-2003 or Z87+) safety goggles.

All persons entering / occupying any laboratory where procedures involve pressures above / below ambient must use the appropriate PPE based on the hazards outlined in the lab-specific policies and procedures and /or other written SOPs. A face shield cannot be used by itself in place of impact-resistant goggles.

Employees and students are cautioned against the underestimation of the hazards associated with the use of any chemical or the risks present in any laboratory procedure.

Users should be aware of the possibility of an immediate or delayed allergic reaction to the materials in safety glasses and goggles. Contact the CHO for alternatives if a known allergy exists. If the CHO is unavailable, contact EHSRM at 786-1300.

9.3.2 Hand Protection

Glove selection should be based on the known literature risks / hazards or safety precautions, and the anticipated level of chemical contact. Glove selection for newly synthesized compounds where no literature is available

should be based on the risks / hazards associated with the starting materials, accounting for possible higher levels of risks / hazards of the reaction products or mixtures.

Gloves shall be selected to be protective against the chemical(s) in use, with a sufficiently long breakthrough time to permit rinsing and removal of the contaminated glove(s) and donning of new ones. Consult the chemical SDS and glove manufacturers' glove compatibility charts to determine the most appropriate glove material.

All gloves should be inspected prior to use for holes, tears, swelling, discoloration, and for a proper fit.

Users should be aware of the possibility of an immediate or delayed allergic reaction to the materials in gloves. Contact the CHO for alternatives if a known allergy exists. If the CHO is unavailable, contact EHSRM at 786-1300.

9.3.3 Hearing Protection

Hearing protection is required when noise levels of non-isolated devices such as probe-sonicators, vacuum pumps, and NMR air pumps are above OSHA standards. Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Hearing Protection. The current UAA program is located at Safety Programs Hearing Conservation.

9.3.4 Respiratory Protection

Respiratory protection is not usually required for normal lab operations. The use of respirators in lab requires medical evaluation, fitting, and training prior to use. Current UAA policy is outlined in the Administrative Policies, policies and procedures section, at Safety Policies Respiratory Protection. The current UAA program is located at Safety Programs Respiratory Protection.

9.3.5 Body Protection

In addition to lab-appropriate clothing, hazard-specific body protection should be employed. In instances where disposable gowns are appropriate, said gowns must be disposed after use or before leaving the lab. Where lab coats are more prudent, the fabric should be appropriate to the hazard. For example, flammable resistant lab coats should be worn when using open flames. Lab coats should be appropriately sized for the people wearing them and they should be worn buttoned up. Once a lab coat develops holes or tears, its use should be discontinued. Lab coats should be laundered separately from other clothing after each contamination event. Researchers who require additional body protection such as coveralls, shoe covers, and bouffants need to follow SDS and / or manufacturer's recommendations for use, decontamination, and disposal.

10 CHEMICAL EXPOSURE ASSESSMENT AND MEDICAL EXAMS [29 CFR 1910.1450(e)(3)(vi)]

The EPA, under the Toxic Substances Control Act (TSCA) [15 U.S.C. 2605(a)], has been issuing new regulations for substances and mixtures "to address unreasonable risks to the extent necessary so that the chemical substance or mixture no longer presents such risk" [40 CFR 751]. Under these regulations, a Potentially Exposed Person (any person who may be exposed…in a workplace as a result… of use of that chemical or substance) [40 CFR 751.5] is to be afforded the same protection from exposure as an employee. Further, a Workplace Chemical Protection Program (WCPP) for each EPA regulated chemical or substance must be followed and an Exposure Control Plan (ECP) must be written for each regulated chemical or substance for each use/procedure. Existing Chemical Exposure Limits (ECELs), prohibitions of use, conditions of use, personal exposure monitoring, required PPE, and additional specifics are to be addressed in the ECP.

Current ECPs for chemical or substances used at UAA can be found at the EHSRM website, TBD.

10.1 Personal Exposure Monitoring

When action levels or permissible exposure levels (PELs) for a regulated substance are believed to routinely be exceeded, EHSRM will conduct personal exposure monitoring for that substance. If the initial monitoring discloses exposure over the action level or PEL, periodic monitoring according to the relevant standard will be done by EHSRM. Monitoring will be terminated according to the relevant standard. For any monitoring conducted, EHSRM shall notify the employee of the results in writing within 15 working days of receipt of the results.

Exposure monitoring and remediation may be conducted by other support groups as coordinated with EHSRM. All expenses of exposure control and monitoring, with the exception of medical consultations described in section 10.3 Medical Examinations and Records below, are the responsibility of the academic departments.

Resources to review for exposure limits include the SDS for the substance, Table Z-1-A Limits for Air Contaminants, NIOSH Pocket Guide and regulatory agencies such as EPA and OSHA.

The costs associated with personal exposure monitoring shall be borne by the department/unit in need of monitoring, and will vary depending on the type of monitoring appropriate for the specific substance. EHSRM can assist in determining monitoring device options, sourcing options for rental or purchase of monitoring equipment, and interpreting the results as they apply to the exposure limits.

10.2 Frequency of Exposure Monitoring

The initiation, frequency, and termination of personal exposure monitoring will be determined by EHSRM in accordance with the current regulations.

10.3 Medical Examinations and Records

Under the following conditions:

a) Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, or

b) Where exposure monitoring reveals an exposure level routinely above the action level or PEL for an OSHA regulated substance, or the action level or ECEL for an EPA regulated substance, for which there are exposure monitoring and medical surveillance requirements, or

c) Whenever an event takes place in the work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of an exposure,

the EHSRM department will direct affected employees to an appropriate UAA-contracted physician for medical evaluation, which could include follow-up examinations that the physician determines to be necessary.

All medical examinations shall be provided at no cost to the employee.

Current UAA policy is in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Use of Chemical Carcinogens. The System Office of Risk Services funds these exams. The results of any medical examinations will be provided within the period specified under current laws.

Current UAA policy is outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies Incident, Injury, Illness and Vehicular Accident Reporting.

11 EMERGENCY SITUATIONS AND EVACUATIONS

Emergency situations can occur from natural disasters such as earthquakes, volcanic eruptions, and severe storms, or humanmade events such as biological-, chemical-, and radiological spills, terrorist attacks, medical emergencies, etc. All situations will be assessed with regard to the level of threat to an individual's life and / or health.

11.1 Life-Threatening Incident or Injuries

All life-threatening incidents involving employees, students, visitors, and volunteers including any major cut, uncontrolled bleeding, epileptic seizure, and fainting with possible head injury, etc., requires an immediate call to 911.

Any person injured in lab must complete an Origami report as outlined in section 8.1 General Laboratory Standard Operating Procedures (SOPs), of this document.

Employees have the right to choose their own health care provider, except in cases involving chemical exposure evaluations that must be done through the University's contract physician with written approval from EHSRM.

Students who are currently employed by the University and are injured during the course and scope of employment are covered by workers' compensation.

All other students are responsible for their own insurance needs. Qualifying students should be directed to the Student Health and Counseling Center for relatively minor injuries.

In the advent of a minor injury, first aid to an employee is covered under the current UAA policy outlined in the Administrative Policies, EHSRM, policies and procedures section, at Safety Policies First Aid. The current UAA program is located at Safety Programs First Aid.

11.2 Natural Disasters or Emergency Building Evacuations

During any natural disaster situation or emergency / incident, EHSRM, UPD, APD, or AFD will determine if any building or any portion thereof is unsafe for occupancy. The evacuation will be coordinated by EHSRM if it is a non-emergency situation. In an emergency, occupants should activate the fire alarm, call 911, and evacuate in accordance with the appropriate 'Building Emergency Plan'. This plan is available from each facility's building manager and should be reviewed annually.

In the advent of a visible fire or the sound of a building fire alarm, building occupants should remain calm and follow their instructor's, supervisor's, *the authority's* or their designee's directions for evacuating the building and convening at the Emergency Assembly Area for said building. See the current UAA Incident Action Plan for employees and students 'Fire Alarm-Academic Building'.

In the event of an earthquake, building occupants should remain calm and get under a bench or stand against an inside wall. They should not stand in a doorway or against windows. When the shaking stops occupants should check for personal injuries and ask others if they are injured, then follow their instructor's, supervisor's, *the authority's* or their designee's directions regarding any building evacuation.

During a building evacuation, all chemical procedures should be stopped. If time and safety permits, all personal belongings should be collected prior to calmly exiting the building via the nearest and safest exit and going to the building's emergency evacuation assembly point. Elevators should not be used. Once outside, everyone should stay at least 50 to 100 feet from any building. Faculty should personally account for everyone in their classes. The

class evacuation assembly point should not be left prior to receiving approval from faculty to do so. During and after evacuating the building, evacuees should be aware of their surroundings and be on the lookout for additional hazards, such as overhead power lines, light posts, and trees that could cause injury in the event they come down.

Evacuated buildings should not be re-entered until they have been cleared and deemed safe through an official announcement from UPD, APD, AFD, or UAA IMT / EHSRM / administrator.

For additional information, see the current UAA policy outlined in the Administrative Policies, EHSRM, policies and procedures section at Safety Policies Emergency Evacuations.

11.3 Chemical Spills

Read the SDS prior to using any chemical or substance, paying particular attention to Section 2 Hazard Identification, Section 4 First Aid measures, and Section 6 Accident release measures.

a) If a chemical spill occurs, determine if there is an imminent threat to anyone in the area of the spill. If so, vacate the area immediately and call 911. If possible, convey the following information to an emergency responder:
   - Name of the spilled compound
   - Concentration of the compound
   - The size (volume) of the spill
   - Location of the spill

b) Assess all involved parties for injuries and exposure. If significant exposure to the chemical or severe injury to a person is suspected, call 911 immediately.

c) If there is no imminent threat to anyone's health or safety, the spill should be cleaned up immediately:
   - Contain the spill by diking (surrounding) with absorbent pigs or Amphomag if necessary.
   - Treat the spill using the appropriate spill kit materials.
   - Notify the *authority* or their designee, CHO, and building manager of the location and type of chemical spill.

Let's work together to keep our community safe by employing a Safety-First Approach.

12 REFERENCES

a) Occupational Exposure to Hazardous Chemicals in Laboratories, Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1910.1450, Federal Register, Washington, DC, January 31, 1990 'Laboratory Standard'

b) Prudent Practices in the Laboratory, Handling and Disposal of Chemicals, Natural Research Council, National Academy Press, Washington, DC, 2011 (updated edition)

c) Safety in Academic Chemistry Laboratories, 6th ed. American Chemical Society, Washington, DC, 1995

d) Handbook of Chemical Safety, American Chemical Society, Washington, DC, 2001

e) Stanford University CHP

f) Michigan State University Waste Disposal Guide

g) UAA EHSRM Policies and Procedures

h) Flammable and Combustible Liquids Code, National Fire Protection Association, Quincy, MA, 1996 NFPA 30

i) Fire Protection for Laboratories Using Chemicals, National Fire Protection Association, Quincy, MA, 1996 NFPA 45

j) University of Vermont CHP

k) University of Pennsylvania CHP

l) Edits from Dr. Kaufman Report

m) UAA Building Access Policy

n) UAA Controlled-Space Access Plan

o) Regulation of Certain Chemical Substances and Mixtures Under Section 6 of the Toxic Substances Control Act, Department of the Interior, Environmental Protection Agency, 40 CFR Part 751

13 LIST OF ABBREVIATIONS

- ACGIH ..... American Conference of Governmental Industrial Hygienists
- AFD ..... Anchorage Fire Department
- AKOSH ..... Alaska Occupational Safety and Health Administration
- APD ..... Anchorage Police Department
- CDC ..... Centers for Disease Control
- CFR ..... Code of Federal Regulations
- CHA ..... Chemical Hazard Assessment
- CHO ..... Chemical Hygiene Officer
- CHP ..... Chemical Hygiene Plan
- DEA ..... Drug Enforcement Agency
- DEC ..... Department of Environmental Conservation
- DHS ..... Department of Homeland Security
- DNA ..... Deoxyribonucleic acid
- DOT ..... Department of Transportation
- EHSRM ..... Environmental Health & Safety and Risk Management
- EPA ..... Environmental Protection Agency
- GHS ..... Globally Harmonized System
- HCP ..... Hazard Communication Program
- HCS ..... Hazard Communication Standard
- IACUC ..... Institutional Animal Care and Use Committee
- IARC ..... International Agency for Research on Cancer
- MOA ..... Municipality of Anchorage
- NFPA ..... National Fire Prevention Association
- NIH ..... National Institute of Health
- NRC ..... Nuclear Regulatory Commission
- NSF ..... National Science Foundation
- OSHA ..... Occupational Safety and Health Administration
- PEL ..... Permissible Exposure Limit
- PHS ..... Particularly Hazardous Substance
- PI ..... Principal Investigator
- PPE ..... Personal Protective Equipment
- RAM ..... Radioactive Materials
- RSO ..... Radiation Safety Officer
- SDS ..... Safety Data Sheet
- SFA ..... Safety First Approach
- SOP ..... Standard Operating Procedure
- UL ..... Underwriters Laboratory
- USDA ..... United States Department of Agriculture
- USDHHS ..... United States Department of Health and Human Services
- UAA ..... University of Alaska Anchorage
- UPD ..... University Police Department
- VSQG ..... Very Small Quantity Generator

14 DEFINITIONS

Acutely Hazardous/ Acutely Toxic

Fatal to humans or animals at low doses (40 CFR 261.11(a)(2)). See P-listed and U-listed wastes.

Authority, The authority:

For the purpose of this document, *the authority* is the employee who is considered the subject matter expert on the research, instruction, and/ or other laboratory activities in which they, their staff, and their students engage. Examples of positions the authority might have include: Faculty, Research Faculty (Principal Investigator), Term Instructor, Adjunct.

Biological Safety Level (BSL):

A set of biocontainment precautions required to isolate dangerous biological agents in an enclosed laboratory facility. The levels of containment range from the lowest biosafety level 1 (BSL-1) to the highest at level 4 (BSL-4). UAA currently has BSL-1 and BSL-2 laboratories with appropriate biosafety cabinets.

Campus Status:

Open Status: The open status designates the time the building is unlocked and open to. visitors. Each building publishes its open hours which are generally Monday through Friday from 8:00 a.m. to 5:00 p.m. Additionally, a campus building may be in open status for scheduled events that are open to the public and campus community. Some buildings, for example residential housing, are never in open status.

Tiered Access or extended hours: Tiered access means that campus can be accessed beyond open hours for campus community when there is a business reason. For example, campus community could be granted extended access, but the building would not be open to visitors. Generally, this means the door will be locked and access will be by Wolfcard through the access control system (ACS). In absence of the ACS, as is the case with a limited number of our facilities, users are requested to coordinate opening/locking of the doors with UPD. Generally, the hours for tiered access are Monday through Friday from 7:00 a.m. to 10:30 p.m.

During open or tiered access status, to schedule an event in University owned buildings, employees and students shall use the University Scheduling Software. The Scheduling Office manages the software.

Intersession: Classes are not in session. Employees are expected to report to work. Campus is open to visitors during normal business hours or for events, meetings, or to use the library.

After Hours/Overnight Campus Closure: Access to campus facilities is restricted between 10:30 p.m. and 7:00 a.m. Sunday to Sunday. Buildings and facilities are normally closed and locked. Events during after-hours are coordinated through the scheduling software and require a risk assessment by EHSRM or UPD.

Weekends and Holidays Limited Campus Access: While most buildings and facilities are locked during the weekends and on holidays, campus access is permitted to use the library, the student union or for scheduled events and meetings. To schedule an event in University owned buildings, employees and students shall use the University Scheduling Software. The Scheduling Office

manages the software and UPD is the approval authority. Delegated approvals once obtained are in place until rescinded.

Building Closure for Emergency: A building or buildings may be closed or evacuated because of an emergency, health mandate or system failures. During the time of a building closure classes may be relocated or delivered online. Employees may be asked to stay home or work at another location.

Campus Closure for Emergency or Evacuation: Classes are cancelled during emergency closure. Employees are not expected to report to work, may be asked to shelter in place, leave work early, or evacuate campus or a specific building as directed. Examples of emergency closures are weather related, earthquakes, or campus incidents involving hazardous materials or an active shooter situation. Only essential personnel are permitted on campus during emergency closure or campus evacuation. Special consideration may be given to students living on-campus who may be unable to relocate.

Carcinogen/ Carcinogenic:

Any substance, radionuclide, or radiation that promotes carcinogenesis, the formation of cancer.

Chemical Hygiene Officer (CHO):

The Chemical Hygiene Officer is an employee of EHSRM and in lab and chemical matters acts as an agent of EHSRM. This position is required per OSHA 29 CFR 1910.1450(e)(3)(vii). Contact the CHO at 907-786-1279.

Chemical Hygiene Plan (CHP):

The University of Alaska Anchorage's Chemical Hygiene Plan is an OSHA-mandated document, as per 29 CFR 1910.1450(e)(3). It outlines the university's Safety-First Approach to chemicals and chemical handling and describes the university's cradle-to-grave policies for chemicals. The CHP is continuously reviewed and updated as needed by the Chemical Safety Committee, which is overseen by the Office of Research Integrity and Compliance. The most recent copy is available through the EHSRM website.

Corrosive/ Corrosivity:

Chemical solutions with a pH less than or equal to 2 or greater than or equal to 12.5 are corrosive. Corrosivity is a characteristic of chemical wastes with a pH less than or equal to 2 or greater than or equal to 12.5.

Designee:

A person chosen by the *authority* to act in their stead in matters of instruction and training. Examples of positions a designee might hold are: Laboratory Manager, Research Assistant, Teaching Assistant, Term Instructor, Adjunct, Post-Doctoral Student, Graduate Student.

Employee:

Employees are individuals who are currently employed by and receive a paycheck from the University of Alaska Anchorage.

Environmental Health & Safety and Risk Management (EHSRM):

These employees perform their duties under the authority of Board of Regents Policy 05.09. Among other duties, said employees are mandated to "stop any activity that presents an unreasonable health and safety risk to employees, students, visitors or the environment".

Extreme Hazard Protocol:

See "Protocol Hazard Level."

Flammable liquid:

Any liquid having a flashpoint at or below 199.4 °F (93 °C). Flammable liquids are divided into four categories, with Category 1 having the lowest flashpoints and boiling points below 95 °F (35 °C), and Category 4 having the highest flashpoints.

Germ cell mutagen/ mutagenicity:

A GHS hazard class that is primarily concerned with chemicals that may cause mutations in the germ cell of humans that can be transmitted to the progeny.

Hazard:

Threat. Anything in the environment that has the potential to cause harm to people, including ill health, injury, or death, or cause damage to equipment, property, or the environment. Hazards are an inherent property and cannot be mitigated.

Hazard Classification:

Under GHS, chemicals and mixtures are classified by class and category, describing the nature and degree of hazard of the product. The three major hazard classes are health, physical, and environmental. Each hazard class is further categorized in terms of severity, with lower number rankings indicating a greater severity of that hazard class.

Hazardous Materials:

Any material or substance, which, if improperly handled, can be damaging to personal health and the environment. Hazards associated with a material may be determined by reviewing the Safety Data Sheets (SDS), the product label, or the shipping papers. Federal and State regulations determine if a material is hazardous through specific listings and definitions addressed in EPA regulation 40 CFR 261 and CDPHE regulation 6 CCR 1007-3, Part 261. The final tool in determining if a material is hazardous is personal knowledge; an individual may have created the materials or have specific information about the material's ingredients.

Incident:

Per OSHA, an incident is "an unplanned, undesired event that adversely affects the completion of a task." An incident may be anywhere between a near miss to a severe injury. Also referred to as an "accident."

All incidents should be reported in Origami. Incidents involving hospitalization or death must be reported to Origami within 8 hours of occurrence.

Job Hazard Analysis/ Job Safety Analysis (JHA/JSA):

A written analysis of the steps to perform a task and the hazards associated with each step. Recommendations for elimination or reduction of hazards are included for each step of the task.

Laboratory (lab):

General: Any room where hands-on learning occurs. Includes spaces referred to as shops, studios, makerspaces, or similar.

Research laboratory: The laboratory of a specific PI. An individual, who has certain permissions in the laboratory of one PI, shall have no permissions in the laboratory of another PI, unless granted by the other PI.

Teaching laboratory: The laboratory associated with a specific course and teaching faculty or assistant.

Laboratory facilities: All teaching and research laboratory facilities.

Laboratory Coordinator:

The laboratory coordinator for a department or division is the person charged with, among other duties, overseeing the lab curriculum, staffing, student workers, training, facilities, safety compliance, equipment maintenance, and/or lab orders for their respective department or division.

Laboratory-Specific (Lab-Specific) Training:

Personnel engaged in any laboratory research or teaching/ prepping must attend an annual laboratory-specific training conducted by *the authority* or designee in which lab-specific safety procedures and protocols are covered. Personnel and teaching assistants are, in turn, responsible for offering a similar safety orientation to the students enrolled in their courses or learning experiences. Topics that shall be included in this training are the UAA Administrative Policies and lab-specific policies that apply to the lab activities, emergency evacuation and general emergency procedures, finding the location of emergency equipment in and near the room, and the location and use of safety equipment and personal protective equipment required for the activities. Additional topics may be included at the discretion of *the authority*. For employees and volunteers, training shall be repeated annually and when work assignments involve new exposures. For students, training shall be given for each lab course in which they are enrolled.

Low/Negligible Hazard Protocol:

See “Protocol Hazard Level.”

Moderate Hazard Protocol:

See “Protocol Hazard Level.”

Mutagen:

Physical or chemical agent that changes the genetic material, usually DNA, of a population or cells or an organism and thus increases the frequency of mutations above the natural background level.

OSHA-mandated Training:

Any regulation found in 29 CFR 1910, OHSA’s General Industry Regulations, and/or 29 CFR 1926, OSHA’s Construction Regulations, that specifically state employees must receive training.

Oxidizer:

A substance that has the ability to oxidize or cause another substance to lose electrons.

P-listed:

Acute hazardous waste from discarded commercial chemical products, manufacturing chemical intermediates, and off-specification commercial chemical products that contain certain ingredients, and any soil or debris contaminated by spills of those products or intermediates. The P-list can be found at 40 CFR 261.33.

Principal Investigator (PI):

The principal investigator is the lead researcher and therefore *the authority* for a particular research project. If the PI has staff and/ or students working for him or her, then he or she is also responsible for the training and safety of his or her subordinates. The PI shall be proficient in all protocols associated with his or her lab and research, and the PI of a lab is responsible for his or her lab facilities.

Protocol Hazard Level:

The *calculated hazard level* of each protocol shall be determined through a risk assessment based on *the authority's* SOP/ JHA. EHSRM serves as a resource, as needed, for developing a risk assessment. Work through the calculation using the matrices found in Appendix A – Risk Assessment, to determine the overall hazard level of the protocol.

Low/Negligible Hazard Protocol: Has a calculated Protocol Hazard Value under 20 on the Severity Level vs. Probability Matrix. In general, Low/Negligible Hazard Protocols have a low or negligible severity level regardless of the probability, or a moderate or significant severity level with an unlikely probability.

Moderate Hazard Protocol: Has a calculated Protocol Hazard Value of 25-45 on the Severity Level vs. Probability Matrix. In general, Moderate Hazard Protocols have moderate or significant severity levels with possible probabilities, or an extreme severity level with a very unlikely probability.

Significant Hazard Protocol: Has a calculated Protocol Hazard Value of 50-70 on the Severity Level vs. Probability Matrix. In general, Significant Hazard Protocols have a moderate or significant severity level and a likely to very likely probability, or an extreme severity level and an unlikely probability.

Extreme Hazard Protocol: Has a calculated Protocol Hazard Value above 70 on the Severity vs. Probability Matrix. In general, an Extreme Hazard Protocol has a significant severity level and a very likely probability, or an extreme severity level and a possible to likely probability.

Radioactive:

Giving off, or capable of giving off, radiant energy in the form of alpha and/ or beta particles, and gamma rays, by the spontaneous disintegration of atomic nuclei. Includes X-ray producing equipment.

Reproductive toxin/ toxicity:

A GHS hazard class that is primarily concerned with chemicals with adverse effects on sexual function in adult males and females, as well as developmental toxicity in the offspring. These chemicals affect reproductive capabilities including causing chromosomal damage (mutations) and adverse effects on fetal development (teratogenesis).

Risk:

Actions a person takes in relationship to hazards. Also, the combination of the likelihood of the harm occurring and the severity of the harm that may occur. Risk can be mitigated by following the Hierarchy of Controls to lessen the effects of a hazard. The Hierarchy of Controls is a process described by NIOSH as using the most effective and protective means as feasible. The controls from most to least effective and

protective are: 1. Elimination – physically remove the hazard, 2. Substitution – replace the hazard with something safer, 3. Engineering Controls – isolate people from the hazard, 4. Administrative Controls – change the way people work, and 5. Personal Protective Equipment – require people wear equipment protective against the hazard.

Risk Assessment:

A risk assessment is performed by *the authority* or their designee with assistance from EHSRM when requested. A risk assessment involves the identification and evaluation of estimated levels of risk involved in the use of a protocol that may involve environmental, chemical, biological, physical, or radioactive hazards. An estimation of severity of consequences and likelihood of occurrence occurs with the aid of a risk assessment (see Appendix A).

Safety Data Sheet (SDS):

A detailed informational document prepared by the manufacturer or importer of a chemical. The intent of the SDS is to communicate chemical information to downstream transporters and users of the material. The SDS includes information such as physical properties, health and environmental hazards, protective measures, and precautions for handling, storage, and transportation.

Safety First Approach (SFA):

The attitude of avoiding unnecessary risks and acting to prevent harm to oneself, other persons, property, and the environment. The action of performing a hazard analysis of the procedure, evaluating the potential risks and how they are to be mitigated, and maintaining situational awareness while engaging in laboratory activities. Safety training is needed to become cognizant of the potential hazards inherent in laboratories.

Shall/ Must/ Will:

Indicates a mandatory requirement; something that must be done.

Should/ May/ Could/ Can:

Indicates a recommendation or that which is advised but not required.

Sharps:

Devices with sharp points or edges that can puncture or cut skin, e.g., syringes, needles, scalpel blades, or razor blades.

Significant Hazard Protocol:

See “Protocol Hazard Level.”

Staff:

For the purposes of this document, staff refers to University of Alaska Anchorage employees that are not faculty.

Student:

Any person enrolled in a course, regardless of age. This includes graduate, undergraduate, and Alaska Middle School enrollees.

Student Worker/ Employee:

For the purpose of this document, a student worker is a UAA student employed in the "Student Worker" category with lab-specific duties. Teaching laboratories employ two types of student workers that work inside the lab - students who set up lab equipment and make solutions (prep work), and students who serve as lab monitors for open labs.

Teaching Assistant:

A teaching assistant is a student that teaches or facilitates a course or courses in exchange for a stipend, or a tuition waiver / remission and a stipend.

Teratogen:

Substances that may cause birth defects via a toxic effect on an embryo or fetus.

Training/ Safety training:

Includes, but is not limited to, Laboratory-Specific training, OSHA-mandated training, and other safety related instruction provided by the university, through web-based instruction, in-person instruction, or any other means appropriate to provide health and safety information to employees, students, and other personnel.

U-listed

Toxic waste from discarded commercial chemical products, manufacturing chemical intermediates, and off-specification commercial chemical products that contain certain ingredients, and any soil or debris contaminated by spills of those products or intermediates. The U-list can be found at 40 CFR 261.33.

Undergraduate Student:

A student that has been accepted to UAA as an undergraduate and who is currently registered in courses.

University of Alaska Anchorage (UAA):

UAA is the "university" in this document and refers to the Anchorage campus only. Satellite campuses are responsible for either developing their own chemical hygiene plan or adopting the Anchorage campus CHP as a whole. In cases of adoption, the terms "UAA" and "university" apply to the adopter as well.

Visiting Researcher:

A visiting researcher is a collaborator from private industry, another higher education establishment, or government facility performing research on the UAA campus.

Volunteer:

Volunteers are typically individuals who are performing duties in research labs without being enrolled in a research course or being paid or otherwise compensated as an employee. All UAA lab volunteers must complete a Volunteer Qualification Checklist and be pre-approved by the appropriate academic department's Dean or Campus Director, Human Resource Services, and EHSRM.

15 APPENDIX A - Risk Assessment

Training module entitled *Risk Assessment* is available online at myUA.

1) Determine what materials or activities are used in the process. Use the Hazard Type Matrix to determine the severity of the hazard to the person performing the activity.
2) Find the same severity level in the Consequences Matrix under People. Evaluate the effect of an adverse incident of that severity to a person on the Assets (building, equipment, etc.), Environment (air, water, and/or ground contamination and clean up), and the university's reputation. Add the numbers in the 4 boxes.
3) Find the Severity Level Total Value from the Consequences Matrix in the Severity Level vs Probability Matrix. Determine how likely the adverse incident is to occur. The box where the Severity Level and Probability intersect is the Protocol Hazard Level.

15.1 Hazard Type Matrix

Severity Level	Chemical	Biological	Radiation	Physical
A	Not working with chemicals	Not working with any biological materials	Not working with any sources of radiation	Not working with any tools
B	Working with chemicals rated NFPA 0 or GHS 5 for any Hazard Category	Working with Biosafety Level 1 materials	Working with interlocked equipment – SEMs, TEMs, lasers	Working with portable hand tools without blades
C	Working with chemicals rated NFPA 1 or GHS 3 or 4 for any Hazard Category	Working with Biosafety Level 2 materials	Working with sealed RAM sources or Class IIIA, low power open beam lasers	Working with powered hand tools or portable tools with blades
D	Working with chemicals rated NFPA 3 or GHS 2 for any Hazard Category	Working with Biosafety Level 3 materials	Working with RIA kits, RAM sources, or areas labeled High Radiation Area	Working with powered hand tools with blades, floor or bench mounted equipment, hot work operations
E	Working with chemicals rated NFPA 4 or GHS 1 for any Hazard Category	Working with Biosafety Level 4 materials	Working with open beam Class IIIB or Class IV Lasers, or area labeled Very High Radiation Area	Working from heights above 4 feet not on a ladder, on catwalks, roofs; flying manned aircraft

15.2 Consequences Matrix

Severity Level	University's Reputation	Environment	Assets	People
1	Zero to Slight impact; Contained within the department **Value = 1**	Zero to Slight effect; Individual or class clean-up efforts **Value = 2**	Zero to Slight damage; Annoyance level impact on services **Value = 3**	Zero to Slight injury **Value = 4**
2	Limited impact; Contained within the department; known by upper administration **Value = 2**	Minor effect; Individual or class clean-up efforts **Value = 4**	Minor damage; Minor impact on service, minor cost **$** **Value = 6**	Minor injury – may need First Aid **Value = 8**
3	Considerable impact; Local public and press interest and coverage **Value = 3**	Local effect; university or contracted clean-up – potential State agency involvement **Value = 6**	Local damage; Disruption to service, moderate cost **$$** **Value = 9**	Major injury – needs First Aid; may need Medical treatment **Value = 12**
4	Major National impact; National public and press interest and coverage **Value = 4**	Major effect; May need contracted clean-up – State agency involvement **Value = 8**	Major damage; Serious disruption to services, costly **$$$** **Value = 12**	Serious injury or disability **Value = 16**
5	Major International impact; National publicity for more than 3 days **Value = 5**	Massive effect; Contracted clean-up efforts – potential Federal agency involvement **Value = 10**	Extensive damage; Total failure of services, extremely expensive **$$$$** **Value = 15**	Fatalities **Value = 20**

People _____
+ Assets _____
+ Environment _____
+ University's Reputation _____

Severity Level Total Value _____

15.3 Severity Level vs. Probability Matrix

Severity Level	Very unlikely	Unlikely	Possible	Likely	Very likely
Total Value 10-15	Low/ Negligible Hazard Protocol Value = 1	Low/ Negligible Hazard Protocol Value = 2	Low/ Negligible Hazard Protocol Value =3	Low/ Negligible Hazard Protocol Value = 4	Low/ Negligible Hazard Protocol Value = 5
Total Value 15-25	Low/ Negligible Hazard Protocol Value = 5	Low/ Negligible Hazard Protocol Value = 10	Low/ Negligible Hazard Protocol Value = 15	Low/ Negligible Hazard Protocol Value = 20	Moderate Hazard Protocol Value = 25
Total Value 25-35	Low/ Negligible Hazard Protocol Value = 10	Low/ Negligible Hazard Protocol Value = 20	Moderate Hazard Protocol Value = 30	Moderate Hazard Protocol Value = 40	Significant Hazard Protocol Value = 50
Total Value 35-45	Low/ Negligible Hazard Protocol Value =15	Moderate Hazard Protocol Value = 30	Moderate Hazard Protocol Value = 45	Significant Hazard Protocol Value = 60	Extreme Hazard Protocol Value = 75
Total Value 45-50	Moderate Hazard Protocol Value = 25	Significant Hazard Protocol Value = 50	Extreme Hazard Protocol Value = 75	Extreme Hazard Protocol Value = 100	Extreme Hazard Protocol Value = 125

Calculated Protocol Hazard Level

Low/Negligible Hazard Protocol – 1-20

Moderate Hazard Protocol – 25-45

Significant Hazard Protocol – 50-70

Extreme Hazard Protocol – above 70

15.4 The Buddy System

The Buddy System is designed to ensure the safety of individuals working alone in labs/shops/studios, especially when hazardous chemicals or situations are present that may pose a threat to human health or physical safety.

A Safety Contact is someone who meets the following requirements:

- Is available and able to communicate (via call, text, radio, or email) during the entire time the individual will be working alone.
- Willingly takes on the responsibility to communicate according to a pre-established schedule.
- Knows the procedure for contacting UPD in case of the loss of contact with the individual working alone.
- Not required to be in the same building or room as the individual working alone.

A Buddy is someone who meets the following requirements:

- Has taken applicable safety training for the area in which the individual is working.
- Is preferably a UAA student, faculty, or staff member.
- Willingly takes on the responsibility to visually check in with the individual working alone according to a pre-established schedule.
- Willingly takes on the responsibility to be present in the same building or room when required.
- Knows the procedure for contacting 911/UPD in case of an emergency.

Buddy System Procedure:

1) Identify under which tier your work falls by checking your Protocol Equipment and Proficiency Form. The requirements of the most hazardous activity or protocol shall be followed.
2) Determine who your Safety Contact/Buddy will be and notify them of the building and room number you will be in, the materials/equipment you will be working with, associated hazards, and the time period during which you will be working.
3) If the Safety Contact/Buddy is not required to be in the room with you (Tiers 2, 3), set up a communication schedule and check-in with your Safety Contact/Buddy on a pre-established, periodic basis via call, text, radio, or email.
4) Ensure the Safety Contact/Buddy has your contact information and the contact information for UPD. Instruct them to contact 911/UPD (907-786-1120) immediately should a scheduled check-in be missed and you cannot be reached or should they be witness to an emergency.

NOTES:

These are the minimum requirements for establishing a Buddy System. Specific Colleges/Departments may be more restrictive with their process.

15.5 The Buddy System Hazard Matrix

Buddy System Requirements Based on Hazard

NOTE: Follow the requirements of the highest hazard category of all the elements included in your activity.

Risk Category	Chemical Safety	Biosafety	Radiation Safety	Physical Hazards	DR/ Buddy Requirements
Extreme Hazard Protocol	You will be working directly with a chemical that: ● is an unstable explosive, is explosive (mass explosion hazard, severe projection hazard, or fire, blast or projection hazard), may mass explode in fire; ● is extremely flammable, heating may cause an explosion, catches fire spontaneously if exposed to air, is self-heating (may catch fire); ● when in contact with water releases flammable gases which may ignite spontaneously, may intensify fire (oxidizer), may cause fire or explosion (strong oxidizer); and/or ● is fatal or toxic in contact with skin, causes severe burns and eye damage, causes serious eye damage, or is fatal or toxic if inhaled. **Any chemical on OSHA's Partcularly Hazardous Substances List, rated NFPA 4, or GHS 1 for any Hazard Category, or has an NFPA Specific Hazard Designation.**	You will be working with any agent classified as **Biohazard Level 4**: bioagents likely to cause serious or lethal human disease for which preventive or therapeutic interventions are not ususally available. **UAA does not have BSL 4 capabilities.** **Examples:** Ebola virus, Marburg virus, *Bacillus anthracis* , Hantavirus, HIV	You will be working with **open beam Class IIIB and/or IV Laser(s)** or in an area labeled as a **Very High Radiation Area.**	You will be working at a **height that requires fall protection.**	**You must have a Designated Responder (DR) in the lab/shop with you**. See the Definitions section for requirements to be a Designated Responder. Must have appropriate training/ experience. Must follow written SOP. Ensure the DR knows the proper procedure for contacting UPD. Exceptions to DR requirement can be made by Risk Management. **After Hours:** Activity is **prohibited,** unless academic necessity is demonstrated and pre-approved by Risk Management. Then at least a Safety Contact is required.
Significant Hazard Protocol	You will be working directly with a chemical that: ● is a fire or projection hazard, flammable or highly flammable, heating may cause fire or explosion, is self-heating in large quantities (may catch fire); ● when in contact with water releases flammable gas, may intensify fire (oxidizer); ● is harmful in contact with skin, causes serious eye irritation, is harmful if inhaled, may cause allergy or asthma symptoms or breathing difficulties if inhaled; and/or ● may cause genetic defects or cancer, or causes damage to organs. **Any chemical rated NFPA 3 or GHS 2 for any Hazard Category**	You will be working with any agent classified as **Biohazard Level 3**: bioagents associated with serious or lethal human diseases for which preventive or therapeutic interventions may be available. **UAA does not have BSL 3 capabilities.** **Examples:** *Yersinia pestis* , HIV, SARS virus.	You will be working in an area labeled as a **High Radiation Area.** You will be working with **RIA kits** or other sources of **radio-isotopes**.	You will be working directly with **industrial equipment, floor or benchtop mounted equipment, hot work operations**. **Example:** Table saw, welding, open flames, kiln operation.	**An on-site Buddy is required, but not necessarily in the lab/shop with you**. You must have a predetermined communication or check-in schedule. Ensure your Buddy knows the proper procedure for contacting UPD. **After Hours:** Needs **Risk Manager approval**. **A Buddy in the same room is required** .
Moderate Hazard Protocol	You will be working directly with a chemical that: ● is a combustible liquid, heating may cause fire; ● may be harmful in contact with skin, causes skin irritation or mild skin irritation, may cause an allergic skin reaction, causes eye irritation; ● may be harmful if inhaled, may cause respiratory irritation, may cause drowsiness or dizziness; and/or ● is suspected of causing genetic defects or cancer, or may cause damage to organs. **Any chemical rated NFPA 1 or GHS 3 or 4 for any Hazard Category**	You will be working with any agent classified as **Biohazard Level 2:** bioagents associated with human disease that is rarely serious and for which preventive or therapeutic interventions are often available. **Examples:** Hepatitis A, B, or C, Influenza A, salmonella, pathogenic *Escherichia coli*	You will be working with sealed sources or low power (Class IIIa) open beam lasers.	You will be working directly with **portable tools**. **Example:** Cord and Cordless powered hand tools	**An on-site Buddy is recommended.** If not available, a Safety Contact should be utilized. **After Hours:** An **on-site Buddy** is **required,** within visual distance.
Low to Negligible Hazard Protocol	You will be working with only minimally hazardous chemicals or not working with **any** chemicals. **Any chemical rated NFPA 0 or GHS 5 for any Hazard Category.**	You will **not** be working with **any** biological agents **OR** you will be working with any agent classified as **Biohazard Level 1:** bioagents not associated with disease in healthy adult humans. **Examples:** cell cultures, non-infectious bacteria, bacteria and viruses including *Bacillus subtilis, canine hepatitis,* varicella (chicken pox)	You will not be working with **any** hazardous materials (Ex: Class I and II, IIA Lasers), or you will be working with **interlocked** equipment (interlocked SEMs, TEMs, or lasers).	You will not be working with any power tools. **Example:** Hammer, screwdriver, hand saw	A Safety Contact is recommended. **After Hours: A Safety Contact is required.**

NOTE: The lists of examples are not exhaustive. Not all relevant hazards are mentioned, these are just some common examples. Refer to the Hazard Assessment for the protocol you will be following to determine the hazard level and buddy system requirements to follow.

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