Eastern Oregon University Chemical Hygiene Plan

March 2025

EOU CHEMICAL HYGIENE PLAN TABLE OF CONTENTS

SECTION 1: POLICY

The **purpose of the Chemical Hygiene Plan is** to provide safety and health procedures for all employees involved in laboratory operations. This includes the laboratory facilities for Chemistry, Biology, and Psychology. The intent of this plan is to identify safety and health guidelines to be used when working with hazardous chemicals or conducting hazardous processes.

This plan is to be reviewed at least annually for pertinent application to our laboratory procedures. If chemicals requiring safety considerations not currently addressed in the Plan are approved for purchase, then the Plan will be updated to reflect proper handling procedure **within three months**. An example of such a situation would be purchase of a chemical of a new hazard class.

The Chemical Hygiene Plan will be monitored and updated by the **Chemical Hygiene Committee** which shall consist of faculty, staff & Partners from Badgley and Loso Halls.

CHEMICAL HYGIENE COMMITTEE MEMBERS

	Sally Gee, Microbiologist, Fish Health Services – ODFW, Badgley Hall, 219, Phone: 541-962-3011
Anthony Stenson, Assistant Professor of Psychology, Badgley Hall 153, 541-962-3791	
Auburn Issak, Education Program Assistance 2, Loso Hall 105H, 541-962-3675	Emma Skillings, EH&S Professional 3 (Science Storekeeper), Badgley Hall, 317, Phone: 541-962-3348 **CHO**, CHAIR**
Colby Heideman, Professor, Chemistry, Badgley Hall, 303J, Phone: 541-962-3321, 541-663-7217, **RSO***	Laura Mahrt, Professor, Biology, Badgley Hall, 303F, Phone: 541-962-3022
Jenny Bartell, Instructor of Science OSU Badgley Hall 313B, 541-962-3527	Nathan Prouty, Assistant Professor, Art, Loso Hall, 112, Phone 978-844-4350

Invite Department Chairs, Chemical Hygiene Officer and Radiation Safety Officer to each meeting.

Copies of the Chemical Hygiene Plan will be kept and be available in the following locations:

1. Science Storeroom
2. Offices of Chemical Hygiene Committee Members
3. Chemistry and Biology research labs
4. The EOU Enviromental Health and Safety Website

All reference materials such as the analytical methods and technical resources are available from the department professors. The EH&S 3 keeps technical information about chemical hazards, storage and handling in the Science Storeroom.

* Radiation Safety Officer, responsibilities and duties:

The Radiation Safety Officer maintains responsibility for the following tasks.

(1) Ensure users receive proper training in safe operation of equipment generating potentially harmful radiation;
(2) Ensure interlocks, shielding, and other safety features on high energy radiation producing equipment are functioning as designed;
(3) Maintain records and documentation of radiation training;
(4) Identify radiation safety problems;
(5) Initiate, recommend, or provide corrective actions;
(6) Stop unsafe operations; and,
(7) Verify implementation of corrective actions.

** Chemical Hygiene Officer, responsibilities and duties:

This Plan also includes the Laboratory Safety Rules followed by Science students. While Oregon OSHA does not have authority over students, it is Eastern Oregon University's position that general safety rules are equally important for the students' safety.

RECORDKEEPING

Additional records may be generated through the implementation of this plan and provisions for record retention and employee access must be developed. The records include:

1. Safety Data Sheets: MSDSOnline Safety Data Sheets and chemical inventories are maintained by the Science Storekeeper for the College of Arts and Sciences. Partners in Badgley Hall will maintain their own records. SDS's or dated inventories are required to be retained for 30 years.

2. Records of air monitoring results or exposure assessments will be maintained by the EH&S Professional 3. Employees will be notified annually of the location of air monitoring results and the availability for review. These records must be maintained for at least 30 years.

3. Radiation exposure monitoring results will be kept by the School's Radiation Officer. These records must be maintained for at least 30 years. Each individual will be a provided a

copy of the results. School of Ag records are maintained at the OSU Radiation Office in Corvallis, Oregon.

4. Medical consultation and examinations results will be maintained by the health care professional and the summary statement as to findings will be provided to the individual employee and a copy maintained in the employees confidential medical file by the Personnel Office for 30 years plus employment.

5. Ventilation system testing and maintenance activities will be maintained by the Plant Services Department. At least the most current results and maintenance records are to be maintained.

6. Training Records will be maintained by the department supervisor and EH&S Professional 3.

7. Work place injury records and OSHA 300 injury/illness log records are all maintained by Human Resources Department based on information provided by the Department. These records must be maintained for at least 5 years.

8. Hazardous waste and other environmental report records will be maintained by the reporting department and the EH&S Professional 3 for the years required by each of the different regulations.

9. Records of the Chemical Hygiene Plan will be maintained by the Committee Chairperson. OSHA does not set a time period for record retention but it is recommended that at least three years of review and revision records be maintained.

LIST OF HAZARDOUS CHEMICALS USED/STORED IN THE LABORATORIES

The EH&S 3 keeps and maintains the lists of chemicals found in the Science laboratories. While the lists are not mandated by the Laboratory Regulations, it would be difficult to address the specific hazards and questions of highly toxic materials without an inventory, plus the inventory is an important part of instructional activities. Safety Data Sheets are maintained via MSDSOnline E-binder in the Science Storeroom for the various chemicals that have been received.

SEE Environmental Health & Safety Professional 3 FOR THE CURRENT CHEMICAL INVENTORY.

ASSISTANCE ANIMALS IN LABORATORY SPACES

Eastern Oregon University Chemical Hygiene Committee has developed this policy to ensure the safety of faculty, staff, students and service animals in laboratory spaces. This policy is to be used in conjunction with University Policy 6.05.30 Assistance Animal Policy for Service and Emotional Support. In compliance with this policy, Emotional Support Animals (ESA's) are not permitted in Laboratory spaces. Only Service Animals (defined by Title II and Title III of the Americans with Disabilities Act) are allowed in laboratory spaces. University employees who require the use of a Service Dog must request an accommodation through Human Resources.

Procedures for Departments, Faculty, Supervisors, and Instructors

1. This program applies only to service dogs. Miniature horses or other types of service animals are not allowed in university laboratories.
2. Service dogs will not be allowed into the laboratory without the appropriate personal protective equipment (PPE).
3. Service dogs can only be excluded from the laboratory if:
    - If the dog is out of control and the handler doesn't take effective action to control it; or
    - If the dog is not housebroken.
4. Employers have a right to request the needs assessment provided by the Disability Services Office of the respective campus.
5. Faculty and Staff are not allowed to request any medical documentation for the dog, require that the dog demonstrate its task, or inquire about the nature of the person's disability.
6. Owners are responsible for cleanup and disposal of urine and feces.
7. In coordination with the owner, identify an appropriate location within the laboratory space for the service animal. Consideration should be given to chemical and waste storage locations, proximity to the owner, trip hazards, and overall chemical hygiene.
8. Any issues shall be reported to the Environmental Health and Safety Officer.

Laboratories Utilizing Hazardous Materials or Live Animals

1. Service dogs are generally not permitted in laboratories utilizing risk group 2 or higher biological materials. Personnel may request a risk assessment to accompany their Needs Assessment for a possible exception. Note that currently no risk group 2 or higher biological materials are being used on campus.
2. Service dogs are not permitted in laboratories making use of live animals.

Procedures for Service Dog Owners

Students, faculty or staff that require the use of a service dog in a laboratory are required to contact the Disability Services Office to document the need and recommendations.

1. Please refer to University Policy 6.05.30 Assistance Animal Policy for Service and Emotional Support.
2. Complete a needs assessment with Disability Services (for students) or Human Resources (for employees) for the assessment of service dogs in laboratories for each laboratory course.
3. Dog beds are not appropriate for use in the lab due to the difficulty of washing. See Personal Protective Equipment for Service Dogs in the following section.
4. Service dogs must wear appropriate personal protective equipment to be permitted into the laboratory.
5. In the event that the nature of a laboratory prohibits the presence of a service dog, an alternative activity will be provided.

Personal Protective Equipment for Service Dogs

Service dogs entering laboratories must be protected to prevent exposure to hazardous chemicals, broken glass or other hazards that might be present in the laboratory environment. This PPE shall be worn by the dog and purchased by the owner and include the following:

1. Disposable or reusable boots to cover the feet such as commercially available products (Pawz Rubber Dog Boots). These are required regardless of the nature of current lab activities.
2. Disposable plastic-backed absorbent lab paper or pet pads for the dog to lie on during lab to protect them from whatever might be on the floor. The location of the dog will be determined in coordination with the instructor. Considerations should include chemical and waste locations, walkways, shared use areas and specific procedures for the activity. These are required regardless of the nature of current lab activities.
3. Safety goggles are required for the dog in any laboratory where chemicals are in use.
4. A lab coat for the dog may be required for individual laboratory activities at the discretion of the instructor.
5. If appropriate PPE is not brought to the lab, then the service dog will not be permitted into the laboratory.

Behavior Expectations of Service Dogs

The following are the behavior expectations for services dogs:

1. If the service dog is present in lab, the dog must be trained to “stay” and “leave it” (or equivalent behavior).
2. The dog must not vocalize, bark, or growl inappropriately.
3. If the dog is trained to alert by vocalizing, the instructor or staff must be aware of the circumstances under which the dog would vocalize. Disruptive, extended vocalizing or barking will not be permitted, unless in proper context.
4. The dog must not behave aggressively towards other people – snapping, snarling, growling, charging, swiping, etc.
5. The dog must not jump up on other people.

6. If the service dog displays any of these behaviors, the dog will not be permitted in the laboratory until documented and demonstrated re-training has occurred.
7. The people in the laboratory will be informed that the dog is a service dog and always working.
8. Interaction with the dog is by permission of the owner and only permitted outside of the laboratory.
9. Service animal access is not allowed into research or laboratory spaces where the service animal is a predator or prey of the research subject, under the guidance of the Office of Laboratory Animal Welfare.

SECTION 2: SAFETY

GENERAL SAFETY PROCEDURES

1. Become familiar with location and proper use of **safety showers and eye washes**.

2. **Handle and store glassware properly** to avoid damage. Do not use damaged glassware. Shield evacuated glassware to contain chemicals and glass should implosion occur.

3. **Avoid "routine" exposure** by developing and encouraging safe habits when handling chemicals. Avoid any unnecessary exposure. Do not smell or taste chemicals. Vent apparatus that may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into exhaust devises.

4 **Avoid working alone in the building**. Do not work alone in a laboratory if the procedures being conducted are hazardous.

5. **Collect and store used chemicals** for disposal following proper guidelines.

6. **Avoid practical jokes** or other behavior that might confuse, startle or distract another worker.

7. **Use hood** for operations that might result in release of toxic chemical vapors or dust.

8. **Wear appropriate personal apparel** in the laboratory. Wear closed toed, liquid resistant shoes. Confine long hair and loose clothing. Pant length should be below the knee to protect from potential spills, or a laboratory coat/apron should be worn.

9. Keep work areas free of clutter and debris.

10. Use **appropriate personal protective equipment** when working with toxic or reactive chemicals in a manner that skin, eye, or respiratory contact is possible.

11. Make sure all staff members are familiar with and **follow all safety and emergency fire and chemical spill procedures** listed in this plan.

12. Do not eat or drink in chemical/sample analysis work areas.

13. Pipetting safety: inspect pipettes for chips or broken ends. NO MOUTH PIPETTING. Use safety bulbs or pipette pumps. Immediately place used pipette into the pipette washer or rinse after use. Do not lay the pipette on the bench.

> If a chemical is accidentally drawn up into the safety pipette bulb, rinse the inside of the bulb and allow it to dry. This is not an easy task, but it will prevent someone from getting hurt.

14. For reaching beyond your normal reach, use the safety step stools that should be available in your work area. **Do not stand on chairs or use counters as stepladders or stools.**

15. Mercury is still found in some of our mercury thermometers and other equipment. When it is spilled and not cleaned up properly it will slowly evaporate exposing the staff to potentially toxic vapors. Mercury spill kit is in the Science Storeroom for small spill cleanup. The collected mercury will then be kept in the Science Storeroom in a secured plastic bottle. When full, mercury will be properly disposed.

16. Contact Lenses: Contact lenses can cause greater damage if corrosive or toxic materials are splashed into the eyes or if particulate materials are trapped under the contact lenses. The laboratory staff is encouraged not to wear contact lenses and at least be aware of the potential hazard.

CHEMICAL AND PROCESS SAFETY PROCEDURES

EOU staff or faculty will identify the analytical procedures that use the following chemicals so that the employees and students will understand which special procedures apply. Also most of these materials can cause serious health effects if exposures are not controlled for inhalation and skin contact.

FLAMMABLE/COMBUSTIBLE MATERIALS (examples: benzene, xylene, alcohols, MEK)

Our laboratories, in general, do not use any significant quantities of flammable liquids. However, even with small quantities we need to ensure that our handling practices preclude

fire and health hazards. Basic procedures to follow when using these materials should include:

1. No sources of ignition should be used in the vicinity of flammable liquids. Work in fire protected areas, with portable fire extinguishers readily available.

2. When transferring flammable liquid using metal containers, both containers need to be grounded and bonded to dissipate static electricity build up. When pouring or measuring flammable materials, always check the area to make certain there are no open flames in the immediate vicinity.

3. All flammable and combustible liquids need to be stored in the approved fire cabinet or our outside flammable storeroom when not in use. Small quantities of these liquids may be kept inside the laboratory for daily use. The liquids must be kept in properly labeled secondary containers. (Oregon OSHA Flammable liquid regulation 1910.106(e)(2)(ii)(b) permits 25 gallons of Class 1A liquid to be located outside of a properly designed storage room or cabinet).

4. Flammable liquids should be heated with heating mantles or hot plates.

5. Ovens used to heat flammables should have explosion proof wiring.

6. Flammable liquids should never be stored in ordinary refrigerators or freezers, only Class 1 Division I refrigerators or freezers may be used.

7. Work with flammable liquids, in most cases, should be performed in a fume hood.

8. Spill cleanup is covered in Section 4 of this plan. (See page 24)

9. The health hazards related to flammable/combustible solvents are reviewed in the Hazard Communication program.

HIGH ENERGY OXIDIZERS

Oxidizing agents such as perchlorates, peroxides, nitric acid, nitrates, nitrites and permanganates represent a significant hazard in the laboratory. They have a propensity under appropriated conditions to undergo vigorous reactions when they come into contact with easily oxidized materials such as metal powders and organic materials such as wood, paper, and other organic compounds. Most oxidizing materials increase the rate at which they decompose and release oxygen with temperature.

Elements from group 7A of the Periodic Table - fluorine, chlorine, bromine, and iodine react similarly to oxygen and are classified as oxidizing agents as well.

1. Fume hoods should be used to contain any potentially highly reactive experiment. The fume hood should be able to contain any fire that may occur.

2. Flammable materials should not be stored in the presence of flame in the fume hood.

3. Minimize the amount of materials in the fume hood.

4. Quantities of strong oxidizing agents within the lab should be minimized and these materials should be rigorously segregated from materials with which they could react.

5. The containers should be protected glass, with appropriate lids.

6. Mandatory personal protective equipment includes: gloves and eye protection, which provides both chemical splash and impact protection.

Perchloric Acid - Example of Special Chemical Hazard

Perchloric acid accidents usually involve very severe explosions caused when the acid comes in contact with organic materials.

1. Perchloric acid should be handled in rooms with floors of concrete or masonry.

2. The floor of the lab should be gently sloped to a drain and contain no low spots.

3. Bench tops should be of resistant and nonabsorbent materials such as tile, epoxy composites and polyethylene.

4. Direct flame heating of perchlorates is not allowed.

5. Fume hoods specifically designed for perchloric acids should be installed and used solely for perchlorates. These hoods have no exposed organic coatings, sealing compounds, or lubricants and include a water wash down system. Perchloric acids require a special hood to prevent vapors from contacting organic materials

6. Spilled perchloric acid should be neutralized and absorbed using diatomaceous earth.
7. Use chemical splash and impact goggles whenever the acid is handled.

8. Transfer the acid over secondary containment in order to catch any spills and easily dispose of the material.

9. Use only fresh acid. Keep the quantity of acid on hand as small as possible.

10. No organic materials should be stored in the perchloric acid hood.

For additional information about handling Perchloric Acids and fume hood design see: CRC Handbook of Laboratory Safety, 5th Edition 2000.

***Note: Since May 2009 perchloric acid has not been in the chemical inventory.**

***Bromine - Example of Special Chemical Hazards**

Bromine is highly reactive material. Bromine can cause serious burns to tissue; it is toxic when inhaled, and can cause serious damage to the respiratory system. Any use of liquid or gaseous bromine will need prior approval by the CHP committee.

***Ethers - Example of Special Chemical Hazards**

Ethers present a problem to the lab worker because they can form peroxides. Peroxides are explosive and are formed by exposure to light and air, however they can also form in unopened containers.

1. Mark the date of receipt on all ether containers. For isopropyl and diethyl ethers, it is recommended that even unopened containers be disposed of after 1 year and opened containers 6 months after they are first used if they have not been tested periodically during the interval.

2. Maintain the minimum quantity of ethers in stores and mark all containers with an end of storage life date.

3. Dispose of any unused ethers in open containers immediately.

4. Follow the safety procedures of flammable/combustible liquids.

5. Test ethers every six months for presence of peroxides using peroxide test strips. Label container with date of test and results.

CORROSIVE MATERIALS: ACIDS and BASES

Corrosive chemicals have immediate and acute erosive effects on tissues, particularly the eyes and skin. These chemicals also can cause hazardous chemical reactions when mixed with other chemicals.

1. Wear the appropriate personal protective equipment when handling corrosive materials. This includes wearing proper eye protection (goggles) or using the fume hood with the sash down if there is a chance of a liquid splash. Chemical gloves need to be worn if hand contact is possible and additional body protection such as aprons may be needed if there is a risk of liquid splash to the body (i.e. transfer of bulk quantities).

2. Deluge eyewash and shower shall be available in laboratories where corrosive materials are used.

3. Use safety carriers when transferring dangerous corrosives.

4. Add acid to water.

5. Keep the container sizes and quantities on hand as small as possible. Never carry a bottle of caustic by the cap, it is recommended that a bottle carrier be used to carry concentrated liquid corrosives, unless the container is plastic coated.

6. Store each class of corrosives together, acids with acids etc. Be careful to not store incompatible materials of the same classes together. (Sulfuric acid and Nitric Acid are incompatible.)

7. Store containers when not in use. Caustic materials are to be stored in designated corrosive storage cabinets.

8. Acids and bases are corrosive by nature and will react with organic materials and metals. Acids and bases will evaporate leaving crystals of salts that could be highly irritating to the skin.

9. Spill cleanup is covered in Section 4, Page 24.

10. Health hazards related to corrosive materials are reviewed in the Hazard Communication program Section 8.

**** Hydrofluoric Acid - Example of Special Chemical Hazard***

This acid is extremely dangerous in all forms including vapors and solutions. They can cause severe burns to tissue which heal slowly. HF solutions in contact with skin result in marked tissue destruction; un- dissociated HF readily penetrates skin and deep tissue where the corrosive fluoride ion can cause necrosis of soft tissues and decalcification of bone; the destruction produced is excruciatingly painful. Fluoride ions also attack enzymes and cell membranes.

The process of tissue destruction and neutralization of HF is prolonged for days, unlike other acids, which are rapidly neutralized. When skin contact is with solutions of less than 20% HF, the burn manifests itself by pain and erythema with a latent period of up to 24 hours. With 20% to 50% solutions, the burn becomes apparent 1 to 8 hours following exposure; solutions above 50% cause immediate pain, and tissue destruction is rapidly apparent.

Delayed recognition of contact with dilute solutions, which consequently delays irrigation, often results in more severe burns than expected. Severe eye injuries from splashes may occur.

First Aid & Medical Treatment

Persons who have contact with HF should immediately deluge the area with water for 15 minutes. Contaminated clothing should be removed as rapidly as possible, even while the person is under the shower. Flushing is effective in removing surface HF, but not HF that has penetrated to deeper tissues. The affected area after deluging should be immediately soaked with soft, bulky dressing that has been immersed in iced solutions of quaternary ammonium compounds, 0.13% benzalkonium chloride (Zephiran) or 0.2% benzethonium chloride (Hyamine). An iced 25% solution of magnesium sulfate (Epsom salts) or calcium gluconate gel also is acceptable for topical therapy.

The magnesium sulfate solution may be prepared by adding one half to one cup of Epsom salts to a quart of water. If the HF solution contained less than 20% HF, and pain is relieved, treatment need not go beyond iced topical soaks for 1 to 4 hours. Meticulous and frequent medical follow-up is recommended.

For higher concentrations, or if burns appear, a medical provider should cautiously inject the area with 10% calcium gluconate. SEE MEDICAL PROFESSIONALS WHO ARE AWARE OF HF CONTAMINATION HAZARDS AND PROPER TREATMENTS.

Precautions

1. All HF work should be done in a fume hood.
2. Always wear gloves and chemical splash goggles and apron.
3. Each lab shall have a deluge eye wash and shower.
4. If PPE is contaminated, dispose of it immediately.

Note: Since May 2009 hydrofluoric acid has not been in the chemical inventory

COMPRESSED GASES

A variety of compressed gases could be used in the laboratory from flammable gases to toxic gases. Because these materials are under tremendous pressure, special handling of the cylinder and regulators must be observed.

Types of compressed gases that may be used include:

- FLAMMABLE GASES: acetylene, hydrogen,
- INERT - DISPLACE OXYGEN: helium, argon, carbon dioxide, nitrogen,
- OXIDIZERS: oxygen
- TOXIC: sulfur dioxide, bromine, hydrogen chloride, anhydrous ammonia

1. All gas cylinders must be secured to prevent falling over.

2. Gas cylinder storage must be away from flammable/corrosive fumes or chemicals, direct or localized heat, open flames or sparks and located in a cool, dry area.

3. The cylinders that are empty must be labeled "Empty" and stored separately from full cylinders.

4. Flammable or toxic gases should not be stored in basements.

5. Incompatible gases must be segregated.

6. When gas cylinders are not in use, the valve cap must be securely in place to protect the valve stem and valve.

7. A hand truck should be used to transport cylinders.

8. For specific toxicity data and handling procedures refer to the SDS of the compressed gas.

NOTE: ADDITIONAL INFORMATION ABOUT SPECIFIC TYPE OF COMPRESSED GASES IN USE IS FOUND IN THE SDS.

CRYOGENICS - LIQUID NITROGEN AND HELIUM

Three main hazards exist with the use of liquid nitrogen and liquid helium:

- The primary hazard of cryogenic materials is their extreme coldness. Severe burns can occur if skin or eyes come in contact with the liquid or surfaces cooled by the liquid.

- Asphyxiation can be caused by the displacement of oxygen.

- Cryogenic materials can present a high-pressure gas hazard since the liquefied gases are usually stored at or near their boiling point; there is always some gas present in the container. Containers designed to hold the liquefied gases must be used.

BASIC PRECAUTIONS:

1. Gloves, face shield, impervious apron or coat, cuff less trousers, and high-topped shoes should be worn where personal contact with the fluid may occur when preparing or using cryogenic materials.

2. Watches, rings, bracelets, or other jewelry should not be worn.

5. Storage of cryogenic fluids must be in a well-insulated container designed to minimize loss of product due to boil-off.

OXYGEN MONITORING:

An oxygen monitor is mounted on the wall in the room housing the NMR. The monitor is tested monthly using 19% oxygen. The monitor is checked quarterly to evaluate the remaining lifespan of the oxygen sensor. Calibration, with 21% oxygen, will be completed as needed. Testing and maintenance of this monitor is performed by the Scientific Instrument Technician 2.

BIOHAZARDS

I. Microbiological

The level of biological hazard must be identified. If a laboratory is testing blood or body fluids then an extensive written program and other provisions is required under the Blood Borne Pathogen regulations (191 0.1030). If other types of biological hazard are present, the Center for Disease Control (CDC) procedures must be followed. CDC has five classes of biological agents according to risk.

- Class 1: Agents of no or minimal hazard under ordinary conditions of handling.

- Class 2: Agents of ordinary potential hazard. This class includes agents, which may produce disease of varying degrees of severity from accidental inoculation or injection, or other means of skin penetration but which are contained by ordinary laboratory techniques (Listed Below)
    - *Class 2 includes most microorganisms used in microbiology labs.*

- Class 3 - 4 and 5: require federal permits and are not in use at Eastern Oregon University.

A. Standard Microbiological Practices - Biosafety Level 1

1. Access to the laboratory should be limited or restricted, at the discretion of the laboratory director, when experiments are in progress.

2. Work surfaces are to be decontaminated after each day in which operations are performed and after any spill of viable material.

3. All contaminated liquid or solid wastes must be decontaminated before disposal.

4. Mechanical or automatic pipetting devices must be used; mouth pipetting is prohibited.

5. Eating, drinking, chewing gum, use of tobacco products, and applying cosmetics are not permitted in the work area.

6. Lab workers must wash their hands with a disinfectant soap or detergent after they handle viable materials and before leaving the area.

7. All procedures must be performed in order to minimize the creation of aerosols.

8. Laboratory coats, gowns, or uniforms should be worn over street clothes while working in the laboratory. These should not be worn away from the lab.

B. Special Practices

1. Contaminated materials that are to be decontaminated at a site away from the laboratory are to be placed in a durable leak proof container that is closed before being removed from the lab.

2. Freezers should be provided for storage of biological waste materials that will not be collected promptly so that they will not putrefy.

3. No flammable or combustible solvents should be placed in the freezer.

C. Containment Equipment

1. Special containment equipment is generally not required for manipulations of agents in Class 1 or 2.

D. Laboratory Facilities

1. Laboratory should be easily cleaned

2. Bench tops should be impervious to water and resistant to other chemicals and moderate heat.

3. Laboratory furniture should be cleanable.

4. Each lab should have a hand washing sink and soap.

5. An autoclave for decontamination of infectious laboratory wastes should be available.

II. ANIMAL RESEARCH LABORATORY OPERATIONS

The use and care of laboratory animals at EOU will comply with the Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals. Principles of laboratory animal care and use will follow the *Guide for the Use and Care of Laboratory Animals (1996)*. EOU's Institutional Animal Care and Use Committee (IACUC) will oversee the use of and housing of laboratory animals on campus. Copies of these policies are available from the IACUC Chair.

A. Animal Laboratory Special Requirements:

1. Sanitation of Animal Cages and Equipment:

a. The teaching/research staff in charge of the testing will have specific procedures for cage sanitation to control pathogen microorganisms. This includes: cages, bedding, water and food containers, etc.

b. Employees performing the work will wear appropriate personal protective equipment including gloves, lab coat, goggles and a respirator (N-95).

2. Disposing of animals. Animals will be transported to the Sciences Stockroom in appropriate containers for disposal by incineration.

B. Laboratory Animal Operations will meet the Guide for Care and Use of Laboratory Animals (NIH Publication 85-23). This includes the following elements:

1. Appropriate cage and enclosure size
2. Social Environmental factors
3. Temperature and humidity ranges
4. Ventilation for animal facilities
5. Level of illumination and noise
6. Separation of species and sanitation of caging and facilities
7. Provision for quarantine and adequate veterinary care.

C. Protection and Prevention from Animal Dander Allergies and Asthma:

1. Background Information:

It has been known for many years that animal dander can cause allergies and asthma; in fact some studies have shown that up to 15% of the animal laboratory personnel have developed asthma and or allergies to animal dander. Types of conditions include: rhinitis/conjunctivitis, cough, and palatial itch. Rat dander has been shown to be the most frequent allergen.

The most important sources of allergen are aerosolized dander and urine, and to a lesser degree food or bedding materials. Data suggest that soluble protein material on dander is as important as the dander itself.

Development of symptoms varies from less than one to many years after initial contact. It appears those with a history of allergies may develop reactions sooner than those with no history.

2. Methods to reduce exposure or minimize the effects of exposure:

a. Use of protective clothing, especially gloves, lab coat, and if aerosolizing of the dander, respiratory protection (recommend N-95 respirator).

b. A well designed ventilation system.

c. General cleanliness of animal areas, use of wet mopping and good ventilation.

D. Chemical Exposure Methods: A specific protocol must be developed for how the animals will be safely administered chemicals or drugs that are being tested. The procedures will need to consider the toxicity of the test agent, method of administration, control of aerosols and animal waste products chemically contaminated. Specific personal protective equipment and procedures are to be included in the specific protocols.

PHYSICAL HAZARDS

RADIATION
A. IONIZING RADIATION SAFETY

Before procurement of radionuclides and other sources of ionizing radiation, the following controls must be in place and used:

1. Approval by the Radiation Safety Officer
2. All users appropriately licensed
3. Formal application for procurement by investigators
4. Procedure for procurement or changes in radiation-producing equipment
5. Human use guidelines
6. Loan and transfer policy and procedure
7. Establishment of radionuclide pools

Proper waste disposal, with provision for:

1. Sewage
2. Incineration
3. Commercial waste
4. Storage of waste
5. Disposition of unused radionuclides

Personal protection program involving:

1. Radiation surveys by the Radiation Safety Office
2. Radiation surveys by the lab personnel
3. Loan of survey instruments
4. Incident procedure
5. Prevention of maximum permissible dose exposure
6. Unauthorized entry
7. Caution signs, labels and signals
8. Instruction of new radiation workers

Reports and Record keeping, including:

1. Radiation Safety Office records
2. Annual Reports
3. Forms, as needed.

B. NON-IONIZATION RADIATION SAFETY

The Physics department does have low wattage lasers and microwave units. The department has specific procedure for the use of these units. Please refer to the department safety procedures and testing data as to energy levels and controls.

1. Lasers: The risk to personnel from the use of laser in the lab depends upon a number of factors. The first consideration is the classification of the laser that is based on the frequency, pulse system, continuous wave, and extended-source.

The Physics department has Class II, IIIb and IV lasers but these have not been used since June 30, 2012 and there are no plans for their use in the future.. Class 1 is the least powerful and is used in Physics labs. Each class has specific safety procedures and warning signs. It is the physics and chemistry departments' responsibility to have safety procedures for the Class of lasers being used in their laboratories.

2. Microwave Equipment: All microwave equipment should be properly shielded to preclude any hazard exposure levels. The Physics department is responsible for testing their equipment if changes or modifications are made on manufactured equipment.

NANOPARTICLES AND NANOMATERIALS

Nanoparticles and nanomaterials used at EOU are category 1, which represents the lowest level of health risk. Signage indicating presence of nanomaterials will be posted in all areas where nanomaterials are stored or used. A resource for more complete information regarding

the handling and use of nanomaterials may be found at the following link from UCLA, http://www.ehs.ucr.edu/laboratory/nanotoolkit.pdf

ELECTRICAL SYSTEMS

Most of the hazards associated with the use of electricity come from electrical shock, resistive heating, and ignition of flammables. Most of the actual incidents occur because of a failure to anticipate all of the ways in which these hazards may be evoked in a laboratory situation.

1. Only grounded electrical equipment may be used in a lab.

2. When working with flammable materials, explosion-proof wiring and motors shall be used.

3. The Lock out/ Tag out procedure shall be utilized whenever work on electrical equipment occurs where unexpected energizing may occur.

GLASSWARE

Glass is involved in a large percentage of laboratory accidents. Glass containers can be dropped, or they may explode or fail due to stress.

1. Lab glassware shall never be used for beverages or food containers.

2. Damaged items shall be discarded or repaired.

3. Adequate hand protection should be used when inserting glass tubing into stoppers or hose connections.

4. Vacuum-jacketed glass apparatus should be handled with extreme care to prevent implosions. Equipment such as Dewar flasks should be taped or shielded. Only glassware designed for vacuum work should be used for that purpose.

5. Broken glass must be disposed of in a separate and clearly identified waste container in each laboratory.

SECTION 3: EOU HAZARD COMMUNICATION PROGRAM

EOU has a written Hazard Communication Program as required by OSHA's Hazard Communication Standard, CFR 1910.1200, **https://www.osha.gov/dsg/hazcom/**. This written plan specifies policies, procedures and essential information such as container labeling, the collection, storage and availability of Safety Data Sheets and the location of inventories of hazardous chemicals on campus including their locations.

The written plan details guidelines for the training of employees specific to the chemicals they will be working with.

SECTION 4: CONTROLS

PPE, Spill Response, Hygiene Practices, Chemical Storage and Engineering Controls

Personal Protective Equipment

A. Eye Protection

1. Eye protection is required for all personnel, students, and any visitors present in locations where chemicals are handled and there is a potential for chemical splash.

2. Chemical splash goggles or safety glasses must also be worn where chemicals are being used that could injure the eye.

3. Eye protection must be used during the following procedures:

- Performing experiments that involve the use of hazardous chemicals
- Washing glassware with caustic chemicals
- Working with corrosives, and toxic chemicals where a splash hazard exists, (i.e. during transfer of hazardous chemicals from primary containers to secondary use containers)
- Disposing of hazardous chemicals

B. Hand Protection

1. Many injuries in labs can be prevented by wearing proper and effective hand protection.

2. Before using any hazardous chemical that may spill on the skin review the SDS and the reference documents on the selection of Chemical Protective Clothing to determine the appropriate glove material. In general, nitrile gloves (solvent resistant) are appropriate for formaldehyde and solvent (xylene) exposures. Latex gloves are not chemical resistant but are adequate for biological material contact.

3. Insulated gloves are provided for handling hot materials and cryogenic gases.

C. Body Protection

1. Lab coats, aprons, and other similar garments must be worn when working with chemicals that may spill or splash. This is extremely important when handling toxic, highly toxic and corrosive materials.

2. Laboratory coats are required to be worn by laboratory staff when using toxic or hazardous chemicals.

3. If the clothing becomes contaminated with a highly toxic chemical the clothing shall be discarded and disposed of.

D. Respiratory Protection

Respirators are not NORMALLY provided to the laboratory employees. When laboratory methods are carried out properly or performed appropriately in the lab hood there is generally no need for a respirator. The level of protection does need to be evaluated by each laboratory. Special precautions must be taken in unventilated areas such as greenhouses. Employees should consult product labels and safety data sheets.

Hazardous spills or chemical releases generally do require respirators for cleanup and control. Each employer is required to have an Emergency Action or Response Plan to deal with chemical spills or releases. If laboratory employees are to control hazardous releases they will need to be provided respirators and specially trained to respond to a hazardous chemical spill or release. **Currently, there is no response team in Badgley Hall**. **For any significant release, evacuate the lab and CALL LA GRANDE FIRE DEPARTMENT, 911. They will evaluate the situation, deny entry and call in a HAZMAT Team if needed.**

Respirators can provide various levels of protection from air purifying to supply air. Depending on the toxicity of the chemicals and the methods of control used the degree of respiratory protection will be determined. Only NIOSH approved respirators shall be provided and used.

All workers who may have to wear a respirator must be trained in its use and limitation. Workers required to wear respirators must be clean-shaven where the respirator seals with the face. Full-face respirators or chemical splash goggles shall be worn if the chemical causes eye damage when splashed into the eyes.

See the employers written Respirator Program for maintenance, storage, selection and fit testing, medical surveillance and other details of the program.

HYGIENE PRACTICES & EMERGENCY SHOWERS

A. Eyewash and Shower

1. The location of the emergency showers/eyewashes should be in each lab that handles corrosive or toxic chemicals.

2. All laboratory personnel must be aware of the location of safety showers and eye wash facilities and be trained in their use.

3. EH&S Professional 1 or Scientific Instrument Technician 2 shall test showers and eyewashes quarterly.**(SAIF, Laurie Lebrasseur)**

B. Personal Hygiene

1. Before leaving the lab, workers must wash their hands thoroughly.

2. Protective lab clothing must be properly laundered. Do not wear contaminated lab clothing (coats, aprons) outside the lab.

FIRE PROTECTION

A. Fire extinguishers must be immediately available and accessible to all lab staff wherever flammable materials are used.

1. Lab staff must be trained in the extinguisher's use.

B. Fire exits and routes from the laboratories must be marked and kept clear of obstacles at all times.

1. Evacuation plans are to be discussed with the staff and students.

CHEMICAL SPILL PROCEDURES

A. Very Small Spills Emergency Procedures

1. If reagents spill either on the outside of the bottle or on the lab counter, wipe up immediately (using proper gloves, if appropriate) and wash carefully with water to avoid injury to other personnel using the same reagent later.

2. Sample containers are to be rinsed and wiped down prior to placing in the plastic carriers.

3. Any questions about spill procedures and/or clean up should be directed to the Chemical Hygiene Committee or Chairperson.

B. Small Hazardous Material Spills on the lab counters or floor. (EXAMPLE: Spills limited to an approximate volume of 200 ml). **This procedure does NOT apply to acutely hazardous chemicals**.

1. Employee(s) observing hazardous chemical spill(s) is to alert all lab personnel in the immediate vicinity and **CALL EH&S PROFESSIONAL 3 IMMEDIATELY at extension 23348**.

- Describe nature and extent of the spill.

- Give instructions for the type of assistance needed such as fire extinguishers or neutralizers.

2. Confine the emergency.

3. Evacuate the area of non-responder personnel as necessary.

4. Chemical Spill Clean-up Procedures: There are three basic approaches when dealing with chemical spills:

- Use the counter or floor as the reaction vessel for neutralization

- Absorb the chemical and carry out the neutralization reaction elsewhere

- Sweep the dry non-reactive chemical into a container.

a. Appropriate spill response materials need to be selected for the type of material that may spill or leak. These materials will absorb the chemicals and some help reduce the vapor concentration.

b. Spill response materials are located in the Science Storeroom and include:

- Sodium bicarbonate - baking soda
- Diatomaceous Earth – "Super Absorbent"
- Spill containment absorbent pads

c. When spill of a chemical occurs:

- Contact Stockroom personnel.
- Determine substance spilled and notify other lab workers.
- Consult the Spill Response/Chemical list to determine the appropriate spill kit.
- Retrieve spill kit from storage location. Put on appropriate PPE.
- Apply spill clean-up material. Wait until it has been absorbed then sweep up and place in labeled disposal container provided by EH&S Professional 3. Determination of hazards will be determined by the EH&S Professional 3.

NOTE: if additional protection is needed evacuate the area and call for emergency assistance.

EXAMPLE OF SMALL SPILL CLEAN-UP PROCEDURES

CHEMICAL/GROUP	**CLEAN-UP ACTION**
ACIDS (small spill)	Neutralize with commercial kit absorbent material. Cover spill with absorbent - note there will be a heat of reaction that can cause splashing of the material due to the reaction.)
CAUSTIC (small)	Dilute and neutralize, solidify and collect for disposal.
COMPRESSED GAS FLAMMABLE	Eliminate source of ignition. Turn off valve and ventilate area. EVACUATE.

COMPRESSED GAS NON FLAMMABLE	Turn off valve - ventilate, may need to evacuate if the leak cannot be stopped
DRY CHEMICALS INORGANIC SALTS	Sweep up and place into appropriate waste container. For oxidizers keep spilled chemical away from organic material
MERCURY	Use mercury spill kit (kept in Science Stockroom – (tray VII A16).
SOLVENT/ALCOHOL	Eliminate source of ignition. Absorb with diatomaceous earth or commercial spill kit.

NOTE. ADDITIONAL OR OTHER TYPES OF PROCEDURES MAY BE USED. LA GRANDE HAZMAT TEAM WILL BE CALLED AND WILL DETERMINE THE BEST OVERALL PROCEDURES FOR EACH SPILL EMERGENCY.
5. Spills must be reported to Campus Security/Safety (x23241 or x23911) if any off-campus assistance is needed or an employee has been injured.

C. Vapor Release Response

1. Employee(s) observing hazardous odors or vapors is to alert all lab personnel in the immediate vicinity and **CALL Safety and Security at x3911**.
   • Security will close the space to all **non-essential emergency** response individuals. And evacuate any non-essential individuals to a safe location.

2. After notifying Security personnel to close the lab, immediately contact the **EH&S III Professional at x3348.**
   - Describe nature and extent of the odor.
   - Give instructions for the type of assistance needed such as neutralizers if the cause of the odor is known.

3. Employees should inform EH&S III professional if they are having any ill effects from exposure to the released vapors.
   - If medical attention is required for an employee who is having ill effects from the vapor than Emergency Services will be called immediately by the EH&S III Professional and no individuals will enter the lab.

4. EH&S III Professional will determine if the vapor release can be neutralized and cleaned up by EOU employees or if the Fire Department should be notified.

- In the event that the odor is unknown and cause can not be determined, the La Grande Fire Department will be contacted to determine the hazardous level of the unknown odor.
    - Prior to contacting the fire department to determine cause EH&S III will determine if there is contamination from the following.
        1. Diesel fumes from generator.
        2. Environmental fumes from air intake.
        3. Environmental fumes from other lab spaces.
        4. Environmental fumes from facility operations.

5. The space **will remain closed** to non-essential personnel until the cause of the vapors has been cleaned up and the space has been **reopened by the EH&S III personnel**.

D. Hazardous Materials Release that needs the HAZMAT team response.

1. "Release" includes any spill, leak or pumping discharge or any other means by which the escape into the environment of a hazardous substance that cannot be immediately controlled by the laboratory staff person.

2. Evacuate the area and secure the entrances to prevent entry and CALL 911 FOR THE LA GRANDE FIRE DEPARTMENT and CAMPUS SECURITY/SAFETY (23241 or 23911). Be available to the response team when they arrive.

3. Follow instructions of the Fire Department's incident Commander.

VENTILATION

A. General Use of Lab Fume Hoods

1. Work as far as possible inside the hood

2. Keep working surface uncluttered

3. Do not block ventilation slots at back of hood

4. Keep sash as low as possible

5. Check operation of hood before use

6. Make periodic performance and maintenance checks. Comprehensive checks and complete maintenance must be done annually.

7. Make sure airflow into hood is maintained. Do not store material or equipment in front of the hood opening.

8. Should hood alarm sound, notify EH&S Professional 3 at extension 23348 or Scientific Instrument Technician 2 at x3296.

B. Usage of Chemical Fume Hoods for Chemical Exposure Control

1. A lab hood is not performing its function unless it captures and retains the atmospheric contaminants generated within it. A hood is not intended to capture contaminants that become airborne elsewhere in the laboratory, nor is a hood generally designed to contain explosions.

2. Successful performance depends primarily on the velocity of air moving through the hood. Factors that affect the face velocity and air movement through the hood are:

- Crosscurrents
- Entrance shapes
- Thermal loading
- Mechanical action
- Exhaust slot design
- Obstructions

Other performance factors may include:

- Ability to confine a fire
- Ability to withstand corrosion
- Easily cleaned
- Ability to collect certain contaminants such as radioactive materials

C. HOOD FACE VELOCITY

1. The velocity of air entering a hood at its face determines whether or not the hood will be safe, since an adequate face velocity is the basic requirement for capture and control of contaminants generated within a hood.

2. A minimum face velocity of 100 fpm is recommended. This face velocity, however; will not be adequate to capture contaminants released with great force or more than very low velocity, as may be seen in some type of tests.

3. Hoods for highly toxic materials require higher face velocities ranging from 125 to 200 fpm, as a means of minimizing out leakage that could be hazardous. However, face velocities in excess of 100 fpm may disturb gas flames, fine powder or tissue slices

4. The operational face of a hood is the actual operating height of the sash. For example, if the work performed in the hood requires sash opening of 20 inches, then the operational face is 20 inches and the airflow must be measured with the sash open to 20 inches. The operational height must be determined, marked, and the air velocity measured to ensure minimum airflow requirements have been met. Higher capture velocities can be achieved in ordinary hoods by closing the sash or positioning bench shields to reduce the open face area.

a. Laminar airflow into a hood provides the best capture of contaminants.

b. Cross currents outside a hood can divert airflow into a hood and nullify its capture ability. It is important to locate hoods where air currents from doors, window, and air supply grilles are minimized.

c. Walking in front of a lab hood can easily create eddies and prevent contaminates from being exhausted.

D. TESTING PERFORMANCE OF LABORATORY VENTILATION SYSTEMS

1. Plant Services staff is responsible to see that the fume hoods velocity is tested and proper preventive maintenance is performed following the ASHRAE Standard 110 guidelines. A copy of annual test results is kept on file by EH&S Professional 3.

2. Face velocities are to be tested annually. Velocity is checked at the center, left and right of the entrance of each hood. Monitoring is performed using a multimeter (Airdata brand), model ADM-860.

3. The following elements should be checked to determine the condition of the fume hood system.

a. Obstruction of slots and concealed space between slots, leaks, or obstructions in ducts, and the condition of the fan. Since many hood and exhaust systems are not designed to provide convenient access, maintenance is often neglected and obstructions accumulate.
b. Corrosion of fan impeller vanes (system performance drops when room air leaks into ducts, and when fan impeller vanes are slowed down or reduced in area by corrosion).

c. Marked reduction in hood suction can often be traced to one or more of the following

1. Reduced performance by the exhaust fan caused by reduced speed due to belt slippage, wear on rotor or casing, or an accumulation of material in the rotor or casing obstructing the airflow.

2. Incorrect direction of exhaust rotation

3. Reduced performance caused by defects in the exhaust piping, such as accumulations of material in branch of main ducts due to insufficient conveying velocities, condensation of oil or water vapors on duct walls, adhesive characteristics of material exhausted.

4. Leakage losses due to loose clean-out doors, broken joints, holes worn in duct (most frequently in elbows) or poor connection to the exhaust inlet.

5. Change in settings of blast gates

6. Obstruction in dust collector or air cleaning devices.

4. Controls, discharge outlets, fans, and ducts of hoods exhausting radioactive, pathogenic or highly toxic materials should be clearly marked to prevent shutdown of service without notification of hood users and personnel responsible for safety and health.

CHEMICAL PROCUREMENT AND STORAGE PRACTICES

Safe storage of chemicals must begin with the identification of the chemicals to be stored and their hazards. When chemicals have multiple hazards it is important to store them in the most appropriate areas possible or segregating them within the same storage area. The size or volume of the chemical containers will also affect the need for special storage procedures. Ventilation is needed for chemicals and containers that may release dangerous quantities of vapors or gases that are flammable, corrosive, or toxic.

A. Procurement: Chemicals are ordered through and received in the Science Storeroom via the Shipping & Receiving department.

1. The EH&S Professional 3 (Science Storekeeper) ensures that the containers are not leaking and are labeled according to GHS guidelines. All new chemicals are added to the chemical inventory, including volume, responsible faculty and review-by date.

2. The Science Storekeeper dates unstable chemicals such as anhydrous ether to facilitate monitoring.

B. Storage

1. Chemicals are stored in appropriate cabinets within the Science Storeroom and, to a lesser extent, in research laboratories. Chemicals are segregated from other incompatible materials.

2. Only small amounts of chemicals used for laboratory assignments in progress may be stored in laboratories at any one time. Any long-term storage in the laboratory must be for non-volatile, chemically neutral substances. Hood must be used for storage of volatile chemicals for laboratory assignments in progress. Unused and unneeded chemicals must be returned to the storeroom or discarded in the appropriate manner.

For additional information there are excellent reference materials on laboratory storage that should be used to determine specific storage practices. Some of these references include:

Safe Storage of Laboratory Chemicals, Edited by David Pipitone, John Wiley & Sons, 1991

Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press

Handbook of Laboratory Safety, 5th Edition, Editor Keith Furr, PhD., CRC Press

CHEMICAL STORAGE REQUIREMENTS

The following items are required for safe storage of chemicals. Inspection sheets designed specifically for each of the storage areas may be found with the EH&S Professional 3 in the Science Stores, BH317. Formal inspection of these areas will be performed at least quarterly by the EH&S Professional. Informal inspections may occur on a more frequent basis.

STORAGE AREAS

- Outside storage area has appropriate signage.
- Stockroom storage area is secured when not in use and is available only to authorized employees via keypad entry.
- Storage areas have clearly marked exits
- Well-ventilated with exhaust air leaving the building
- No open flames smoking or localized heating units are permitted in the storage areas.
- Aisles are kept free from obstructions
- Ladders are available as needed.

SHELF STORAGE

- Large bottles and containers are stored on shelves no higher than 2 feet from the floor.
- Shelves of flammable and corrosive storage cabinets have raised edges or rim guards to prevent the accidental dislodging of containers
- Reagent bottles or containers do not protrude over the shelf edges
- Enough space is available so chemicals are not overcrowded.
- Empty bottles are removed from stockroom shelves.
- Shelves are level and stable. Shelving units are securely fastened to wall or floor
- Shelves are clean - free of dust and chemical contamination.

STORAGE CONTAINERS

- Storage containers are inspected at least annually for rust corrosion or leakage.
- Damaged containers are removed or repaired immediately.
- Chemicals are kept in airtight bottles.
- Eyedropper bottles are not used for storing corrosive or water- reactive chemicals.

LABELING OF CHEMICAL CONTAINERS

- Hazard Communication labels are readable on all storage containers
- Chemical containers are labeled with date received, disposal date, responsible faculty and laboratory identification number or name
- All chemicals will be labeled with date opened.

HOUSEKEEPING

- Cleanliness and order are maintained in the storage areas at all times.
- Unlabeled, contaminated, or undesirable chemicals are discarded properly.
- Chemicals in storage cabinets and on shelves are inspected for decomposition on a regular basis.
- Packing materials and empty cartons are removed once materials are stored.
- Waste receptacles are properly marked and easily located.
- Separate disposal containers are available for broken glass.
- Environmentally safe disposal methods have been arranged.

GAS CYLINDERS

- All cylinders are secured to prevent falling.
- Gas cylinders are stored away from direct or localized heat, open flames, or sparks.
- When gas cylinders are not in use, the valve cap is securely in place to protect the valve stem and valve.
- Gas cylinders are labeled with unique tracking number and “Dispose by” label that includes responsible faculty, laboratory name or number & disposal date.

EMERGENCY PREPAREDNESS

- An emergency warning system is available in the event of a chemical accident. (Fire Alarm)
- Equipment and supplies for cleaning up spills are readily available.
- Fire extinguishers are periodically inspected and maintained.

CHEMICAL STORAGE

- Chemicals are not exposed to direct sunlight or localized heat.
- Containers of corrosive chemicals are stored in trays large enough to contain spillage or leakage.
- Chemicals are stored according to reactive class (i.e. flammable with flammables, oxidizers with oxidizers).
- An EPA Chemical Compatibility chart guide is available in the stockroom.
- Incompatible chemicals are physically segregated from each other during storage.

ACIDS

- Large bottles of acids are stored in designated acid cabinets.
- Oxidizing acids are segregated from organic acids, flammable and combustible materials.
- Acids are segregated from chemicals that can generate toxic gases on contact.
- Spill control pillows or acid neutralizers are available for acid spills.

CAUSTICS

- Caustics are stored away from acids.
- Solutions of inorganic hydroxides are stored in polyethylene containers
- Spill control pillows or caustic neutralizers are available for spills.

FLAMMABLES

- Kept away from sources of ignition
- Approved refrigerators are used to store flammable liquids
- All electrical service equipment is explosion proof for class of flammable material
- Bonding and grounding wires are used where flammables are stored and dispensed.

OXIDIZERS

- Stored away from flammable combustibles and reducing agents (e.g. zinc alkaline metals)

SECTION 5: EXPOSURE MONITORING

Do not use odor as a means of determining whether inhalation exposure limits are being exceeded. If you suspect that a toxic chemical inhalation limit might be exceeded, notify the EH&S Professional 3 to arrange for the operation to be evaluated.

There are also other specific chemicals that Oregon OSHA requires that air monitoring be conducted if the chemical in use exceeds a threshold limit value. This includes the following regulated chemicals:

- Acrylonitrile
- Asbestos
- Benzene *
- Cadmium
- Ethylene Oxide
- Formaldehyde
- Inorganic Arsenic
- Lead
- Methylenedianiline
- Vinyl Chloride
- Dichloromethane**

* Since October 2009 only benzene is in inventory. Appropriate controls must be used to minimize exposure to this chemical.
** Removed June of 2024

There is no monitoring for any of these chemicals. Most of them are not on the inventory. Benzene is used with proper engineering controls.

SECTION 6: MEDICAL SURVEILLANCE & EMERGENCY ACTION PLAN INCLUDING SPILLS AND ACCIDENTS

1. MEDICAL SURVEILLANCE

A. Overview

1. Our laboratory operations in general use small quantities of chemicals and various ventilation control systems are in place. The new OSHA standard does, however, require that each laboratory facility have a medical surveillance program defined if hazardous exposures to toxic materials occur.

It is important to know that a routine medical surveillance program is not required except under some specific circumstances.

2. If any medical examinations are needed they will be performed through an occupational health provider or at an emergency clinic if it is a medical emergency. The medical exams shall be provided at no cost to the employee, without loss of pay and at a reasonable time and place.

B. Medical examinations are required under the following events:

If any one of the following events occurs then a medical examination must be given to an employee who requests testing under the OSHA rules:

1. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.

2. Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.

3. Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided with an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.

4. An additional area of potential medical examination that is not covered in the Oregon OSHA standard is exposure to animals used in research. Hazardous exposure could include: animal bites, scratches, contact with bodily wastes and sites contaminated with zoonotic agents.

C. Medical Examination:

When an examination is performed due to any of the first three listed events, the following information must be gathered and provided to the physician:

1. The identity of the hazardous chemicals to which the employee may have been exposed

2. A description of the conditions under which the exposure occurred including quantitative exposure data, if available

3. A description of the signs and symptoms of exposure that the employee is experiencing, if any.

D. Medical Opinion & Eastern Oregon University's Responsibility

Eastern Oregon University shall be provided with a written opinion from the examining physician that shall include the following:

1. Any recommendation for further medical follow-up

2. The results of the medical examination and any associated tests

3. Any medical condition, which may be revealed in the course of the examination, which may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace

4. A statement by the physician stating that the employee has been informed of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

II. Emergency Medical Procedures:

A. General Emergency/First Aid Procedures: Obtain immediate assistance for liquid splashes of corrosives and toxic materials. The following procedures need to be followed immediately:

- **Eye contact -** If splashed into the eyes, flush with water for 15 minutes or until irritation subsides. If irritation continues seek medical attention.

- **Skin contact** - in case of skin contact, remove any contaminated clothing, and wash skin and clothing thoroughly with water and soap (if clothing is not disposed of).

- **Inhalation** - if overcome by vapor fumes, remove from exposure and call a physician immediately. If breathing is irregular or has stopped, start resuscitation.

Ingestion - if ingested, in general DO NOT INDUCE VOMITING, call emergency medical aid immediately.

Follow medical emergency plan of action posted throughout the campus and call 911 for medical emergencies that require immediate treatment.

B. Spills and Accidents

1. General Emergency Procedures: Alert all lab personnel in the immediate vicinity and explain:

- Nature and extent of the emergency.
- Give instructions for the type of assistance needed such as fire extinguishers or spill kits

2. Confine the emergency if this can be done safely with the equipment available. Acid and base spills should be cleaned up with a neutralizing medium. Use pH indicator to determine when neutralization has been achieved.

3. Evacuate the area (See Evacuation Routes - posted outside labs in hallway)

SECTION 7: PRIOR APPROVAL PROCEDURES

Laboratory operations vary, and it is impractical to list all the processes or procedures and their safety precautions especially for non-routine or new procedures. Consequently, the best way to assure safe work conditions is to get prior approval from the Chemical Hygiene Officer for major changes in lab chemicals and procedures. Examples that would require prior approval include the use of extremely toxic chemicals, and hazardous processes, or procedures that may result in uncontrolled reactions. This is not anticipated to be a frequent issue. Most of the changes in laboratory protocols have reduced the chemical hazards to the employees. If prior approval is denied by the Chemical Hygiene Officer, the person making the request has the right to request a review by the full committee.

Such purchases of new toxic products will be reviewed by the EH&S Professional 3 or Chemical Hygiene Officer and possible alternatives investigated. In general the purchase of

P-Listed chemicals (acutely hazardous) is discouraged. Part of the rationale for this is that EOU is a small quantity Conditionally Exempt Generator. Any acutely toxic hazardous waste exceeding 2.2 pounds or 200 pounds of hazardous waste in any one month will place the university into Large Quantity Generator status. EOU must avoid this situation due to the exponentially greater amount of paperwork and regulations that then must be adhered to. Another important result of reviewing purchase requests is the reduction of legacy waste and the associated cost of disposal.

The above procedures and regulations apply to all areas of campus including Facilities, Custodial, Grounds and all disciplines including those outside Badgley Hall that purchase chemicals with the potential for generating waste.

A. The prior approval process is as follows:

1. Laboratory Instruction and Research Staff Responsibilities:

a. The project must be planned and developed in writing.

b. An inventory of chemicals that will be used must accompany the written plan.

c. Check to make sure all the necessary equipment and control mechanisms are available. (PPE, Ventilation Fume Hoods).

d. Develop a spill response plan.

e. Assure the waste is disposable by legal means.

2. A Chemical Hygiene Review

a. Review chemicals and procedures associated with new teaching experiments or research projects. Review new chemicals and procedures associated with existing teaching experiments or research projects.

b. Prior to submittal to granting and funding agencies any proposal involving the use of hazardous materials must be reviewed and approved by the department chair in consultation with the Chemical Hygiene Officer.

c. Discuss with researcher/chemist the need for the project and expected outcomes and review chemical SDS or animal study procedures.

d. Make sure first aid and fire protection equipment is adequate and available.

e. Notify other lab workers of upcoming special project.

B. Changes to the Chemical Hygiene Plan

1. Chemical Hygiene Committee Chair will see that necessary changes to the Chemical Hygiene Plan are made.
2. Chemical Hygiene Committee Chair will ensure that all staff are notified of any procedural and safety changes.

SECTION 8: HIGHLY TOXIC CHEMICAL HANDLING PROCEDURES

(INCLUDING MUTAGENS, CARCINOGENS & TERATOGENS)

A. Overall Control:

1. Effective control of exposure in the lab entails a well-planned and carefully implemented program that combines good industrial hygiene practices with sound engineering controls. A successful program depends on strict adherence to simple, but proven concepts, such as good housekeeping, personal hygiene, medical surveillance, and employee information and training.

2. The most effective engineering control is establishment of regulated areas that are kept under negative pressure (with respect to the surrounding areas).

3. When dealing with highly toxic chemicals, controlled access and adequate personal hygiene facilities are essential to minimize exposure to workers.

4. An effective control program consists of proper work practices, engineering controls, personal protection, and medical surveillance programs. The following lists the minimum components of this program:

- Exposure monitoring and surveillance
- Medical surveillance
- Regulated areas and controlled access
- Protective clothing and equipment
- Housekeeping
- Hygiene facilities and practices
- Employee information and training
- Signs and labels
- Process enclosure
- Process modification
- Process automation
- Ventilation

B. Policy:

1. Only authorized, trained employees are permitted to enter and/or work in the regulated area in our laboratories.

2. The following information is to be reviewed with each authorized person and the supervisor will discuss the material to ensure that the employees understand the hazards and the necessary control measures. Any questions about the overall program should be directed to the Chemical Hygiene Committee.

C. Establishment of Regulated Areas *

1. Work with highly toxic chemicals shall be restricted to regulated labs or areas within the lab.

2. Employees who work with these materials shall receive special training in the hazards and control systems.

3. All regulated areas shall be under negative pressure to any adjacent area.

4. When work with these materials involves transfer from a closed system or container, this must be performed in a glove box or under continuous local exhaust ventilation.

5. Specially trained staff must perform maintenance or repair on equipment in a regulated area. When this work could result in direct contact with the chemical, employees must wear clean impervious garments, gloves and boots and a hood continuously supplied with breathing air.

7. Waste shall be collected in appropriately labeled containers. Disposal shall then take place according to appropriate state, local and government regulations.

* Since May 2009 there are no regulated areas in Badgley Hall.

CHEMICALS IN THE LABORATORY LISTED AS CARCINOGENS

Oregon OSHA defines cancer agents which are to be included in the planning as "select carcinogens" based on the following criteria:

- It is regulated by OSHA as a carcinogen; or
- It is listed under category, “Known Carcinogens” in the Annual Report on carcinogens published by the National Toxicology Program (NTP); or
- It is listed under Group 1 “Carcinogenic to Humans” by the international Agency for Research on Cancer Monographs (IARC) or
- It is listed in either Group 2A or 2B by (IARC) or under the category “Reasonably anticipated to be carcinogens by NTP and causes statistically significant tumor incidence in experimental animals …”.

CONTROLLED SUBSTANCES

Controlled substances as described in US Code of Federal Regulations Title 21 Parts 329.1 and 1308.14 (1995) require strict management. Access will be controlled by two people for the purpose of security; the Director of Facilities and a faculty member with a DEA Registration number. A Chain of Custody log will be maintained in a file kept in the EH&S Professional 3’s office (currently BH317A). Each will have a key to the wall safe with only the faculty member having knowledge of its location. This will ensure protection from liability for both parties. The faculty member must keep DEA Registration current. There are currently no controlled substances used for teaching or research. May 5, 2017 the retiring Psycology professor gave custody of the wall safe keys to the EH&S 3.

SECTION 9: EMPLOYEE TRAINING AND INFORMATION

A. Laboratory employee training on the CHP has these goals:

1. To familiarize employee with safe methods for performing each job, operation, or experiment.

2. To review various hazards of the job and the necessary precautions and safeguards provided.

3. To teach the correct use of PPE and controls.

4. To inform employee regarding standard operating levels of control systems.

5. To explain proper procedure for obtaining improvements or maintenance of equipment.

B. Each laboratory employee shall receive training at the time of initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations.

C. Annually updated Chemical Hygiene Plan will be provided to the campus community.

D. The information that must be covered in this training must include:

1. An explanation of the Occupational Exposures to Hazardous Chemicals in Laboratories standard.

2. The location and availability of the CHP.

3. The Permissible Exposure Limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard.

4. Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.

5. The location of reference materials such as Safety Data Sheets.

6. Methods and observation that may be used to detect the presence or release of hazardous chemicals.

7. The physical and health hazards of chemicals in the work area.

8. The measures that employees can take to protect themselves from exposures to chemicals including the use of PPE and special work precautions.

SECTION 10: CHEMICAL & WASTE DISPOSAL

A. Waste Program Goals

1. The intention of a waste disposal program is to minimize the quantity of hazardous chemical waste as defined by the Oregon Department of Environmental Quality (DEQ) and the Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act (RCRA), and to dispose of laboratory waste according to regulations that ensure minimal harm to people and the environment.

2. To meet this objective, reclamation or neutralization will be part of the laboratory protocol whenever possible. Efforts will be made to use smaller quantities of materials whenever possible.

3. Requests for hazardous waste disposal from all departments on campus will be reviewed by the Chemical Hygiene Officer and/or EH&S Professional 3 in order to guarantee that the University maintains its Conditionally Exempt Generator status (CEG).

B. Procedures:

1. Labeled waste collection containers will be placed in an accessible laboratory location. The EH&S Professional 3 is responsible for the collection and handling of hazardous chemical wastes.

2. Methods of Disposal: Generally materials that cannot be reclaimed/recycled or neutralized, solidified & land filled will be disposed of via contracted vendor. Biological specimens shall be autoclaved or incinerated. The final disposal method for hazardous waste will be managed by the EH&S Professional 3 in conjunction with hazardous waste contractors.

3. The **Radiation Safety Officer** is responsible for handling radioactive waste.

4. Questions about specific waste handling must be directed to the EH&S Professional 3.

SECTION 11: CHEMICAL INVENTORIES

The chemical inventory is kept, up-to-date, by the Environmental Health & Safety Professional 3, utilizing an Access program. A written copy of the Inventory may be obtained by request. An electronic version is available to faculty. Chemicals that are known or suspected carcinogens, mutagens or teratogens are flagged. **Cancer: C, Mutagen: M, Teratogen: T**.

SECTION 12: STUDENT SAFETY HANDOUT

The following pages contain safety information provided to Chemistry Students. Additional employee safety information is provided by each of the science departments.

LABORATORY SAFETY RULES

1. Immediately tell the instructor of any accidents such as burns, spills or fires.

2. Wear goggles in lab at all times even if you are not working with chemicals-someone else might be. If you should get a chemical in your eye, wash with flowing water from the sink or the eyewash fountain in the hall. The wearing of contact lenses is not recommended because fumes can get under them and irritate your eyes. Due to the lenses, the natural washing action of tears will be blocked. Rinse for 15 minutes.

3. Do not taste anything in the laboratory. This applies to food and drinks as well as chemicals. Do not use the lab as an eating place, and don't eat or drink from laboratory glassware.

4. Reagents should be obtained from the reagent bottles placed in designated locations. DO NOT take the reagent bottles to your bench unless authorized to do so. Try not to take any more material than is required. If you do end up with more than you can use, return it to the reagent bottle. Check with the instructor before discarding it.

5. All chemicals **MUST** be disposed of in properly labeled containers provided for each lab. **NO CHEMICALS MAY BE DISPOSED OF VIA THE SINK.** Please read the label on the collection vessel to be certain you have the right container. Contact your instructor, TA or Stockroom personnel if a container is not available, or is full.

6. Try to avoid getting any chemicals on your hands or skin. Some compounds can be absorbed directly through the skin. Wash your hands immediately if contaminated and wash upon leaving the lab as a precaution since some contact with chemicals is usually unavoidable from unsuspected sources. Keep the lab clean. Wipe up all spills immediately. If acids or bases are spilled, wash with plenty of water then with sodium bicarbonate for acid spills or with vinegar or base spills.

7. If it is necessary to smell the vapors from a chemical substance, hold the container away from your nose and wave ("waft") the vapors toward you with one hand. Direct breathing of vapors from a reagent bottle or test tube can be very dangerous. Remember that the hoods are provided to remove unwanted fumes. The pouring and handling of most volatile substances (chemicals with vapors) should take place in the hoods.

8. Do not sit on bench tops or leave coats or books on them because of unknown chemical spills. Wear shoes because of broken glass or chemicals on floor. A broom is available in the stockroom for sweeping up broken glass.

9. In case of fire call the instructor at once. Know where the shower and fire extinguishers are. There is a phone in the stockroom with emergency numbers. Wet towels are efficient for smothering small fires. Check for volatile chemicals before lighting a Bunsen burner. Smoking is forbidden in this and all public buildings.

10. Always pour reagents away from the label and using a stirring rod to help guide the pouring. Both actions will minimize damage to the label and will reduce the chances of hands being contaminated. Hold the stopper in your pouring hand or place it on the bench top so that it does not pick up dirt or contaminate the reagent. Always re-stopper or recap the reagent bottle when finished with it.

11. Never apply heat to the bottom of the test tube. Apply it to the point at which the solution is highest in the tube, working downwards if necessary. Be careful about the direction you point a test tube. The contents of the test tubes often "bump" explosively out of the tube when heated. NEVER point a test tube of boiling liquid at your neighbor - it may bump.

12. Use a suction bulb or pipette pump when filling a pipette, even with water. Never mouth pipet.

13. Confine long hair in the laboratory.

14. Never work in the lab alone. Ask instructor's permission to work at a time other than the scheduled lab period. Perform no unauthorized experiments.

15 When leaving the laboratory, make certain that the gas and water are off and that your bench area and sink are neat and CLEAN.

SECTION 13: OSHA LAB STANDARD

Oregon OSHA Laboratory Standard OAR 437 Division 2 - 1910.1450, OSHA Lab Standard

OAR 437 DIVISION 2, GENERAL OCCUPATIONAL SAFETY AND HEALTH RULES

Appendix A: TOXIC AND HAZARDOUS SUBSTANCES. S 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories. OSHA Lab Standard Appendix A

SECTION 14: EOU SILICA EXPOSURE CONTROL PROGRAM

EOU Silica Exposure Control Program
Purpose
Under the new Occupational Safety and Health Administration's (OSHA) Silica standard (29 CFR 1910.1053) [2], the University is required to have a Silica Exposure Control Program (SECP). The SECP describes the hazards associated with silica dust, outlines the steps to ensure employees who work with or around silica are not exposed to hazardous levels of silica dust, and provides procedures to minimize exposures for common silica related work duties.
Scope

This program covers University employees who work with silica, establishes the minimum requirements for working with silica, and applies to employees who are exposed over the action level.

Policy and Regulation

Eastern Oregon University Chemical Hygiene Plan

OSHA Regulation, 29 CFR 1910.1053, Respirable crystalline silica. [2]

Roles and Responsibilities

EHS is responsible for:

- Establishing University expectations to meet regulatory requirements.
- Developing training related to silica.
- Conducting a yearly audit of each department's program.
- Conducting qualitative assessments to determine the need for a SECP for the department.
- Ensuring exposure monitoring for silica exposure is conducted by a qualified Industrial Hygienist.
- Ensuring the SECP is available to all affected employees.
- Ensuring employees take required training.
- Conducting the annual review of the written exposure control plan.
- Ensuring needed PPE and exposure controls are available to employees.

Employees are responsible for:

- Complying with the requirements of this program and any further safety requirements set by supervisors.

Program Requirements

Initial Exposure Assessment

Exposure monitoring will be conducted on any employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level.

Some activities at EOU that might have an exposure risk are working with sandstone samples at a geological survey, sand blasting, art involving ceramics and associated tasks, grounds and landscaping, and cutting cement.

Exposure monitoring is not required if the task is listed in 29 CFR 1926.1153(c)(1) and the engineering controls, work practices, and PPE listed are used as listed.

Periodic Exposure Assessment

If the most recent results are at or above the action level but are below the PEL, monitoring shall be repeated every 6 months.

If the most recent results are at or above the PEL, monitoring shall be repeated every 3 months.

Periodic exposure monitoring may be discontinued if results from two consecutive sampling periods taken at least 7 days apart show that employee exposure is below the action level.

Reassessment of Exposures

Whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, monitoring shall be conducted.

Employee Notification

Within 15 workdays after the completion of the exposure assessment, employee(s) shall be notified in writing of the results of the assessment or the results will be posted in an appropriate location accessible to all affected employees.

If the result is above the PEL, the notification will include the means that are being taken to reduce the exposure to below the PEL.

Regulated Areas

Anywhere the exposure is above the PEL, a regulated area will be established. The regulated area must be separated from other areas in a way to minimize the number of employees exposed. At each entrance of a regulated area, appropriate signage must be posted.

Only employees who have work to perform in the area are allowed to enter the area. All employees entering the regulated area must wear a respirator, regardless of the amount time spent in the area.

Written Exposure Control Plan

For each area that has an exposure over the action level, a written exposure control plan must be developed. The exposure control plan includes a description of the task(s) being done that involve(s) silica and all of the controls that are in place to minimize potential employee exposures.

The plan must be reviewed at least annually.

Engineering and Work Practice Controls

Anywhere the exposure is above the PEL, engineering controls (i.e. wet work, ventilation) or work practice controls (i.e. housekeeping, inspections, scheduling) will be implemented to lower the exposure as much as possible.

Housekeeping

Cleaning of silica dust will be conducted with wet sweeping methods or HEPA-filtered vacuum cleaners. These methods will minimize the likelihood of exposure.

Only if other methods are not feasible can compressed air and/or dry sweeping be used.

Medical Services

Any employee who is exposed above the action level for 30 or more days per year will be provided medical surveillance at no cost. The medical surveillance is performed initially and at least every 3 years, unless more frequently recommended by a PLHCP.

The medical examination will include medical and work history, a physical exam, chest x-ray, pulmonary function, tuberculosis test, and any other test recommended by the PLHCP.

The department will provide the following information to the PLHCP: the employee's duties as they relate to silica exposure, results of air sampling, and the PPE that is used.

A written report on the results will be provided to the employee within 30 days.

Hazard Communication

Silica must be included in the department's hazard communication program. This includes proper labeling and having a Safety Data Sheet (SDS).

Training

Any employee who is exposed to silica above the action level is required to complete a silica safety training course on an annual basis.

Training records are maintained by the Director of Safety and Security.

Reviews and Audits

EHS Audits

EHS will review the SECP on a yearly basis. The review will cover all aspects of the written program to ensure they are up to date and complete. EH&S will also conduct an annual walkthrough of the area to check for appropriate labels, warning signs, and housekeeping.

A. Ceramics Silica Ventilation and handling specific procedures

Clay Room:

When mixing clay ensure that the snorkels are turned on and lowered into the plume zone to draw the silica dust away from the handler. When weather permits open the windows to allow for more fresh air exchange. The door to the classroom should be closed while mixers are running to reduce noise pollution as well as fine dust particles entering the teaching space. When employees are mixing clay they are encouraged to wear an 95-filtering mask or equivalent. After each use the floor should be hosed cleaned. If mopping is needed than it should be wet mopped, or vacuumed with HEPA vacuum, never swept.

Glaze Room:

When employees are mixing glazes they are required to wear at minimum a N95-filtering mask. During this process the snorkel should be lowered into the plum zone while scooping from the stock containers, drawing silica and fine dust away from the handler. Once dry ingredients are removed from the stock containers they should be handled in the counter top hoods. Primary containers of crystalline silica should be housed in a secondary container, with a lid, this secondary container should also be lined with a trash bag to contain any dust when changing out bags. When working with silica use the appropriate scooping equipment to reduce static cling. If removing dry mix from the glaze room cover the transfer container in order to prevent dust from entering teaching spaces while in transit. This space should be hosed cleaned weekly If mopping is needed than it should be wet mopped, or vacuumed with HEPA vacuum, never swept.

Kiln/Plaster Room:

When mixing dry and wet ingredients for plaster making, ensure that the over head hood is running. Lower the snorkel into the plume zone. Once all dry ingredients are mixed into solution than ventilation can be turned off. As with other dust generating processes employees are required to wear at minimum a N95-filtering mask. This space should be hosed

cleaned weekly. If mopping is needed than it should be wet mopped, or vacuumed with HEPA vacuum, never swept.

Maintenance of Ventilation Systems in Ceramics:
Tabletop hoods will be tested annually by facilities and a log will be sent to EH&S III professional for the 30 year retention requirement.
The face velocity of the hoods will be tested according to the ANSI/ASHRAE Standard 110. Should the face velocity fall below 100 fpm while the hoods are set on low, then the filters on the tabletop hoods will need to be replaced.
Filters in snorkels will be checked quarterly by the Education Program Assistant 2, either by visual inspection or the monitoring gauge, and replaced accordingly.

SECTION 15: TRANSPORTING HAZARDOUS MATERIALS IN MOTOR VECHILES

When transporting hazardous materials in private or university owned motor vehicles the Department of Transpiration regulations apply. No one at Eastern Oregon University will transport more than the exemption amount in a personal or university owned vehicle.

A hazardous material is defined as a substance or material that has been determined by the DOT title 49 of the Code of Federal Regulations (CFR) to be capable of posing an unreasonable risk to health, safety, and property when in transport. Materials that are hazardous to the environment (i.e., hazardous substance, hazardous wastes, and marine pollutants) are also regulated. Hazardous materials include but are not limited to:

- Laboratory chemicals
- Biological materials
- Radioactive materials
- Compressed gases
- Dry ice
- Refrigerants and related equipment
- Instruments/equipment that contain hazardous materials

For certain hazardous materials called **materials of trade in limited amounts**, there are exemptions to the full requirements that normally apply (see 49.CFR 173.6). Most university transport falls under this exemption, for example, when a university worker must transport a hazardous material, other than a hazardous waste, on a motor vehicle to support job duties or for the operation and maintenance of equipment.

The transportation table below outlines the hazard class and allowable amounts to be transported under the material trade exemption. For chemicals not specifically listed, check section 14 of the SDS to identify the hazard class and packing group.

Packing and Loading

Hazardous chemicals

Transport in the manufactures' original container if possible, or in a container of equal quality. Containers must be leak-tight and securely closed. Tape or parafilm lids closed to prevent cap loosing during transport.

Place containers in secondary containment sufficient enough to hold spilled material with absorbent pads or material to absorb any spilled liquid. Use separate secondary containers for incompatible materials.

Secure containers in the vehicle against shifting by using straps to secure secondary container to vehicle. Whenever possible transport materials in the bed of a pick-up truck or inside the truck and not in the passenger cab especially for any volatile material.

Compressed Gas Cylinders

Cylinders must be transported with the protective valve cap secured in place. Cylinders must be secured to tie down points in the vehicle using sturdy straps. Ideally, cylinders should be transported in the bed of a pick-up truck, not inside the passenger cab as a leak could lead to oxygen depletion.

Cryogens and Dry Ice

Due to slow but constant evaporation, cryogens and dry ice cannot be transported in sealed containers without pressure relief devices. As evaporation could displace oxygen, asphyxiation is a likely hazard inside a vehicle cab. Transport cryogens and dry ice in the bed of a pick-up truck. If small amounts (<1L) may must be transported inside the vehicle cab for short distances travel with a window open

Labeling of Containers

Label all containers with the common name of the material as it is understood by the public. If you are transporting a reportable quantity label containers with "RQ"
If transporting bulk packaging of diluted mixture of class 9 material please contact the EH&S III Professional to assist you with the additional transportation requirements.

A bulk packaging (container size > 450 L (119 gallons) containing a diluted mixture of a Class 9 material must be marked on two opposing sides with the four-digit identification number of the material. The identification number must be displayed on placards, orange panels or, alternatively, a white square-on-point configuration having the same outside dimensions as a placard (at least 273 mm (10.8 inches) on a side), in the manner specified in §172.332 (b) and (c) of this subchapter.

The operator of a motor vehicle transporting a material of trade must be informed of the presence of the hazardous material and if it is a reportable quantity

Emergency Preparedness

Bring PPE (gloves and eye protection) and sufficient material to clean up spills of the transported material

Transportation Table

Hazard Class	Transportation Requirements
Class 1 – Explosives	Cannot be transported!
Class 2 – Gases	
• Division 2.1 – Flammable Gases	In a cylinder with gross weight ≤ 100 kg (220 lbs) In a dewar flask ≤ 25.3 psi Ex: cryogenic liquids (ethylene; hydrogen; methane); ethane; compressed (hydrogen; methane; deuterium); acetylene, dissolved; petroleum gases, liquefied (butane; butylene)
• Division 2.2 – Non-toxic, non-flammable Gases	In a cylinder with gross weight ≤ 100 kg (220 lbs) In a dewar flask ≤ 25.3 psi Ex: cryogenic liquids (argon; helium; nitrogen); compressed gases (air; argon; helium; nitrogen; oxygen); carbon dioxide (liquified, compressed)
• Division 2.3 – Poisonous or Toxic Gases	Cannot be transported! Ex: carbon monoxide; fluorine; nitric oxide
Class 3 – Flammable Liquids	Packing Group I: 0.5 kg (1 lb) or 0.5 L (1 pt) • Ex: acetaldehyde; allyl chloride; 2-chloropropane; diethyl ether, crude oil (boiling point < 35°C) Packing Group II, III, or no packing group: 30 kg (66 lbs) or 30 L (8 gal) • Ex: acetone; ethanol; gasoline; methanol; diesel fuel; formaldehyde solutions; acetonitrile; heptane
Class 4 – Other Flammable Substances	

• Division 4.1 – Flammable Solids	Packing Group I: 0.5 kg (1 lb) or 0.5 L (1 pt) • Ex: smokeless powder for small arms; black powder for small arms Packing Group II, III, or no packing group: 30 kg (66 lbs) or 30 L (8 gal) • Ex: hexamethylenetetramine; magnesium; naphthalene; paraformaldehyde; silicon powder, amorphous; ferrocerium, sodium dodecy sulfate
• Division 4.2 – Spontaneously combustible materials (i.e., self-reactive)	Cannot be transported!
• Division 4.3 – Dangerous when wet materials	Packing Group II, III, or no packing group: 30 mL (1 ounce) • Ex: sodium aluminum hydride; zinc ashes; alkali metal amides
Class 5 – Oxidizing Substances & Organic Peroxides	
• Division 5.1 – Oxidizers	Packing Group I: 0.5 kg (1 lb) or 0.5 L (1 pt) • Ex: hydrogen peroxide, stabilized; iodine pentafluoride; sodium peroxide Packing Group II, III, or no packing group: 30 kg (66 lbs) or 30 L (8 gal) • Ex: aluminum nitrate; ammonium persulfate; barium bromate; barium nitrate; calcium chlorate; calcium nitrate; ferric nitrate; lead dioxide; magnesium bromate
• Division 5.2 – Organic Peroxides	Packing Group I: 0.5 kg (1 lb) or 0.5 L (1 pt) Packing Group II, III, or no packing group: 30 kg (66 lbs) or 30 L (8 gal)

Class 6 – Poisonous (Toxic) and Infectious Substances	
• Division 6.1 – Poisonous (Toxic) Material	Packing Group I: 0.5 kg (1 lb) or 0.5 L (1 pt). Except: Poisonous by inhalation cannot be transported (see SDS section 14). Packing Group II, III, or no packing group: 30 kg (66 lbs) or 30 L (8 gal) • Ex: acridine; aldol
• Division 6.2 – Infectious Substances	Category A: Cannot be transported! Category B : Biological material and regulated medical waste, including sharps, is potentially infectious. Requires additional training, contact DRS Unregulated and Exempt: See Classification Guide
Class 7 – Radioactive Materials	Cannot be transported!
Class 8 - Corrosives	Packing Group I: 0.5 kg (1 lb) or 0.5 L (1 pt) • Ex: Nitric acid solution (>70%); chromosulfuric acid Packing Group II, III, or no packing group: 30 kg (66 lbs) or 30 L (8 gal) • Ex: acid solutions (acetic acid; hydrochloric; nitric acid (20-70%); phosphoric acid, sulfuric (not oleum or fuming sulfuric acid)); aluminum chloride; copper chloride
Class 9 – Miscellaneous Hazardous Materials	Packing Group I: 0.5 kg (1 lb) or 0.5 L (1 pt) Packing Group II, III, or no packing group: 30 kg (66 lbs) or 30 L (8 gal) • Ex: Dry Ice Dilute mixtures (≤2%) of a Class 9 material: 1500 L (400 gal)

The **aggregate gross weight** of all materials of trade on a motor vehicle must **not exceed 200 kg** (440 pounds), except for dilute mixtures of class 9 material.

SECTION 16: GLOBAL HARMONIZING SYSTEM

"In 2012, OSHA revised the HCS to be consistent with the United Nation's Globally Harmonized System (GHS) of classification and labeling of chemicals. The GHS is an international approach to hazard communication that provides specific criteria for classification of chemical hazards and a standardized approach to label elements and safety data sheets."*

*Oregon OSHA's guide to the GHS-aligned Hazard Communication Standard**, page 7**

The following section is to be used in conjunction with the DVD "Hazard Communication and the Global Harmonizing System". Obtain DVD and quiz from Environmental Health & Safety Professional 3.

**** HAZARD COMMUNICATION & THE GLOBAL HARMONIZING SYSTEM EMPLOYEE TRAINING**

INTRODUCTION

Recent changes in OHSA's Hazard Communication Standard have brought the regulation more in line with international standards with the implementation of the Global Harmonizing System. Implementing the Global Harmonizing System, or GHS, helps ensure improved quality and consistency in the classification and labeling of all chemicals, which in turn improves an employee's ability to quickly understand critical safety information. This program is designed to help employees understand the three key elements of the GHS: Hazard Classification, container labeling and Safety Data Sheets.

Topics include the written Hazard Communication plan, physical and health hazard classes, pictograms, signal words and other information found on GHS container labels and the 16 sections of a Safety Data Sheet.

PROGRAM OUTLINE

BACKGROUND

- Hazardous chemicals—they are found in more than 7 million workplaces and over 55 million employees handle, use or work around these potentially harmful substances throughout North America.
- While these substances are essential to many work processes in a variety of industries, they can also be very dangerous.
- Effects from worker exposure to hazardous chemicals can range from mild skin irritation to

severe burns to the eyes or skin to death from various types of exposure.
- Hazardous chemicals can also be highly toxic, flammable or even explosive.
- Because of the dangers presented by hazardous chemicals, The Occupational Safety and Health Administration, OSHA, developed the Hazard Communication Standard, CFR 1910.1200.
- OSHA's regulation requires companies to develop a Hazard Communication Program which communicates the hazards of workplace chemicals to all employees.

THE WRITTEN HAZARD COMMUNICATION PLAN
- Your organization's Hazard Communication Program must include a written plan. This written plan specifies the policies, procedures and essential elements of the Hazard Communication Program such as container labeling, the collection, storage and availability of Safety Data Sheets and a listing of all hazardous chemicals on-site as well as their location.
- The written plan will also detail specific guidelines for the training of employees. For example, employees will receive specific training based on the hazardous chemicals to which they may be exposed.
- Some examples of specific chemical training which you may receive include the methods used for monitoring the presence of hazardous chemicals and the warning signals used to indicate a leak or spill; the physical and health hazards of chemicals used in your work area and the safe work practices and personal protective equipment used to prevent exposure; and how to read the important information found on chemical labels and Safety Data Sheets and the locations on-site where Safety Data Sheets and the written plan may be accessed.
- All of this information may be found in your organization's written hazard communication plan. The written plan is an important document which all employees have a right to review upon request.

THE GLOBAL HARMONIZING SYSTEM (GHS)
- OSHA's Hazard Communication Standard was first enacted in 1983; however, recent changes have brought the regulation more in line with international standards with the implementation of the Global Harmonizing System, or GHS for short.
- Implementing the Global Harmonizing System helps ensure improved quality and consistency in the classification and labeling of all chemicals. This in turn improves an employee's ability to quickly understand critical safety information.
- Created by the international community and adopted by the United Nations, the Global Harmonizing System provides a single set of harmonized criteria for classifying chemicals and mixtures according to their health, physical and environmental hazards.
- The Global Harmonizing System improves hazard communication by specifying communication elements, such as signal words, pictograms and precautionary statements, which are used on container labels or Safety Data Sheets.

HAZARD CLASSIFICATION

- Hazard Classification is the process of assigning a chemical or mixture to a hazard or danger category based on its health and physical hazards.
- Physical hazards are the properties of a gas, liquid or solid that could adversely affect you or the workplace in a physical way, such as a fire or explosion.
- Health hazards are determined by the properties of a substance or mixture that can cause illness or injury to the skin, eyes, lungs or other organs and body parts.
- Because there are such a large variety of hazardous chemicals, there are also a large variety of physical and health hazards presented by these chemicals.
- To better communicate the specific information needed by chemical workers, the Global Harmonizing System has created multiple classes of hazards. There are 16 classes of physical hazards and 10 classes of health hazards.
- The 16 classes of physical hazards include explosives, flammable gases, aerosols, oxidizing gases, gases under pressure, flammable liquids, flammable solids and self-reactive substances and mixtures.
- Other physical hazard classes include pyrophoric liquids, pyrophoric solids, self-heating substances and mixtures, substances and mixtures emitting flammable gases when contacting water, oxidizing liquids, oxidizing solids, organic peroxides and substances corrosive to metal.
- The 10 classes of health hazards include acute toxicity, skin corrosion and irritation, serious eye damage or eye irritation, respiratory or skin sensitization and germ cell mutagenicity.
- Other health hazard classes include carcinogenicity, reproductive toxicology, specific target organ toxicity from a single exposure, specific target organ toxicity from repeated exposures and aspiration hazard.
- Of course, you may not be familiar with many of these terms and you may never work with or handle chemicals in many of these hazard classes; however, it's important for you to understand that the existence of the various GHS hazard classes makes it easier for you to receive the specific training and important information you need to work safely with the chemicals which are located in your workplace.

CONTAINER LABELS

- Container labels will provide information on the relevant hazard classifications of the chemical. The labels which conform to the Global Harmonizing System may be quite different from the traditional labels you may be accustomed to seeing, so it is important to become familiar with them and the important information they deliver.
- As part of the Global Harmonizing System, chemical manufacturers and importers are required to provide a label that includes a pictogram, harmonized signal word, hazard statements and precautionary statements for each hazard class and category.
- Remember, the GHS standardizes all of this information based on hazard category and class to ensure that all workers, worldwide, receive consistent chemical safety information.

USE OF PICTOGRAMS ON CONTAINER LABELS

- Pictograms are standardized graphics, sometimes called harmonized hazard symbols, which are assigned to a specific hazard class or category. Pictograms on a GHS label may convey health, physical or environmental hazard information.
- Each pictogram is assigned to only one class of hazard. A pictogram will represent either a physical hazard, health hazard or environmental hazard.
- Keep in mind that there is not a unique pictogram for each individual hazard within each class. In other words, one pictogram may be used to represent several hazards within a class.

PHYSICAL HAZARD PICTOGRAMS

- There are five pictograms displayed on GHS labels to represent physical hazards of a chemical.
- The exploding bomb pictogram is used to signify a material as explosive, unstable explosive organic peroxide or a self-reactive substance or mixture.
- The flame pictogram is used for flammable gases, liquids, solids and aerosols as well as self-reactive substances. It may also indicate a material is an organic peroxide, pyrophoric liquid or solid, a self-heating substance or mixture or emits flammable gases when it makes contact with water.
- The flame over circle, or oxidizer pictogram, appears on a label when a chemical is an oxidizing gas, liquid or solid.
- The gas cylinder pictogram is exhibited when a substance is a compressed, liquefied, refrigerated liquefied or dissolved gas.
- The corrosion pictogram indicates a material is corrosive to metal.

HEALTH HAZARD & ENVIRONMENTAL PICTOGRAMS

- The corrosion pictogram is also used to denote the health hazards of skin corrosion and serious eye damage.
- Besides corrosion, there are three other health hazard pictograms. The skull and crossbones pictogram is used when a chemical is acutely toxic to the skin, lungs or digestive system.
- The health hazard pictogram, sometimes called the chronic health hazard pictogram, denotes respiratory sensitization, germ cell mutagenicity, carcinogenicity, reproductive toxicity or an aspiration hazard. It is also used when a substance can cause specific target organ toxicity following single or repeated exposures.
- The exclamation point pictogram is used for the health hazards of acute toxicity, skin irritation, eye irritation, skin sensitization and specific target organ toxicity following a single exposure in the form of narcotic effects or a respiratory tract infection.
- The exclamation point is not to be used in conjunction with the skull and crossbones pictogram. It also is not used for skin or eye irritation if the corrosion pictogram also appears or if the health hazard pictogram is used to indicate respiratory sensitization.

- A third type of pictogram is used to indicate environmental hazards. This single pictogram is used when a substance poses acute or chronic hazards to the aquatic environment.

TRANSPORTATION PICTOGRAMS

- Pictograms are also used when chemicals are being transported; however, the pictograms used during transport are different from those found on labels.
- Transportation pictograms still feature the harmonized hazard symbols; however, the background, border and colors used on the transport pictogram come from in the United Nations Recommendations on the Transport of Dangerous Goods.
- Your specific chemical training, as well as your company's written plan, will include an explanation of the pictograms associated with the chemicals in your work environment. This knowledge helps workers quickly identify a chemical's hazards and is the first step to taking proper precautions to work safely.

SIGNAL WORDS

- There are two signal words that appear on GHS container labels. The words "Danger" or "Warning" are used to emphasize hazards and indicate the relative level of severity of the hazard.
- The signal word "Danger" represents a more severe hazard than the signal word "Warning". Only one signal word, corresponding to the class of the most severe hazard, should be used on a chemical label.
- Keep in mind that some hazard classes have not been assigned a signal word; therefore not all labels will have a signal word.

HAZARD & PRECAUTIONARY STATEMENTS

- Other standardized communication elements found on GHS container labels are Hazard Statements and Precautionary Statements.
- Hazard Statements are standard phrases assigned to a hazard class and category that concisely describe the nature of the hazard. For example, the Hazard Statement for an eye irritant may be "Causes eye irritation" while the Hazard Statement for a substance with acute inhalation toxicity may be "Toxic if inhaled."
- For products which pose more than one risk, an appropriate hazard statement for each GHS hazard will be included on the chemical label.
- Chemical labels will also contain Precautionary Statements. Precautionary Statements are standardized explanations of the measures to be taken to minimize or prevent adverse effects.
- There are four types of precautionary statements for each hazard class: prevention, response, storage and disposal.
- Some examples of "Prevention" precautionary statements include "Do not allow contact with water" and "Wear protective gloves."
- Some examples of "Response" precautionary statements include "If on skin wash with plenty of water" and "If inhaled remove person to fresh air."

- Some examples of “Storage” precautionary statements include “Store in well ventilated place” and “Protect from sunlight.”
- “Disposal” precautionary statements typically state to “Dispose in accordance to local regulations.” Disposal precautions are an area the United Nations plans to further develop in the future.

OTHER LABEL COMPONENTS

- The product identifier is the name or number used for a hazardous substance and the label should include the chemical identity of the substance. It should match the same identifier in the Safety Data Sheet for the product.
- Also included on the label will be the supplier identification. The name, address and telephone number should be provided.
- Finally, the label may list supplemental information such as non-harmonized data that is not required or specified under the GHS. Supplemental information may be used to provide further detail; however, it must not contradict or cast doubt on the validity of the standardized hazard information.
- The pictograms, signal words, hazard statements and precautionary statements are standardized based on a chemical or mixture’s hazard category and class as defined by the GHS.
- If needed, a reference guide to the GHS, which includes a detailed explanation of this information, has been published by the United Nations. It is titled “A Guide to the Globally Harmonized System of Classification and Labeling of Chemicals;” however, it is commonly called “The Purple Book.”
- While it is not necessary for chemical workers to have complete understanding of the entire Global Harmonizing System, they must understand the elements of the system used to communicate the hazards presented by the chemicals in their workplace.

SAFETY DATA SHEETS

- Required by OSHA’s original Hazard Communications Standard, Material Safety Data Sheets have been the comprehensive source of safety information about specific chemicals; unfortunately, these valuable documents came in a wide variety of styles and formats making them hard to read and understand quickly.
- As part of the Globally Harmonized System, they are now called “Safety Data Sheets” and have a uniform format that allows employees to obtain concise, relevant and accurate information more easily.
- All Safety Data Sheets will have the following 16 sections, in specific order, so workers will always know which section will provide which data no matter what chemical you are referencing.
- Section 1: Product and Company Identification — This section provides the product name and use, the manufacturer and a number to call in case of an emergency.
- Section 2: Hazards Identification—Health, environmental and physical hazards are listed in this section. Also shown are the GHS standard and transport pictograms as well as the

hazard and precautionary statements found on the container label.

- Section 3: Composition/Information on Ingredients—This section gives the components of the substance and their concentration as well as their Chemical Abstract Service numbers, European Commission numbers and European Chemical Agency numbers.
- Section 4: First Aid Measures—Treating chemical exposures such as contact with the eyes and skin, inhalation and ingestion are covered in this section.
- Section 5: Firefighting Measures—This section lists the appropriate and inappropriate fire extinguisher agents to be used in the event of a fire, the exposure hazards, the combustion products and the personal protection to be worn by firefighters.
- Section 6: Accidental Release Measure—Personal precautions, environmental precautions and methods for clean up in the event of a spill are explained in this section.
- Section 7: Handling and Storage—This section provides the procedures for safe handling and storage of the chemical.
- Section 8: Precautions to Control Exposure/Personal Protection—Exposure limits and the controls and monitoring required to prevent exposure above these limits are listed in this section. Also, the necessary personal protection needed to prevent exposure is also included.
- Section 9: Physical and Chemical Properties—This section contains the various properties of the substance, such as appearance, odor, flash point, specific gravity, flammability limits and vapor density.
- Section 10: Stability and Reactivity—Such issues as stability, hazardous decomposition products, conditions to avoid and incompatible materials are discussed in this section.
- Section 11: Toxicological Information—This section explains the routes of entry to the human body as well as the symptoms and effects of exposure to the chemical.
- Section 12: Ecological Information—Provided in this section is information on the product's effect on plants or animals and its ultimate environmental disposition.
- Section 13: Waste Disposal Considerations—This section discusses how to safely dispose of the chemical.
- Section 14: Transport Information—The proper shipping name, hazard class, UN Identification Number, Transport Label required and other information required for transporting the product are listed in this section.
- Section 15: Regulatory Information—This section documents the chemical's classification under federal regulations such as the Toxic Substances Control Act, the Clean Water Act and the Superfund Amendments and Reauthorization Act among others. It may also include applicable state and international regulations as well as European Union classification and EU risk and safety phrases.
- Section 16: Other Information—The final section allows chemical manufacturers to provide information not found in the first 15 sections. This may include such things as the manufacturer's email address, the intended use of product, what agency issued the data sheet, date of issue, a full explanation of risk and safety phrases, just to name a few.
- Your facility maintains a Safety Data Sheet for every chemical in the workplace as part of its Hazard Communication Program. You should review the SDS before working with any

chemical or anytime you have concerns about safety issues.
- Always ask your supervisor if you have any questions about a chemical label or Safety Data Sheet.

PERSONAL PROTECTIVE EQUIPMENT
- Of course, always wear the proper protective equipment specified by the container label or Safety Data Sheet. This often includes wearing gloves, protective clothing and goggles with a face shield.
- Respiratory protection may also be required to avoid breathing in hazardous fumes.
- If you are unsure about the required PPE for any chemical, stop and ask your supervisor.

** From American Training Resources Handout to accompany DVD "Hazard Communication and the Global Harmonizing System"

Globally Harmonized System Pictograms

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity	**Flame**  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	**Exclamation Mark**  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  • Gases Under Pressure	**Corrosion**  • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals	**Exploding Bomb**  • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  • Oxidizers	**Environment** **(Non-Mandatory)**  • Aquatic Toxicity	**Skull and Crossbones**  • Acute Toxicity (Fatal or Toxic)

Safety Data Sheet

Version 3.12
Revision Date 04/09/2013
Print Date 09/12/2013

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Acetone

Product Number : 650501
Brand : Sigma-Aldrich

Supplier : Sigma-Aldrich 3050
Spruce Street
SAINT LOUIS MO 63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview OSHA

Hazards

Flammable liquid, Target Organ Effect, Irritant

Target Organs

Liver, Kidney

GHS Classification Flammable liquids (Category 2) Skin irritation (Category 3)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3), Central nervous system

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H225	Highly flammable liquid and vapor.
H316	Causes mild skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Other hazards

Repeated exposure may cause skin dryness or cracking.

HMIS Classification

Health hazard: 2
Chronic Health Hazard: *
Flammability: 3
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 3
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation. Vapors may cause drowsiness and dizziness.
Skin May be harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C_3H_6O
Molecular Weight : 58.08 g/mol

Component		Concentration
Acetone		
CAS-No.	67-64-1	90 - 100 %
EC-No.	200-662-2	
Index-No.	606-001-00-8	

4. FIRST AID MEASURES

General advice
Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Carbon oxides

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the buildup of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Acetone	67-64-1	TWA	500 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Hematologic effects Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen			
		STEL	750 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Eye & Upper Respiratory Tract irritation Central Nervous System impairment Hematologic effects Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen			
		STEL	1,000 ppm 2,400 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	The acetone STEL does not apply to the cellulose acetate fiber industry. It is in effect for all other sectors.			
		TWA	1,000 ppm 2,400 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.			
		TWA	250 ppm 590 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	750 ppm 1,800 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

Personal protective equipment

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components

tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374 If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Impervious clothing, Flame retardant antistatic protective clothing, the type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid, clear
Colour	colourless

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -94 °C (-137 °F)
Boiling point	56 °C (133 °F) at 1,013 hPa (760 mmHg)
Flash point	no data available
Ignition temperature	465 °C (869 °F)
Auto-ignition temperature	465.0 °C (869.0 °F)
Lower explosion limit	2 %(V)
Upper explosion limit	13
%(V)	
Vapor pressure	533.3 hPa (400.0 mmHg) at 39.5 °C (103.1 °F) 245.3 hPa (184.0 mmHg) at 20.0 °C (68.0 °F)
Density	0.791 g/mL at 25 °C (77
°F) Water solubility	completely miscible

Partition coefficient: n-octanol/water log Pow: -0.24

Relative vapor density no data available

Odor no data available Odor

Threshold no data available

Evaporation rate no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Vapors may form explosive mixture with air.

Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Bases, Oxidizing agents, Reducing agents, Acetone reacts violently with phosphorous oxychloride.

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute
toxicity
Oral LD50
LD50 Oral - rat - 5,800 mg/kg
Remarks: Behavioral: Altered sleep time (including change in righting reflex). Behavioral: Tremor.

Inhalation LC50
LC50 Inhalation - rat - 8 h - 50,100

mg/m3 no data available

Dermal LD50
LD50 Dermal - guinea pig - 7,426 mg/kg

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Eye irritation - 24 h

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as

probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation. Vapors may cause drowsiness and dizziness.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects
no data available

Additional Information
RTECS: AL3150000

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 13,500.00 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects
no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone
Reportable Quantity (RQ): 5000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1090 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ACETONE
Marine pollutant: No

IATA
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone

15. REGULATORY INFORMATION

OSHA Hazards
Flammable liquid, Target Organ Effect, Irritant

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No. 67-64-1	Revision Date 2007-03-01
Acetone		

Pennsylvania Right To Know Components

	CAS-No. 67-64-1	Revision Date 2007-03-01
Acetone		

New Jersey Right To Know Components

	CAS-No. 67-64-1	Revision Date 2007-03-01
Acetone		

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.