

Abbreviations (Acronyms)

AKOSH - Alaska Occupational Safety and Health

B&W - Biology and Wildlife

CFR - Code of Federal Regulations

CGA - Compressed Gas Association

CHO - Chemical Hygiene Officer

CHP - Chemical Hygiene Plan

EHSRM - Environmental Health, Safety, and Risk Management

EPA - Environmental Protection Agency

IAB - Institute of Arctic Biology

JHA - Job Hazard Analysis

LD50 - Lethal Dose 50%

OSHA - Occupational Safety and Health Administration

PEL - Permissible Exposure Limits

PPE - Personal Protective Equipment

SOP - Standard Operating Procedures

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Biology and Wildlife Chemical Hygiene Plan

INTRODUCTION

The University of Alaska Fairbanks (UAF) and the Department of Environmental Health, Safety and Risk Management (EHSRM) encourages and supports all programs which promote the safety, health and well-being of UAF faculty, staff, students, participants in UAF-sponsored programs, visitors, the community and the environment. It is the goal of UAF to provide a safe working environment and to reduce injuries and illnesses to the lowest possible level. In keeping with this commitment, this Chemical Hygiene Plan (CHP) was developed as part of the Laboratory Safety program.

The CHP provides information to laboratory personnel with regard to protecting themselves from potential hazards associated with the use of chemicals. Biology and Wildlife's plan also addresses potential hazards associated with the use of biological agents. Compliance with the provisions of the CHP is mandatory for all employees working in campus laboratories due to the requirements of the Occupational Safety and Health Administration (OSHA) standard on "Hazardous Chemicals in Laboratories" ([Code of Federal Regulations 29 CFR 1910.1450](#)). While these regulations pertain specifically to employees, UAF maintains that everyone working with hazardous materials in a campus laboratory must comply with the provisions of the CHP. Expectations with regard to safety and behavior, including consequences for non-compliance, are outlined in the UAF Safety Policy ([Appendix 14](#)). UAF's Safety Policy and the consequences laid out in that document shall be followed. For minor infractions, a documented verbal warning will be given for the first instance, a written warning for the second, and a third violation may result in termination of lab privileges.

A variety of hazardous chemicals are used in research and teaching laboratories at UAF. Chemicals may cause injury or property damage if they are toxic, flammable, corrosive or reactive. The degree of personal risk associated with the use of these chemicals depends on how these substances are handled and stored, as well as on the specific reactions and processes in which the chemicals are used.

The objective of UAF's general CHP is to provide uniform requirements for the safe use of potentially hazardous substances in UAF laboratories. This CHP has been adapted by Biology and Wildlife to reflect the unique tasks performed in our labs and to outline the methods of mitigating the risks associated with those tasks. This CHP is one component of our laboratory safety program. Policies may be added and existing policies may be made stricter. They may not be made less strict, nor may they be waived.

CONTACT INFORMATION

| | |
|-----------------------------|----------|
| Emergency | 911 |
| UAF Dispatch, non-emergency | 474-7221 |
| Facilities Services | 474-7000 |

| | | | |
|---|----------------|--------------|---------------------|
| B&W Laboratory Supervisor, Chemical Hygiene Officer, and Safety Coordinator | Patrick Knavel | 907-474-5622 | pdknavel@alaska.edu |
|---|----------------|--------------|---------------------|

| | | | |
|---------------------------|-----------------|---------------|------------------------|
| B&W Laboratory Technician | Rosa Villarreal | 907- 474-7205 | rvillarreal@alaska.edu |
|---------------------------|-----------------|---------------|------------------------|

| | | | |
|--------------------|--------------|--------------|--------------------|
| B&W Office Manager | Rachel Elmer | 907-474-6294 | raelmer@alaska.edu |
|--------------------|--------------|--------------|--------------------|

| | | | |
|--------------------|-------------|--------------|----------------------|
| IAB Safety Officer | Dan Uliassi | 907-474-5455 | dduliassi@alaska.edu |
|--------------------|-------------|--------------|----------------------|

| | | | |
|---------------------------|---|--|--|
| EHSRM Contact Information | http://www.uaf.edu/safety/about-us/contact/ | | |
|---------------------------|---|--|--|

INDIVIDUAL CHEMICAL HYGIENE RESPONSIBILITIES

The responsibility for maintaining a safe laboratory environment lies with the Principal Investigator (PI) for the lab. In Biology and Wildlife teaching laboratories, **the instructor of record for the course is the PI**. Every individual in the lab is expected to conduct all operations and procedures in a safe and prudent manner.

Instructor (PI)

The instructor has responsibility for implementation of the CHP and the ensuring of safe conditions in their course. The instructor shall:

1. complete all required safety training, including those related to lab safety.
2. ensure that their TAs have completed all required training prior to the start of lab work, including training on the contents of this CHP document. Work with the B&W Laboratory Supervisor and Department Chair to address any deficiencies in a timely fashion.
3. ensure that students are always appropriately supervised while performing lab work, including work done outside of regular lab hours.
4. identify hazards and risks associated with each lab exercise. This includes performing the [29CFR1910.132\(d\)](#) required hazard determination and maintaining required documentation as well as carrying out or arranging for Job Hazard Analysis (JHA) –assistance with this may be obtained from the Laboratory Supervisor.
5. obtain prior approval from appropriate parties for laboratory procedures that may require prior approval (see [Circumstances Requiring Prior Approval](#))
6. maintain up-to-date written lab protocols, including measures that must be taken to ensure safety.
7. train TAs on the hazards of the procedures performed during the lab and how to carry out the procedures correctly to minimize risk.
8. identify additional training that needs to be provided to TAs for procedures to be carried out in the lab. Ensure that this training has been provided prior to the occurrence of the relevant laboratory exercise(s).
9. ensure that TAs properly train students and require students to follow the procedures outlined in this document as well as specific procedures for given lab exercises.
10. be familiar with emergency procedures and review them with TAs, including knowledge of the location and use of emergency equipment for the laboratory, as well as how to obtain additional help in an emergency.
11. be familiar with required reporting procedures for incidents requiring reporting, ensure that TAs know how and when to report incidents, and ensure that incidents are reported as required.
12. know current legal requirements concerning regulated substances.
13. identify new SOPS and training necessary for new laboratory activities.
14. in collaboration with the Laboratory Supervisor, review and evaluate the effectiveness of the laboratory SOPs at least annually and update as necessary.
15. request assistance from the Laboratory Supervisor and Laboratory Technician as necessary.
16. keep the Laboratory Supervisor and Laboratory Technician apprised of materials and safety needs, including waste pick-up and decontamination needs. If some or all of this is delegated to TAs, it is the instructor's responsibility to ensure that TAs are doing so in an appropriate and timely manner.

Teaching and Course Assistants

Teaching and Course assistants shall:

1. complete required training, including those related to lab safety.
2. familiarize themselves with departmental lab procedures and available information (this CHP, Google Drive folder of equipment manuals and instruction manuals, B&W website safety page, and document binders in lab).
3. ensure that students are always properly supervised while performing lab work, including work done outside of regular lab hours.
4. meet regularly with the course instructor to discuss course issues and learn laboratory procedures. Follow appropriate procedures as given by the instructor and contained in this document during laboratory preparation, laboratory exercises with students and laboratory clean-up.
5. know the types of protective equipment available and use the proper type for each procedure.
6. use equipment and materials only for their designated purposes. Report equipment needs and problems to the Laboratory Technician.
7. ensure that procedures, including all necessary safety and waste management procedures, are followed at all times by students.
8. be familiar with emergency procedures, including knowledge of the location and use of emergency equipment for the laboratory, as well as how to obtain additional help in an emergency.
9. know and follow required reporting procedures following any incidents requiring reporting.
10. be alert to unsafe conditions and actions and notify the Laboratory Technician and Laboratory Supervisor as soon as possible.
11. work with the instructor of record for the course to identify any additional training on equipment or procedures that would be beneficial or required, and work with the instructor, Laboratory Technician and Laboratory Supervisor to obtain training.
12. inform the Laboratory Technician and Laboratory Supervisor of any problems or needs related to lab management or lab safety in a timely fashion. This includes, but is not limited to:
 - A. PPE restocking needs
 - B. specialized PPE required for a particular procedure
 - C. equipment problems
 - D. spills and leaks
 - E. need for waste disposal containers
 - F. need for waste pick-up
 - G. facilities problems and malfunctions

Students

Students shall:

1. carry out all operations in accordance with the provided guidelines and directions, including safety guidelines.
2. never work without appropriate supervision in the lab.
3. be familiar with emergency procedures, including knowledge of the location and use of emergency equipment for the laboratory and how to obtain additional help in an emergency.
4. know the types of protective equipment available and use the proper type for each procedure.
5. be alert to unsafe conditions and actions and call attention to them so corrections can be made as soon as possible.
6. exercise good judgment.
7. look out for the safety of others in the lab.
8. dispose of all materials appropriately in accordance with instructions provided.
9. use equipment and materials only for their designated purposes.

10. notify their TA and/or instructor immediately in the event of an accident, spill, injury, damage to equipment, improperly functioning equipment, or other potential laboratory problem or hazard.
11. notify the instructor of any pre-existing health conditions that could be affected by working in the lab.

Laboratory Supervisor

The Lab Supervisor shall:

1. complete all required safety training, including those related to lab safety.
2. prepare and provide department-specific training (B&W CHP Training, TA Orientation) at the start of each semester.
3. approve all chemical purchases to be made for courses.
4. assist instructors with performing the [29CFR1910.132\(d\)](#) required hazard determination and maintaining required documentation as well as carrying out or arranging for Job Hazard Analysis (JHA).
5. assist instructors and TAs with development and implementation of SOPs and laboratory practices, including but not limited to identification of appropriate PPE and waste management plans for specific activities.
6. help instructors and TAs identify when additional training is necessary and help arrange for that training.
7. be available to go over procedures with and answer questions from instructors and TAs, upon request.
8. keep abreast of legal requirements concerning regulated substances and communicate any changes to instructors and TAs.
9. seek ways to improve the overall CHP.
10. in collaboration with the IAB/B&W web manager, maintain the B&W Laboratory Safety website.
11. maintain a repository of equipment manuals, instruction manuals, protocols, procedures and other materials on Google Drive and provide access for individuals requiring it.
12. Once per semester, carry out a thorough internal audit of all laboratory spaces in collaboration with the Laboratory Technician. Laboratory users shall also be given the opportunity to participate in audits. At least twice per semester, observe each lab to promote positive interaction with TAs and students.
13. serve as the Chemical Hygiene Officer (CHO) for the department. In this capacity, the Lab Supervisor shall
 - a. provide appropriate waste containers for chemical and biological wastes upon request.
 - b. arrange for disposal of chemical waste and biological waste that cannot be autoclaved once notified of the waste by TAs or instructors.
 - c. collaborate with Safety Officers and CHOs from other departments and with EHSRM to stay abreast of current information and find ways to improve B&W's safety program.
 - d. assist PIs and other laboratory employees with development and implementation of standard operating procedures and practices, including providing consultation and information.
 - e. keep abreast of legal requirements concerning regulated substances and communicate any changes to PIs and laboratory employees.
 - f. perform an annual review of the CHP and all B&W lab documents (procedures, SOPs, flow charts, training requirements, etc.), update them, and make the updates available in the relevant lab rooms and electronic repositories.
 - g. seek ways to improve the overall chemical hygiene program.

Lab Technician

The Lab Technician shall:

1. complete all required training.
2. carry out weekly testing of emergency showers and eyewashes.
3. carry out weekly inspections of all B&W labs and prep areas, including inspection of PPE. Correct any problems, including re-stocking and replacement of PPE as needed.

4. provide additional PPE when it is identified as necessary and make sure that the users understand how to properly use it.
5. place orders for courses, with approval of all chemical purchases or purchases over a specified dollar amount requiring approval from the Laboratory Supervisor. Keep all necessary documentation.
6. inspect equipment at time of issue to a lab and upon return. At time of supply pick-up, make sure that the user is familiar with all hazards and procedures for mitigating risk. Involve Lab Supervisor as necessary to provide training to users.
7. keep the Lab Supervisor informed of equipment and chemicals requested by courses so that safety concerns can be addressed when the equipment is picked up.
8. oversee chemical and equipment storage to ensure it is appropriate and in accordance with relevant regulations and guidelines.
9. assist with clean-up of spills and decontamination of space and equipment.
10. at least twice per semester, observe each course's labs to ensure that procedures are followed and promote interaction with TAs and students.
11. promote completion of training by obtaining training records and following up on deficiencies with individuals. Notify the Department Chair of any training that remains incomplete after the second week of classes.
12. ensure that TAs are trained on proper use of emergency equipment available in the teaching labs.
13. ensure that the B&W Laboratory Safety Agreement is up-to-date.
14. actively seek ways to promote and improve laboratory safety and bring these to the attention of the Laboratory Supervisor.

Office Manager

The Office Manager shall:

1. complete all required training.
2. when receiving requests for laboratory space use by non-Biology and Wildlife groups, inform prospective users of the need to complete training requirements prior to space use.
3. notify the Laboratory Supervisor of all requests for lab use by non-Biology and Wildlife groups so that they can be contacted and training compliance can be confirmed.

CNSM Dean and Biology and Wildlife Department Chair

The Dean and Department Chair shall:

1. complete all required training.
2. promote instructor and TA awareness of their responsibility for the safety aspects of course instruction.
3. ensure that TA contracts (1) include time on contract for completion of required training prior to the start of classes and lab prep activities, and (2) specify the need to complete all training requirements, the timing requirements for completion, and the consequences for non-compliance.
4. apprise the Laboratory Supervisor and Lab Technician of incoming TAs each semester or designate a responsible person to perform this task so that the Laboratory Supervisor can contact individuals in a timely fashion about training requirements.
5. assist in ensuring faculty and graduate student compliance with training requirements as needed, including involving University Administrators as needed.
6. assist in resolving disagreements upon request of the CHO.
7. assist in the enforcement of policies and contracts as needed.
8. bring to the attention of the CHO any items that could improve Biology and Wildlife's CHP and lab safety program.
9. help promote a culture of laboratory and field safety.
10. provide support and resources to the CHO.

Vice Chancellor for Research and Provost

The Vice Chancellor for Research and the Provost shall

1. maintain laboratory safety as an institutional priority in both research and teaching.
2. provide support to CHOs when safety issues in research or teaching labs are not addressed by the instructor or faculty member responsible for that lab

INFORMATION AND TRAINING

Information

The Laboratory Supervisor and Lab Technician shall ensure that information needed to complete required training is provided at the time of a TA's or instructor's initial hire. People who are teaching in B&W lab spaces but are not hired by B&W (e.g. CTC, SLL) are expected to be provided with this information by their supervisor: the Laboratory Supervisor will confirm that training information has been provided and notify individuals and programs of any training needs or deficiencies prior to the start of lab usage. The Laboratory Supervisor shall ensure that instructors are notified of any training needs or deficiencies prior to each semester in which they teach, including need for refresher training and updates on prior training information. The Lab Technician shall ensure that TAs are notified of training requirements and have completed them prior to teaching..

Instructors shall also bear responsibility for ensuring that TAs comply with training requirements. If informed of training deficiencies by the Lab Technician, the instructor shall make sure that the training is completed by their TA in a timely fashion. Instructors shall ensure that information and training relevant to each laboratory exercise are provided to TAs prior to the occurrence of each laboratory exercise. TAs shall attend laboratory preparation meetings with instructors to receive training appropriate to specific laboratory exercises.

Instructors shall inform TAs of the following, or shall request assistance from the Laboratory Supervisor if desired:

1. the requirements of the OSHA Standard, "Occupational Exposure to Hazardous Chemicals in Laboratories," [29 CFR 1910.1450](#).
2. the contents and availability of this CHP.
3. the Permissible Exposure Limits (PELs) for OSHA regulated substances (or other applicable exposure limits, such as those published by the American Conference of Industrial Hygienists).
4. methods and observations that may be used to detect the presence or release of a hazardous chemical; e.g., exposure monitoring conducted by EHSRM, visual appearance or odor of hazardous chemicals when being released, etc.
5. the measures TAs and students can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect individuals from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and PPE to be used.
6. signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
7. the location of reference materials on the hazard, safe handling, storage and disposal of hazardous chemicals found in the laboratory (including, but not limited to, Safety Data Sheets (SDSs)).

Training

Employees (Including TAs) shall complete all the general training required of all UAF personnel and renew them as required in accordance with [UAF Policy 04.07.010](#). The Biology and Wildlife Department uses a [Canvas Course](#) to track trainings - See [Appendix 2](#) for more information (* denotes training requires annual renewal):

Trainings accessed through [MyUA](#):

1. Workplace Harassment Prevention
2. Behavior Based Safety (BBS)

Training currently accessed through Blackboard (see [UAF's Equity and Compliance website](#) for current instructions):

3. *Title IX

Trainings accessed through [UAF EHSRM](#):

4. Employee Safety Orientation
5. Hazard Communication/GHS
6. Office Safety (general)
7. Slips, Trips and Falls

Trainings accessed elsewhere:

8. Protection of Minors ("[Shine a Light](#)" unless you work directly with minors)
9. *Departmental Emergency Action Plan ([DEAP](#)) training (all buildings you work in)

In addition, Biology and Wildlife laboratory personnel (instructors and TAs) shall complete the following:

1. *[FERPA](#) training (required of all who work with student records)
2. *Biology and Wildlife Chemical Hygiene Plan (this document and Canvas quiz)
3. TAs must also complete TA orientation (in-person)

Trainings accessed through [EHSRM Lab Workers](#) Page:

4. UAF Laboratory Safety
5. UAF Hazardous Waste Management (Initial)
 - a. *UAF Hazardous Waste Management (annual refresher)
6. UAF Chemical Hygiene
7. UAF Drivers Training

Researchers must also complete

- [Responsible Conduct in Research](#) (requires renewal every three years)

Additional [basic training](#) modules developed by EHSRM are available, and may be required for certain laboratory activities. They include, but are not limited to:

- Bloodborne Pathogen
- Laboratory Sharps Safety
- Understanding Safety Data Sheets
- Formaldehyde
- Methylene Chloride
- Chloroform
- Phenol
- Hydrofluoric Acid
- Biosafety Cabinets
- Radiation Safety

CIRCUMSTANCES REQUIRING PRIOR APPROVAL

It is the Instructor's (PI's) responsibility to obtain prior approval for laboratory procedures that may include any of the following circumstances. The Laboratory Supervisor may assist with obtaining prior approval.

Prior approval from EHSRM is required in order to proceed when:

1. radioactive materials will be used.
2. recombinant DNA will be used or produced (exception: certain kits, such as Carolina's pGLO bacterial transformation kit, do not require approval).
3. biological material of Biosafety Level 2 or greater will be used.
4. human blood or other fluids will be used that could expose individuals to bloodborne pathogens.
5. it is likely that exposure to limited concentrations could be exceeded or that other harm is likely.

Approval from the Laboratory Technician, Laboratory Supervisor or EHSRM is required in order to proceed when:

1. there is a failure of any equipment used in the process, especially of safeguards such as chemical fume hoods.
2. members of laboratory staff or students become ill, suspect they or others have been exposed to a hazardous material, or otherwise suspect a failure of any safeguards.
3. a TA or instructor must work alone in the lab, regardless of the time of day or the day of the week.
4. working with Particularly Hazardous Substances (PHS), as defined by OSHA (see [Appendix 10](#)). PHSs include:
 - a) select carcinogens
 - b) reproductive toxins
 - c) acute toxins
 - d) chemicals that can cause harm by direct absorption through skin

Prior approval from the Institutional Animal Care and Use Committee (IACUC) is required whenever vertebrates will be used for a lab. This includes vertebrates that will be euthanized for use in a lab. This also may include observations carried out on vertebrates in the field. Approved protocols must be in place before the laboratory activities can occur.

Prior approval from the Institutional Review Board (IRB) may be required for operations in which students collect data using themselves or other people as the subjects. If required, any IRB approvals must be in place before the laboratory activities occur.

LABORATORY-SPECIFIC STANDARD OPERATING PROCEDURES (SOPs)

Instructors must include their own laboratory specific SOPs in this CHP. Instructors may ask the Laboratory Supervisor to write SOPs for them, but must provide all information necessary for the preparation of the SOP to the Laboratory Supervisor in a timely fashion as requested.

Examples of procedures for which SOPs are needed include, but are not limited to:

1. operation of laboratory equipment that could pose a hazard, including but not limited to
 - electrophoresis equipment
 - cryocooling equipment
 - Bunsen burners
 - compressed gas cylinders
 - lasers
 - atomic absorption spectrometers
 - muffle furnaces
 - freeze-dryers
2. operations or materials posing a special hazard, including but not limited to
 - perchloric acid
 - pyrophorics
 - distillations and/or extractions
 - handling infectious agents
 - working with microbiological cultures
 - ethidium bromide
3. operations that use a chemical listed as requiring an SOP in the chemical inventory
4. neutralizing non-contaminated acid wastes
5. specific procedures for any operations that are to be conducted in fume hoods
6. collection and processing of chemical and biological wastes

SOPs are step-by-step instructions for conducting the procedure and must include

1. training requirements for lab personnel. Training documentation must include the name of the trainer, the topics covered and the date of the training.
2. information on the specific hazards posed by the chemicals, biologicals and/or equipment used in the procedure.
3. information on the personal protective equipment (PPE) needed during the procedure, including specific information on PPE types (e.g. glove type and thickness) needed.
4. a step-by-step description of the process.
5. First aid measures.
6. waste collection and disposal instructions.

[SOPs can be found at the end of this CHP.](#)

ENGINEERING CONTROLS AND LABORATORY VENTILATION

General laboratory ventilation is normally designed to provide a minimum of eight air changes per hour. In order to maintain this flow, external laboratory doors must remain closed at all times; laboratory doors that open to the hallway may not be propped open at any time. This flow is not necessarily sufficient to prevent the accumulation of chemical vapors in the lab.

Fume hoods

Laboratory work shall be conducted in a fume hood, glove box or similar device when:

1. Procedures call for work with toxic substances which are volatile; i.e., can evaporate at normal temperature and pressure.
2. There is a possibility that the action level or PEL (Personal Exposure Limit) will be exceeded.

The way the hood is used will determine the degree of protection it will provide. Each employee is responsible for implementing the following work practices when using a hood. The TA or instructor for a lab section is responsible for ensuring that students implement the following work practices when using a hood, and the instructor for the course is responsible for ensuring that the TA is properly trained to supervise the students.

1. Continually monitor air being drawn into the hood. The hoods in the Biology and Wildlife teaching labs have electronic monitors and will alarm if the air flow is too low or too high (Fig. 1) If the display is blank and/or the green light is not lit, do NOT proceed with your work. Notify the Laboratory Technician and Laboratory Supervisor at once, or notify Facilities Services directly if they cannot be reached. Work may only occur in a properly functioning hood.



Figure 1. Fume hood monitors showing acceptable air flow readings.

2. Operate the hood at a sash position that allows no more than a 10-12 inch opening of the fume hood. This helps to ensure optimum protection when conducting operations in the hood. The hood should never be operated when opened above the maximum operational opening marked on the hood.
3. Avoid using the fume hood for storage of bottles and equipment, especially along the back wall of the hood. This impedes air flow.
4. Any apparatus that must be housed in the hood for use should fit completely inside the hood. If appropriate, elevate the apparatus on blocks (at least 2 inches off the bench top) to allow air to flow freely around and beneath the item.
5. Manipulations within the hood should be performed at least 6 inches inside the face of the hood or as far towards the back of the hood as possible. This minimizes the possibility of contaminants escaping from the hood due to turbulent air flow.
6. Minimize air turbulence across the face of the hood from fans or excessive movement around the hood face. Avoid excessive arm movements that could create air turbulence.

7. Avoid walking close to a fume hood when someone else is using it.
8. Fume exhaust hoods do not provide adequate protection for all operations involving toxic materials. A higher level of containment should be used for procedures where exposure to even small amounts of the chemical can be serious. If you are in doubt about the level of containment needed for your operation, ask the Laboratory Supervisor well in advance of beginning work.
9. Fume hoods do NOT provide an appropriate location for work with microbiological organisms. Fume hoods do not properly contain them, and may cause their accidental release. Fume hoods also draw air in over cultures and increase the likelihood of contamination. Do NOT work with microbiological cultures in a fume hood. If you need help working safely with microbiological cultures, contact the Laboratory Supervisor.

Fume hoods shall be evaluated annually by EHSRM to verify that adequate airflow is maintained through the hood face, there are no leaks in the ductwork, the sash cable integrity is maintained, and the stack height and exhaust velocity are sufficient. Check for a current sticker on the side of the fume hood or other local exhaust equipment.

1. The date should not be over a year old. If it is, contact the Laboratory Technician so that a face velocity test can be scheduled with EHSRM.
2. Face velocities should be between 80 and 120 feet per minute (fpm).
3. Contact the Laboratory Technician and Laboratory Supervisor if you suspect a hood is not working. Contact Facilities Services if you cannot reach them. Do not use a hood that does not appear to be functioning properly, as it will not afford the correct protection.

In the event of a fume hood failure or low-flow alarm, discontinue all fume hood operations and, **only if it is safe to do so**, place lids on containers, lower the hood sash and secure reactions that may be generating hazardous emissions.

1. Contact the Laboratory Technician and Laboratory Supervisor to report the problem and obtain assistance. You may also contact Facilities Services. After work hours, the Facilities Services number is forwarded to Emergency Dispatch so that 474-7000 is responded to 24 hours.
2. If the hood failure poses imminent danger, leave the lab immediately and call 911.

Snorkel hoods

1. Snorkel hoods shall be used to ventilate work spaces whenever recommended for a given protocol or procedure. In general, their use is limited to dissections of non-preserved specimens and specimens preserved in non-formalin-based holding solutions and the ventilation of other non-hazardous fumes. **Snorkel hoods do NOT provide adequate protection for formalin / formaldehyde-based solutions or other hazardous materials.** Follow the ventilation requirements in the appropriate Safety Data Sheet(s) and Standard Operating Procedures (when applicable).
2. Recommended procedure
 - move tables under snorkel hoods if not already in that position
 - adjust hoods so that they are low to the work area but do not interfere with the work.
 - turn hoods on by moving the two silver toggle switches in the lab to the “up” position. In 203 and 211, these are on the back pillar in the room. In 303, these are on the side (north and south) walls of the room.
 - check that air flow is occurring through all hoods that are in use. There are on/off adjustment valves on the hood tubing; these should be opened to allow air flow as needed.
 - keep hoods on throughout work and clean-up period. Turn off when work and clean-up are completed.

Respirators

1. Because of the difficulty and expense associated with respirators, procedures that would require the use of a respirator should be replaced with a safer, less hazardous alternative in Biology and Wildlife teaching labs if at all possible.
2. Instructors wishing to carry out a procedure that would require the use of respirators by students and TAs must obtain prior approval from the Department Chair for the expense (of the respirators themselves and the required medical examinations), and must consult with the Laboratory Supervisor to determine (1) whether a safer alternative exists and (2) to be sure respirators can be made available and all steps in the approval and training process completed prior to the lab.
3. Respirators require a medical evaluation, training and fit testing. Procedures are outlined in the UAF Respiratory Protection Policy. Consult the EHSRM Industrial Hygienist for assistance. The use of respirators without prior approval and training by the Industrial Hygienist is prohibited.
4. Respirator use is governed by OSHA regulations: [29 CFR 1910.134](#). All use must be compliant with regulations.

LABORATORY SECURITY

All laboratory personnel are expected to maintain laboratory security at all times. This includes, but may not be limited to:

- Not sharing Polar Express cards or laboratory cabinet keys or using your card or keys to give access to individuals who have not been granted their own access.
- Check that your Polar Express card successfully unlocks and locks your laboratory doors at least 1 week prior to the start of the semester. Notify the Laboratory Supervisor and Biology and Wildlife Office Manager if your access is not working.
- Immediately report any lock failures to the Laboratory Technician and Laboratory Supervisor. If a door cannot be locked and they cannot be reached:
 - if it is between 9am and 5pm, call Facilities at 907-474-7000 to report the room number and location of the door that will not lock. Notify them that it is a lab and must be secured.
 - if it is before 9am or after 5pm, call the non-emergency UAF dispatch number 907-474-7721. Report the room number and door affected. Specify that it is a laboratory room with a Polar Express lock, and the Key Shop on-call person needs to be contacted so they can secure the room.
- If a room is found to be unlocked when it should be secured, report the date, time, and room number to the Laboratory Technician and Laboratory Supervisor as soon as possible so they can follow up .

Card-Swipe Door Lock Function

- Swiping the card reader once with your PolarExpress card will unlock the door and allow you to enter the lab. The door remains locked after a single swipe; the room is secure while you are working and when you leave.
- To unlock a laboratory door for others to enter and exit during a laboratory session, use the card reader double-swipe function. Swipe your card once, wait for the light to finish flashing green, then swipe again. After your second swipe, the lights should flash green again, and the door should be unlocked. If your lab has two hallway doors, you must turn the handle on the second hallway door TWICE so it will be open for students to enter. Do NOT double-swipe the second door to open it unless the light flashes red when you turn the handle.
- If your attempt to double-swipe and unlock the door is unsuccessful, you must wait two minutes before re-attempting the process. This allows the system to re-set between attempts. Failure to wait can cause the electronic mechanisms to keep the door in the locked state.

If you double-swipe to unlock the room for the lab, you must repeat the double-swipe process to lock the doors when you leave. After your second swipe, the light should flash red, and the mechanism should be locked when you check it. If your lab has two hallway doors, turn the handle on the second door to make sure it is locked. It will open on the first turn, but the light should flash red, and the door should be locked on any subsequent attempts to turn the handle.

PERSONAL PROTECTIVE EQUIPMENT (PPE) AND APPAREL

Carefully inspect all PPE prior to use. Do not use defective equipment.

Eye Protection

All individuals working in a laboratory shall wear eye protection appropriate for the procedure(s) being conducted (e.g. safety glasses, chemical-resistant goggles, chemical face shield, UV face shield, etc.). Eye protection shall be worn at all times in laboratories where chemicals are being used.

1. All eye protection must meet American National Standards Institute (ANSI) Z-87.1 -2015.
2. Ordinary prescription glasses are not considered safety glasses. Safety glasses must be worn over prescription glasses, or prescription safety glasses may be worn.
3. Contact lenses may be worn as long as additional ANSI 87.1-2015 -compliant eye protection outlined above is used and the wearing of contacts is compatible with the hazard.
4. Additional information regarding the use of contacts in a chemical environment is outlined in the National Institute of Occupational Safety and Health Publication Number 2005-139 (<http://www.cdc.gov/niosh/docs/2005-139/pdfs/2005-139.pdf>).
5. Biology and Wildlife has goggles designed for over-glasses wear, but these must be specifically requested by the TA. TAs must note how many students require over-glasses goggles and request a sufficient quantity from the Laboratory Technician.
6. Chemical or UV face shields must be requested in advance from the Lab Technician. Use of UV imaging requires prior approval from the Laboratory Technician and Laboratory Supervisor.

Gloves

When working with corrosive, toxic, allergenic or sensitizing chemicals, rough or sharp-edged objects, very hot or very cold materials, gloves made of material known to be resistant to the substance shall be worn. No one glove can protect against all hazards.

1. Cloth gloves can be used to protect against light abrasive materials and moderate temperature changes. They are inappropriate for use around liquids.
2. Synthetic or rubber gloves protect against corrosives, solvents and toxins. Consult the SDS or glove manufacturer's glove selection charts to determine which type of glove is appropriate for a given chemical, or contact the Laboratory Technician or Laboratory Supervisor for assistance. Some solvents permeate particular glove types very rapidly.
3. Leather gloves protect against sparks, heat and rough abrasives, and are often used for tasks such as welding.
4. Autoclave gloves protect against heat. They are used for loading and unloading the autoclave and handling hot materials that have been autoclaved.
5. Insulated neoprene gloves protect against hot or cold liquids. They come in different lengths. Shorter ones are suitable for handling many autoclaved materials or small volumes of liquid nitrogen. Longer ones are suitable for working with the cryocooler or in other situations that require arm as well as hand protection.

Clothing

Clothing should provide protection from laboratory hazards and avoid creating additional hazards.

1. A full body-length rubber, plastic or neoprene apron appropriate for the material being handled should be worn if there is risk of splash or spill when working with large volumes of hazardous chemicals. Hazards of this type must be pre-approved.
2. Low-heeled shoes with fully covered uppers shall be worn at all times in the laboratory. Shoes or sandals with open toes or shoes with mesh covered uppers shall not be worn.
3. Long pants and long sleeves should be worn when working with or around chemicals.
4. Long hair should be held in place behind the head.
5. Loose clothing, especially loose trouser legs and sleeves, should not be worn in the laboratory.
6. A lab coat that is resistant to the hazard being worked with shall be worn (e.g. a chemical resistant lab coat when working with chemicals, a fire-resistant lab coat when working around fire hazards, etc.)
7. Clothing made of synthetic materials is strongly discouraged, and prohibited if specified in the SOP for a procedure.

UV Protective Face Shields

1. UV Protective face shields should be used when working with gels on a UV light box if the protective cover for the light box must be removed to excise bands or carry out other work with the gel.
2. When the situation warrants UV face shielding, skin should be protected from UV by wearing a long-sleeved lab coat and appropriate gloves.

Care and maintenance of PPE

1. Personal protective clothing and equipment shall be used and maintained in a sanitary and reliable condition and shall be cleaned regularly to avoid spreading contamination.
 - Laboratory coats shall never be washed at home.
 - Non-contaminated laboratory coats can be washed in 215 Murie. Contact the Laboratory Technician if you have lab coats that require washing.
 - Consult with the Laboratory Technician regarding treatment of lab coats contaminated with chemicals or biological materials.
2. Remove laboratory coats before you leave the laboratory to prevent spreading contamination to other areas. Laboratories with lab coats have a designated area to hang them. Laboratory coats shall never be hung on the hooks in the front of the room; these are reserved for students' personal belongings and must remain uncontaminated.
3. Do not wear gloves outside the laboratory. If you must carry a hazardous substance from one room to another and need to wear a glove to hold the container, the other hand should be ungloved. The ungloved hand should be used when door handles must be touched.
4. Do not wear contaminated or potentially contaminated shoes outside the laboratory.
5. Regular clothing that is suspected of being contaminated shall be evaluated by chemical hygiene staff (B&W Laboratory Supervisor) to determine whether or not it can be decontaminated or if it should be disposed of. Contaminated clothing shall not be washed with or come into contact with other personal laundry.

LABORATORY SAFETY RULES AND REGULATIONS

General rules for laboratory work with chemicals

1. Regular work schedules should be followed unless a deviation is authorized by the laboratory supervisor, laboratory Technician or instructor. Employees shall not work alone after hours. No one may work alone on hazardous tasks. Students may never work unsupervised.
 - Arrangements should be made between individuals working in separate laboratories outside of regular working hours to cross check each other frequently. Preferably, workers who are alone in a lab should have an emergency alert device to call for help in the event of an emergency. Contact the Laboratory Supervisor for more information.
 - Procedures involving any hazardous materials shall not be undertaken by an employee who is alone in the laboratory. This includes all operations with chemical hazards (corrosives, flammables, toxics, reactives, etc.), electrical hazards, and physical hazards (machinery, sharp tools, asphyxiants, etc.).
 - If there is any question about whether a procedure or material is hazardous, the Laboratory Supervisor shall be consulted in advance of performing the work.
2. **Students must be supervised by an appropriate individual whenever working in the laboratory.**
 - If students need to complete work outside of their scheduled lab period, the TA and instructor are responsible for ensuring that appropriate oversight is provided. The TA and/or instructor are generally responsible for providing oversight themselves.
 - A TA or instructor may make arrangements with the Laboratory Technician or Laboratory Supervisor for one of them to oversee a student if necessary and possible.
 - If someone other than the instructor, TA, Lab Technician or Lab Supervisor is designated to supervise work outside of lab time, the Lab Supervisor must be notified in advance so that the person's training can be confirmed before they serve as a supervisor. If there is insufficient time to confirm and/or complete training, the person shall not be allowed to serve as a supervisor.
3. Unauthorized experiments shall not be performed.
4. Plan and review all safety procedures before beginning any operation.
5. Always review the Safety Data Sheet (SDS) and container label before using any chemical.
6. Follow standard operating procedures (SOPs) at all times, as appropriate.
7. Wear appropriate laboratory attire and appropriate PPE at all times.
8. Use appropriate ventilation when working with hazardous chemicals.
9. Chemicals must be stored appropriately based on hazard categories. Chemicals should be kept secured in locked chemical storage cabinets when not in use.
10. Pipetting should never be done by mouth. Use mechanical devices, such as pipet bulbs, pipet wheels, pipet pumps, electric pipettors or other pipetting devices.
11. Wash hands with soap and water immediately after working with any laboratory chemicals, even if gloves have been worn. Never use solvents to wash skin.
12. Eating, drinking, chewing gum, applying cosmetics and taking medicine in laboratories and lab prep areas is strictly prohibited.
13. Smoking is prohibited in all UAF facilities.
14. Food, beverages, cups and other eating or drinking utensils shall not be stored in areas where hazardous chemicals are stored or handled.
15. Laboratory refrigerators, ice chests, cold rooms and ovens shall not be used for food storage or preparation.
16. Eating and office areas are separated from laboratory and chemical storage areas. Hazardous chemicals may not be stored in eating or office areas at any time.

17. Maintain situational awareness – be aware and alert of things going on around you at all times.
18. Make others aware of any special hazards associated with your work.
19. Notify the instructor of any chemical sensitivities or allergies, and consult with the Laboratory Technician, Laboratory Supervisor or EHSRM Industrial Hygienist for assistance with identifying protective measures or alternatives.
20. Report all injuries, accidents, incidents and near misses to the Laboratory Supervisor, Laboratory Technician, and instructor for the course.
21. If an injury or accident requires an immediate response, call 911 to request emergency assistance. Follow appropriate reporting procedures once the emergency is resolved. See [Appendix 9](#).
22. If injury requires medical attention, follow the appropriate reporting procedures. See [Appendix 8](#). Consult the Laboratory Supervisor, Laboratory Technician, or EHSRM for assistance with reporting.
23. Unauthorized persons are not allowed in the laboratory. In teaching labs, any individuals not enrolled in the course or involved in teaching it are considered unauthorized.
24. Report unsafe conditions in the lab to the course instructor, Laboratory Supervisor and Laboratory Technician. If an unsafe condition poses an emergency, call 911. If a condition is not an emergency but requires prompt attention, contact EHSRM or Facilities Services as appropriate to report it and request assistance. Be prepared to provide details on the location and nature of the problem.
25. Properly dispose of chemical wastes.
 - The Laboratory Supervisor and Laboratory Technician must be notified in advance when a lab will produce chemical waste. They will provide appropriate waste containers and secondary containment as necessary.
 - When wastes need to be picked up, they should be reported to the Laboratory Technician.
26. Properly dispose of biological wastes. See [Appendix 3](#) and [Appendix 4](#).
27. Contact the course instructor and Laboratory Technician or Supervisor with all safety questions or concerns.

Housekeeping

1. Proper housekeeping includes appropriate labeling and storage of chemicals, safe and regular cleaning of the facility, and proper arrangement of laboratory equipment.
2. All work areas, especially laboratory bench tops, should be kept clear of clutter.
3. All aisles, corridors, stairs and stairwells shall be kept clear of chemicals, equipment, supplies, boxes and debris.
4. Equipment and supplies shall be cleaned thoroughly and appropriately by the students and/or TA following a lab activity and put away properly.
5. All wastes and trash shall be collected and disposed of appropriately and promptly. The Laboratory Technician will assist with waste disposal.
6. Storage of empty cardboard boxes in the lab should be avoided. If some cardboard must be stored for use in laboratory exercises, the boxes must be flattened and placed in an appropriate storage location. A limited number of cardboard boxes are kept in 209 Murie and 007 Murie for use in transporting equipment.

General rules for laboratory work with biological agents

In addition to the general rules for laboratory work, the following rules apply to any procedure that uses biological materials (e.g. live animals, preserved animal specimens, fresh animal specimens, microbiological specimens, animal or human body fluids).

1. All materials must be collected and disposed of properly.
2. Biological agents must be stored securely to prevent unauthorized access and accidental exposure.

3. Non-preserved animal tissue (non-human, including non-human animal blood) must be collected in incineration bags or containers. It shall be labeled with the date of collection. The Laboratory Technician shall be notified of the start date and end date of collection of materials so that incineration pick-up can be arranged. If the materials must be stored pending pick-up, they should be placed in the chest freezer in Murie 307 to prevent them from rotting prior to pick-up. Bags shall be securely closed to prevent leaks and placed in secondary containment as needed.
4. If working with human blood or other non-preserved human tissues
 - Bloodborne Pathogen (BBP) training must be successfully completed prior to the start of the laboratory work. BBP training can be scheduled with the EHSRM Industrial Hygienist. Contact the B&W Laboratory Supervisor to make appropriate arrangements.
 - an exposure control plan must be approved by the EHSRM Industrial Hygienist prior to the start of laboratory work. Previously utilized exposure control plans used in Biology and Wildlife labs are available from the Laboratory Supervisor or Laboratory Technician for use as a starting point.
5. Preserved specimens can be bagged and boxed for pick-up. The Laboratory Technician should be notified of the start date and end date of collection of materials so that pick-up can be arranged.
6. Microbiological specimens (e.g. tube cultures, plate cultures) must be autoclaved before tubes are cleaned or plates disposed of. An autoclave flow chart is included as Appendix 4 of this CHP. Specific procedures for autoclaving waste are detailed in the Autoclaving SOP.
7. When working with microbiological agents, the lowest Biosafety Level organism that will be effective for the laboratory activity should be chosen.
8. Any use of live vertebrates or vertebrates that will be euthanized for a lab requires IACUC approval. The IACUC approval process should be initiated well in advance of the lab activity.

EMERGENCY EQUIPMENT

- Know the location and proper use of safety equipment. TAs may request refresher training as needed, and may be asked to complete refresher training annually.
- Access to emergency equipment, showers, eyewashes, fire extinguishers, exits and circuit breakers shall never be blocked or obstructed.
- Use of any emergency equipment shall be reported to the Laboratory Supervisor and other appropriate personnel immediately after the incident is resolved to enable follow-up reporting, prevention of recurrence, and/or replacement of used materials.

Emergency eyewashes and showers

OSHA ([29 CFR1910.151](#)) states:

Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

The ANSI standard [Z358.1](#) recommends that

1. The safety shower and eyewash are within 10 seconds of the work area.
2. The equipment must be installed on the same level as the hazard (i.e. access should not require going up or down stairs or ramps).
3. The path of travel from the hazard to the equipment should be free of obstructions and as straight as possible.
4. Eyewash stations and showers will be tested annually (by Facility Services) to determine pressure and flow rates.

5. Equipment is tested weekly (by the Laboratory Technician in Biology and Wildlife) to ensure the delivery of clear, tepid, debris-free water. These weekly tests are documented in a written log. In Biology and Wildlife, these logs are kept on a clipboard with the SDS in each lab.
6. Visible signage is provided indicating the location of all emergency equipment.

The showers and eyewashes in the Murie Building labs are connected to an alarm system that notifies UAF Emergency Dispatch of their activation. **TAs and/or instructors SHALL NOT demonstrate the use of the shower and/or eyewash without first arranging to have the alarm-out function disabled.** This can be arranged through the Laboratory Technician or Laboratory Supervisor. Any fines or fees arising from a false call-out due to demonstrations or other inappropriate use shall be charged to that course's lab fee.

If a shower or eyewash is used to respond to an emergency, someone in the lab shall call 911 to identify the nature of the emergency and request assistance. The TA should immediately designate a student to do this. **In Biology and Wildlife, any incident requiring the use of a shower or eyewash is considered a medical emergency, and 911 should be called.** See the emergency response flow charts in [Appendix 8](#). The TA or instructor present in the lab shall provide EMTs with full details on the hazard(s) the victim was exposed to, including copies of the Safety Data Sheets for all chemicals involved. It is recommended that the affected area be rinsed continuously for 15 minutes. Contaminated clothing should be removed.

Fire Extinguishers

UAF's policy is to have employees and students exit the building in the event of a fire, not remain behind to attempt to fight the fire. However, it is recognized that individuals who are properly trained and equipped may be able to put out a small fire in a piece of equipment, thus reducing the amount of property damage to the equipment and surrounding lab.

Although Biology and Wildlife teaching labs are not high fire hazard areas, they are equipped with fire extinguishers. Fire extinguishers are to be used only by trained personnel. Individuals who have and are current in their training may follow their training to extinguish a small fire. Untrained individuals should not attempt to extinguish a fire, but should exit the building. In the process of exiting, the fire alarm pull station should be activated to warn others of the danger and alert the fire department.

Propane Gas Shut-Off Valves

In the event that you smell propane and may have a possible propane leak, immediately turn off all possible sources of ignition (open flames, hot plates, magnetic stir plates, etc.). Turn off the propane to the room. The shut-off valve for each room is located behind a clear Plexiglas plate in the front of the room (Fig. 2). The Plexiglas slides off so that the valve can be accessed (Fig. 3). Turn the valve handle so that it is at a 90 degree angle to the pipe (Fig. 4) to shut off the propane. Contact the Laboratory Supervisor immediately for assistance. If the Lab Supervisor is unavailable, contact EHSRM directly for assistance. If you believe that the leak poses an immediate threat of fire or explosion, evacuate the area and call 911 immediately. Do not resume work until it is safe to do so.



Figure 2. Propane gas shut-off valve



Figure 3. Removal of Plexiglass plate covering valve



Figure 4. Valve handle in "off" position

Emergency Fire Blankets

1. Each teaching lab (202, 203, 206, 211, 302, 303, 306 and 309 Murie) is equipped with a fire blanket that is hung on the wall in a protective bag.
2. Fire blankets may be used to smother a small fire or flames on an individual. If a small fire cannot be immediately extinguished, exit the building and pull the fire alarm. If an individual's clothing or hair catches fire, extinguish the flames and call 911 immediately.
3. Things to remember:
 - Lower the blanket onto the fire carefully to avoid spreading the fire. Be careful not to spread the fire. Leave the blanket in place to completely smother the fire. Avoid beating a fire with the blanket, as this can fan the flames and make the fire worse.
 - If a person's clothing or hair catches fire, the person should drop to the ground and roll to smother the flames. The blanket can then be used to smother the flames completely. Do **not** wrap a standing person in a fire blanket, as this can create a chimney effect that intensifies the flames.
 - If a person's clothing or hair catches fire, the emergency shower can also be used to extinguish the flames if there are not any water-incompatible materials involved.
4. The fire blanket may also be used
 - to provide a privacy screen for someone who must use the emergency shower.
 - to provide warmth to an injured person to minimize shock.

Emergency Telephones

In an emergency, a cell phone can be used to call 911. An emergency phone is located in the south (front) entry of the Murie building, between the outer and inner doors of the entry. If 911 must be called and a cell phone is not available, someone should be directed to use this phone to call 911. Be prepared to provide details on your location and the nature of the emergency.

The emergency telephones are also set up to allow on-campus and local telephone calls, so they can be used to reach departmental personnel, EHSRM, or OIT (Office of Information Technology) when non-emergency assistance is needed.

CHEMICAL MANAGEMENT

Chemical Procurement

1. TAs or instructors needing a chemical shall request the chemical from the Laboratory Supervisor and Laboratory Technician far enough in advance to allow it to be obtained. The full name of the chemical, quantity needed, date needed, and what it will be used for should be provided. All purchases of chemicals shall be reviewed and approved by the Laboratory Supervisor before the purchase is made. All purchases of chemicals shall be made by either the Laboratory Technician or Laboratory Supervisor.
2. Only the minimum amount of the chemical needed to perform the planned work should be ordered.
3. The Laboratory Supervisor must be notified ahead of time (minimum 1 week in advance) of chemicals that are being brought to teaching labs from research labs to allow time to make sure that appropriate PPE, waste handling measures, and SDS are in place.
4. Information on proper handling, storage and disposal should be provided to those who will be involved before a chemical is received or used. Proper protective equipment and handling and storage procedures shall be in place before receiving a shipment.

5. Only containers with proper labels identifying the chemical and its hazard should be accepted. Beginning June 1, 2016, all container labels must be compliant with the Globally Harmonized System (GHS). UAF also uses the [J.T. Baker color code](#) storage system. See [Appendix 6](#) and [Appendix 7](#)
6. Shipments with breakage or leakage should be refused or opened in a chemical fume hood using appropriate precautions and PPE.
7. When a shipment containing chemicals is received at the B&W Office, the box shall be placed unopened into the chemical resistant receiving bin. The Laboratory Technician shall be notified immediately. If not available, the Laboratory Supervisor shall be notified immediately.
8. Chemical shipments shall be dated upon receipt. TAs and instructors should use older materials before opening newer ones.
9. Upon receipt of a chemical, the following will be done by the Laboratory Technician or Laboratory Supervisor:
 - A) The box shall be visually inspected and opened in an appropriate location
 - B) the container holding the chemical shall be inspected
 - C) the container shall be dated and labeled appropriately
 - D) the chemical shall be entered into the inventory database
 - E) the current SDS shall be linked to the inventory and printed for the lab(s) where the chemical will be stored and/or used
 - F) the chemical and SDS shall be placed in the appropriate storage location.

Chemical Storage

1. Chemicals should be separated and stored according to hazard category and compatibility. SDS and label information should be consulted as needed. All chemicals should be stored in locked cabinets when not in use regardless of hazard category. All hazardous chemicals must be stored in locked cabinets when not in use.
2. Maintain existing labels on incoming containers of chemicals and other materials.
3. Peroxide formers should be stored away from heat and light with tight-fitting, nonmetal lids. They shall be labeled with peroxide test date, result and initials of tester, and tested at least annually.
4. All containers used to hold chemicals must be labeled with chemical name, chemical concentration, hazard warnings, and date received or mixed.
5. Hazardous liquids should be stored in secondary containment.
6. Open shelves used for chemical storage must be secured to the wall and have 3/4 inch or more lips.
7. Incompatible chemicals should be kept separate during transport, storage, use and disposal. Consult the SDS.
8. Oxidizers, reducing agents and flammables should be stored separately to prevent contact.
9. Chemicals should not be stored in chemical fume hoods, on the floor, in areas of egress, on the benchtop, near heat sources, or in direct sunlight. Chemicals may be in chemical fume hoods or on benchtops while in use or between lab prep and lab sessions, but must be in appropriate secondary containment as needed and appropriately labeled with contents and hazards.
10. Laboratory-grade, flammable-rated refrigerators and freezers are required to store sealed chemical containers of flammable liquids that require cool storage. Flammable liquids may not be stored in the refrigerators in Biology and Wildlife labs.
11. Corrosives should be stored below eye level.
12. Flammable chemicals should be stored in the flammables cabinet when not in use. They must be in a spark-free environment and in approved containers. When transferring flammables from drums in the hazmat storage room, grounding and bonding must be used to prevent static buildup. Storage shall be limited to quantities specified in [Appendix 11](#).

Chemical Handling

1. A risk assessment should be conducted prior to beginning work with any hazardous chemical for the first time or when scaling up a procedure to use larger quantities of a hazardous material. Contact the Laboratory Supervisor for assistance.
2. Read all SDS and label information before using a chemical for the first time, if it has been a while since you last used the chemical, or if the SDS has been updated by the manufacturer.
3. TAs and instructors must ensure that proper administrative controls (e.g. correct procedures), engineering controls (e.g. ventilation) and PPE are in place.
4. TAs and instructors are responsible for ensuring that students utilize the appropriate controls and PPE throughout the experiment. Controls and PPE must be used appropriately to be effective.
5. The Laboratory Supervisor should be consulted whenever there are any questions about the use of a chemical or a combined set of chemicals.
6. Appropriate containers for properly collecting and storing waste until pick-up must be obtained and in place before work begins. TAs and instructors should contact the Laboratory Supervisor for assistance in determining proper waste handling procedures prior to setting up the lab activity.
7. Spill control and clean-up measures must have been considered and materials available before work begins. TAs and instructors should contact the Laboratory Supervisor for assistance.
8. TAs and instructors are responsible for ensuring that students follow waste segregation and collection procedures.

Chemical Inventory

1. UAF uses an online chemical inventory system that stores all information electronically. Go to <http://www.uaf.edu/safety/ehs-assist> to learn about the system.
2. The B&W Laboratory Supervisor and Laboratory Technician are responsible for maintaining the B&W inventory. If you have questions about the availability of a particular chemical, contact the Laboratory Supervisor. An up-to-date hard copy of the inventory is available in the MSDS/SDS binder in the front of each lab.
3. A current copy of the inventory for each teaching lab and prep room is available at the front of the SDS/MSDS binder in the front of the room.
4. If your class has chemicals that you are no longer using, please notify the Laboratory Supervisor and Laboratory Technician so that they can be removed from your lab.

Chemical Transport

1. TAs and instructors are not to transport chemicals from building to building. Ask the Laboratory Technician or Laboratory Supervisor for assistance.
2. Use secondary containment, such as bins and buckets, when transporting chemicals
3. Use a break-resistant transport container when transporting chemicals outside of the laboratory or between stockrooms and laboratories.
4. The outside of the secondary container must be free of any hazardous material so that personnel can carry the package safely between buildings **without wearing gloves**. Appropriate gloves shall be kept on the cart for protection of transporter in case of a spill during transit.
5. Wear safety glasses or goggles while transporting chemicals in secondary containment. Goggles should be worn when transporting liquid chemicals in containers larger than 500 mL.
6. Avoid transporting chemicals through high-traffic areas.
7. Never transport chemicals in your personal vehicle or in a departmental vehicle. Call EHSRM Hazmat Division for assistance at 474-5617 or 474-7889.

Chemical Transfer

1. Use adequate ventilation (such as a fume hood) when transferring even a small amount of a particularly hazardous substance ([see Appendix 10](#)).
2. When transferring flammable chemicals from one container to another, make sure that there are no ignition sources in the area. If transferring from large containers (2 gallons or more), appropriate grounding and bonding should be used to disperse static charge. Consult the Laboratory Supervisor or Laboratory Technician for assistance. They will follow the B&W grounding and bonding SOP.
3. Large quantities of chemicals should not be kept in labs or prep rooms. In particular, drums and multi-gallon containers are not allowed. Contact the Laboratory Supervisor if you need to use large quantities of a chemical for the lab.
4. The container a chemical is being transferred to must be appropriately labeled – including full name of chemical, concentration (if appropriate, e.g. X% (w:v)), and hazards – before transfer occurs.
5. Following a lab, any leftover chemicals must be disposed of properly or transferred to an appropriately labeled container (chemical name, concentration if appropriate, UAF color code, NFPA rating, hazard statements) and stored correctly. Chemicals should NEVER be returned to the original container as this poses the risk of contaminating the entire container of chemicals.

Chemical Shipping

1. Under no circumstances may TAs or instructors ship chemicals. If shipping is necessary, contact the Laboratory Technician or EHSRM for assistance.

COMPRESSED GAS SAFETY

Compressed gases present a number of chemical, physical and health hazards. Improper handling and use can cause structural damage, severe injury and possibly death. Compressed gas safety training, if available from EHSRM, is required for TAs and instructors who will work with compressed gases or who work in labs where compressed gas cylinders are housed.

Receiving and Storage

1. If compressed gases are needed for a lab, contact the Laboratory Technician and Laboratory Supervisor. They will arrange for delivery and pick-up of cylinders.
2. As soon as use of the gas is completed, notify the Laboratory Technician that the cylinder is ready for pick-up. A rental fee is charged on the gas cylinders obtained from Facilities until the cylinder is returned.
3. Cylinders should not be accepted unless the cylinder contents are clearly labeled. Cylinders labeled with only a color code shall not be accepted.
4. Do not accept cylinders which are damaged or do not have a valve protection cap.
5. All gas cylinders shall be secured in an upright position in racks, holders, or clamping devices, with straps or chains placed at 1/3 and 2/3 the tank height.
6. When cylinders are grouped together, they should be individually secured and conspicuously labeled on the shoulder area. Labels must be readily visible.
7. Never place oxygen cylinders near highly combustible materials, especially oil and grease, near stocks of carbide and acetylene or other fuel gas cylinders, nor near any other substance likely to cause or accelerate a fire.
 - a) Systems and components used for other gases and purposes must never be used for oxygen or interconnected with oxygen.
 - b) Signs should be conspicuously posted in areas where flammable compressed gases are stored, identifying the gases and the appropriate precautions to be taken.
8. Cylinders should have the current hydrostatic test date engraved on the cylinder. Cylinders should be returned to the supplier for servicing prior to the expiration date.
9. Do not place cylinders near heat, sparks, or flames or where they might become part of an electrical circuit.
10. Do not store cylinders in exit corridors or hallways.

Handling and Use

1. Only Compressed Gas Association fittings and components are permitted for use with gas cylinders.
2. Only use regulators approved for the type of gas in the cylinder. The CGA number on the cylinder valve must match the CGA number on the regulator.
3. Do not use adapters to interchange regulators.
4. Use care when threading a regulator onto a cylinder to avoid damage and a leaking connection.
5. Open cylinder valves slowly and face away from the valve when opening it. Ensure that others are not facing the valve when you open it.
6. Never force a gas cylinder valve. If the valve cannot be opened by the wheel or small wrench provided, the cylinder should be returned.
7. Transferring gases from one cylinder to another, refilling cylinders or mixing gases in a cylinder are all prohibited.
8. All cylinders are to be considered full unless properly identified as empty by the user. Empty cylinders must be returned promptly and not accumulated.
9. Compressed gases must not be used to clean skin or clothing.
10. Never heat cylinders to raise their internal pressure.

11. Do not use copper (>65%) connectors or tubing with acetylene. Acetylene can form explosive compounds with copper, silver and mercury.
12. Always leave at least 30 psi minimum in “empty” cylinders. Do not leave an empty cylinder attached to a pressurized system.

EMERGENCY PROCEDURES FOR ACCIDENTS AND SPILLS

Medical Emergencies and Injuries Requiring Emergency Response

Call 911. Be prepared to identify the location of the emergency and provide details to the emergency operator. For student emergencies, follow the emergency procedure flow chart posted in the lab. This is included as [Appendix 8A](#) in this document. A separate flowchart is included in [Appendix 8B](#) for dealing with emergencies involving employees (TAs or instructors).

After the emergency has been handled, refer to Appendix [8A](#) or [8B](#) as appropriate, and EHSRM’s website (<http://www.uaf.edu/safety/>) for current reporting procedures.

Spill Clean-up Procedures

1. Spill response information shall be included in your laboratory procedures. It is the instructor’s responsibility to provide spill response procedures and train TAs in them. TAs are responsible for ensuring students know what to do if there is a spill. Instructors, TAs and students are responsible for following procedures. Instructors and TAs can contact the Laboratory Supervisor for assistance and the Laboratory Technician to obtain appropriate spill clean-up materials. Appropriate spill control materials should be obtained and in the lab prior to beginning work.
2. Whether or not a spill would constitute an emergency shall be spelled out in the procedures. It is the instructor’s responsibility to make this determination and provide written guidelines for what would constitute an emergency. TAs and students are responsible for following the documents and responding in accordance with the written guidelines.
3. If you do not feel comfortable cleaning up a hazardous material spill, contact the Laboratory Technician and Laboratory Supervisor immediately. If they are unavailable, you may contact EHSRM for assistance during business hours. After business hours, contact Dispatch.
4. Call 911 if a spill causes an emergency, is likely to become an emergency, or if anyone is in danger from the spill. A telephone is available in the south (front) entry of the building, between the outer and inner doors of the entry.
5. Attend to anyone who may have been contaminated during the spill or who is injured. Ask if others in the room have training that allows them to assist you.
6. Notify or instruct someone to notify occupants in the immediate area of the spill.
7. Evacuate all nonessential personnel from the area. Students who are not assisting the TA or instructor may be directed to go to one of the interaction or lounge areas in the building and wait there if the building is still safe.
8. If the spilled material is flammable, turn off all ignition and heat sources; this includes magnetic stir plates and refrigerator/freezers. If you unplug the refrigerator/freezer, please notify the Laboratory Technician and Laboratory Supervisor immediately so they can make sure the materials in it are taken care of.
9. Ensure that the fume hood is on.
10. Confine or contain the spill to a small area using dikes or spill pads if you can do so without injuring yourself or anyone else.
11. Avoid breathing vapors of the spilled material. If the vapors require a respirator and you do not have one, evacuate the area and call for emergency assistance. B&W personnel are not trained to handle such a spill and shall call for assistance.

12. Wear suitable PPE, including appropriate gloves, lab coat and chemically-resistant goggles for clean-up. Ensure that PPE is resistant to the spilled material.
13. Use appropriate kit and materials to neutralize and absorb inorganic acids and bases.

EXPOSURE MONITORING

Exposure assessments and monitoring shall be conducted by the UAF Industrial Hygienist (474-6771). Any chemical requiring exposure monitoring shall only be used after receiving approval from the Laboratory Supervisor and EHSRM.

Initial Monitoring:

Exposure monitoring shall be performed when there is reason to believe that exposures are in excess of the action level or the PEL. Substances which require monitoring under these conditions are listed in OSHA Regulations, [29 CFR 1910 Subpart Z](#)

Periodic Monitoring:

If initial monitoring reveals that exposures are in excess of the action level or PEL, the employer shall immediately comply with the exposure monitoring provisions of the relevant standard.

Termination of Monitoring:

Monitoring may be terminated in accordance with the relevant standard.

Employee Notification:

Employees will be notified in writing by EHSRM within 15 working days after receiving any monitoring results. Documentation of exposure monitoring shall be kept and maintained as part of each employee's personnel record.

MEDICAL CONSULTATIONS AND EXAMINATIONS

Employees shall be provided an opportunity to receive medical attention, including any related follow-up examinations, at UAF's expense, under the following circumstances:

1. An individual develops signs or symptoms associated with exposure to hazardous chemicals in the laboratory.
2. Exposure monitoring reveals an exposure level routinely above the action level or PEL for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.
3. An accident such as a spill, leak, equipment failure or explosion results in possible over-exposure to hazardous chemicals.

EHSRM is responsible for establishing and maintaining an accurate record of any medical consultations and examinations provided to an employee for issues related to their employment.

Appendix 1: HAZARD CLASSIFICATIONS

HEALTH HAZARDS

Criteria for determining whether a chemical is classified as a health hazard are detailed in [Appendix A to 29 CFR 1910.1200](#). Always read the SDS for any chemical you use to familiarize yourself with its hazards and proper handling.

Acute Toxicity

Refers to those adverse effects occurring following oral or dermal administration of a single dose or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.

Skin Corrosion / Irritation

1. Corrosion is irreversible damage to the skin.
2. Irritation is reversible damage to the skin.

Serious Eye Damage / Irritation

1. Eye damage refers to tissue damage of the eye or serious decay of vision.
2. Eye irritation refers to changes to the eye that are reversible within 21 days of the exposure.

Respiratory or Skin Sensitization

1. Respiratory sensitization refers to a chemical that will lead to hypersensitivity of the airways following inhalation.
2. Skin sensitization refers to a chemical that will lead to an allergic response following skin contact.

Germ Cell Mutagenicity

Defined as a permanent change in the amount or structure of the genetic material in a cell.

Carcinogenicity

A substance or mixture which will induce cancer or increase its incidence. There are three categories for carcinogens:

1A: substances which are known to have carcinogenic potential for humans

1B: substances which are presumed to have carcinogenic potential for humans

1C: substances which are suspected human carcinogens

A list of chemicals that are classified as carcinogens by the National Toxicity Program is given in Appendix 10, as are the thirteen chemicals listed by OSHA as carcinogens.

Reproductive Toxicity

Reproductive toxicity includes adverse effects on sexual function in adult males and females, as well as adverse effects on development of the offspring. There are two categories for reproductive toxicants:

1. Known or presumed human reproductive toxicant
2. Suspected human reproductive toxicant

Specific Target Organ Toxicity, Single Exposure

Refers to a specific, non-lethal target organ toxicity arising from a single exposure to a chemical.

Specific Target Organ Toxicity, Repeated or Prolonged Exposure

Refers to specific target organ toxicity arising from repeated exposure to a substance or mixture.

Aspiration Hazard

Refers to the entry of a liquid or solid into the trachea and lower respiratory system.

Simple asphyxiant

A simple asphyxiant (as defined in [29 CFR 1910.1200\(c\)](#)) is a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

PHYSICAL HAZARDS

Criteria for determining whether a chemical is classified as a physical hazard are detailed in [29CFR1910.1200 Appendix B](#).

Explosive

A solid or liquid chemical which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings.

Flammable Gas

Refers to a gas having a flammable range with air at 20°C (68°F) and a standard pressure of 101.3 kPa (14.7 psi).

Flammable Aerosols

Refers to any non-refillable receptacle containing a gas compressed, liquefied or dissolved under pressure and fitted with a release device allowing the contents to be sprayed as a gas, foam, paste, powder or liquid.

Oxidizing Gases

Refers to any gas which may, usually by providing oxygen, cause or contribute to the combustion of other material above and beyond what air does.

Pressurized Gases

Refers to gases which are contained in a receptacle at a pressure of 200 kPa (29 psi) or more, or which are liquefied or liquefied and refrigerated.

Flammable Liquids

Refers to liquids having a flash point of not more than 93°C (199.4°F). Flash point refers to the minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air.

Flammable Solids

Refers to a solid which is readily combustible or which may cause or contribute to fire through friction.

Self-Reactive Chemicals

Refers to thermally unstable liquid or solid chemicals liable to undergo a strongly exothermic decomposition even without oxygen.

Pyrophoric Liquids

Refers to a liquid which is liable to ignite within five minutes after coming into contact with air.

Pyrophoric Solids

Refers to a solid which is liable to ignite within five minutes after coming into contact with air.

Self-Heating Chemicals

Refers to a large amount of solid or liquid chemical (excluding pyrophoric liquids or solids) which, by reaction with air and without an energy supply, is able to self-heat within hours or days.

Chemicals Emitting Flammable Gases when in Contact with Water

Refers to a solid or liquid chemical that, upon contact with water, is likely to become spontaneously flammable or emit flammable gases.

Oxidizing Liquids

Refers to a liquid which, generally by yielding oxygen, causes or contributes to the combustion of other materials.

Oxidizing Solids

Refers to a solid which, generally by yielding oxygen, causes or contributes to the combustion of other materials.

Organic Peroxides

Refers to a liquid or solid that is derivative of hydrogen peroxide.

1. Organic peroxides are thermally unstable chemicals and may undergo exothermic self-accelerating decomposition.
2. They are liable to explosive decomposition, burn rapidly, be sensitive to impact or friction and react dangerously with other substances.

Corrosive to Metals

Refers to a chemical that can materially damage, or even destroy, metals.

Appendix 2: TRAINING REQUIREMENTS

All required training shall be completed before any lab work begins. Required training for B&W personnel are listed below. Please check the [EHSRM website](#) to ensure that you are aware of any changes in requirements. Each training has a quiz or test that must be **successfully completed** and documentation submitted for the training to be completed. IMPORTANT: Please print or save copies of the certificates or e-mails documenting training completion. All users need to save their FERPA, Title IX, and Minor Protection Awareness Training – United Educators EduRisk Training certificates and e-mail them to the gmail group UAF-iab-bw-training-records@alaska.edu.

Be aware that much of what is in the training will already be familiar to you. A big part of working safely comes down to using common sense, being aware of potential hazards, knowing what your responsibilities are, and asking questions when you're not sure about something.

It is important that you realize these training sessions do not cover all possible hazards that you will face in your labs. It is your personal responsibility to seek out or request any additional training you may need based on specific hazards in your lab. Some of the most common additional training are on handling ethidium bromide, handling biologically contaminated materials and PPE (personal protective equipment), including goggles and gloves. You may need to have these or other specialized training depending on your laboratory activities. Please see the list of available training modules at www.uaf.edu/safety/training/basic-training/ for common requirements. If you feel you need additional training that is not available on-line, it is your responsibility to ask for the additional training.

(*) denotes trainings that must be renewed annually

Required Training for all UAF Employees:

Instructions for MyUA training, and links to other training are available below, as well as at [UAF EHSRM's Website](#).

- All Tier 1 Trainings accessed through [MyUA](#):
 - a. Log in to myUA.
 - b. Click on “myUA Employee Services Dashboard.”
 - c. Click on “My Community” then “Learning Library.”
 - d. Select Tier 1, UA Employee Required Training.
 - i. *Title IX
 - ii. Behavior Based Safety
 - iii. Workplace Harassment
- Trainings accessed through [UAF EHSRM's Website](#):
 - a. Employee Safety Orientation
 - b. Hazard Communication
 - c. Office Safety (General)
 - d. Slips, Trips, and Falls
- *Department Emergency Action Plan (DEAP):
 - a. For every building you work in. IAB and B&W DEAPs can be found on the [IAB Safety Office Page](#)
- Protection of Minors
 - a. [Shine A Light](#) for employees who don't work directly with minors
 - b. Employees who do work directly with minors should follow instructions from [EHSRM](#)

Required Training for UAF Employees Working with Student Records:

- *FERPA training, accessed through [MyUA](#).

Training Required for UAF Laboratory Workers:

Accessed through [EHSRM's Lab Workers](#) page.

- Laboratory Safety
- Chemical Hygiene
- Hazardous Waste Management (Initial Course)
 - a. *Hazardous Waste Management Yearly Refresher

Training Required for Employees Using B&W Labs:

- Chemical Hygiene Plan (In-person training)
- TA Orientation (In-person training; TAs only)

Additional training required for advisors:

- [Academic Advisor Training](#)

Supervisors are required to complete one additional training:

- [Supervisor Training](#)

Researchers must also complete:

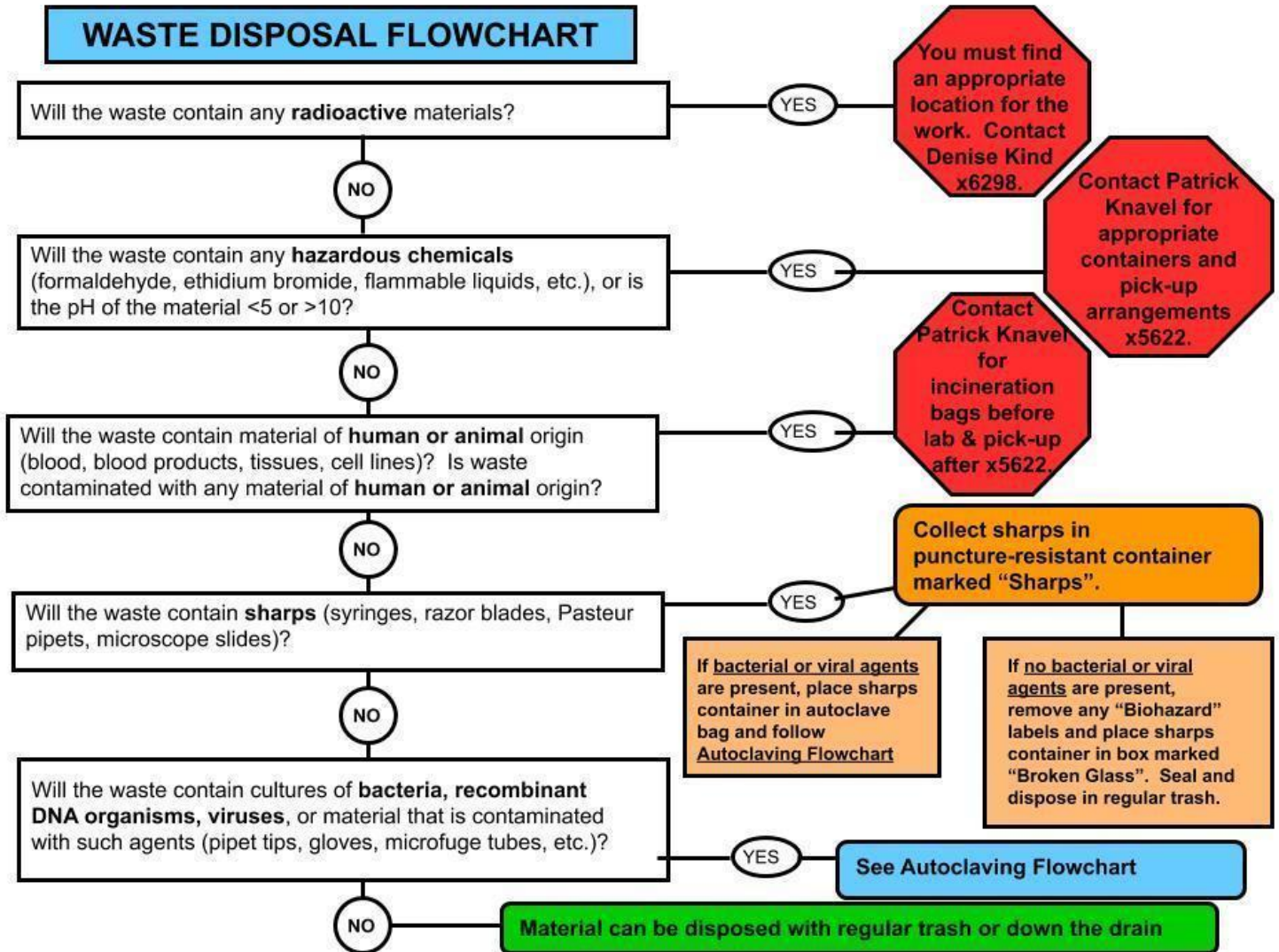
- [Responsible Conduct in Research](#) (requires renewal every three years)

Training Required for Specific Lab Activities:

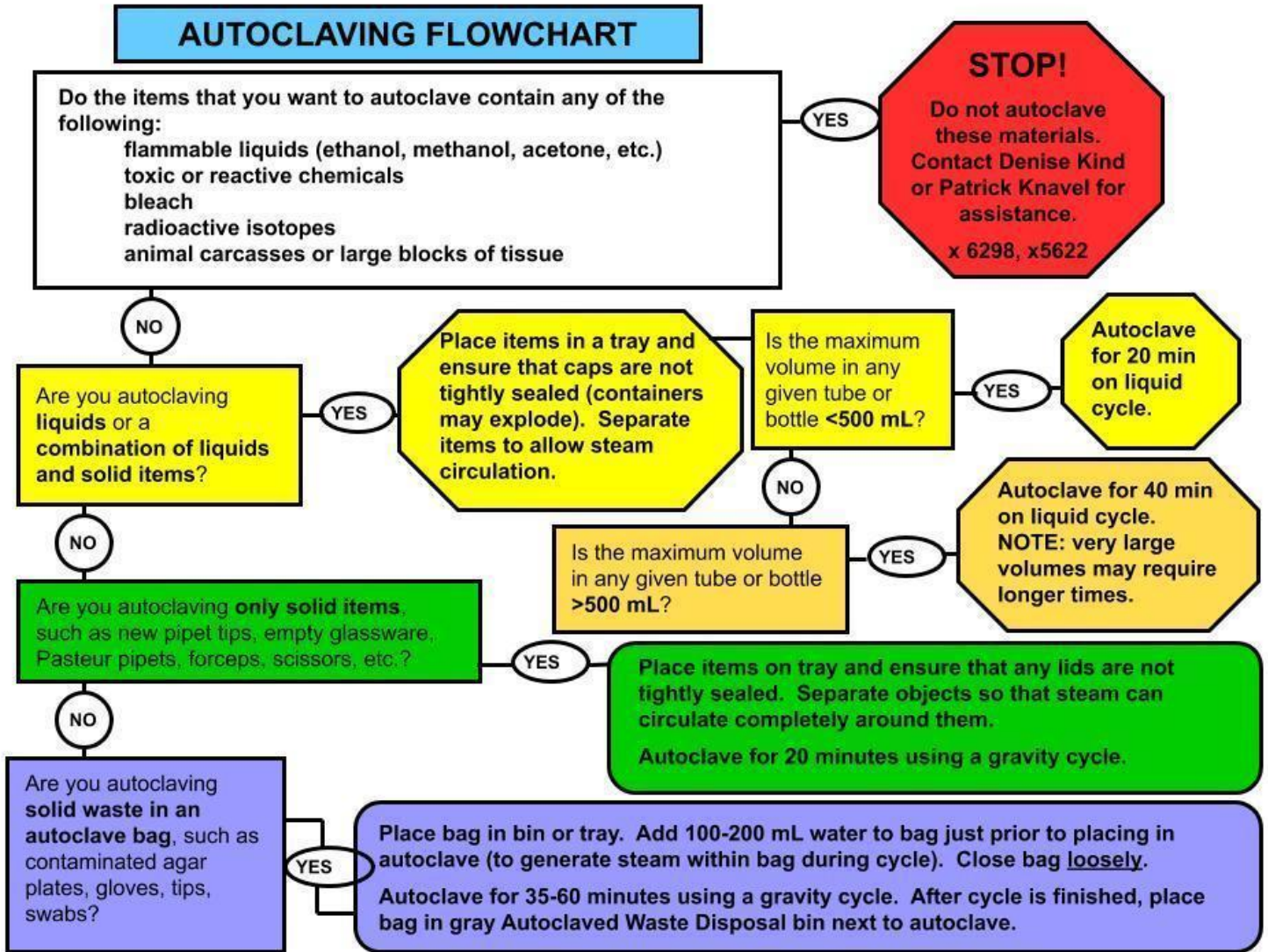
These may be accessed through EHSRM's [Basic Training](#) page.

- Driver Training
- Bloodborne Pathogen
- Laboratory Sharps Safety
- Understanding Safety Data Sheets
- Formaldehyde
- Methylene Chloride
- Chloroform
- Phenol
- Hydrofluoric Acid
- Biosafety Cabinets
- Radiation Safety
- Working with Hand Tools or Power Tools

Appendix 3: WASTE HANDLING FLOW CHART



Appendix 4: AUTOCLAVE FLOWCHART



Appendix 5: HAZARDOUS MATERIALS PICKUP AND DISPOSAL PROCEDURES

Hazardous materials are defined as those materials that are flammable, corrosive, air or water reactive or toxic (see Definitions of Hazardous Materials below). The EHSRM Hazardous Materials Section is responsible for removing all hazardous materials, used and unused, from UAF facilities. Materials picked up by EHSRM are recycled, made available to others on campus, or disposed of at an EPA-approved facility. The complete disposal procedure is found in UAF Policy 601, Hazardous Materials Management Procedure.

INDIVIDUAL RESPONSIBILITIES

Instructor(s)

- Communicate the materials that will be used or produced to the Laboratory Supervisor and Laboratory Technician far enough in advance of the lab to allow them to identify and obtain appropriate PPE and waste management supplies. If there is insufficient time to obtain necessary waste management supplies and/or necessary PPE, the lab shall not be conducted.
- Read the Safety Data Sheet for each chemical to be used.
- Ensure that TAs are properly trained on all aspects of the procedure, including preparation of materials, use of PPE, student oversight, waste handling and spill and emergency responses. This includes requesting additional training as necessary; additional training may be arranged through the Laboratory Supervisor.
- Encourage TAs to ask questions to make sure that they understand the procedures fully.
- Ensure that students are appropriately trained by the TA.
- Ensure that necessary supplies are available and are utilized properly during the lab. This may be delegated to the TAs so long as they are properly trained to oversee this.
- Ensure that all waste containers are clearly and appropriately labeled as instructed on the following page.

Teaching Assistants (TAs)

- Follow all training and procedures as given.
- Monitor student activity and ensure that students follow all training and procedures, including the use of PPE.
- Ensure that wastes are appropriately collected and contained, including segregation of incompatible wastes.
- Keep waste chemicals and unused chemicals separate.
- Ensure that all containers remain appropriately labeled.
- Notify the Laboratory Technician when waste is ready for pick-up.
- Make sure that appropriate PPE and waste management supplies and containers are available throughout the lab activity, including prep and clean-up. Notify the Laboratory Technician if additional supplies (e.g. waste containers, PPE) will be needed.
- Notify the instructor, Laboratory Technician, and Laboratory Supervisor of any problems.
- Use common sense and ask questions whenever something is unclear or unknown.

Laboratory Supervisor

- Assist the Laboratory Technician in identifying appropriate PPE and waste management supplies.
- Arrange for waste pick-up in a timely fashion after the lab is completed.
- Contact EHSRM with any questions.
- Arrange additional training as needed, or direct the Laboratory Technician to do so.
- Answer questions from TAs and assist if there are questions or problems associated with the lab.

Laboratory Technician

- With the Laboratory Supervisor, identify needed PPE. Order PPE and stock lab.
- With the Laboratory Supervisor, identify needed waste management and spill response supplies. Order any needed supplies and ensure that the lab is appropriately stocked.
- Check in as the lab progresses to ensure that supply levels remain adequate.

Students

- Follow all procedures as instructed, including the use of PPE and management of waste.
- Use common sense and ask questions whenever something is unclear or unknown.
- Clean up work space after the lab following specified procedures.

TO COLLECT HAZARDOUS WASTE IN LAB

- Obtain appropriate containers and secondary containment (if needed).
- Identify an appropriate location for waste collection.
- Clearly label the waste container with
 - full chemical name and any common acronym (if appropriate)
 - concentration (approximate if necessary)
 - hazard(s)
 - UAF color code for the hazard(s)
 - instructor name
 - course number (e.g. BIOL 116X)
 - date on which collection began

TO HAVE HAZARDOUS WASTE REMOVED FROM THE LAB, TAs/INSTRUCTORS MUST

- Notify the Laboratory Technician that the waste is ready for pick up.
- Add the words "FOR DISPOSAL" to the waste container.

PROCEDURES FOR PROPERLY COLLECTING, STORING, HANDLING AND TRANSPORTING HAZARDOUS MATERIALS

- Keep all hazardous materials in appropriate closed containers with airtight lids.
- Do not store hazardous materials in a fume hood. Hazardous materials may be collected in containers housed in the fume hood during lab, but should not be stored there long-term.
- Do not mix incompatible chemicals (e.g. oxidizers with flammables).
- Do not mix hazardous materials with non-hazardous materials. It greatly increases waste cost. If students are producing both hazardous and non-hazardous waste during a lab, keep them separate.
- Accurately label all containers as specified in the above section. Unlabeled containers are not permitted; it is exceedingly expensive to dispose of such materials.
- Broken glass and other sharps that are contaminated (e.g. with blood or microorganisms) should be collected in a biohazard sharps container.
- Broken, uncontaminated glass should be collected in a broken glass container. In Biology and Wildlife labs, these are labeled cardboard bins lined with a heavy-duty plastic liner.

PACKAGING REQUIREMENTS FOR ALL HAZARDOUS MATERIALS

- The outside of the containers must be clean and free of chemical contamination.
- Use appropriate containers.
- All containers of liquids must have leak-proof lids that remain leak-proof when the container is inverted. Corks, stoppers, cotton plugs, tape or parafilm are unacceptable lids for containers of hazardous materials.

- All containers of liquids must be placed in compatible secondary containment that would be sufficient to hold the volume of liquid in the event that the primary container ruptured.
- When possible, use the original container for disposal of the used material. Be sure that the container is clearly labeled as waste so that it is not mixed up with unused material and re-used.
- Metal cans are only acceptable for accumulating waste oil; they may not be used for any other type of hazardous waste.
- Loose solid materials must be placed in a sealed container or in a cardboard box that is lined with two polyethylene bags.
- Containers storing hazardous materials must be kept closed except when adding or removing contents.

DEFINITIONS OF HAZARDOUS MATERIALS

Hazardous materials are those that “could cause injury or death; or damage or pollute land, air, or water.” Hazardous wastes are defined as substances that are ignitable (flammable), corrosive, toxic, explosive, or reactive, (react with air, water, acids or bases). Specific definitions are found in [40 CFR part 261](#). These are summarized below.

Ignitable: This category contains materials that are easily combustible or flammable. This includes liquids that have a flash point less than 60°C (140°F), and non-liquids that are capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical change and when ignited burn so vigorously and persistently that they create a hazard, and any ignitable compressed gas described in [40 CFR 261.21](#). Examples are solvents and spent solvents (acetone, benzene, ethyl acetate, ethyl ether, methanol, methyl isobutyl ketone, xylene); ignitable paint waste (some paint removers, brush cleaners, and stripping agents); epoxy resins and adhesives (epoxies, rubber cements and marine glues); inks containing flammable solvents, and some degreasers. For additional information see [40 CFR 261.21](#).

Corrosive: This category includes acids and bases or mixtures having a pH less than or equal to 2 or greater than or equal to 12.5, and materials that burn the skin or dissolve metals. Examples are strong mineral acids (chromic, sulfuric, hydrochloric, or nitric), strong alkalis (potassium hydroxide), rust removers, and acid or alkaline cleaning fluids. This category also includes solids that when mixed with water form solutions that are strongly acidic or basic (ferric chloride, sodium hydroxide). For additional information see [40 CFR 261.22](#).

Reactive: This category includes materials that are unstable or undergo rapid or violent chemical reaction when exposed to air, water or other material, generate toxic gases or vapors when mixed with water or when exposed to pH conditions between 2 and 12.5 (as in the case with cyanide or sulfide containing materials), forms potentially explosive mixtures with water, or are capable of detonation or explosive reaction when heated or subjected to shock. Examples include acetyl chloride, chromic acid, cyanides, hypochlorites, organic peroxides, perchlorates, permanganates, sulfides, some plating materials and bleaches. For additional information see [40 CFR 261.23](#).

Toxic: This category includes heavy metal compounds such as arsenic, barium, cadmium, chromium, lead, mercury, silver, selenium, etc. Pesticides such as Aldrin, arsenic pentoxide, arsenic trioxide, cacodylic acid, chlordane, copper cyanides, DDT, Dieldrin, dimethylcarbamoyl chloride, Endrin, Lindane, pentachlorophenol, strychnine, etc. are in this category. For additional information see [40 CFR 261.24](#).

Pathogenic, infectious and etiologic agents: This includes any material that can directly cause an infectious disease in humans or animals, including viable microorganisms, toxins and viruses. Infectious waste includes wastes that may contain bloodborne pathogens such as the hepatitis B virus or human immunodeficiency virus (HIV). For more information on infectious agents, contact the EHSRM Biosafety Officer.

Sharps: Sharps are defined as any non-contaminated sharp object that can penetrate the skin, including but not limited to broken capillary tubes and pipettes, blades from power tools, glass microscope slides and coverslips, and hypodermic and non-hypodermic needles.


There may be other hazardous substances that are not described here. It is your responsibility to determine if the materials you use are hazardous to human health or the environment. If you have any doubt, contact the Laboratory Supervisor for assistance in making a determination.

You can find information about your material by looking at the Safety Data Sheet available from the manufacturer. In Biology and Wildlife labs, a copy of this document is available in the SDS binder in the front of the lab or prep room. These are updated annually to maintain current information. Safety Data Sheets for infectious agents are available from Health Canada at <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/index-eng.php>. In labs that use pathogens, a copy of the document for each pathogen used can be found in the designated binder in the prep room. These are also updated annually to ensure that current information is available. You should have Safety Data Sheets accessible for all substances utilized in the lab. If you ever note that you are missing an SDS, please contact the Laboratory Technician with information about which SDS is missing so that one can be provided.

Appendix 6: GLOBALLY HARMONIZED SYSTEM (GHS) LABELING

As of June 1, 2015, the Hazard Communication Standard (HCS) will require pictograms on labels to alert users of the chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification.

HCS Pictograms and Hazards

| | | |
|--|--|--|
| <p>Health Hazard</p>  <ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity | <p>Flame</p>  <ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides | <p>Exclamation Mark</p>  <ul style="list-style-type: none"> • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory) |
| <p>Gas Cylinder</p>  <ul style="list-style-type: none"> • Gases Under Pressure | <p>Corrosion</p>  <ul style="list-style-type: none"> • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals | <p>Exploding Bomb</p>  <ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides |
| <p>Flame Over Circle</p>  <ul style="list-style-type: none"> • Oxidizers | <p>Environment (Non-Mandatory)</p>  <ul style="list-style-type: none"> • Aquatic Toxicity | <p>Skull and Crossbones</p>  <ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic) |

For more information:



U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

OSHA 3491-02 2012

Taken from [OSHA](http://www.osha.gov)

Appendix 7: NFPA LABELING AND STORAGE CODE COLOR INTERPRETATION

The NFPA diamond (example shown in Fig. 5) is used to indicate the health, flammability, instability and other hazards of a chemical.

- blue (left) section = health hazard rating
- red (top) section = flammability rating
- yellow (right) section = reactivity rating
- white (bottom) section = other hazards



Figure 5. Example NFPA diamond

The example shown in Figure 5 is a serious health hazard (toxic), a moderate flammability hazard, a slight reactivity hazard, and should not be allowed to contact water. Figure 6 provides further information about what the different ratings mean. If you have any questions about the hazards posed by a particular chemical, contact the Laboratory Supervisor before handling the chemical.

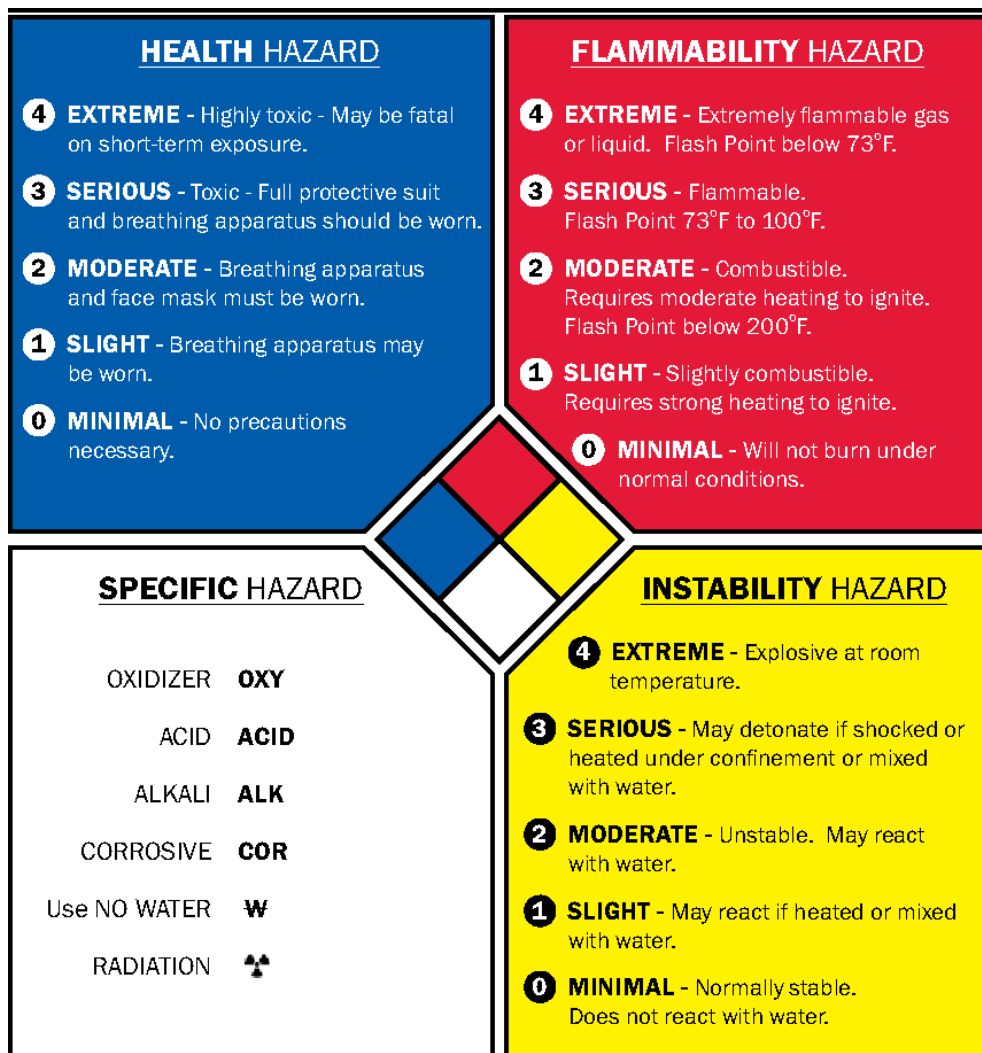



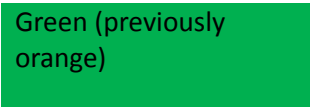



Figure 6. Interpretation of NFPA ratings. Taken from <http://www.enggcyclopedia.com/2012/02/nfpa-diamond-label/>

Table 1. UAF (J.T. Baker) Color Codes and Their Interpretation.

| Color Code | Hazard | Storage |
|---|--|--|
|  | health hazard | store in a secure poison area |
|  | flammable | store in flammable storage |
|  | reactive | store secured and isolated from flammables and combustibles |
| White | corrosive | store in secure corrosives cabinet |
|  | no serious hazard | general storage |
|  Diagonal Stripes | incompatible with other materials in same hazard category (e.g. white with stripes indicates a corrosive chemical that cannot be stored with unstriped white corrosives) | store in appropriate storage based on hazard, but isolated from other items in same category |

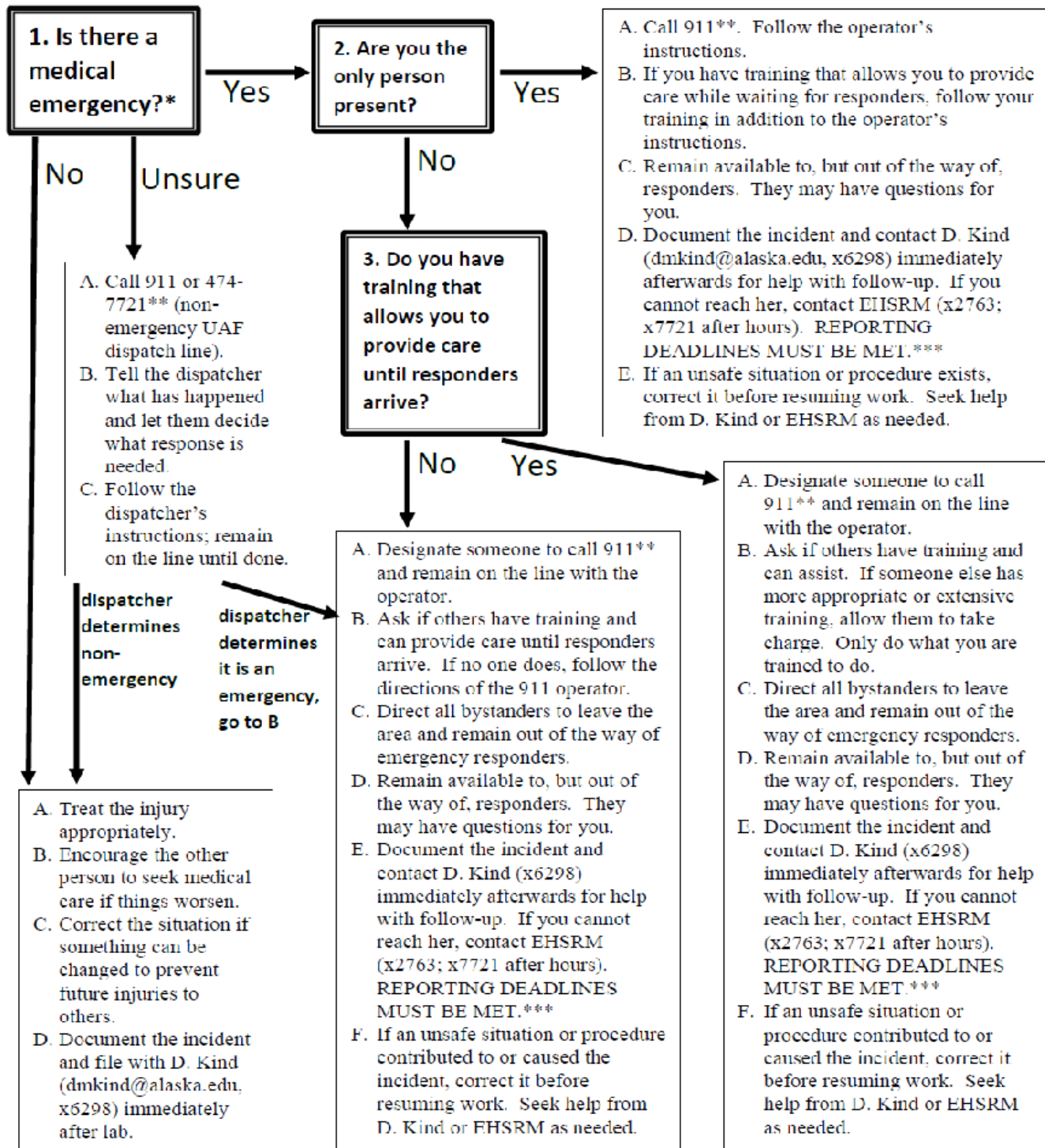
Before using any chemical, review the SDS, NFPA ratings, and color code. Be sure you know how to handle the chemical and all waste products appropriately before beginning work. Be sure you have appropriate PPE, spill management, and waste management materials. Certain chemicals are highly hazardous and require an SOP. If a chemical requires an SOP, the SOP must be written and followed.

Biology and Wildlife policy is to store all chemicals locked up when not in use. Color coding is indicated by colored lab tape that has been added to the bottle or by integrated color coding that is printed on the label. Any chemicals that are identified as blue, red, yellow or white require special handling and may require specialized PPE. Chemicals that are blue, yellow or white MUST be stored locked up when not in use, and the use of these chemicals by students must be particularly closely supervised. Red labeled chemicals should be stored in locked flammable cabinets, with the exception of small quantities of ethanol that are used on a regular basis in the lab.

If you have any questions about chemical storage or color coding, contact the Laboratory Supervisor. If you find a container that does not have a color code, notify the Laboratory Technician so that the color code can be identified and the bottle labeled.

Appendix 8: PROCEDURES FOR PERSONAL INJURY AND MEDICAL EMERGENCIES

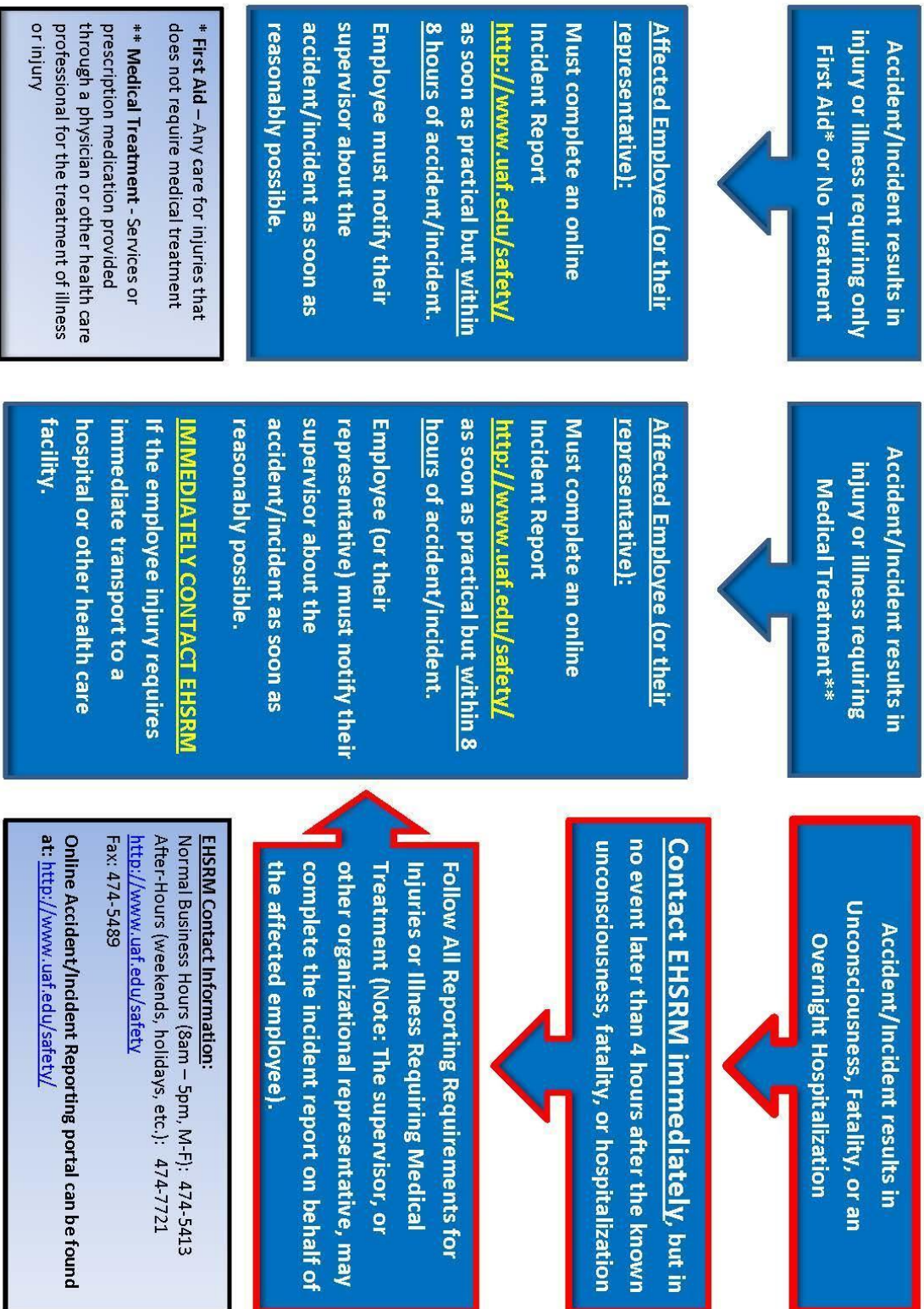
8A: Student Emergencies



* Any loss of consciousness or severe disorientation shall be considered a medical emergency. Any incident requiring use of the eyewash and/or shower shall be considered a medical emergency. ** Call from the location on a cell phone if safe and possible. An emergency landline phone is available in the south (front) entry of the building between the outer and inner entry doors. *** Report incidents at <http://www.uaf.edu/safety/occupational-safety/accident-reporting/>.

last updated 17 August 2017

EMPLOYEE ACCIDENT/INCIDENT REPORTING FLOW CHART



* First Aid – Any care for injuries that does not require medical treatment

** Medical Treatment - Services or prescription medication provided through a physician or other health care professional for the treatment of illness or injury

Appendix 9: LABORATORY EMERGENCY PROCEDURES DURING POWER OUTAGES

It is important to remember that some equipment cannot be turned off and certain other pieces of equipment do not shut themselves off when there is a power outage. Plan specific procedures for your laboratory while adhering to the following:

- Fully close chemical fume hood sashes. No work is allowed in fume hoods during a power outage.
- Ensure that all chemical containers are secured with caps, parafilm, etc. and returned to their proper storage location.
- All non-essential electrical devices should be turned off, especially computers, printers, and other devices with sensitive circuitry (including autoclaves and laminar flow hoods).
- Keep the doors of refrigerators and freezers closed.
- Ensure that no flammable chemicals are stored in domestic refrigerators and freezers. When power returns to these appliances, a reaction may be ignited by the refrigerator light or other electrical source.
- Check to ensure that lasers, radio frequency generators, etc. have been turned off. These are generally not used in Biology and Wildlife laboratories.
- Turn off all gas cylinders at the tank valves. However, if a low flow of an inert gas is being used to blanket a reactive compound or mixture, it may be appropriate to leave the flow of gas on. These are not generally used in Biology and Wildlife teaching labs; if used, the procedure to be followed during a power outage should be part of the written Standard Operating Procedure for using the compound or mixture.
- Check all cryogenic vacuum traps (N_2 , CO_2 and solvent). The evaporation of trapped materials may cause dangerous conditions. These are not generally used in Biology and Wildlife teaching labs.
- Check all pressure, temperature, air or moisture sensitive materials and equipment. This includes vacuum work, distillations, glove boxes used for airless or moistureless reactions, etc. These are not generally used in Biology and Wildlife labs; you should know if you are using them and have procedures for dealing with power outages as part of your Standard Operating Procedure.

Appendix 10: SELECT CARCINOGENS AND PARTICULARLY HAZARDOUS SUBSTANCES (PHSs)

SELECT CARCINOGENS (Tables 1 and 2)

The following standards apply to substances that are classified as carcinogens or potential carcinogens by the National Toxicity Program (NTP) and listed in OSHA's "13 Carcinogens" ([29 CFR 1910.1003](#)). The applicable OSHA standard for the substance is listed next to the substance name.

Table 2. Select Carcinogens

| Chemical Name | Applicable Policy (See 29 CFR 1910.1003) |
|--|---|
| 2-Acetylaminofluorene | 29 CFR 1910.1014 |
| Acrylonitrile | 29 CFR 1910.1045 |
| 4-Aminobiphenyl | 29 CFR 1910.1011 |
| Inorganic Arsenic | 29 CFR 1910.1018 |
| Asbestos | 29 CFR 1910.1001 |
| Benzene | 29 CFR 1910.1028 |
| Benzidine | 29 CFR 1910.1010 |
| bis-Chloromethyl ether | 29 CFR 1910.1008 |
| 1,3-Butadiene | 29 CFR 1910.1051 |
| Cadmium | 29 CFR 1910.1027 |
| Chromium (IV) | 29 CFR 1910.1026 |
| Coke oven emissions | 29 CFR 1910.1029 |
| 1,2-Dibromo-3-chloropropane | 29 CFR 1910.1044 |
| 3,3'-Dichlorobenzidine (and its salts) | 29 CFR 1910.1007 |
| 4-Dimethylaminoazobenzene | 29 CFR 1910.1015 |
| Ethylene oxide | 29 CFR 1910.1047 |
| Ethyleneimine | 29 CFR 1910.1012 |
| Formaldehyde | 29 CFR 1910.1048 |
| Methyl chloromethyl ether | 29 CFR 1910.1006 |
| Methylene chloride | 29 CFR 1910.1052 |
| Methylenedianiline | 29 CFR 1910.1050 |
| alpha-Naphthylamine | 29 CFR 1910.1004 |
| beta-Naphthylamine | 29 CFR 1910.1009 |
| N-Nitrosodimethylamine | 29 CFR 1910.1016 |
| beta-Propiolactone | 29 CFR 1910.1013 |
| Vinyl chloride | 29 CFR 1910.1017 |

Table 3. Partial list of known or potential carcinogens. This list is NOT complete.

| Chemical Name | CAS Number | Category* |
|---|------------|-------------------------|
| 2-Acetylaminofluorene | 53-96-3 | NTPRAHC OSHA 13 |
| Acrylonitrile | 107-13-1 | IARC 2B; NTPRAHC |
| Actinomycin D | 50-76-0 | IARC 3 |
| Adriamycin | 23214-928 | IARC 2A; NTPRAHC |
| Aflatoxins | 1402-68-2 | IARC 1; NTPKHC |
| 2-Aminoanthraquinone | 117-79-3 | IARC 3; NTPRAHC |
| o-Aminoazotoluene | 97-56-3 | IARC 2B |
| 4-Aminobiphenyl (4-aminodiphenyl) | 92-67-1 | IARC 1; NTPKHC, OSHA 13 |
| 2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole | 712-68-5 | IARC 2B |
| Amitrole | 61-82-5 | IARC 2B; NTPRAHC |
| Ortho-Anisidine | 90-04-0 | IARC 2B; NTPRAHC |
| O-Anisidine hydrochloride | 134-29-2 | NTPRAHC |
| Aramite ® | 140-57-8 | IARC 2B; NTPRAHC |
| Arsenic | 7440-38-2 | IARC 1; NTPKHC |
| Arsenic compounds | 7440-38-2 | NTPKHC |
| Arsenic pentoxide | 1303-28-2 | IARC 1 |
| Arsenic trioxide | 1327-53-3 | IARC 1; NTPKHC |
| Arsenic, inorganic compounds | 7440-38-2 | IARC 1; NTPKHC |
| Asbestos (all forms) | | IARC 1; NTPKHC |
| Auramine | 492-80-8 | IARC 2B |
| Azaserine | 115-02-6 | IARC 2B |
| Azathioprine | 446-86-6 | IARC 2; NTPKHC |
| Benzene | 71-43-2 | IARC 1; NTPKHC |
| Benzidine | 92-87-5 | IARC 1; NTPKHC, OSHA 13 |
| Benzo(a)pyrene | 50-32-8 | IARC 1 |
| Benzo(b)fluoranthene | 205-99-2 | IARC 2B |
| Benzotrichloride | 98-07-7 | NTPRAHC |
| Benzyl violet | 1694-09-3 | IARC 2B |
| Beryllium and compounds | 7440-41-7 | IARC 1; NTPKHC |
| Bis-(chloromethyl)-ether | 542-88-1 | IARC 1; NTPKHC, OSHA 13 |
| Bis-chloroethyl nitrosourea | 154-93-8 | IARC 2A; NTPRAHC |
| 1,4-Butanediol dimethane-sulphonate | 55-98-1 | IARC 1; NTPKHC |
| beta-Butyrolactone | 3068-88-0 | IARC 2B |
| Cadmium and compounds | 7440-43-9 | IARC 1; NTPKHC |
| Carbon tetrachloride | 56-23-5 | IARC 2B; NTPRAHC |
| Chlorambucil | 305-03-3 | IARC 1; NTPKHC |
| Chloramphenicol | 56-75-7 | IARC 2A |
| Alpha-Chlorinated toluenes | | IARC 2A |
| 1-(2-Chloroethyl)-3-cyclo-hexyl-1-nitrosourea | 13010-47-4 | IARC 2A; NTPRAHC |
| 4-Chloro-o-phenylenediamine | 95-83-0 | IARC 2B; NTPRAHC |

| Chromium hexavalent compounds | 1333-82-0 | IARC 1; NTPKHC |
|--|-------------------|---------------------------|
| Chemical Name | CAS Number | Category* |
| Cisplatin | 15663-27-1 | IARC 2A |
| Citrus red no. 2 | 6358-53-8 | IARC 2B |
| Creosote(s) | 8001-58-9 | IARC 2A |
| para-Cresidine | 120-71-8 | IARC 2B; NTPRAHC |
| Cupferron | 135-20-6 | NTPRAHC |
| Cycasin | 14901-08-7 | IARC 2B |
| Cyclophosphamide | 50-18-0 | IARC 1; NTPKHC |
| Dacarbazine | 4342-03-4 | IARC 2B; NTPRAHC |
| Daunomycin | 20830-81-3 | IARC 2B |
| DDT | 50-29-3 | IARC 2B; NTPRAHC |
| N,N'-Diacetylbenzidine | 613-35-4 | IARC 2B |
| 2,4-Diaminoanisole sulfate | 39156-41-7 | IARC 2B; NTPRAHC |
| 4,4'-Diaminodiphenyl ether | 101-80-4 | IARC 2B |
| 2,4-Diaminotoluene | 95-80-7 | IARC 2B; NTPRAHC |
| Dibenz(a,h)acridine | 226-36-8 | IARC 2B; NTPRAHC |
| Dibenz[a,j]acridine | 224-42-0 | IARC 2A; NTPRAHC |
| Dibenz[a,h]anthracene | 53-70-3 | IARC 2A; NTPRAHC |
| Dibenzo(a,e)pyrene | 192-65-4 | IARC 3 |
| Dibenzo[a,h]pyrene | 189-64-0 | IARC 2B; NTPRAHC |
| Dibenzo[a,i]pyrene | 189-55-9 | IARC 2B; NTPRAHC |
| Dibenzo[g,i]pyrene | 189-55-9 | IARC 2B; NTPRAHC |
| 1,2-Dibromo-3-chloropropane (DBCP) | 96-12-8 | IARC 2B; NTPRAHC |
| 3,3'-Dichlorobenzidine | 91-94-1 | IARC 2B; NTPRAHC, OSHA 13 |
| 3,3'-Dichloro-4,4'-diaminodiphenyl ether | 28434-86-8 | IARC 2B |
| Diethyl sulfate | 64-67-5 | IARC 2A; NTPRAHC |
| Diethylstilbestrol | 56-53-1 | IARC 1; NTPKHC |
| Dihydrosafrole | 94-58-6 | IARC 2B |
| 3,3'-Dimethoxybenzidine | 119-90-4 | IARC 2B; NTPRAHC |
| trans-2((Dimethylamino)methylimino)5-(2-(5-nitro-2-furyl)vinyl)-1,3,4-oxadiazole | 25962-77-0 | IARC 2B |
| 1,1-Dimethylhydrazine (UDMH) | 57-14-7 | IARC 2B; NTPRAHC |
| Dimethyl sulfate | 77-78-1 | IARC 2A; NTPRAHC |
| Para-Dimethylaminoazobenzene | 60-11-7 | IARC 2B; NTPRAHC, OSHA 13 |
| Dimethylcarbonyl chloride | 79-44-7 | IARC 2A; NTPRAHC |
| 1,4-Dioxane | 123-91-1 | IARC 2B; NTPRAHC |
| Estrone | 53-16-7 | IARC 1; NTPKHC |
| Ethyl methanesulfonate (EMS) | 62-50-0 | IARC 2B |
| Ethylene dibromide (EDB) | 106-93-4 | IARC 2A; NTPRAHC |
| Ethylenethiourea | 96-45-7 | IARC 3; NTPRAHC |
| Ethyleneimine | 15-15-64 | OSHA 13 |
| Formaldehyde | 50-00-0 | IARC 1; NTPKHC |

| | | |
|---|-------------------|-------------------------|
| 2-(2-Formylhydrazino)-4-(5-nitro-2-furyl)thiazole | 3570-75-0 | IARC 2B |
| Chemical Name | CAS Number | Category* |
| Glycidylaldehyde | 765-34-4 | IARC 2B |
| Hexachlorobenzene | 118-74-1 | IARC 2B; NTPRAHC |
| Hexamethylphosphoramide | 680-31-9 | IARC 2B; NTPRAHC |
| Hydrazine, sulfate (1:1) | 10034-93-2 | NTPRAHC |
| Lasiocarpine | 303-34-4 | IARC 2B |
| Lead acetate | 301-04-2 | NTPRAHC |
| Lead chromate (VI) oxide | 18454-12-1 | IARC 2B; NTPKHC |
| Lindane, and mixed isomers | 58-89-9 | NTPRAHC |
| Melphalan | 148-82-3 | IARC 1; NTPKHC |
| Merphalan | 531-76-0 | IARC 2B |
| Mestranol | 72-33-3 | IARC 2B; NTPKHC |
| Methyl chloromethyl ether | 107-30-2 | OSHA 13 |
| 4,4'-Methylene bis-(2-chloroaniline) | 101-14-4 | IARC 1; NTPRAHC |
| 4,4'-Methylene bis(N,N-dimethyl)benzeneamine | 101-61-1 | NTPRAHC |
| 4,4'-Methylene bis (2-methylaniline) | 838-88-0 | IARC 2B |
| Methylenedianiline | 101-77-9 | IARC 2B; NTPRAHC |
| Methylenedianiline dihydro-chloride | 13552-44-8 | NTPRAHC |
| Methyl iodide | 74-88-4 | IARC E |
| Methyl methanesulfonate (MMS) | 66-27-3 | IARC 2A |
| Methylnitroanthraquinone | 129-15-7 | IARC 2B |
| Methylnitronitrosoguanidine | 70-25-7 | IARC 2A |
| Methylazoxymethanol acetate | 592-62-1 | IARC 2B |
| Methylthiouracil | 56-04-2 | IARC 2B |
| Metronidazole | 443-48-1 | IARC 2B; NTPRAHC |
| Michler's ketone | 90-94-8 | IARC 2B; NTPRAHC |
| Mirex | 2385-85-5 | IARC 2B; NTPRAHC |
| Mitomycin C | 50-07-7 | IARC 2B |
| Monocrotaline | 315-22-0 | IARC 2B |
| Mustard gas (Sulfur mustard) | 505-60-2 | IARC 1; NTPKHC |
| 1-Naphthylamine (alpha-naphthylamine) | 134-32-7 | IARC 3; OSHA 13 |
| 2-Naphthylamine (beta-naphthylamine) | 91-59-8 | IARC 1; NTPKHC, OSHA 13 |
| 5-Nitroacenaphthene | 602-87-9 | IARC 2B |
| 4-Nitrobiphenyl | 92-93-3 | IARC 3; OSHA 13 |
| 5-Nitro-ortho-anisidine | 99-59-2 | IARC 3; NTPRAHC |
| N-Nitrosodimethylamine | 62-75-9 | IARC 2A; OSHA 13 |
| beta-Propiolactone | 57-57-8 | IARC 2B; OSHA 13 |

*Notes on categories:

IARC = International Agency for Research on Cancer

| | |
|----------|---|
| Group 1 | The agent (mixture) is carcinogenic to humans. The exposure circumstances entail exposures that are carcinogenic to humans. |
| Group 2A | The agent (mixture) is probably carcinogenic to humans. The exposure circumstance entails exposures that are probably carcinogenic to humans. |
| Group 2B | The agent (mixture) is possibly carcinogenic to humans. The exposure circumstance entails exposures that are possibly carcinogenic to humans. |
| Group 3 | The agent (mixture or exposure circumstance) is unclassifiable as to carcinogenicity in humans. |
| Group 4 | The agent (mixture, exposure circumstance) is probably not carcinogenic to humans. |

NTP = National Toxicology Program

| | |
|------|---|
| RAHC | Reasonably Anticipated to be Human Carcinogen |
| KHC | Known to be Human Carcinogen |

OSHA = Occupational Safety and Health Administration

| | |
|----|----------------------------|
| 13 | OSHA Regulated carcinogens |
|----|----------------------------|

PARTICULARLY HAZARDOUS SUBSTANCES

Particularly Hazardous Substances (PHSs) include select carcinogens, reproductive toxins, substances with a high level of acute toxicity, and chemicals that can be absorbed through the skin.

A full list of Particularly Hazardous Substances is near impossible to maintain. To identify a PHS, use the [GHS Lookup Tool](#). UAF's EHSRM also maintains a complete list of all [hazardous chemicals](#) used at UAF

Appendix 11: INTERNATIONAL BUILDING AND FIRE CODE FOR STORAGE AND HANDLING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

Table 4. Flammable and Combustible Liquid Classes

| CLASS | IA | IB | IC | II | IIIA |
|---|--|---|--|---------------------------|--|
| FLASH POINT | <73°F | <73°F | 73° - 100°F | 100° - 140°F | 140° - 200°F |
| BOILING POINT | <100°F | >100°F | | | |
| FLAMMABILITY POTENTIAL | Extremely High | Very High | High | Moderate | Moderate |
| EXAMPLES OF COMMONLY USED MATERIALS | acetaldehyde ethyl ether pentane | acetone ethanol butylamine gasoline methanol isopropanol | amyl acetate butanol chlorobenzene turpentine xylene | formaldehyde hydrazine | aniline glycol glycerine kerosene nitrobenzene |
| NFPA 704 HAZARD RATINGS* | 4 | 4 | 3 | 2 | 2 |
| | | | | | |
| Glass | 1 pint** (500 mL) | 1 quart** (1 liters) | 1 gallon (4 liters) | 1 gallon (4 liters) | 1 gallon (4 liters) |
| Metal – other than DOT approved drums or approved plastic | 1 gallon | 2 gallons | 2 gallons | 2 gallons | 2 gallons |
| Safety cans | 2 gallons | 2 gallons | 2 gallons | 2 gallons | 2 gallons |
| DOT metal drums | N/A | 5 gallons | 5 gallons | 60 gallons | |
| Polyethylene (DOT Spec. 34 or as authorized by DOT Exemption) | 1 gallon | 2 gallons | 2 gallons | 2 gallons | 2 gallons |

*National Fire Protection Association. NFPA 704, Standard System for the Identification of Fire Hazards of Materials for Emergency Response, provides planning guidance to fire departments for safe tactical procedures in emergency operations. The Hazard Identification System is not intended to identify the non-emergency health hazards of chemicals.

**Exception: Class IA and Class IB flammable liquids may be stored in glass containers of not more than one-gallon capacity if the required liquid purity (e.g., ACS analytical reagent grade or higher) would be affected by storage in metal containers or if the liquid would cause excessive corrosion of the metal container.

STORAGE REQUIREMENTS

1. Flammable and/or combustible liquids stored in the open in a laboratory work area or inside any building shall be kept to the minimum necessary for the work being done.
2. Maximum quantity permitted in labs and other areas of use is limited to a total of 10 gallons, all classifications combined, outside of a flammable storage cabinet or approved flammable storage room. Please refer to the table above.
3. Quantities stored in flammable storage cabinets shall be limited to 60 gallons of class I, II or III liquids and the total of all liquids shall not exceed 120 gallons. Please refer to the table above for maximum allowable container size for each class. Not more than three cabinets shall be located in the same room.

4. Quantities exceeding the above must be stored in an approved flammable storage room meeting the requirements of the Uniform Building and Fire Codes.
5. Flammable and combustible liquids shall not be stored near exit doorways, stairways, in exit corridors, or in a location that would impede egress from the building.
6. Flammable aerosols and unstable liquids shall be treated as class I-A liquids. Please refer to the table above.
7. Materials which will react with water or other liquids to produce a hazard shall be segregated from flammable and/or combustible liquids.

HANDLING AND DISPENSING

1. Class I liquids shall not be transferred from one vessel to another in any exit passageway.
2. Transfer of flammable liquids from 5 gallon containers (or less) to small containers shall be done in a laboratory fume hood or in an approved flammable liquid storage room. When transferring in a flammable liquid storage room, the provided grounding mechanisms must be properly used to ground both containers and the transfer pump or tubes.

Appendix 12: INSTRUCTIONS FOR COMPLETING CHEMICAL INVENTORIES

[Title 29 of the Code of Federal Regulations 1910.1450](#) (29 CFR 1910.1450), Occupational Exposure to Hazardous Chemicals in Laboratories, covers all workers using hazardous chemicals in laboratories.

As part of this code, up-to-date chemical inventories must be included in the Chemical Hygiene Plan (CHP). A CHP is required for each lab using hazardous chemicals.

EHSRM uses the web-based program Environmental Health & Safety Assistant (On Site Systems, Inc., St. Louis) to maintain chemical inventories on campus.

The program is accessible using any web browser. If you are on a UAF campus or at a UAF facility, all you need is access to the internet.

Connecting from off-campus locations requires the installation of the Global Protect VPN software: <https://www.alaska.edu/oit/servicecatalog/#id=162>.

In Biology and Wildlife, the current chemical inventory for a lab is printed and available at the front of the MSDS/SDS binder in the front of the room.

Updates to the chemical inventory occur as follows:

- Any chemical received is entered into the online and printed inventories by the Laboratory Supervisor or Laboratory Technician, whichever received it.
- Any chemical that is used up is removed from the online inventory by the Laboratory Supervisor or Laboratory Technician. TAs and instructors are responsible for notifying them when a container of chemicals is used up so that the inventory can be kept up to date.
- Whenever a chemical is transferred (e.g. to EHSRM, Chemistry Department, a different lab room, etc.), the chemical entry is edited in the on-line inventory and the printed inventory by the Laboratory Technician or Laboratory Supervisor.
- A complete inspection and inventory of all chemicals is conducted annually following the end of Spring Semester by the Laboratory Supervisor and Laboratory Technician. The Laboratory Supervisor is responsible for updating all items and SDS in the on-line inventory. The Laboratory Technician is responsible for updating all SDS print-outs in the labs and prep rooms once the on-line inventory is updated.
- During the annual inventory, the Laboratory Supervisor and Laboratory Technician shall assess all chemicals to determine whether they have deteriorated or expired and should be disposed of, and shall examine container integrity and secondary containment to ensure that all chemical containers are intact.

E. Personal Protective Equipment

- Yes No N/A Is the appropriate personal protective equipment required for the lab available?
 Safety Glasses Goggles Face Shields Gloves Lab Coats/aprons
- Yes No N/A If the lab is considered a high-hazard fire area, is an appropriate extinguisher available?
- Yes No N/A In high-hazard fire areas, are lab personnel current on fire extinguisher training?

F. Laboratory Equipment

- Yes No N/A Is the eyewash free from any obstructions?
- Yes No N/A Is the eyewash operated weekly?
- Yes No N/A Is the emergency shower free from any obstructions?
- Yes No N/A Is the emergency shower operated weekly?
- Yes No N/A Has the fume hood been tested within the last year?
- Yes No N/A Is storage with the fume hood minimized?
- Yes No N/A Are the biological safety cabinets certified annually?
- Yes No N/A Is non-ionizing radiation equipment such as lasers, microwaves, and ultraviolet light sources properly posted and shielded?
- Yes No N/A Are vacuum systems that are capable of imploding protected with cages or barriers; are smaller vacuum systems taped?
- Yes No N/A Glass dewars are wrapped or shielded?
- Yes No N/A Are proper gloves and safety glasses available for use with liquid nitrogen?
- Yes No N/A Vacuum pump belt guard is in place?
- Yes No N/A Are two-pronged appliances not within a five foot radius or directly located above a sink or flammable materials?

G. Refrigerators

- Yes No N/A Are food and beverages kept out of work areas and out of laboratory refrigerators?
- Yes No N/A Is the proper type of refrigerator used i.e., explosion-proof for flammable liquids?
- Yes No N/A The laboratory refrigerators are properly marked, prohibiting the storage of food or drink?
- Yes No N/A The refrigerator/freezer is free of chemical spills or contamination; all containers are labeled, stoppered, or tightly closed?

H. Compressed Gases

- Yes No N/A Are all cylinders properly secured in an upright position?
- Yes No N/A Are protective caps in place when the cylinder is not in use?
- Yes No N/A Are incompatible cylinders stored separately?
- Yes No N/A Are gauges of oxygen regulators marked with the words, "Use No Oil"?
- Yes No N/A Are the regulators, connections and supply lines in good condition? Are shatter-resistant supply lines utilized (no hard plastic)?
- Yes No N/A Are flash arrestors on flammable gas supplies for atomic absorption instruments, in-house propane gas lines, hydrogen and oxy-acetylene torch lines?

I. Hazardous Materials/Wastes

- Yes No N/A Are all chemical and waste containers properly labeled with the chemical name(s) and hazard of the material(s)?
- Yes No N/A Are the proper containers obtained and used for storing hazardous waste?
- Yes No N/A Are all chemicals color-coded to identify proper storage location?
- Yes No N/A Are all chemicals and wastes stored according to hazard classification and compatibility?
- Yes No N/A Are all containers of potential peroxide-forming chemicals dated upon receipt and utilized or disposed of within one year?
- Yes No N/A Are flammable liquids stored in flammable liquid storage cabinets or in closed metal safety cans whenever possible?
- Yes No N/A Are flammable cabinets free of corrosion, spills, and damage?
- Yes No N/A Are corrosive cabinets free of corrosion, spills, and damage?
- Yes No N/A Is storage of corrosive chemicals above eye level avoided?
- Yes No N/A Are all containers kept tightly closed except when adding or removing waste?
- Yes No N/A Are liquid waste containers kept in secondary containment tubs?
- Yes No N/A Are all "sharps" collected in puncture and leak resistant containers?
- Yes No N/A Is broken glass collected in puncture resistant containers, marked with the words "Broken Glass"?

Additional comments:

OBSERVATIONS OF LABORATORY OPERATIONS

Date: _____ Person(s) making observations: _____ Time: _____

Observed use of PPE

Are employees wearing proper attire (closed-toed shoes, long pants, etc.)?

Date: _____ Person(s) making observations: _____ Time: _____

Observed use of PPE

Are employees wearing proper attire (closed-toed shoes, long pants, etc.)?

** Audit to be carried out every semester by Laboratory Supervisor and Laboratory Technician*

Appendix 14: UAF SAFETY POLICY

UAF Policy 02.09.01

Original Adoption: March 3, 2015

Responsible Chancellor's Cabinet Member: Provost and Associate VCR (Office of Research Integrity)

Responsible Department/Office: Provost and VCR



HEALTH AND SAFETY POLICY

The UAF core safety values are:

- Safety is the responsibility of everyone.
- UAF employees, students, and volunteers give priority to personal safety and the safety of others.
- UAF employees, students, and volunteers are vigilant in identifying, correcting, and reporting health or safety hazards.
- Completing required safety training is essential.
- UAF employees believe that work-related injuries and illnesses are preventable.

POLICY STATEMENT

The University of Alaska Fairbanks (UAF) hereby establishes a comprehensive safety policy in order to protect life and health by creating a safe working and learning environment. This policy specifies responsibilities for safety and environmental health, regulations and procedures and provides basic guidelines for safe practices, activities, programs and training. The policy applies to all UAF employees, students, volunteers, and contractors at all UAF campuses and sites utilized by UAF. Environmental Health and Safety and Risk Management (ESHRM) staff have full institutional support and authority to develop and execute comprehensive health and safety programs for UAF.

BACKGROUND & JUSTIFICATION

The U.S. Occupational Safety and Health Administration (OSHA) encourages all employers to adopt an Injury and Illness Prevention Program (<https://www.osha.gov/as/opa/worker/employer-responsibility.html>). Most successful Injury and Illness Prevention Programs are based on a common set of key elements. These include: management leadership, worker participation, hazard identification, hazard prevention and control, education and training, and program evaluation and improvement. UAF's Health and Safety Policy establishes management and worker responsibilities and training requirements and is a component of UAF's Injury and Illness Prevention Program.

DEFINITIONS

Basic Safety Training Requirements are the group of required trainings established by EHSRM and posted as such at the EHSRM website (<http://www.uaf.edu/safety/training/>).

Contractor is an individual or business that conducts work in as specified in a contract with UAF, or in a contract with the UA system, if that work is being conducted at UAF owned or leased facilities or property.

Employee is anyone who is employed by the University of Alaska.

Environmental Health and Safety and Risk Management (EHSRM) is the UAF office that provides technical environmental health, regulatory and related safety, and operational risk management services to the colleges and departments of the University of Alaska Fairbanks (UAF).

Hazard communications programs are a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets.

Job Hazard Analysis (JHA) is the breakdown of a job into its component steps and then the evaluation of each step to identify hazards. Each hazard is then corrected or a method of worker protection is identified. Additional requirements for worker training, certification, authorization, etc., may also be identified.

Student is an individual enrolled in at least one UAF credit or non-credit course.

Visitor is an individual who is in a UAF facility or on UAF property, but is not a university student, employee, contractor or contractor employee, or volunteer.

Volunteer, as defined by Federal law under the federal Fair Labor Standards Act, (FLSA), is an individual that provides services, in this case services to the University, without any expectation of compensation, and without any coercion or intimidation.

RESPONSIBILITIES & PROCEDURES

1. UAF and its organizational units have the following responsibilities in fulfilling the institution's commitment to the health and safety of employees, students, volunteers, and visitors:
 - 1.1 UAF activities shall be conducted in accordance with applicable health and safety laws, regulations, and codes, such as those established by the State of Alaska, National Fire Protection Association (NFPA), American National Standards Institute (ANSI), Occupational Health and Safety Administration (OSHA), Environmental Protection Agency (EPA), US Department of Transportation (DOT), Nuclear Regulatory Commission (NRC), and other similar agencies that govern the design, construction, operation, use and maintenance of UAF

facilities and the conduct of University activities in locations both within and outside of university facilities.

- 1.2 UAF will provide information, training, and safeguards to employees, students, volunteers, and contractors regarding health and safety hazards. In addition, UAF will provide to the surrounding community information regarding environmental health hazards arising from operations and activities at the University as required by applicable regulations.
 - 1.3 UAF will install and maintain facilities and equipment in accordance with recognized and accepted standards essential to reduce or prevent exposure to hazards of employees, students, volunteers, contractors and visitors.
 - 1.4 UAF will provide appropriate personal protective equipment to all employees at University expense when engineering or administrative controls are not adequate to minimize exposure.
 - 1.5 UAF will provide medical services as required by law and as may be dictated by existing circumstances or programs.
 - 1.6 UAF Environmental, Health, Safety and Risk Management (EHSRM) will develop and execute comprehensive health and safety programs for the university. These programs will comply with all federal, state, and borough laws, codes, acts, regulations and standards relating to health and safety.
 - 1.7 EHSRM will work closely with departments, safety committees, employees, students, and volunteers to promote compliance with this policy throughout the University.
 - 1.8 Employees are afforded rights under OSHA's Whistleblower's Protection Program (<http://www.whistleblowers.gov/>). These rights include, but are not limited to, filing an OSHA complaint, participating in an inspection or talking to an inspector, seeking access to employer exposure and injury records, and raising a safety or health complaint. UAF will not tolerate adverse treatment of any employee exercising these rights. If an employee feels they have been retaliated or discriminated against for exercising these rights, they are encouraged to first seek consultation with EHSRM.
2. All University employees, students, and volunteers have the following responsibilities:
 - 2.1 Observing and following health and safety regulations, policies, and procedures
 - 2.2 Comply with applicable local, state, and federal laws and regulations. Including the recent Alaska Statute 28.35.161 *Use of electronic devices while driving; unlawful installation of television, monitor, or similar device*, which covers texting, communicating on a computer, or while a screen device is operating while driving <http://www.uaf.edu/police/alaskas-seatbelt-and-text/>
 - 2.3 Completing mandatory health and safety training
 - 2.4 Promptly reporting to their supervisors or instructors all safety and health hazards or violations and on-site incidents, injuries, and environmental illnesses
 - 2.5 Giving due consideration to personal safety and the safety of others while performing assigned tasks
 3. All UAF employees have the following responsibilities:

- 3.1 Comply with this policy and all other University health and safety programs.
- 3.2 Know that all necessary warnings and precautionary measures are not contained in this document and that additional information and safety measures may be required in particular circumstances.
- 3.3 Complete and comply with:
 - Basic Safety Training Requirements as determined by EHSRM <http://www.uaf.edu/safety/>
 - Department Emergency Action Plan (DEAP) training (department specific; trained by supervisor or designee)
 - Supervisor Safety Training, if the individual is a supervisor
 - Driver Training (for those who drive UAF vehicles, personal vehicles on University business, or leased/rental cars on University business)
 - Title IX Training
 - Substance Abuse Policy
 - Protection of Minors Policy
 - All institution, department or unit, and protocol specific safety training
 - All grant specific required safety training
 - All state and federal required safety training
- 3.4 Inform a supervisor or instructor of any safety or health hazards in the workplace, University campuses, or University locations away from campuses such as research facilities, field sites, and leased spaces. Unsafe conditions, such as excessive noise, dust, odors, etc., presenting acute adverse health effects, should be reported promptly to EHSRM using the UAF Unsafe Condition Report found at <http://www.uaf.edu/safety/>.
- 3.5 Report to EHSRM any accident resulting in an in-patient hospitalization (admitted overnight), unconsciousness or death. The report must be made immediately but in no event later than four hours after receipt of information that the accident has occurred. Failure to report can result in fines to the department. All other work-related accidents/incidents must be reported to EHSRM within the guidelines posted at www.uaf.edu/safety. **To report an accident or incident:**
 - EHSRM Office: 907-474-5413 during normal work hours
 - UAF Emergency Dispatch Center: 907-474-7721 after hours, holidays and weekends
- 3.6 Contact EHSRM immediately when workplace injuries or illness require transport for medical treatment.
- 3.7 Report injuries of students or volunteers who are engaged in work that benefits the University. <http://www.uaf.edu/safety/>
- 3.8 Comply with all vehicle rules and regulations. Report all vehicle accidents immediately. The driver is responsible for completing the appropriate vehicle incident report. <http://www.uaf.edu/safety/>

- 3.9 Comply with rules for the use of flammable materials, microwaves, refrigerators, small appliances, heaters, and other fire hazards in the workplace:
www.uaf.edu/fire/prevention/Fire-Safety-Guidelines-for-UAF-3.doc
- 3.10 Properly manage hazardous material storage in accordance with University, state and federal requirements.

The following individuals or offices have responsibilities in addition to those applying to all employees, as listed in section 3.1 through 3.11:

- 3.11 UAF Chancellor
 - 3.11.1 Establish, oversee, and authorize health and safety programs and a system for assessing safety performance for the University.
- 3.12 Vice Chancellors, Associate Vice Chancellors, Deans, and Directors, in all locations under their control
 - 3.12.1 Reinforce the importance of health and safety and create a culture of health and safety in their unit(s).
 - 3.12.2 Implement the Health and Safety Policy and communicate its requirements for employees, students, and volunteers.
 - 3.12.3 Under the guidance of EHSRM, designate and empower safety coordinators for departments, units, or sections to promote compliance with the Health and Safety Policy and program requirements. They will ensure that individuals under their supervision have sufficient authority and support to properly implement health and safety regulations, policies, and procedures.
 - 3.12.4 Provide oversight of facilities, equipment, and practices to support a safe working and learning environment.
 - 3.12.5 Direct individuals, including, but not limited to, principal investigators, supervisors, regular, part-time and temporary employees, visiting professors, and students, to obtain any required safety training before working with hazardous chemicals, biohazardous agents, radiation or radioactive materials, or physical/mechanical hazards in their working or learning environments.
 - 3.12.6 Conduct a review and investigation of all work related illnesses, incidents, and work related injuries as needed to identify if there are workplace hazards that need to be corrected.
 - 3.12.7 Determine whether safety needs for unit/departments are met (e.g., training, personal protective equipment, and corrective measures including non-mandated items identified in safety audits).
 - 3.12.8 Incorporate workplace safety requirements and responsibilities into the position description and responsibility review. Workplace expectations should be communicated to each employee annually and at the time of hire.
 - 3.12.9 Communicate emergency action plans to all personnel to provide familiarity and coordination between facility personnel and emergency responders.

- 3.12.10 Commit resources for correction of health and safety deficiencies.
- 3.13 Faculty, Principal Investigators, Department Chairs/Heads and Supervisors
- 3.13.1 Provide guidance in the implementation of the University's Health and Safety policy and all other University Safety Programs in work areas under their supervision and control, including classrooms and class laboratories for instructional faculty.
- 3.13.2 Provide an onboarding process to new employees, students, and volunteers prior to hazardous exposure that encompasses the provisions of this section as well as a review of any safety or emergency equipment they may be tasked to use, review of applicable job hazards analysis or procedures, required training deadlines, and a review of any other hazardous processes in which they may be involved.
- 3.13.3 Ensure Hazard Communications programs for each area are prepared and updated, and that all employees are informed of hazards associated with their duties.
- 3.13.4 Direct employees, students, and volunteers under their supervision to complete and comply with:
- Basic Safety Training as required by EHSRM
 - Emergency Action Plan (EAP) training which is completed by the supervisor, PI, or other designated departmental person
 - Supervisor Safety Training, if the individual is a supervisor.
 - Driver Training (for those who drive UAF vehicles, personal vehicles on University business, or leased/rental cars on University business)
 - Substance Abuse Policy familiarization
 - Protection of Minors Policy
 - All institutional department and protocol specific safety training
 - All grant specific required safety training
 - All state and federal required safety training
- 3.13.5 Maintain workplaces and equipment under their control in a safe, well-kept condition.
- 3.13.6 Evaluate workplace hazards within their departments using the Job Hazard Analysis (JHA) process to identify workplace hazards and recommend appropriate engineering or administrative controls, or personal protective equipment to protect against any identified hazards. EHSRM provides training and consultation on developing JHAs.
- 3.13.7 Conduct a review and investigation of all work related illnesses, incidents, and work related injuries as needed to identify if there are workplace hazards that need to be corrected.
- 3.13.8 Ensure that employees, volunteers and students properly manage hazardous material storage in accordance with University, state and federal requirements.
- 3.14 Environmental, Health, Safety, and Risk Management (EHSRM)

- 3.14.1 Advise the University community of its responsibilities regarding the Health and Safety Policy.
 - 3.14.2 Provide guidelines to assist and help the University ensure compliance as it relates to relevant environmental, health, and safety laws, regulations, policies, and guidelines.
 - 3.14.3 Recommend programs and actions for compliance.
 - 3.14.4 Consult with regulators and other external entities on behalf of the University.
 - 3.14.5 Provide guidance and assistance in identifying, evaluating and correcting safety and health hazards.
 - 3.14.6 Conduct investigations and analyses of occupational incidents, injuries and illnesses.
 - 3.14.7 Identify noncompliant situations and recommend improvements to those who are responsible for departments, laboratories, units and work areas.
 - 3.14.8 Provide guidance for proper management of hazardous materials.
 - 3.14.9 Execute responsibilities involving inspections and enforcement delegated by the SCCC or additional University safety committees established by the SCCC or the Chancellor.
 - 3.14.10 In cases of imminent danger to life or health, order cessation of hazardous activity until the danger from such a condition is abated or adequate measures have been taken.
 - 3.14.11 Review contractor safety plans for completeness and provide applicable feedback to project/contract managers.
- 3.15 University Police Department
 - 3.15.1 Police services
 - 3.15.2 Security
- 3.16 University Fire Department
 - 3.16.1 Providing responses to fires and operations level hazardous materials incidents and other life-threatening emergencies on the Fairbanks campus.
 - 3.16.2 Providing emergency medical services.
 - 3.16.3 Complete annual testing of fire hydrants on the Fairbanks Campus.
 - 3.16.4 Manage and implement the AED program
 - 3.16.5 The Fire Chief is the UAF Emergency Management Coordinator. For questions regarding emergency preparedness at UAF contact <http://www.uaf.edu/fire/>
- 3.17 Facilities Services
 - 3.17.1 Maintaining and inspecting fire suppression systems, alarms, and extinguishers in campus buildings.

3.18 SCCC (Safety and Compliance Coordinating Committee)

The SCCC oversees University compliance with the Health and Safety Program and is responsible for making recommendations to the Chancellor that further university efforts to provide a safe and compliant workplace. The SCCC also serves as a forum to establish priorities, communicate, and coordinate safety and compliance related issues associated with current and future programs and projects. The core purpose of the committee is to ensure UAF is a safe, healthy and thriving place to learn, live, work and play.

3.19 Oversight Committees

- 3.19.1 Institutional Animal Use and Care Committee (IACUC) provides oversight for all uses of vertebrate animals at UAF and plays an integral role in ensuring the health and safety of employees, students, and volunteers, and visitors accessing the UAF animal facilities.
- 3.19.2 Biosafety Committee provides oversight and guidance for all campus needs related to research and teaching involving the use of recombinant nucleic acids, artificial gene transfer, infectious agents, and biologically derived toxins.
- 3.19.3 The Institutional Review Board (IRB) reviews all research projects under the auspices of UAF that involve human subjects to ensure compliance with federal regulations and assure protection of human participants in research.

3.20 Contractors

- 3.20.1 Architects, engineers, general contractors and subcontractors under contract with UAF will comply with the UAF Design Standards that include safety requirements: <http://www.uaf.edu/fs/resource-information/design-standards/>.
- 3.20.2 Contractors will comply with all applicable health and safety laws and regulations. Serious or willful non-compliance may be grounds for termination of the contract. While on campus, contractors will comply with this policy.
- 3.20.3 Contractors will provide Safety Plans to EHSRM for review and comment prior to start of work.
- 3.20.4 Contractors will maintain and make readily available a Material Safety Data Sheet or Safety Data Sheet for each hazardous material used on site.

NON-COMPLIANCE

1. University employees are subject to disciplinary action, up to and including termination, if they disregard or fail to comply with established health and safety policies and procedures.
2. Non-compliance with OSHA and other regulatory agency requirements may result in citations and penalties/fines. Departments may be charged for the fine or a portion of the fine based on their participation in the notice of violation.
3. Students who disregard or fail to comply with established health and safety policies and procedures are subject to review under the Student Honor Code, and if circumstances warrant

LABORATORY-SPECIFIC STANDARD OPERATING PROCEDURES

SOPs for procedures carried out in B&W labs will be inserted after this page.

Biology and Wildlife
STANDARD OPERATING PROCEDURE
Autoclaving

Location(s): Murie 215

Chemical(s): None

Specific Hazards:

- o steam – improper use of autoclave can expose user to dangerous steam burns
- o extremely hot materials – materials that have been autoclaved are very hot; liquids can be superheated and boil violently if jostled when removed from the autoclave

Contact Information:

Laboratory Supervisor: Patrick Knavel pdknavel@alaska.edu 474-5622

Laboratory Technician: Rosa Villarreal rvillarreal@alaska.edu 474-

1. Purchasing:

Any autoclave bags, ties, tape, trays will be ordered by the Laboratory Technician. If supplies are running low, it is the responsibility of the users to notify the Laboratory Technician in a timely fashion.

2. Storage:

Autoclave trays and gloves are stored in 215 in the cabinet nearest the autoclave and on the counter so that they are readily visible.

Autoclave tape and bags are stored in 215 in the cabinet and drawers nearest the autoclave.

Paper and ink ribbons for the autoclave are handled by the Laboratory Technician. If the autoclave printer is not working, users shall notify the Laboratory Technician.

3. Authorized personnel:

- All authorized personnel must have completed all required employee and laboratory safety training.
- The Instructor is authorized to train their TAs on the proper use of the autoclave for the materials to be autoclaved. The instructor may delegate training to the B&W Laboratory Supervisor by making arrangements at least two (2) weeks in advance.
- TAs, once trained, are authorized to use the autoclave.
- Students shall not use the autoclave.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP and autoclave manual.

5. Use location:

- Murie 215

6. Personal protective equipment (PPE):

All personnel are required to wear the following personal protective equipment (PPE) whenever conducting this procedure:

Heat-protective autoclave gloves must be worn when taking materials out of the autoclave.

Lab coat

Safety glasses

PPE must be inspected prior to use and replaced if damaged. Notify the Laboratory Technician of any PPE needs.

7. Spill equipment:

In the event of an autoclave malfunction or leak, the user may activate the emergency autoclave shut-off if it is safe to do so. If there is any question of safety in the room, the user shall notify the Laboratory Technician and Laboratory Supervisor immediately. If they cannot be reached, Facilities Services shall be contacted directly at 474-7000 and the malfunction reported. After hours, 474-7000 redirects to University Dispatch. An autoclave malfunction may require that they contact the Facilities on-call person to handle the problem immediately, as a malfunctioning autoclave can pose significant risk to people and the building.

8. Procedure:

Instructors shall provide TAs and students with detailed, written lab procedures to follow. Instructors shall train TAs on each procedure before TAs instruct students in the procedure.

Materials needed:

- autoclave bags & bag ties (for processing waste)
- autoclave-safe glassware (Type I borosilicate glass) or autoclave-safe plastic containers, loosely capped with autoclave-safe caps, aluminum foil, or other suitable tops
- autoclave tape (or heat-sensitive strip on bag)
- autoclave tray
- heat-protective gloves
- nitrile gloves for loading waste into autoclave bags

Procedure Notes:

PPE must be used appropriately throughout the procedures. Only TAs or instructors should run the autoclave.

Procedure Steps:

1. Wear nitrile gloves while handling items contaminated with microbes (e.g. Petri dishes that are to be disposed of). Nitrile gloves are not otherwise needed, as hazardous chemicals should not be autoclaved.
2. Place material to be autoclaved in the autoclave tray. Be sure it is an autoclave tray! Other trays melt and ruin the autoclave. A tray must ALWAYS be used as secondary containment for the items being autoclaved.
 - For autoclave bags, add 100-200 mL water to the bag, then loosely close it. This will help generate steam inside the bag, which will greatly aid in destroying microorganisms.
 - Don't fill bottles or tubes more than 2/3 full to prevent boil-overs and loss of media.
 - Keep lids and caps loosely closed. Tightly sealed containers may explode.
 - Use only Type I borosilicate glass (Pyrex) or autoclavable plastic containers. Do not use old food jars to autoclave materials; they will break under autoclave conditions and create a hazard.
3. Determine the length of time required.
 - The media or object must reach and be held at a temperature of 121°C for a minimum of 15 minutes.
 - Small volumes of liquid or glassware reach this temperature very quickly. A 20 minute cycle allows sufficient time for the temperature of these to reach 121°C and remain there for at least 15 minutes.
 - Large volumes of liquid (>500 mL) will NOT reach 121°C as quickly as smaller volumes. A longer cycle (35+ minutes) is needed to allow extra time for the liquids to reach 121°C. Remember, the entire volume of liquid has to be at 121°C for 15 minutes in order to achieve sterilization.

4. Determine the cycle required. Consult the manual for the autoclave you are using. Remember that when autoclaving liquids, the exhaust rate must be carefully controlled in order to keep the liquids from boiling over. Don't waste your media by bypassing the slow exhaust.
5. Wearing heat-resistant autoclave gloves, place tray in the autoclave. Even though the tray you are loading may be cool, the inside surfaces of autoclave chamber may be hot enough to cause a burn.
6. Close the autoclave door securely.
7. Enter the correct cycle. **Fill out the autoclave log immediately.**
8. Wait 10 minutes after the cycle ends before unloading. The autoclave should tell you when it is safe to be unloaded. Waiting will help keep liquids from violently boiling over when moved.
9. Before unloading the autoclave, don heat-resistant autoclave gloves. Exercise care when removing hot items from the autoclave. Hot liquids can be superheated and can boil over if jostled.
10. Place the tray on a heat-proof surface (such as a heat-proof cart or laboratory bench).
11. Bags of autoclaved waste shall be disposed of in the autoclave waste bin in Murie 215. This bin is labeled and located directly across from the autoclave.
12. Allow materials to cool sufficiently before handling. Media to be poured should be allowed to cool to the specified temperature.
13. Return autoclave trays and gloves to the autoclave room promptly so that they are available to other users. If you need to keep an autoclave tray in your lab to collect materials to be autoclaved, contact the Laboratory Technician to make arrangements.

9. Waste disposal and clean up:

The authorized person(s) using this material is (are) responsible for the safe collection, preparation and proper disposal of waste unless otherwise stated below. Waste shall be disposed of as soon as possible and in accordance with all laboratory and University procedures.

When autoclaving waste for disposal, refer to the Waste Handling Flowchart ([Appendix 3](#) of the Biology and Wildlife CHP) to be sure that autoclaving is the appropriate disposal method for the waste in question. Consult the Laboratory Supervisor if you have questions.

Students and TAs shall dispose of used materials properly.

- Wastes to be autoclaved will be placed appropriately in a biohazard bag (Petri dishes, contaminated plastic pipet tips, etc.) when produced. The biohazard bag should be in a biohazard bucket for secondary containment.
- The biohazard bucket lid must always close completely. When full, the bag should be removed and autoclaved following the above procedure.
- Autoclaved waste must be placed in the autoclave waste bin in 215 after autoclaving. Never place contaminated materials in this bin.

10. Decontamination:

If something breaks, shatters or melts in the autoclave, notify the Laboratory Supervisor and Laboratory Technician immediately. Post a sign on the autoclave warning others not to use it and why. Do NOT brush broken glass or clumps of agar into the drain; this will clog the autoclave and prevent steam from draining properly from the autoclave.

11. Exposures: Emergency procedures to be followed (from SDS):

Exposure to heated material from an autoclave can cause severe burns. Chemicals being autoclaved and broken glassware are additional hazards individuals may be exposed to. The list of exposure precautions listed below is for the heated materials in an autoclave. If chemicals are being autoclaved, the relevant Safety Data Sheets for the chemicals must also be consulted to determine the appropriate response to an exposure.

General advice

Consult a physician. Move out of the dangerous area.

Eye contact

Flush eyes with water. Consult a physician.

Skin contact

Skin contact with autoclaved materials can cause burns. If the skin is intact, cool the burn with cool water. Do NOT scrub or apply any soaps or lotions. If the skin is broken, blistered, blackened, or charred (2nd or 3rd degree burns) or if any burn (1st, 2nd or 3rd degree) covers a large area of the body, immediately consult a physician. Call 911 for emergency medical assistance.

Ingestion of materials

In the event autoclaved solutions are ingested, consult the Safety Data Sheet for relevant exposure information and procedures. Never give anything by mouth to an unconscious person. Immediately consult a physician.

Inhalation

If vapors from autoclaved solutions or steam are breathed in, move the person immediately to fresh air. Call 911; possible burns in the lungs require medical attention. If not breathing, give artificial respiration. Consult Safety Data Sheet for the material that was autoclaved for more information on exposure procedures.

12. Spills:

- If a spill occurs, personal safety should come first.
- Alert everyone in the area where the spill occurred so that they can avoid contact with spilled material.
- Broken glass should be placed in a broken glass container.
- Spilled liquid media should be cleaned up with absorbent material such as paper towels. Disposal should be in accordance with the precautions listed in the Safety Data Sheet for the media in question; note that the majority of media is non-hazardous from a waste standpoint. Caution must be used when cleaning up hot media; it may be preferable to allow it to cool before clean-up.
- Hot agar should NEVER be disposed of in a sink drain; it will solidify and clog the sink. Hot agar-based solutions may be allowed to cool and then cleaned up in their solid state and disposed of appropriately.
- Clean the area where the spill occurred with a standard laboratory cleaner and water.
- Spills inside the autoclave: use absorbent material such as paper towels to absorb the spilled material if it is safe to do so. Place absorbent material as a barrier to spilled materials entering the autoclave drain (paper towels are acceptable).
- If the spill cannot be cleaned up by the user, or if there is any possibility that material may have entered and clogged the autoclave drain, contact the Laboratory Supervisor and Laboratory Technician immediately. Place a sign on the autoclave warning others not to use it and stating the reason. You will NOT get into any trouble for reporting that you had an accident in the autoclave. People will be very irritated if you cause a problem and fail to report it, though. Report any accidents or mishaps so that they can be dealt with promptly. This will keep the autoclave in working order and available for use.

13. Phone numbers:

| | |
|--|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| Biology and Wildlife Laboratory Technician | 474-7205 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

Users must also follow the specified procedures for the materials they are autoclaving.

NEVER autoclave corrosive chemicals (e.g. strong acids or bases), solvents, volatile compounds, chlorinated compounds (e.g. bleach), flammable substances, or highly reactive compounds.

Follow the Waste Handling Flowchart (Appendix 3) and Autoclave Flowchart (Appendix 4) in the Biology and Wildlife CHP.

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Biology and Wildlife
STANDARD OPERATING PROCEDURE
Bunsen Burners

Location(s): Murie 202, 203, 204, 206, 209, 211, 302, 303, 304, 306, 307, 309

Chemical(s): Propane (CAS # 74-98-6) is the fuel source for Bunsen burners used in Murie.

Specific Hazards:

- Propane: Danger. Extremely flammable gas.
- Leaks can cause fires and explosions when exposed to ignition sources.

Contact Information:

Laboratory Supervisor: Patrick Knavel pdknavel@alaska.edu 474-5622

Laboratory Technician: Rosa Villarreal rvillarreal@alaska.edu 474-7205

1. Purchasing:

Contact the Laboratory Supervisor and Laboratory Technician if wear is noted on Bunsen burners, strikers, or hoses.

2. Storage:

Bunsen burners can be stored in the labs unsecured.

3. Authorized personnel:

- TAs and instructors must have completed all required employee and laboratory safety training.
- Instructors are authorized to train their TAs on the use of Bunsen burners.
- Once trained, TAs are authorized to train students on the use of Bunsen burners.
- Students may use Bunsen burners for lab exercises once trained by their TA or instructor.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP
- In-person review of procedures

5. Use location:

- Bunsen burners may be used on laboratory benches and/or in fume hoods.
- Bunsen burners should not be used near flammables.
- The use location must be clean and uncluttered.

6. Personal protective equipment (PPE):

- Long hair must be firmly secured behind the head.
- Long sleeves must be close-fitting, not loose.
- As for all lab work, closed-toe shoes and covered legs are required.
- Clothing must be made of material that is not flammable or subject to melting if exposed to fire. Cotton, wool, and other materials with low flammability are appropriate. Synthetics that burn or melt if exposed to flame are not permitted. The use of an appropriate lab coat is recommended.
- Safety glasses or goggles. Goggles are recommended to prevent heated liquid from being splashed into the eye or pieces of material from being thrown into the eye if something breaks.

- Gloves may be required based on what is being heated, but are not necessary for the use of a Bunsen burner in and of itself. Consult the Safety Data Sheets for any chemicals being used to determine the need for gloves.

7. Spill equipment:

It is not possible to contain a propane spill (leak) in the teaching labs. See section 12 below for dealing with leaks.

8. Procedures:

Materials needed:

- Bunsen burner
- striker (for lighting the burner)
- appropriate latex or other hose (for connecting burner to gas supply)

Procedure notes:

- A Bunsen burner shall never be left unattended while lit.
- The work area must be arranged to avoid injury and accidents. Bunsen burners should always be placed so that the flame will not heat anything nearby. Placement of Bunsen burners should keep them clear of other work going on in the lab so that they cannot be accidentally contacted.

Procedure steps:

1. Don PPE.
2. Check the hose for leaks or cracks. If the hose has any leaks or cracks, replace it before beginning.
3. Inspect the Bunsen burner. It should not have any signs of rust. Adjustments should operate freely. If a burner appears to have something wrong with it, do not use it – label it as not in working order and report the problem to the Laboratory Technician. Use a Bunsen burner that is in working order.
4. Make sure that the hose is firmly connected to the gas inlet on the Bunsen burner and to the gas outlet on the benchtop or wall.
5. Check that the striker is working. The flint should readily produce a spark. If the flint appears worn and is in need of replacement, the TA, instructor or Laboratory Technician should be notified.
6. Turn on the propane at the valve and light the burner with the striker. Be careful not to lean over the burner when lighting it; keep face and hair away from the burner area.
7. Adjust the flame on the burner as necessary.
8. Monitor the Bunsen burner the entire time it is in use.
9. When done, turn off the gas using the valve.

9. Waste disposal and clean-up:

Follow procedures for any wastes generated in your particular lab exercise. There is no waste disposal or clean-up required for Bunsen burners themselves.

10. Decontamination:

None.

11. Exposures:

If you begin to smell propane gas during a lab:

- check that the gas valves are off.
- If there may be a leak, turn off the propane to the room using the emergency shut-off valve in the front of the room. This is behind a clear plexiglass plate. You can slide the plate to the side to remove it, then turn the handle so that it is at a 90° angle to the pipe.

- notify the Laboratory Supervisor and Laboratory Technician immediately. If you cannot contact them, call Facilities Services at 474-7000 to report the problem.

If you notice a propane gas odor when you walk into a room:

- do NOT turn on anything, including the lights.
- if it is safe to do so, turn off the propane to the room using the emergency shut-off valve.
- notify others as appropriate:
 - If the odor is minor and there is no indication of an immediate threat to life and safety, notify those working nearby of the possible hazard. Notify the Laboratory Supervisor and Laboratory Technician immediately. If you cannot contact them, call Facilities Services at 474-7000 for assistance. If you cannot reach anyone at 474-7000, call University Dispatch at 474-7721 to report a possible propane leak. Any potential leak should be taken seriously and reported.
 - If the odor is strong and you have any concerns that an explosion or fire is imminent, evacuate to a safe location and call 911 to request emergency assistance.

Exposure to a lit Bunsen burner can cause burns ranging from minor to life-threatening.

It is critical that the TA and/or instructor teach students the proper and safe use of Bunsen burners. TAs and/or instructors are also responsible for ongoing monitoring of students to ensure that they follow this Standard Operating Procedure and all other laboratory procedures as specified.

Burn response general advice:

- For a small first-degree burn (redness, no blistering or blackening, skin intact), wash the burn with cool water. Do not scrub or apply any soaps or treatments to the skin. Seek medical attention as needed.
- For small second degree burns (blistering, possible open skin due to broken blisters), advise the person to seek medical attention to make sure the burn is cleaned and treated to prevent infection.
- For third degree burns (blackening, charring, broken skin), large first or second degree burns, or burn victims who may be experiencing shock (lightheadedness/dizziness/faintness, loss of coherence/not making sense, loss of consciousness), call 911. A phone is available in each lab's adjoining prep room.
- If you are unsure of the severity of a burn or what needs to be done, call the Laboratory Supervisor at 474-5622 or University Dispatch at 474-7721. Tell them what has happened and allow them to make the decision on whether emergency response is needed.

If an individual's hair or clothing catches fire:

- Instruct the person to lie down and roll to smother the flames. Assist by smothering the fire with the emergency blanket located in the lab. TAs and instructors must make sure they know the location of the blanket at the start of the course. The emergency shower may be used to douse the flames if safe to do so. If the shower is used to douse flames, turn it off once the flames have been extinguished unless there are hazardous chemicals that must be washed off the victim. Be prepared to cover the burn victim with a blanket or lab coat to keep them warm and minimize hypothermia and shock.
- Immediately call or direct someone to call 911 and request an ambulance.
- Instruct students to turn off all equipment, including Bunsen burners and quietly wait in the hall or lounge area, out of the way of emergency responders who will be arriving.
- If you do not have emergency medical training, ask if anyone present has emergency medical training. If others have emergency medical training, they may remain to assist the victim while waiting for professional responders to arrive.

- Do NOT attempt to remove burned clothing from the victim or treat the burn beyond extinguishing it and cooling the burned area if possible and appropriate. Keep the victim still and calm; encourage them to lie down if possible. If the victim is seated in a lab chair that has wheels, ask them to sit or lie on the floor instead because a chair with wheels is not sufficiently stable. If possible, try to keep the victim talking to you; this will help you make sure s/he isn't going into shock and can give the victim something to focus on besides any injuries sustained.
- Do NOT move an unconscious person unless there is an immediate threat to life or safety that requires evacuation of the person from the area (for example, if the lab is on fire, it may be necessary to move the victim. Only attempt to move a victim to safety if doing so does not endanger additional people.).
- As soon as possible after the incident has been resolved, contact the Laboratory Supervisor for help filling out a report. This must be done even if it is after hours. If a TA or Instructor was injured, EHSRM must be contacted immediately, as they have an 8-hour reporting deadline for employee injuries that must be met under Federal regulations.

If there is a fire in the room:

- If the fire is small and contained, if the fire is not fueled by a propane leak, if you have fire extinguisher training and if it is safe for you to attempt to extinguish the fire, instruct students to calmly exit the room. Use your training to put out the fire; be sure to turn off any sources that could feed the fire. A small, contained fire may also be extinguished using the fire blanket.
- The problem that caused the fire must be corrected before students re-enter the room. Any hazards caused by the fire must be properly taken care of before students re-enter the room. After a small fire is extinguished, students may re-enter the lab once it is safe to do so.
- After you extinguish a fire using a fire extinguisher or fire blanket, you must notify the Laboratory Supervisor and Laboratory Technician so that they can replace used materials and conduct necessary follow-up to prevent a recurrence.
- If you do not have fire extinguisher training, if you are unable to immediately extinguish the fire, if the fire is too big to deal with or may be fueled by a propane leak, or if there are chemical or other hazards that make it unsafe for you to attempt to extinguish the fire, evacuate yourself and your students from the building. If it is safe to do so, turn off the propane to the room at the valve in the front of the room as you exit. Slide the Plexiglas cover off and turn the handle to a 90° angle to the pipe to shut off the valve. Instruct your students to meet you at the emergency assembly point; you will have to account for them after exiting the building. Pull the fire alarm as you exit to alert other building occupants.
- TAs or instructors must account for their students at the emergency assembly point. TAs or instructors must report the status of their students to the building coordinator (Jami Warrick), assistant building coordinator (Jeff Baxter), or directly to emergency response crew members who ask for an accounting of who was in the building.

12. Spills

A propane leak can expose those in the area to the gas and the risk of fire or explosion. There is a room shut-off valve in the front wall of each lab and prep room. The valve is located behind a Plexiglas cover that slides to the side to expose the valve. Turning the valve so that it is at a 90° angle to the pipe turns off the flow of propane to the room.

If there is a propane leak and you turn off the valve, notify the Laboratory Supervisor immediately. Notify Facilities Services directly at 474-7000 if you cannot reach the Laboratory Supervisor. If the propane leak may be severe and pose immediate risk of fire or explosion, evacuate to a safe location and call 911.

13. Phone numbers

| | |
|--|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| Biology and Wildlife Laboratory Technician | 474-7205 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information

None

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Biology and Wildlife
STANDARD OPERATING PROCEDURE
Catechol



Location(s): Murie 209, 211

Chemical(s): Catechol (Pyrocatechol), CAS # 120-80-9

Specific Hazards:

- GHS Classification in accordance with 29 CFR 1910 (OSHA HCS):
 - Acute toxicity, oral (category 3), H301
 - Acute toxicity, inhalation (category 4), H33
 - Acute toxicity, dermal (category 3), H311
 - Skin irritation (category 2), H315
 - Serious eye damage (category 1), H318
 - Skin sensitization (category 1), H317
 - Germ cell mutagenicity (category 2), H341
 - Acute aquatic toxicity (category 2), H401
- Danger.
 - Toxic if swallowed or in contact with skin
 - Causes skin irritation
 - May cause an allergic skin reaction
 - Causes serious eye damage
 - Harmful if inhaled
 - Suspected of causing genetic defects
 - Toxic to aquatic life
 - Avoid breathing dust/fume/gas/mist/vapors/spray
 - Wash skin thoroughly after handling; wear appropriate gloves while handling
 - Use in a well-ventilated area. Solid catechol must be handled in a fume hood.
 - Wear appropriate PPE.
 - Do not handle it until all safety precautions have been read and understood.

Contact Information:

Laboratory Supervisor: Patrick Knavel pdknavel@alaska.edu 474-5622

Laboratory Technician: Rosa Villarreal rvillarreal@alaska.edu 474-7205

1. Purchasing:

All chemical orders are placed by the Laboratory Technician once approved by the Laboratory Supervisor.

2. Storage:

JT Baker storage code is white; stored in a locked corrosives cabinet in 211.

3. Authorized personnel:

- All authorized personnel must have completed all required employee and laboratory safety training.
- The Instructor is authorized to train their TAs on the proper preparation, handling, storage and disposal of this material. The instructor may delegate training to the B&W Laboratory Supervisor by making arrangements at least two (2) weeks in advance.
- TAs, once trained, are authorized to prepare solutions and to train and supervise their students.
- Students must be trained in the use of this material in accordance with this SOP before conducting a lab. Students are only permitted to use dilute solutions of this compound; they should not handle concentrated or solid catechol.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP and chemical Safety Data Sheet

5. Use location:

- Murie B&W teaching labs, rooms 209 and 211
- On tables or lab benches isolated from sinks.
- This material shall NOT be used near a sink. In the event of a leak or spill, this material must be contained and may not enter the drain.

6. Personal protective equipment (PPE):

- All personnel are required to wear the following personal protective equipment (PPE) whenever conducting this procedure:
 - Nitrile gloves, thickness of 0.11mm has a breakthrough time of 480 minutes
 - Safety goggles
 - Lab coat, long sleeved
- PPE must be inspected prior to use and replaced if damaged.
- In addition to wearing appropriate PPE, catechol solutions prepared from solid catechol must be prepared in the fume hood to provide adequate respiratory protection.
- PPE must be removed as appropriate to avoid contaminating surfaces and items in the lab or outside of the lab that should not be contaminated. In particular, PPE must be removed before leaving the lab, before handling personal items such as cell phones or laptops, and before moving on to other procedures in the lab. If a subsequent lab procedure also requires gloves, catechol-contaminated gloves must be removed and disposed of appropriately, and fresh gloves must be donned.

7. Spill equipment:

- Inert absorbent material. Paper towels are suitable.
- Waste containers to keep contaminated material separate from trash.

In the event of a spill, follow the directions in section 12, below.

8. Procedure:

Materials needed:

- catechol
- water
- balance and weigh boat
- labeled container, securely sealing
- secondary containment sufficient to hold entire volume of solution to be prepared
- waste collection container, appropriately labeled, securely sealing, in secondary containment

Procedure Notes:

PPE must be used appropriately throughout the procedures. Only TAs or instructors may handle solid or concentrated catechol.

Procedure Steps, Working with Dilute Catechol:

1. Don appropriate PPE. TA or instructor shall prepare working solution(s) for students prior to lab (see **Procedure Steps, Preparing Catechol Solutions** below); students may not handle solid or concentrated catechol.
2. For the lab, TA or instructor will set out solutions for student use.
3. Prior to the lab, students must be trained on the proper use of PPE and proper handling and disposal of catechol solutions.
4. Students must don appropriate PPE before beginning work.
5. Catechol can be measured into test tubes or cuvettes using disposable transfer pipets.
6. Waste solutions containing catechol shall be collected at student workstations and transferred to a waste container that closes securely.
7. Waste solutions that do NOT contain catechol should NOT be mixed with the catechol solutions. Non-hazardous solutions can be disposed of down the drain (e.g. potato extract and water) and should not be added to the volume of hazardous waste that will have to be shipped to a hazardous waste disposal facility.

Procedure Steps, Preparing Catechol Solutions

1. Collect the following materials and place them in a fume hood.
 - scoop
 - RO water, quantity needed
 - balance
 - weigh boats
 - tightly-closing container(s) for prepared solutions
 - secondary containment for container(s) of prepared solutions
 - waste container
 - spill clean-up materials: paper towel and spray bottle of water
 - waste container for solid waste
2. Don PPE.
3. Obtain solid catechol and place in fume hood. Keep the container tightly closed when not in use.
4. Check that fume hood flow is adequate. Each hood has an electronic monitor that indicates air flow. Flow can also be checked by tearing a strip of Kimwipe or tissue and holding it so that it dangles from the edge of the open sash. The strip of Kimwipe or tissue should be pulled toward the inside of the hood. If there is any indication that the hood is not functioning properly, DO NOT PROCEED. Report the problem to the Lab Supervisor immediately and work in a different hood that is functioning properly.
5. Work at least 8" in from the face of the hood. The fume hood should otherwise be empty to allow for adequate air flow while working. The balance cord should be fed through the slot at the base of the hood so that it does not impede the sash closure.
6. Measure appropriate amounts of RO water into tightly-closing containers.
7. Weigh out the needed amount of catechol into the weigh boat.
8. Add catechol to tightly-closing container. Cap securely and swirl gently to dissolve catechol.
9. Store prepared solutions in secondary containment in a secure location. Short-term storage in a locked lab or prep room is acceptable.

10. Dispose of used weigh boats and gloves as solid waste.
11. Clean up and put materials away. Clean glassware and scoop by washing with warm, soapy water and rinsing three times with RO water. Allow to air dry before putting it away.

9. Waste disposal and clean up:

- Catechol containing solutions must be collected and disposed of as hazardous waste.
- Waste containers must be clearly labeled with "Catechol Waste," the approximate concentration of catechol in the waste, the class, the instructor's name, and the date waste collection began.
- When the waste is ready for disposal, label the container "for disposal" and contact the Laboratory Supervisor.

10. Decontamination:

- No decontamination is necessary following the use of dilute catechol solutions. Normal cleaning procedures for glassware and lab surfaces should be followed after solutions have been collected as waste.

11. Exposures: Emergency procedures to be followed (from SDS):

The most important known symptoms and effects are as stated in the "Specific Hazards" statement at the beginning of this document.

General advice

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

Eye contact with catechol solutions

Rinse thoroughly with plenty of water for at least 15 minutes. Use the eyewash station in the lab. Consult a physician.

Skin contact with catechol, solid or concentrated solutions

Wash off immediately with soap and plenty of water. Take the victim immediately to hospital. Consult a physician.

Skin contact with catechol, dilute solutions

Wash off immediately with soap and plenty of water. Consult a physician.

Ingestion of catechol solutions

Never give anything by mouth to an unconscious person. Rinse mouth with water. Immediately consult a physician.

Inhalation

If breathed in, move the person into fresh air. Immediately consult a physician. If not breathing, give artificial respiration and call 911.

12. Spills:

- If a spill occurs, personal safety should come first.
- Alert everyone in the area where the spill occurred so that they can avoid contact with spilled material.
- Soak up the spilled liquid with paper towels. Place them in a separate waste container for solid wastes rather than in the container with liquid waste.
- Clean the area where the spill occurred with a standard laboratory cleaner and water.
- TA or instructor who spills solid catechol: use forceps or paper towel to pick up the spilled pieces if they are large enough to do so. Place in a waste container for solids. Once as much of the solid catechol is cleaned up as possible, place a paper towel over the area of the spill and gently spray with water. The solubility of catechol is high; this will cause any remaining catechol solids to dissolve and be soaked up by

the paper towel. Allow to stand wet for 15 minutes, then wipe up the area with an additional paper towel and place paper towels in the waste container for solids.

13. Phone numbers:

| | |
|--|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| Biology and Wildlife Laboratory Technician | 474-7205 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

This material must not enter the standard solid or liquid waste streams (i.e. regular trash or sink drains). All contaminated materials must be collected and disposed of as hazardous waste.

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Biology and Wildlife
STANDARD OPERATING PROCEDURE

Cryocooler Circulating Ultra-Low Temperature Bath with 95% Ethanol Coolant

Location(s): Murie 203

Chemical(s): 95% ethanol

Specific Hazards:

Cold hazard: Extreme low temperatures (as low as -80°C).

Highly flammable liquid and vapor (category 2); causes serious eye irritation (category 2A).

1. Purchasing:

95% ethanol is available on site; purchases are not expected to be necessary. When bulk ethanol needs re-stocking, this will be arranged by the Lab Technician or Lab Supervisor in cooperation with the IAB Safety Officer and Murie Building Coordinator.

Any additional chemicals required must have approval from the Chemical Hygiene Officer and Lab Supervisor before ordering. The Lab Technician will place the order and ensure that a current Safety Data Sheet is available in the lab. Quantities of this material will be limited to the smallest amount necessary to complete the experiments.

2. Storage:

Storage areas will be regularly inspected by lab personnel to ensure safety. Periodic inventory reductions will be scheduled.

Ethanol will be stored according to compatibility and label recommendations in the designated flammables cabinet in 203 Murie. Access to this cabinet is restricted; obtain a key from the Lab Technician in advance and return promptly after use.

The cryocooler must be drained and the coolant liquid returned to the proper, labeled bottles if it will go unused for more than 48 hours.

3. Authorized personnel:

Use will be limited to the following personnel. Proper training must be completed by each individual prior to use:

- Course instructor
- Teaching assistant
- Students

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP
- Fire extinguisher training

Instructors and TAs shall have completed all required employee, laboratory, and departmental training prior to receiving authorization to use this equipment.

5. Use location:

This procedure will be done in Murie 203.

6. Personal protective equipment (PPE):

All personnel are required to wear the following personal protective equipment (PPE) whenever conducting this procedure. All PPE must be obtained ahead of time from the Lab Technician:

- Flame-resistant lab coat
- Safety goggles
- Waterproof, thermally protective neoprene gloves

7. Spill equipment: The liquids involved can be absorbed with cotton towels and/or paper towels if spilled. Contaminated paper towels must be collected in a plastic container that can be sealed and properly disposed of. The Lab Supervisor and Lab Technician must be notified of any large spills so they can assist with clean-up and disposal.

8. Procedure:

Materials needed:

- Thermocouple wires
- Plastic centrifuge tubes sized appropriately for sample (ranges from microcentrifuge tubes to Falcon tubes)
- Brick (in bottom of cooling bath; leave there)
- Beakers
- Foam or sponge pieces to secure samples
- Tape
- Cooling bath (NESLAB Bath Circulator)
- Temperature sensor unit (IsoThermix)
- Computer with required software (desktop in back of 203)
- PPE (see #6 above)
- Long forceps
- Tongs for beakers and centrifuge tubes

Bath Circulator Prep and Setup

- There are two components of the unit- the NESLAB Bath Circulator (large refrigeration unit) and the temperature sensor (IsoThermix).
- Do not play with settings/arrows on the bath circulator interface.
- Add 95% ethanol to the bath. It will take approx. 12 L. Add enough to cover the coils in the refrigeration unit.
 - **Safety:** If you need to reach into the bath when the refrigeration is running, use the neoprene gloves
 - **Safety:** The cover should be kept on the bath except when adding or removing something from the bath to decrease the release of ethanol vapor.
 - If you notice any ice around the coils, that is bad. It means that there is too much water in the bath. Turn off the unit.
- Once the bath liquid is added, turn on the green *Main* switch and *Refrigeration* switch.
- The **Error 21** message means that the bath is too warm. This message will go away once the bath is below 15C.
- It takes a long time for the unit to get down to 0C, so plan accordingly.
- There is a brick in the bottom of the cooler. Keep this in the cooler.

- Samples should be placed in plastic centrifuge tubes and put in a beaker. The beaker should sit on the brick. You may need to add additional weight to keep the beaker with your samples from floating.
 - If you are freezing something smaller than a few centimeters, you can use 1 thermocouple wire. If it's larger than a few centimeters, you should use at least two wires.
 - Wires should touch the sample. You can hold the wire in position by inserting a piece of sponge in the top of the tube. You can tape the wire to the outside of the bath with tape.
 - One wire should measure the temperature in the beaker.

Iso-Thermix Set up

- This unit measures resistance to determine temperature. The switch is located on the back of the small blue box.
- To program on the computer, click on the blue and white **Iso-Thermix icon**.
- Under *Setup*
 - Click *1. Select Channels*
 - Click *Rescan* (this reads what wires are available to read the temperature)
 - Notice what temperature ports are available to output temp data.
 - When your experiment is running, make note of what wire is connected where.
- Under *Setup*
 - Click *2. Setup Experiment*
 - Select your *Sampling Rate* (hh:mm:ss).
 - The quickest reading it can output is (00:00:05) 5 seconds
 - Change *# of Samples* to **0**
 - Check *Save Data* box
 - *Starting Time: Immediate*
 - *Output Log File Name*: you will need to rename this file, or it will keep overwriting the default file name.
 - To get the data from the file, you will need to export the file to excel.
 - Files are saved under C:\Program Files (x86)\Iso- Thermix/Data
 - Click *OK*
 - If you are about to overwrite a file, it will give you a warning here.
 - Click *Start* to begin recording your experiment.
- Now that your experiment is running, you can view the data points on each channel
- To see these data in graph form, Under *Run*, select *2. Realtime Plotting*.
 - The colored boxes show each port wire. To hide particular ports, click the box.
- To stop recording, select *Run*, click *3. Experiment Operation*
 - Click *Stop*
- To view data, you have to export your data files to excel. You can do that under File -> export data. Select the file you want to export. Click OK.

- This is now an Excel compatible file in the data file. Open up my computer to find the files. You might have to play with the display setting on My Computer to see them.

Programming Bath Temperatures

- Open the **NESCom** program. There may not be a desktop icon, so you'll have to search "NesLab" in programs.
- Select *File*
 - *New -> Control -> RTE/EX Digital (NC)*
 - Click on the icon
 - The icon can be three colors
 - *Yellow*-bath is not communicating with the computer
 - *Blue*- bath is communicating with the computer
 - *Green*-bath is communicating and running a program with the computer
 - You may have to mess around with the Communication setup (under options) if the bath isn't communicating with the computer (COM4) or just restart the computer.
- A screen will pop up.
 - Change the read only switch to *NO*
 - DO NOT enter in a password or change any other parameters!!!!
- To enter in a cooling program, click *Program -> Program Parameters*.
 - You can enter in your starting temp and your end temp.
 - You can add multiple levels if you want the temperature to be held at a specific temperature for a longer amount of time.
 - The machine does not have a "rate of change" feature, so you'll have to calculate how long you want your temperature changes to be.
 - Click *Add* to add the program
 - Once you have your temperatures all set, click OK
- To start your program, click *Program -> Start Program*
 - You can pause or stop a program under *-> Stop Program* or *-> Pause Program*
- When a program is running, the icon should be green.

9. Waste disposal and clean up:

It is not anticipated that any wastes will be generated during this procedure.

10. Decontamination:

No decontamination is required. At the end of use, the coolant will be allowed to warm to room temperature. The bath must be drained using the spigot on the side. The liquid must be returned to the appropriately labeled storage containers. A large funnel should be inserted into the mouth of the bottle to minimize spillage as the bath is drained. A large plastic tub must be placed under the spout and bottle during draining to catch any spills.

11. Exposures: Emergency procedures to be followed (from SDS):

Eye contact for any or all chemicals used in these procedures

Symptoms:

Ethanol results in a burning sensation.

If the cooled liquid is splashed into the eye, injury from the cold may occur.

First aid:

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice / attention.

If the liquid was chilled, seek attention from an appropriate eye care specialist or physician immediately.

Skin contact for any or all chemicals used in these procedures

Symptoms:

No significant symptoms for the chemicals.

First aid:

Rinse skin with water.

Ingestion for any or all chemicals used in these procedures

Symptoms:

In sufficient quantities, it causes central nervous system depression and narcosis.

First aid:

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Consult a physician. Contact the Lab technician and Lab Supervisor immediately to report the exposure.

Inhalation

Symptoms:

No data available.

First aid:

Move person into fresh air. If not breathing, give artificial respiration and call 911 immediately. Consult a physician.

Contact the Lab Technician (474-) and Lab Supervisor (474-5622) immediately to report the exposure.

12. Spills:

Absorb the spilled material with cotton towels and/or paper towels. Place materials used for spill clean-up in a plastic bin and place the bin in the fume hood. Notify the Lab Technician immediately. Wash the area of the spill with water and dry thoroughly. Wash hands thoroughly.

13. Phone numbers:

| | |
|--|----------|
| Denise Kind, B&W Lab Supervisor and Chemical Hygiene Officer | 474-5622 |
| Patrick Knavel, B&W Lab Technician | 474-7205 |
| EHSRM Hazardous Materials (to report spills, request assistance, request pickup of wastes) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

N/A

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Biology and Wildlife
STANDARD OPERATING PROCEDURE

Dissections – Non-Preserved Specimens and Specimens Preserved in Carolina’s Perfect Solution®

Location(s): Murie 203, 211, 303, 309

Chemical(s): Consult the Safety Data Sheets for your preserved specimens. Specimens ordered through the department are normally preserved in Carolina’s Perfect Solution® non-formalin based solutions, and that is what this SOP covers.

NOTE: Specimens preserved in formalin/formaldehyde-containing solutions are NOT covered by this SOP; a separate SOP must be followed for specimens in these solutions. Use of specimens in formalin/formaldehyde requires consultation with the Laboratory Supervisor prior to use to ensure that ventilation will be adequate to prevent exposures in excess of the personal exposure limits (PELs).

NOTE: Non-preserved, non-commercial specimens (e.g. locally trapped animals) are NOT automatically covered by this SOP. An instructor wishing to use such materials must work with local agencies and appropriate UAF personnel to ensure that there are no high-risk potential exposures (e.g. rabies, etc.) from the material to be dissected. If the specimens to be dissected may be contaminated with a high-risk pathogen, an SOP specific to that hazard must be developed and used for the dissection. This SOP may NOT be used in such situations.

Specific Hazards:

- Cuts from dissection tools.
- Sensitivities to preservatives. Carolina’s Perfect Solution® has the GHS Classification of Skin Irritation Category 3.
- Possible infectious organisms in non-preserved specimens, if used.
- If specimens preserved in formalin/formaldehyde are used, the SOP for formalin/formaldehyde must be followed. This is strongly discouraged in Biology and Wildlife labs as there are safer preservatives on the market, and exposure monitoring is challenging.

Contact Information:

Laboratory Supervisor: Patrick Knavel pdknavel@alaska.edu 474-5622
Laboratory Technician: Rosa Villarreal rvillarreal@alaska.edu 474-7205

1. Purchasing:

Contact the Laboratory Technician for purchasing. Specimens ordered from out-of-state can require weeks to arrive, as they normally require ground shipment. Allow sufficient time.

2. Storage:

Non-preserved specimens:

Non-preserved specimens should be kept frozen or refrigerated to minimize deterioration of the specimens prior to use. After use, used specimens must be handled as described in section 9 of this SOP and placed in the 307 chest freezer pending pick-up for incineration

Preserved specimens:

In the 303 and 309 labs, there are vented storage cabinets in the 307 prep area that should be used to store specimens. Specimens must be securely closed after opening to prevent leaks and spills. In 211, specimens are stored in a cabinet. Additional specimens may be stored in 007.

3. Authorized personnel:

- TAs and instructors must have completed all required employee and laboratory safety training.
- Instructors are authorized to train their TAs, but may request that the Laboratory Supervisor provide training. Training should be requested at least two weeks in advance.
- Once trained, TAs are authorized to train students on dissection procedures.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP
- In-person review of procedures
- Sharps training through EHSRM's website.

5. Use location:

- On lab benches, under snorkel hoods where available.

6. Personal protective equipment (PPE):

- gloves
- safety glasses
- dissection aprons

7. Spill equipment:

Non-preserved specimens

- 10% bleach in spray bottles, freshly mixed
- paper towels

Preserved specimens

- paper towels

8. Procedures:

Non-preserved specimens

Materials needed:

- absorbent bench paper or pads
- cutting boards or dissection trays
- dissection tools
- 10% bleach in spray bottles
- biohazard bags in biohazard buckets
- ties to close bags

Procedure notes:

- sharp implements are used for dissection and must be handled with care
- broken scalpel blades should be disposed of as sharps; new blades can be put on the handles

Procedure steps:

1. Instruct students in the use of PPE, handling of sharps, and handling of dissection specimens prior to beginning the lab exercise.
2. Move tables under snorkel hoods if not already positioned there.

Preserved specimens

Materials needed:

- dissection trays
- dissection tools
- plastic bags or buckets large enough to hold specimens
- zip ties for bags

Procedure notes:

- sharp implements are used for dissection and must be handled with care
- broken scalpel blades should be disposed of as sharps; new blades can be put on the handles

Procedure steps:

1. Instruct students in the use of PPE, handling of sharps, and handling of dissection specimens prior to beginning the lab exercise.
2. Move tables under snorkel hoods if not already positioned there.
3. Place dissection trays at each station.

3. Place absorbent bench paper or pads under the cutting board or tray. Paper/pad must be absorbent side up, plastic side down.
4. Place dissection tools at each station.
5. Ensure that the waste container for used specimens is ready and additional bags are on hand.
6. Ensure that a waste container is available to collect liquids and is properly labeled and in secondary containment.
7. Turn on snorkel hood ventilation. In 203 and 211, there are silver toggle switches on the back pillar that turn on the snorkel hoods.
8. Don PPE.
9. Get out specimens.
10. Monitor students throughout the lab to ensure compliance with SOP and well-being.

9. Waste disposal and clean-up:

Non-preserved specimens

- Collect used specimens for disposal in biohazard bags. Place closed biohazard bags in clear, heavy-duty bags and close these.
- Label bags with contents, course, instructor name, date of collection and the words "For Disposal."
- Place bags in the freezer pending pick-up for disposal.
- Clean dissection tools and trays or cutting boards. This may NOT be done at the soil sinks (the sinks with wheeled buckets underneath them) as it contaminates the soil sink trap. To clean: sanitize tools and trays or cutting boards by soaking in 10% bleach for 10 minutes or by spraying thoroughly with 10% bleach and allowing to stand for 10 minutes. Wash with soap and water, then rinse thoroughly.
- Metal implements must be dried with a paper towel rather than allowed to air-dry to prevent rusting.
- Spray work area with 10% bleach and allow to stand, wet, for 10 minutes before wiping up. If bleach begins to dry within the 10 minute period, spray more on the surface so that it remains wet for the full 10 minute period.

Preserved specimens

- Place specimens that will be re-used back in bags or buckets and close securely (bags must have the end folded over; the folded over end must be secured with a zip tie). These should be placed in the appropriate storage location.
- Specimens that will not be reused may be placed in a heavy-duty bucket. They may also be bagged, the bags securely closed, and the bags placed in cardboard boxes. The buckets or boxes must be clearly labeled with the contents, course, instructor name, date of collection and the words "For Disposal."
- Clean dissection tools and trays by washing with soap and water, then rinsing thoroughly.
- Metal implements must be dried with a paper towel rather than allowed to air-dry to prevent rusting.
- The work area must be cleaned. This can be done by spraying the work area with fresh 10% bleach, then cleaning it with paper towels. There is no need to allow the bleach to stand for 10 minutes as decontamination is not needed.
- Gloves and paper towels should be disposed of in the regular trash.
- Preserved specimens are NOT to be disposed of in biohazard bags or bins, as they are not biohazards and should not be incinerated.

- Collect gloves and any bloody paper towels in a biohazard bag. Paper towels used to wipe up bleach should be placed in regular trash.
- Inform the Laboratory Supervisor that specimens are ready for disposal, where they are, what type of container they are in, and how many containers there are.
- When specimens are ready for disposal, they must be boxed and labeled as described above. Inform the Laboratory Supervisor of the location of the specimens, type of container they are in, and how many containers there are.

10. Decontamination:

None needed for preserved specimens.

For non-preserved specimens, 10% bleach for 10 minutes should be used, as described above.

11. Exposures: Emergency procedures to be followed (from SDS):

Non-preserved specimens

General advice

If exposure to a pathogen or parasite from a specimen is suspected, consult a physician right away.

Eye contact

Flush eyes with water as a precaution. Consult a physician if necessary.

Skin contact

Wash the area thoroughly with soap. Rinse with plenty of water.

Ingestion

Consult a physician. Never give anything by mouth to an unconscious person.

Inhalation

If breathed in, move the person into fresh air. If not breathing, administer artificial respiration and call 911.

Preserved specimens (Carolina's Perfect Solution)

General advice

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

Eye contact

Rinse immediately with plenty of water and seek medical advice.

Skin Contact

Wash thoroughly with soap and plenty of water.

Ingestion

If swallowed, do not induce vomiting; seek medical advice immediately and show the doctor the safety data sheet.

Inhalation

Remove the person to fresh air and keep at rest.

If students are cut during the course of the lab, this is a possible exposure route as well. Minor cuts should be immediately washed with soap and water for at least 5 minutes. Students should consult a physician for care following a cut. If a cut is severe, call 911. Follow the directions of the 911 operator. All cuts, including minor ones, and other lab injuries must be reported to the Laboratory Supervisor immediately after lab.

12. Spills

Non-preserved specimens

- Place paper towels over the spill. Saturate the paper towels with 10% bleach solution and allow to stand for 10 minutes.
- Clean up with paper towels; dispose of paper towels in trash.

Preserved specimens

- Clean up spills with paper towels and dispose of paper towels in trash.
- For large spills, contact the Laboratory Technician or Laboratory Supervisor.

13. Phone numbers

| | |
|--|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| Biology and Wildlife Laboratory Technician | 474-7205 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information

None

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Biology and Wildlife
STANDARD OPERATING PROCEDURE
Electrophoresis with Agarose Gels and TAE/TBE Buffer

Location(s): Murie 204, 206, 211, 306

Chemical(s): varies depending on procedure; consult your procedure and the appropriate Safety Data Sheets (SDS). If using other hazards, follow any additional SOPs as appropriate.

Specific Hazards:

- Electrophoresis equipment can be an electrical hazard. Typical equipment operating at 100 volts can cause a lethal shock.
- If ethidium bromide is used in the gel or buffer, the SOP for ethidium bromide use must be followed. Ethidium bromide use in B&W teaching labs is strongly discouraged because safer, equally effective alternatives are available.
- If UV light will be used for visualizing bands, the SOP for UV light sources must be followed.
- If other hazardous materials are used, the appropriate procedures must be followed.

1. Purchasing:

- If materials are needed, the Laboratory Supervisor and Laboratory Technician should be contacted well in advance of the date materials are needed. Both must be contacted so that the purchase and the relevant safety concerns can be addressed.
- Gels are typically prepared following instructions in the lab protocol, but are sometimes ordered. Liquefied agarose poses a thermal hazard and must be handled with caution.

2. Storage:

- Electrophoresis equipment is stored in labs and in shared equipment areas. Equipment must be inspected prior to and after every use.

3. Authorized personnel:

- Instructors are authorized to train TAs on the use of electrophoresis equipment. Instructors may request training be done by the Laboratory Supervisor if they do not feel capable of providing training.
- TAs are authorized to train and supervise students on the use of electrophoresis equipment once the TAs have been trained.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP
- Review of other SOPs relevant to the specific materials to be used.
- In-person training on the set-up and use of the equipment.

5. Use location:

- Electrophoresis can be done in any of the teaching labs or prep rooms, on any of the tables or benches.
- If multiple electrophoresis power supplies are being used in a particular lab, or electrophoresis rigs and other equipment that requires power, they should be dispersed among tables to avoid overloading circuits.
- Electrophoresis rigs should be separated from other electrical equipment and from liquids to minimize electrical hazards.

6. Personal protective equipment (PPE):

All personnel are required to wear the following personal protective equipment (PPE) whenever conducting this procedure:

- Nitrile gloves
- Safety glasses

7. Spill equipment:

- No special spill equipment is needed for electrophoresis with TAE/TBE and agarose gels. Continue to wear PPE while attending to the spill.
- See section 12 of this SOP for instructions on handling a spill.

8. Procedure:

Materials needed:

- Electrophoresis power supplies and chambers
- Gel trays (optional, not necessary)
- Buffer (TAE (Tris Acetate-EDTA) or TBE (Tris Borate-EDTA), mixed to appropriate concentration as specified in lab protocols)
- Agarose gels
- Pipets and tips for loading samples
- Container for used tips
- Samples to be loaded
- Loading dye

Procedure Notes:

Whenever the chamber (rig) is open, the power should be off and the unit should be disconnected from the power supply. Never leave running equipment unattended.

Before beginning:

- Inspect the area to make sure that it is dry and free of conductive materials (aluminum foil, pipes, other electrical equipment, etc.) and all outlets are in working order.
- Inspect the unit to make sure that it is in working order. Make sure that all leads and cords are undamaged and in working order.
- Make sure that connections between the unit and any cords or leads are secure.
- Use ground fault circuit interrupters (GFCIs). Do not use outlets that are not GFCIs.
- Use only 3-prong plugs. Never modify plugs to fit an outlet.
- Make sure that the power unit includes safety features that detect no-load, overload, sudden load changes, short circuits, arcs, ground leaks, etc.

Procedure Steps:

- Don PPE.
- Gather materials.
- Load gel into the chamber so that it is positioned with the wells at the black (negative) end. This will allow the samples to move toward the positive end (“run to red”).
- Load buffer into chamber.
- Prepare samples for loading; add loading dye as specified in the procedure.
- Load samples.
- Secure lid on chamber.

8. Connect leads to power supply; red to red, black to black. The power supply should NOT be plugged in at this time. Wear dry gloves and connect only one lead at a time with only one hand. Be sure that the leads are fully connected. All chambers that will be connected to the power supply must be connected before the power supply is turned on. Plugging in a chamber while the power is running will cause a change in the load and trigger the power supply to display an error message and stop running.
9. Be sure the outside of the chamber and the workspace are dry.
10. Plug in the power supply.
11. Turn on the power supply. Set the parameters as specified in the procedure.
12. Allow the gel to run.
13. When done, turn off the power supply and unplug it.
14. Disconnect the leads from the power supply.
15. Remove the lid.
16. Remove the gel from the chamber for staining and/or visualization. Follow your specific lab protocols for this.

9. Waste disposal and clean up:

- The following apply only to procedures done without any hazardous chemicals.
- Used TAE and TBE can be disposed of down the sink. Flush sink with water.
- Gel rigs should be washed and thoroughly rinsed with tap water, then **rinsed three times with RO water**. Allow to air dry.
- Agarose and polyacrylamide gels stained with non-hazardous dyes (e.g. Bio-Rad's Fast Blast stain, GelRed, etc.) may be disposed of in regular trash.

10. Decontamination:

Not applicable for standard electrophoresis with non-hazardous chemicals.

11. Exposures: General emergency procedures to be followed are listed below. Users must review the SDS for any and all materials they will be using during electrophoresis and comply with the exposure protocols contained in the SDS. If the specifications in the SDS for a chemical are more restrictive than those listed below, follow the more restrictive exposure response specifications.

Eye contact for any or all chemicals used in these procedures

Flush eyes with water as a precaution.

Skin contact for any or all chemicals used in these procedures

Wash off with soap and plenty of water.

Ingestion for any or all chemicals used in these procedures

Never give anything by mouth to an unconscious person. Rinse mouth with water.

Inhalation

If breathed in, move the person into fresh air. If not breathing, give artificial respiration and call 911.

12. Spills:

- If a spill occurs, personal safety should come first.
- Alert everyone in the area where the spill occurred.
- Shut off and unplug the power unit if it is safe to do so. Shut off and unplug any other electrical equipment in the area that could pose a shock hazard.
- Clean up TAE, TBE or water with paper towels. Paper towels may be disposed of in the trash. If hazardous chemicals are being used in your electrophoresis procedure, follow the spill instructions in the appropriate SOP.

13. Phone numbers:

| | |
|--|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

N/A

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Biology and Wildlife
STANDARD OPERATING PROCEDURE
Ethidium Bromide



This SOP addresses only ethidium bromide. Users must also follow the electrophoresis SOP and any other SOPs relevant to their particular procedure (e.g. UV light box use, etc.).

IMPORTANT NOTE: Ethidium bromide use has been discontinued in Biology and Wildlife laboratories. Alternatives such as GelRed and SybrGreen are safe and effective alternatives, making the risks associated with ethidium bromide unwarranted. If you believe that your procedure requires ethidium bromide to visualize your results, you must get permission in advance from the Laboratory Supervisor to ensure that appropriate safety and decontamination procedures are in place.

Location(s): Murie 204, 206, 306

Chemical(s): Ethidium Bromide, CAS # 1239-45-8

Specific Hazards:

- GHS Classification in accordance with [29 CFR 1910.1200](#) (OSHA HCS):
 - Acute toxicity, oral (category 4), H302
 - Acute toxicity, inhalation (category 2), H330
 - Germ cell mutagenicity (category 2), H341
 - Suspected of causing genetic defects.
- Danger. Fatal if swallowed. Do not breathe dust / fume / gas / mist / vapors / spray. Wash skin thoroughly after handling and removing gloves. Use only in a well ventilated area.
- Do not handle it until all safety precautions have been read and understood.

Contact Information:

Laboratory Supervisor: Patrick Knavel pdknavel@alaska.edu 474-5622

Laboratory Technician: Rosa Villarreal rvillarreal@alaska.edu 474-7205

1. Purchasing:

If ethidium bromide is needed, the Laboratory Supervisor and Laboratory Technician should be contacted well in advance of the date of the lab. Both must be contacted so that the purchase and the relevant safety concerns can be addressed.

2. Storage:

Locked in 209 or 215 Murie chemical cabinets for long-term storage.

Locked in the cabinet in 306, 204, or 206 when needed for a specific lab exercise.

3. Authorized personnel:

- All authorized personnel must have completed all required employee and laboratory safety training.
- The Instructor is authorized to train their TAs on the proper preparation, handling, storage and disposal of this material. The instructor may delegate training to the B&W Laboratory Supervisor by making arrangements at least two (2) weeks in advance.
- TAs, once trained, are authorized to train and supervise their students.
- Students must be trained in the use of this material in accordance with this SOP before they run gels.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP
- In-person review of procedures.

5. Use location:

- Murie B&W teaching labs, rooms 204, 206, 306
- On tables or lab benches isolated from sinks.
- This material shall NOT be used near a sink. In the event of a leak or spill, this material must be contained and may not enter the drain.

6. Personal protective equipment (PPE):

- All personnel are required to wear the following personal protective equipment (PPE) whenever conducting this procedure:
 - Nitrile gloves, thickness of 0.11mm
 - Safety goggles
 - Lab coat, long sleeved
- PPE must be inspected prior to use and replaced if damaged.
- PPE must be removed as appropriate to avoid contaminating surfaces and items in the lab or outside of the lab that should not be contaminated. In particular, PPE must be removed before leaving the lab, before handling personal items such as cell phones or laptops, and before moving on to other procedures in the lab. If a subsequent lab procedure also requires gloves, ethidium bromide-contaminated gloves must be removed and disposed of appropriately, and fresh gloves must be donned.

7. Spill equipment:

- Absorbent bench paper shall be used to cover the benchtops in areas where this material will be used. Bench paper must be secured to the table (masking tape is acceptable), absorbent side up and plastic barrier side down. Bench paper must be placed in areas where ethidium bromide containing solutions and/or gels will be manipulated and under gel rigs that will contain ethidium bromide.
- PPE as specified in section 6 of this document.
- Inert absorbent material. Paper towels are suitable.
- Waste containers to keep contaminated material separate from trash.

In the event of a spill, follow the directions in section 12, below.

8. Procedure:

Materials needed:

- ethidium bromide
- agarose and gel casting trays or precast agarose gels
- pipet and pipet tip (use an ethidium bromide designated pipet as it is difficult to fully decontaminate pipets)
- absorbent bench paper
- masking tape
- waste container for collecting liquid waste
- waste container for collecting solid waste (including gels)

Procedure Notes:

PPE must be used appropriately throughout the procedures.

Procedure Steps:

1. Don appropriate PPE. Mark off and set up a work area.
2. The TA will add ethidium bromide to the gel and/or buffer following the laboratory protocol provided by the instructor. Ethidium bromide should be handled in the fume hood; B&W uses concentrated solutions to prepare gels and running buffers, which can be used on an appropriately protected laboratory bench. Absorbent bench paper should be placed in the fume hood to absorb any spills.
3. During the lab, work will be done in a designated ethidium bromide workspace on a benchtop or counter in the lab that is protected with absorbent bench paper. This workspace shall be clearly labeled "Danger: Ethidium Bromide Area. Appropriate PPE and training required." All contaminated equipment shall remain in this area and on the absorbent bench paper. All wastes produced shall be collected appropriately for disposal as hazardous waste (see below).
4. Ethidium bromide containing gels shall be stored prior to use in a sealed, leak proof container. This container shall be clearly labeled with the contents, hazard, course, instructor, and date of preparation. Secondary containment shall be used to prevent contamination of surfaces.
5. The TA or instructor shall set up the electrophoresis chamber by placing the gel in the rig and adding a buffer. This should not be delegated to students.
6. When loading samples containing ethidium bromide, students shall take turns using a pipet designated for use with ethidium bromide. They should NOT use multiple pipets as this contaminates many pipets and thorough decontamination of pipets is difficult. Pipet tips must be collected in a designated, labeled waste container at the ethidium bromide work space.
7. Follow the SOP for electrophoresis and any other relevant SOPs for any other hazardous materials used.
8. After electrophoresis is complete and the power turned off and units unplugged, gels will need to be visualized. PPE must be worn when transferring gels out of the buffer. Gels should be contained in trays or dishes that prevent ethidium bromide contamination of surrounding surfaces.
9. Used buffers contaminated with ethidium bromide shall be transferred to a leak proof waste container that can be tightly sealed. The waste container shall be in secondary containment that is large enough to hold the entire volume of buffer collected. Transfer from the chamber to the waste container shall be done over a bin or container that is sufficient to catch any drips or spills. Transfer of contaminated buffers shall NEVER take place in, over or near a sink, as it cannot be allowed to enter the drain.

9. Waste disposal and clean up:

- All contaminated equipment (including glassware) shall be kept in the designated work space. It shall NOT be washed or cleaned by the students, TAs or instructors.
- Collect used buffers in an appropriate container. Containers shall be obtained in advance from the B&W Laboratory Technician.
- Containers must be kept securely capped and in secondary containment that is sufficient to hold more than the volume of the primary waste container.
- Label the waste container with “Waste (*specify type of buffer*) contaminated with ethidium bromide,” the course, the instructor name, and the date that collection of waste began.
- Used, contaminated gels, pipet tips, gloves, etc. shall be collected in an appropriate waste container labeled with the gel type (e.g. 1% agarose), Ethidium Bromide Contaminated, the course, the instructor name, and the date collected.
- The Laboratory Technician shall be notified in advance of the expected completion date of the lab. When waste is ready for pick-up, the Laboratory Technician shall be contacted by the instructor or TA running the lab to confirm that the waste is ready for pick-up, and equipment is ready for decontamination.

10. Decontamination:

- Neither students nor TAs nor instructors will carry out decontamination.
- Decontamination of equipment shall be carried out by the Laboratory Technician and Laboratory Supervisor. They shall follow the approved procedure for decontamination that is used by IAB.
- Decontamination of used buffers shall be carried out by the Laboratory Technician and Laboratory Supervisor. They shall follow the approved procedure for decontamination that is used by IAB.
- If equipment or a portion of the room outside of the ethidium bromide work area becomes contaminated, it is the responsibility of the TA or instructor teaching the lab to clearly mark off the area or equipment, label it “Danger: Ethidium Bromide contamination – DO NOT TOUCH” and notify the Laboratory Technician, Laboratory Supervisor, and others who will be using the room immediately. The Laboratory Technician and Laboratory Supervisor will carry out or arrange for decontamination.

11. Exposures: Emergency procedures to be followed (from SDS):

The most important known symptoms and effects are as stated in the “Specific Hazards” statement at the beginning of this document.

General advice

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

Eye contact with ethidium bromide solutions

Flush eyes with water as a precaution. Consult a physician.

Skin contact with ethidium bromide solutions

Wash off with soap and plenty of water. Take the victim immediately to hospital; call 911 for transport if necessary. Consult a physician. Provide the physician with a copy of the Safety Data Sheet.

Ingestion of ethidium bromide solutions

Never give anything by mouth to an unconscious person. Rinse mouth with water. Immediately consult a physician.

Inhalation

If breathed in, move the person into fresh air. Immediately consult a physician. If not breathing, give artificial respiration and call 911.

12. Spills:

- If a spill occurs, personal safety should come first.
- Alert everyone in the area where the spill occurred. Students should be directed to move out of the way and allow the TA to clean up the spill.
 - If the spill occurred on the absorbent bench paper and the paper was sufficient to absorb the spill, the equipment on the wet paper should be moved to clean bench paper. The wet bench paper can be carefully collected to prevent the spill from contacting any surfaces. The contaminated paper shall be disposed of as solid hazardous waste.
 - If the spill occurred outside the designated area, paper towels should be placed on the spilled liquid to absorb it. These paper towels must be collected and disposed of as hazardous waste. The area of the spill should be taped off and warning signs clearly posted to indicate the contaminated area and identify the hazard and contaminant. The Laboratory Technician and Laboratory Supervisor must be notified immediately so that decontamination can take place.
- If the spill occurs near an electrophoresis unit, shut off and unplug the power unit if it is safe to do so. Shut off and unplug any other electrical equipment in the area that could pose a shock hazard.
- Do not allow ethidium bromide to enter drains. If necessary, place absorbent material between the spill and any drain it could enter.
- Any surfaces that come into contact with ethidium bromide solutions are contaminated until decontaminated, and must be clearly marked off and labeled as contaminated. Warning signs must be posted to alert those who could come into contact with the contaminated surfaces of the contaminant and hazards it poses. The Laboratory Technician and Laboratory Supervisor must be immediately notified of any contamination.

13. Phone numbers:

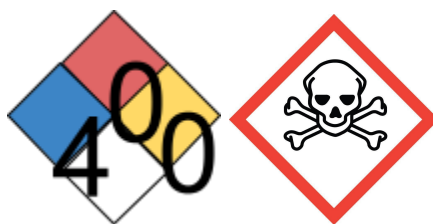
| | |
|---|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| Biology and Wildlife Laboratory Technician | 474-7205 |
| EHSRM Hazardous Materials (if Lab Supervisor not available; assistance with spills) | 474-5617 |
| EHSRM Industrial Hygiene (if HazMat not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

This material must not enter the standard solid or liquid waste streams (i.e. regular trash or sink drains). All contaminated materials must be collected and disposed of as hazardous waste.

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Biology and Wildlife
STANDARD OPERATING PROCEDURE
Phenylthiourea, N-Phenylthiourea



Location(s): Murie 209, 211

Chemical(s): Phenylthiourea, N-Phenylthiourea CAS # 103-85-5

Specific Hazards:

- GHS Classification in accordance with [29 CFR 1910.1200](#) (OSHA HCS):
 - Acute toxicity, oral (category 1), H300
 - Fatal if swallowed, H300
 - May cause an allergic skin reaction, H317
 - Skin sensitization (category 1), H317

- Danger.
 - Fatal if swallowed.
 - May cause an allergic skin reaction.
 - Avoid breathing dust/fume/gas/mist/vapors/spray.
 - Wash skin thoroughly after handling.
 - Wear protective gloves.
 - Do not eat, drink or smoke when using this product.
 - Contaminated work clothing should not be allowed out of the workplace.
 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
 - Rinse mouth.
 - IF ON SKIN: Wash with plenty of soap and water.
 - If skin irritation or rash occurs: Get medical advice / attention.
 - Wash contaminated clothing before reuse; consult Laboratory Supervisor for directions on how to do this.
 - Store locked up.
 - Dispose of contents / container to an approved waste disposal plant. Contact Laboratory Supervisor for assistance with disposal.
 - Do not handle it until all safety precautions have been read and understood.

Contact Information:

Laboratory Supervisor: Patrick Knavel pdknavel@alaska.edu 474-5622

Laboratory Technician: Rosa Villarreal rvillarreal@alaska.edu 474-7205

1. Purchasing:

All chemical orders are placed by the Laboratory Technician once approved by the Laboratory Supervisor.

2. Storage:

JT Baker storage code is blue; stored in a locked cabinet in 209 in a secondary container designated for health hazards.

3. Authorized personnel:

- All authorized personnel must have completed all required employee and laboratory safety training.
- The Instructor is authorized to train their TAs on the proper preparation, handling, storage and disposal of this material. The instructor may delegate training to the B&W Laboratory Supervisor by making arrangements at least two (2) weeks in advance.
- TAs, once trained, are authorized to prepare solutions and to train and supervise their students.
- Students must be trained in the use of this material in accordance with this SOP before conducting a lab. Students are only permitted to use dilute solutions of this compound; they should not handle concentrated or solid phenylthiourea.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP and chemical Safety Data Sheet

5. Use location:

- Murie B&W teaching labs, rooms 209 and 211
- On tables or lab benches isolated from sinks.
- This material shall NOT be used near a sink. In the event of a leak or spill, this material must be contained and may not enter the drain.

6. Personal protective equipment (PPE):

- All personnel are required to wear the following personal protective equipment (PPE) whenever conducting this procedure:
 - Nitrile gloves, thickness of 0.11mm has a breakthrough time of 480 minutes
 - Safety glasses or goggles, face shield if working with concentrated solutions
 - Lab coat, long sleeved
- PPE must be inspected prior to use and replaced if damaged.
- Long hair must be secured behind the head during all lab activities.
- In addition to wearing appropriate PPE, phenylthiourea solutions prepared from solid phenylthiourea must be prepared in the fume hood to provide adequate respiratory protection.
- PPE must be removed as appropriate to avoid contaminating surfaces and items in the lab or outside of the lab that should not be contaminated. In particular, PPE must be removed before leaving the lab, before handling personal items such as cell phones or laptops, and before moving on to other procedures in the lab. If a subsequent lab procedure also requires gloves, phenylthiourea-contaminated gloves must be removed and disposed of appropriately, and fresh gloves must be donned.

7. Spill equipment:

Appropriate PPE shall be worn to clean up a spill.

Materials needed:

- Inert absorbent material. Paper towels are suitable.
- Waste containers to keep contaminated material separate from trash.

In the event of a spill, follow the directions in section 12, below.

8. Procedure:

Instructors shall provide TAs and students with detailed, written lab procedures to follow. Instructors shall train TAs on each procedure before TAs instruct students in the procedure.

Materials needed:

- Phenylthiourea solid (PTU)
- water
- balance and weigh boat
- labeled container, securely sealing
- secondary containment sufficient to hold entire volume of solution to be prepared
- waste collection container, appropriately labeled, securely sealing, in secondary containment

Procedure Notes:

PPE must be used appropriately throughout the procedures. Only TAs or instructors may handle solid or concentrated phenylthiourea. Handling of solid phenylthiourea and preparation of phenylthiourea solutions shall occur in the fume hood.

Procedure Steps: Preparation of Working Solution from Solid:

1. Don appropriate PPE.
2. Place all materials in an unobstructed, properly functioning fume hood.
3. Work at least 8" inside the fume hood sash, but not along the sides or back wall of the hood as this would impede air flow.
4. Measure the required amount of RO water into the tightly-closing, labeled container.
5. Use a scoop to measure solid phenylthiourea into a weigh boat. Less than 0.5g of phenylthiourea will dissolve in 100mL of water (a 0.5% w:v solution), so use no more than that percentage when preparing solutions.
6. Add the phenylthiourea to the water in the tightly-closing, labeled container. Cap tightly and swirl gently to mix. Store in secondary containment in a secure location.

Procedure Steps: Student Work with Dilute Solution in Lab:

1. TA or instructor will measure and set out solutions for student use.
2. Prior to the lab, students must be trained on the proper use of PPE and proper handling and disposal of solutions.
3. Students must don appropriate PPE before beginning work.
4. Phenylthiourea can be measured into test tubes or cuvettes using disposable transfer pipets.
5. Waste solutions containing phenylthiourea shall be collected at student workstations and transferred to a waste container that closes securely.
6. Solutions that do NOT contain any hazardous materials should be kept separate from hazardous waste to minimize the amount of hazardous waste that must be sent for processing.
7. If catechol is also being used (phenylthiourea is most often used in B&W labs as an inhibitor of polyphenol oxidase (aka catechol oxidase)), both catechol and phenylthiourea-containing wastes must be collected for disposal as hazardous waste.

9. Waste disposal and clean up:

The authorized person(s) using this material is (are) responsible for the safe collection, preparation and proper disposal of waste unless otherwise stated below. Waste shall be disposed of as soon as possible and in accordance with all laboratory and University procedures.

Students and TAs shall dispose of used materials properly.

- Phenylthiourea containing solutions must be collected and disposed of as hazardous waste.
- Waste containers must be clearly labeled with "Phenylthiourea Waste," the approximate concentration of phenylthiourea in the waste, the class, the instructor's name, and the date waste collection began. If catechol is also present in the solution, its presence and approximate concentration in the waste must also be indicated.
- When the waste is ready for disposal, label the container "for disposal" and contact the Laboratory Supervisor.

10. Decontamination:

- No decontamination is necessary following the use of dilute phenylthiourea solutions. Normal cleaning procedures for glassware and lab surfaces should be followed after solutions have been collected as waste.

11. Exposures: Emergency procedures to be followed (from SDS):

The most important known symptoms and effects are as stated in the "Specific Hazards" statement at the beginning of this document.

General advice

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

Eye contact with phenylthiourea solutions

Flush eyes with water as a precaution.

Skin contact with phenylthiourea, solid or solutions

Wash off with soap and plenty of water. Take the victim immediately to hospital. Consult a physician.

Ingestion of phenylthiourea solutions

Never give anything by mouth to an unconscious person. Rinse mouth with water. Immediately consult a physician.

Inhalation

If breathed in, move the person into fresh air. Immediately consult a physician. If not breathing, give artificial respiration and call 911.

12. Spills:

- If a spill occurs, personal safety should come first.
- Alert everyone in the area where the spill occurred so that they can avoid contact with spilled material.
- Soak up the spilled liquid with paper towels. Place them in a separate waste container for solid wastes rather than in the container with liquid waste.
- Clean the area where the spill occurred with a standard laboratory cleaner and water.
- Do not allow any material to enter drains.
- TA or instructor who spills solid phenylthiourea: avoid dust formation. Avoid breathing vapors, mist or gas. Sweep up using paper towels. Dispose of spilled material and contaminated paper towels in a suitable, closed waste container for disposal. Waste container must be clearly labeled with contents, date produced, class and instructor name.

13. Phone numbers:

| | |
|--|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| Biology and Wildlife Laboratory Technician | 474-7205 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

This material must not enter the standard solid or liquid waste streams (i.e. regular trash or sink drains). All contaminated materials must be collected and disposed of as hazardous waste.

This material is most often used as an inhibitor of polyphenol oxidase (aka catechol oxidase). Catechol is also a hazardous material, and the SOP for its use must also be followed. Phenylthiourea is a more hazardous substance than catechol. When working with both substances at once, the more restrictive specifications for phenylthiourea take precedence over the specifications for catechol.

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Biology and Wildlife
STANDARD OPERATING PROCEDURE
Polyacrylamide Gels

This SOP addresses only this type of gel. Users must also follow the electrophoresis SOP and any other SOPs relevant to their particular procedure (e.g. UV light box use, ethidium bromide, etc.).

Location(s): Murie 204, 206, 306

Chemical(s): varies; consult the SDS for the manufacturer

Specific Hazards:

Solutions containing acrylamide monomers are used to make polyacrylamide gels (made of acrylamide polymers). The polymerized form of acrylamide is not considered toxic, but fresh gels can contain some unpolymerized monomers. Acrylamide (monomer) is a neurotoxin, and may also be mutagenic, carcinogenic, and cause damage to fertility and/or fetuses. Acrylamide is also an [EPA Hazardous Air Pollutant](#) specified in the Clean Air Act of 1963.

Generally speaking, most pre-cast gels are labeled as below known thresholds to be labeled as hazardous material. In this case, gels that are not contaminated with other hazardous materials (e.g. ethidium bromide) can be disposed of as regular trash.

Because of the variability in contents and hazards of these types of gels, instructors and TAs must carefully read the SDS for the gels to be used and follow any specific instructions contained in the SDS. Instructors and TAs may also consult with the Laboratory Supervisor on any questions or concerns, including what PPE is required and what disposal method is appropriate.

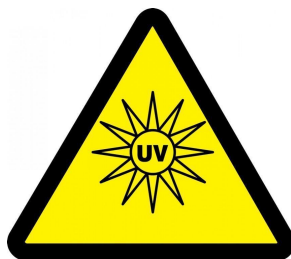
The hazards are more pronounced when casting the gels from the raw materials because of the acrylamide monomer. Because of this, Biology and Wildlife requires purchasing precast acrylamide or polyacrylamide gels when they will be used.

Contact Information:

| | | | |
|------------------------|-----------------|--|----------|
| Laboratory Supervisor: | Patrick Knavel | pdknavel@alaska.edu | 474-5622 |
| Laboratory Technician: | Rosa Villarreal | rvillarreal@alaska.edu | 474-7205 |

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Biology and Wildlife
STANDARD OPERATING PROCEDURE
UV Light



Location(s): Murie 204, 206, 209, 211, 304, 306

Chemical(s): Gels, buffers, and stains vary. Consult the Safety Data Sheet(s) and SOP(s) relevant to the materials you are using. This SOP deals only with UV light.

Specific Hazards:

- UV light can cause skin and eye damage without proper protection.
- UV light exposure can contribute to the development of cancer, particularly skin cancer.

Contact Information:

Laboratory Supervisor: Patrick Knavel pdknavel@alaska.edu 474-5622

Laboratory Technician: Rosa Villarreal rvillarreal@alaska.edu 474-7205

1. Purchasing:

All chemical orders are placed by the Laboratory Technician once approved by the Laboratory Supervisor. The department has UV light boxes and a Bio-Rad UV gel visualizer.

2. Storage:

UV light boxes are stored in locked cabinets in 204, 206, 306 and 211 Murie.

3. Authorized personnel:

- All authorized personnel must have completed all required employee and laboratory safety training.
- The Instructor is authorized to train their TAs on the proper preparation, handling, storage and disposal of this material. The instructor may delegate training to the B&W Laboratory Supervisor by making arrangements at least two (2) weeks in advance.
- TAs, once trained, are authorized to train and supervise their students.
- Students must be trained in the use of UV light imagers in accordance with this SOP before conducting lab.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP

5. Use location:

- Murie B&W teaching labs, rooms 204, 206, 209, 211, 304, 306
- On tables or lab benches.

6. Personal protective equipment (PPE):

When working with the Bio-Rad gel imaging system or a light box that has a UV shield attached, the shield provides protection from UV light. The light should only be turned on once the shield is in place, and should be turned off before the shield is removed. In this case, the following PPE is recommended as a precaution for accidental exposure should the shield be lifted while the box is on.

- Nitrile gloves
- UV resistant safety glasses
- Long sleeved shirt or lab coat to cover exposed skin

If the procedure requires removal of the UV shield to carry out the work (e.g. excising bands from a gel), precautions must be taken to protect the eyes and skin from UV exposure. In this case, the following PPE is required:

- Nitrile gloves
- UV resistant face shield
- Long sleeved shirt or lab coat to cover exposed skin

PPE must be inspected prior to use and replaced if damaged.

If ethidium bromide is being used as the stain, the SOP for its use must be followed and the required additional precautions taken.

7. Spill equipment:

UV light cannot be spilled and does not require clean-up. Follow appropriate spill procedures for the materials you are working with.

8. Procedure:

Materials needed:

- stained gel
- UV light box or UV flashlight or UV penlight
- PPE listed in section 6

Procedure Notes:

PPE must be used appropriately when needed.

Procedure Steps, Bio-Rad Imager

1. If using ethidium bromide, set up a work area as instructed in the ethidium bromide SOP.
2. Set up imager and computer. Open program.
3. Don appropriate PPE. Transfer the gel to the appropriate imaging tray.
4. Remove gloves before working on the computer to avoid contamination of the computer.
5. Don new gloves before handling gel.
6. Follow the directions provided by Bio-Rad. They are not reproduced here.

Procedure Steps, UV Light Box

1. If using ethidium bromide, set up a work area as instructed in the ethidium bromide SOP.
2. Don appropriate PPE.
3. Set up UV light box
4. Transfer gel to a light box. Secure UV shield over gel.
5. Turn on UV light and observe gel. Do not spend more time than necessary observing the gel, even with the shield and PPE on. To spend more time examining the gel, it should be photographed so that the photograph can be studied.
6. When photographing the gel, it is appropriate to remove gloves to handle the camera so that the camera does not become contaminated. Put gloves back on after taking photographs and before handling the gel or light box.
7. If the UV shield must be lifted to work with the gel while the bands can be visualized, be sure that PPE is used correctly and that a UV face shield is added over the UV resistant glasses. Work without the shield for the minimum time possible.
8. After visualizing and documenting the gel, turn the light box off before removing the shield..

Procedure Steps, UV Flashlights or Penlights

1. If using ethidium bromide, set up a work area as instructed in the ethidium bromide SOP. For other procedures involving UV light, follow all necessary precautions for the procedure.
2. Don appropriate PPE before beginning procedures.
3. Turn the light on for the minimum time possible for the procedure.
4. Be careful to avoid shining the UV light at any person, particularly in the face and eyes.
5. Turn light off after observations are completed.

9. Waste disposal and clean up:

- Gels shall be disposed of following the guidelines for the type of gel and stain used. Refer to the appropriate SDS and SOP(s).
- Clean off the surface of the UV light box by wiping it down to remove any residues.

10. Decontamination:

- UV light does not require decontamination. Follow any appropriate decontamination procedures based on the stain used to visualize the bands.

11. Exposures: Emergency procedures to be followed (from SDS):

The most important known symptoms and effects are as stated in the “Specific Hazards” statement at the beginning of this document.

General advice

If exposure is detected, discontinue exposure immediately.

Eye contact with UV light

UV light can cause eye damage. If unshielded UV light has entered a person’s eyes, s/he should consult an appropriate medical provider.

Skin contact with UV light

UV light can cause skin damage and burns (similar to sunburns). If skin exposure causes skin damage or burns, the individual should consult their medical provider as necessary.

Ingestion of UV light

It is not possible to ingest UV light. If a person swallows a small UV penlight, medical help should be sought immediately.

Inhalation

It is not possible to inhale UV light.

12. Spills:

If it is determined that UV light is not being properly shielded, work should be discontinued until proper shielding can be put in place.

13. Phone numbers:

| | |
|--|----------|
| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| Biology and Wildlife Laboratory Technician | 474-7205 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

This material must not enter the standard solid or liquid waste streams (i.e. regular trash or sink drains). All contaminated materials must be collected and disposed of as hazardous waste.

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