

NOAA Earth System Research Laboratory

David Skaggs Research Center (DSRC)

Chemical Hygiene Plan

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INTRODUCTION

This written Chemical Hygiene Plan (CHP) applies to all DSRC employees and visiting personnel operating within DSRC and field facilities who work with hazardous chemicals. A hazardous chemical is defined as any chemical that is a health hazard. This list consists of corrosives, irritants, reproductive toxins, sensitizers, toxic agents, carcinogens, hepatotoxins, nephrotoxins, neurotoxins, agents which affect the blood system and agents which damage the lungs, skin, eyes or mucous membranes. In addition, exposure to physical hazards is also included in the scope of our program. Physical hazards include combustible liquids, explosives, flammables, compressed gases, organic peroxides, oxidizers, pyrophorics, and reactives.

A CHP is required under *29 CFR 1910.1450* - Occupational Exposure to Hazardous Chemicals in Laboratories. Work practices and procedures required to protect employees from health and physical hazards at DSRC are incorporated into this plan. This written CHP is readily available on the NOAA Earth System Laboratory Chemical Sciences Division's website (<http://www.esrl.noaa.gov/csd/safety/>). It will be reviewed at least annually by the Regional Safety Manager (RSM) and updated as necessary.

A. GENERAL PRINCIPLES FOR WORKING WITH LABORATORY CHEMICALS.

The following general principles have been adopted by DSRC to ensure compliance with *29 CFR 1910.1450*. More specific information may be found in the applicable section within this document.

1. Minimize all chemical exposures. Since most laboratory chemicals are hazardous, the DSRC policy is to adopt general precautions for handling all laboratory chemicals. Skin contact, inhalation and ingestion of all chemicals must be avoided through prudent laboratory practices. For additional emphasis on particularly hazardous substances, especially carcinogens, specific precautions are included in section D.5. of this plan.

2. Avoid underestimation of risk. DSRC's policy is to assume that all substances of unknown toxicity are toxic and that any mixture of chemicals may be more toxic than its most toxic component. Even when substances have no known significant hazards, all

exposure should be minimized.

3. Provide adequate ventilation. Chemical laboratories are provided with laboratory hoods for purposes of enclosing chemical handling procedures and thereby minimizing, if not eliminating, exposure to airborne contaminants. In general, engineering controls and prudent laboratory practices are utilized for control of airborne contaminants.

4. Institute a Chemical Hygiene Program. DSRC has developed and implemented, as referenced under the OSHA Lab standard, this Chemical Hygiene Plan. Adherence to the policies and procedures outlined in this plan is required of all those working with hazardous substances.

5. Observe OSHA PELs and ACGIH TLVs. Exposure to chemicals is regulated by the Occupational Safety and Health Administration (OSHA) which has established enforceable exposure limits called Permissible Exposure Limits (PELs). The American Conference of Governmental Industrial Hygienists (ACGIH) has also established recommended exposure limits called Threshold Limit Values (TLVs). Exposure limits are usually specified on material safety data sheets (MSDSs). These exposure limits should not be exceeded at DSRC under normal circumstances. If exposures are determined to exceed the limits, control measures will be immediately implemented to reduce or eliminate employee exposure.

B. CHEMICAL HYGIENE RESPONSIBILITY

Responsibility for chemical hygiene rests at all levels within DSRC. This section identifies personnel responsibilities under the Chemical Hygiene Program.

1. Each Division Director has the ultimate responsibility for chemical hygiene within their lab in the DSRC and provides continued support for the chemical hygiene program.

2. Program Leaders are responsible for chemical hygiene in their area.

3. Project/Team Leaders are responsible for communicating

chemical hygiene concerns to their Group/Branch Chief, the employees involved, and/or the Chemical Hygiene Officer (who is also the Area Safety Representative).

4. Project Leaders have primary responsibility for chemical hygiene procedures for their operations. Their duties include the following:

- a. Ensure all workers under their direction know and follow the chemical hygiene rules.
- b. Participate in the determination of the required level of personal protective equipment needed by task and ensure that it is available and in working condition.
- c. Participate as appropriate in the Job Hazard Analysis process and use the completed forms as training tools.
- d. Ensure that appropriate training and facilities have been provided to all workers before they begin working in the lab or field for the first time or whenever a new chemical is to be handled.
- e. Provide information on special or unusual hazards before work on non-routine activities begins.
- f. Know and follow the legal requirements specific to your operations (eg. labeling, storage and disposal requirements).
- g. Ensure MSDSs and the chemical inventory are maintained.

5. The Chemical Hygiene Officers (CHO), (The Area Safety Representatives for each ESRL division have the following responsibilities:

- a. Work with management and employees to develop and implement appropriate chemical hygiene policies and practices.
- b. Provide guidance in the procurement, use and disposal of chemicals used in the laboratories.
- c. Maintain material safety data sheets (MSDSs).

The chemical inventory is updated by the Project Leaders.

d. Ensure that appropriate audits/inspections are maintained.

e. For new projects, assist project leaders during Project Environmental Health and Safety (PEHS) reviews to make sure that adequate procedures and equipment/facilities are in place for safely using chemicals.

f. For existing projects, participate in the Job Hazard Analysis process which includes the determination of the required level of personal protective equipment by task. Ensure adequate facilities and training are provided for these tasks.

g. Provide regular, formal safety inspections including routine inspection of emergency equipment. GSA inspects safety showers and fire extinguishers.

h. Continue to upgrade the chemical hygiene program as appropriate.

6. Each DSRC employee and all others working with hazardous chemicals within DSRC facilities (labs, trailers, etc.) are responsible for:

a. Planning and conducting each activity in accordance with chemical hygiene procedures.

b. Using the prudent laboratory practices detailed in the document and developing good personal chemical hygiene habits.

c. Communicating concerns to the Project leader, Group Chief and/or the CHO (ASR).

C. LABORATORY FACILITIES

1. Design. DSRC laboratory facilities have:

a. An appropriate general ventilation system with

air intakes and exhausts located as to avoid intake of contaminated air (see #4 below).

b. Adequate ventilated storerooms.

c. Laboratory hoods (when handling volatile, hazardous chemicals) and sinks.

d. Safety equipment including eyewashes and safety showers (required when handling corrosives).

2. Maintenance. Routine inspections of chemical-hygiene related equipment (e.g. hoods, eyewashes, safety showers) will occur. Items found in need of maintenance will be serviced or taken out of use. Items routinely found to be in need of repair will be put on a preventative maintenance schedule.

3. Use of Hazardous Chemicals. Many chemicals used at DSRC are hazardous by definition. Unless there is a letter in the MSDS binders indicating a chemical is not hazardous, assume that it is hazardous. Follow the guidelines provided on the MSDS as well as established procedures which include use of laboratory hoods and other prudent lab practices. If an MSDS is not available, please notify the Chemical Hygiene Officer (CHO)(ASR) before starting work with the chemical.

4. Ventilation.

a. General ventilation. The general ventilation system provides supply air to the offices and the laboratories.

b. Hoods. Laboratory hoods are used for control of contaminants generated in the labs. Adequate laboratory hood space (i.e. 2.5 linear feet per two lab techs) is provided for laboratory workers. Each hood is equipped with an audio and visual alarm system to ensure adequate hood performance is maintained during use. These alarms also have a test button to ensure they are working properly before work in a hood begins.

c. Other local exhaust systems. Ventilated storage cabinets are provided for flammables at the DSRC. Other local exhaust provisions will be provided on

an as needed basis.

d. Modifications. The local exhaust ventilation system must not be modified without a project safety review.

e. Performance. Laboratories are provided with general and local exhaust systems to minimize contaminant build-up within the laboratories.

f. Quality. The air flow throughout the lab and into and within the hood should not be excessively turbulent. Hood face velocities should be 80-120 fpm.

g. Evaluation. Laboratory hoods will be inspected at the time of installation, on an annual basis and any time a modification to the system has occurred.

D. WORKING COMPONENTS OF THE CHEMICAL HYGIENE PLAN

It is DSRC's policy that no person is allowed to work with hazardous chemicals in the laboratory before being trained to do so. Personnel are to be informed and trained on the lab's safety rules and procedures as well as the OSHA Lab Standard Information and Training requirements. This section describes in detail the rules and procedures developed at DSRC to apprise employees of hazards present in their work area and to protect them from these hazards.

1. Employee Information and Training Program

The purpose of the OSHA Lab Standard is to provide a safe and healthful work environment to all workers involved in laboratory activities. This is accomplished through the development and implementation of a Chemical Hygiene Plan (CHP). The CHP establishes procedures/programs which minimize employee exposure to hazardous chemicals. The information and training program is used to communicate the details of the CHP which assure a safe and healthful work environment.

The CHO will provide employees at DSRC with required information and training at the time of an employee's initial assignment to a work area where hazardous

chemicals are present. Information and on-the-job training will also be provided by the Project Leader prior to assignments involving new exposure situations.

Employees will be informed of the following:

- a. The contents of the OSHA Lab Standard and its appendices and their availability.
- b. The location and availability of the Chemical Hygiene Plan.
- c. Exposure limits for hazardous chemicals.
- d. Signs and symptoms of exposure associated with the chemicals they use.
- e. The location of reference materials for information on the chemicals used including MSDSs.

Employees will be trained on the following:

- f. Methods and observations used to evaluate the presence or release of hazardous chemicals.
- g. The physical and health hazards associated with the chemicals.
- h. Control measures the employees should use to protect themselves from these hazards.
- i. The details of the CHP.

A formal training session will be provided once **every two** years by the RSM to review the Chemical Hygiene Plan and Program in general.

2. Basic Rules for Working with Chemicals.

- a. **Minimize** chemical exposures. Use prudent lab practices to minimize exposures:
 - i. Prevent contact with chemicals through the use of appropriate personal protective equipment.

- ii. Never pipet or siphon by mouth.
- iii. Do not smell or taste chemicals.
- iv. Vent toxic discharges from equipment into local exhaust system.
- v. Use minimum volumes/concentrations.

b. Do not eat, drink or smoke in the laboratories and adjacent areas. Food or drinks must not be stored in any manner in which they could come in contact with toxic materials. Do not use lab glassware to eat or drink out of. Wash hands before eating, drinking or smoking to further prevent ingestion of chemicals.

c. Eye protection must always be worn in laboratories when hazardous chemicals are used. Safety glasses are available in the vicinity of the laboratories. Safety glasses, versus goggles/face shield, are considered adequate for most situations. Safety glasses must meet the ANSI specification Z87. This will usually be indicated on the temples of the glasses. Face shields and goggles are available if needed/desired. Requests for prescription safety glasses will be honored based on need but the government will not pay for the eye exam.

i. New evidence has demonstrated that contact lenses do not pose the degree of hazard that was once believed. Although they are not prohibited, they are not recommended either. Regardless, when the potential for chemical splash exists, it is still considered prudent to wear chemical goggles or a face shield instead of safety glasses.

d. Suitable protective clothing must be inspected and worn in laboratories, or elsewhere when the potential for contact with chemical or physical hazards exists. This includes closed shoes, long sleeves and trousers and/or a lab coat. Long hair and loose clothing should be confined. Clothing should be removed when contaminated with chemicals and replaced with clean protective clothing. Remove protective clothing before exiting the lab to prevent the spread of contamination. Gloves must be selected based on the hazard they are to protect against. They must be inspected before use and

replaced in accordance with the chemical resistance chart time guidelines.

e. Activities involving hazardous chemicals or potentially dangerous equipment are not allowed when an employee is working alone in the building. If working alone in your lab, establish a buddy system with someone in the building. Either call them or have them check on you every fifteen minutes or so. When the work is not hazardous and the employee must work alone in the building, arrangements to keep in contact with a friend or family member should be made.

f. Use the hood for operations which might result in a release of toxic chemical gas, vapor or dust after confirming the hood is operational. The rule of thumb is that any chemical with an exposure limit of 50 ppm or less should be used in a hood.

i. Confirm that the alarm is operational by pushing the test button while the hood is running. The audio and visual alarms should activate immediately. If the alarm is in the 'on' position when the hood is first turned on, the audio and visual alarms will be activated for approx. 10 seconds to show they are working.

ii. Keep hood sash closed at all times except when adjustments within the hood are necessary.

iii. Keep materials stored in hood to a minimum and do not block air flow through back slots.

iv. Use only those chemicals for which the quality of the ventilation system is appropriate (e.g. perchloric acid requires a special fume hood).

v. Leave the hood on when it is not in active use if hazardous substances are stored in it or if it is uncertain whether adequate general lab ventilation will be maintained when it is off.

g. If equipment containing hazardous chemicals must be left running after hours, post a sign with the date and your name and phone number for contact in case of an emergency. If equipment is in a hood,

leave the hood on as well. Provide for containment of hazardous chemical in the event of a power failure.

h. Handle and store laboratory glassware with care. Do not use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus. Shield them to contain chemicals and fragments should implosion occur. Use equipment only for its designated purpose.

i. Experiment areas and hallways should be free of clutter. There must always be sufficient clearance for a wheelchair in the hallways. Labs should be cleaned on a regular basis.

j. Contemplate and address safety, health and environmental concerns before commencing work on new equipment or procedures.

k. Be alert to unsafe conditions and report them to the CHO or see that they are corrected. Form CD-351 is available on the secure *Inside the Department of Commerce Boulder Labs* website for official reporting purposes
<https://inside.boulder.doc.gov/corporate/forms.html>.

l. Follow established waste disposal procedures as provided by NIST.

m. Be familiar with (and don't block access to) emergency equipment (safety showers, eyewashes, fire extinguisher, spill kits etc.) and first aid procedures.

i. Eye contact: Promptly flush eyes with water for approximately 15 minutes, call for assistance, continue to flush eyes with isotonic solution while seeking medical attention.

ii. Ingestion: Follow procedures per Material Safety Data Sheet. Seek medical attention.

iii. Skin contact: Promptly flush affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.

iv. Inhalation: Remove to fresh air. Seek medical attention.

3. Chemical Procurement, Distribution and Storage.

Procurement:

a. Order the minimum quantity of chemicals needed. This practice will minimize the quantity of bulk chemical storage and the potential of hazardous waste generated as a result of unneeded chemical stock.

b. The purchaser must place a paper copy of the MSDS in the MSDS file maintained by the group that is using the material. The purchaser must then communicate to the Program Leader either by note or e-mail; the chemical identity, storage location, quantity, and name of the person in charge of the material. This is required so that the Program Leader can update and maintain the chemical inventory. The date of arrival and purchaser's initials should be added to the label on the chemical. The inventory should be provided to the MASC Safety Office for updating emergency response records.

c. When compressed gases are received, their labels must be readable and indicate Department of Transportation (DOT) information as well as the contents or they must be rejected.

d. Before anyone starts to use newly received hazardous chemicals, the hazards associated with that chemical must be reviewed using the MSDS and label information provided by the manufacturer. If a MSDS has not been provided for a hazardous chemical, the information in SAX, MERCK, RTECS and/or the Chemical Dictionary will be reviewed. The procedure in Appendix A for rating the hazards of a chemical may be utilized as well.

Distribution/Transportation:

a. When liquid chemicals are transported between laboratories, a secondary container, such as an acid carrying bucket, should be used.

b. All cylinders of compressed gas should be handled

with extreme care. Cylinders must be transported on a hand truck equipped with straps/chain to secure the cylinder. The cap must be in place while the cylinder is being transported or not in use.

Storage:

a. Chemicals maintained in the laboratories should be properly stored when not in use. Containers should be kept closed and properly segregated in storage cabinets. In Appendix B, there is a summary of incompatibilities to be used as a guideline. Storage in lab hoods should be minimized. Storage quantities should be per the DSRC Occupancy Guidelines.

b. All carcinogens should be stored in ventilated cabinets.

c. Flammable liquids should not be stored in lab refrigerators unless the refrigerators are explosion proof.

d. Within each laboratory, flammable and combustible liquids may be stored in plastic, glass or metal containers of various sizes depending on the class of liquid. In general, a glass or plastic container up to 1 gallon in size or a metal safety can up to 5 gallons in size may be used to store flammable and corrosive liquids.

EXCEPTION 1: Flammables with a flash point of less than 73 F and a boiling point less than 100 F must be stored in a plastic or glass container no larger than 1 pint or a safety can no larger than 2 gallons.

EXCEPTION 2: Flammables with a flash point of less than 73 F and a boiling point greater than or equal to 100 F may be stored in a plastic or glass container up to one quart in size or a 5 gallon safety can.

EXCEPTION 3: Under certain conditions the size of the plastic container specified in EXCEPTIONS 1 and 2 can be increased to one gallon. Please see the CHO for further information.

Proper grounding techniques must be employed when flammable materials are transferred from one container to another.

Up to 60 gallons of flammable and corrosive chemicals are permitted to be stored in a Factory Mutual (FM) approved storage cabinet.

Cabinets containing flammables should be clearly marked, "Flammable Keep Fire Away".

e. Chemicals with long term storage concerns should be identified with a disposal date. Such chemicals include those which can become explosive due to the formation of peroxides (e.g. ether), corrosive degradation, loss of stabilizer; corrosive chemicals which may begin leaking from their containers; and compounds which degrade to toxic byproducts with time.

f. All corrosives must be stored at eye level or lower. Hazardous materials in suitable plastic containers can be stored above eye level if necessary, although it is preferred that they be stored at a lower level.

g. Acids and bases must be stored separately.

h. A periodic inventory of the chemicals in storage should be made by lab personnel to identify chemicals in need of disposal and update the master inventory.

i. Compressed gas cylinders should always be stored and used in an upright position except in rare special cases. The upper 1/3 of the cylinder must be firmly secured by a belt or chain to a wall or laboratory bench. Flammable cylinders must be stored away from oxidizers.

j. Cylinders that are in use (i.e. un-capped) must be secured individually.

4. Hazard Identification - Labels and Material Safety Data Sheets (MSDSs)

Label requirements:

a. Labels on incoming containers must not be removed or defaced. **It is recommended that the date of arrival and the orderer's name/initials be added to the label.**

b. In the laboratory, secondary containers will be labeled with an identity. The only time a label is not required on secondary containers is when one person only will have control over a container of chemicals and the chemicals will be used up in one shift.

MSDS Requirements:

a. All MSDSs received must be forwarded to the CHO who is responsible for maintaining them. Attempts to procure needed MSDSs will be made by the CHO.

b. MSDSs are located in the CHO's office and/or the laboratory. The MSDSs are accessible to workers in the building at all times.

c. A MSDS must accompany each hazardous chemical taken into the field.

d. If a chemical substance is developed in the laboratory which is hazardous, the project leader shall provide training to those employees that will be using it in accordance with the training requirements outlined in section D.1.

e. If a chemical substance is developed and its properties are unknown, it shall be handled as a hazardous chemical.

f. If a chemical substance is prepared for use by someone outside of the laboratory, the labeling and MSDS requirements under the Hazard Communication standard must be complied with. See the CHO for details.

5. Procedures for Particularly Hazardous Substances

The following procedures were developed for special emphasis on "particularly hazardous substances" such as "select carcinogens"(Appendix C, eg. Benzo-a-pyrene), reproductive toxins (eg. lead and mercury compounds and formamide) and substances with a high degree of acute toxicity (e.g. hydrogen cyanide, hydrogen sulfide). It is the responsibility of each employee working in the laboratory to be aware of and follow all DSRC established guidelines and procedures when working with particularly hazardous substances.

The information contained in this section repeats many previously stated policies and procedures. This reiteration is for additional emphasis on particularly hazardous substances with specific additional requirements for select carcinogens and reproductive toxins. A list of select carcinogens is provided in Appendix C. Any carcinogen present in a mixture, reaction product or reagent at a concentration of greater than 0.1 % by volume is subject to the requirements outlined in this procedure.

"Reproductive toxins" are chemicals which affect the reproductive capabilities including chromosomal damage(mutations) and effects on the fetus (teratogenesis).

Before initial work begins with a chemical in any of these categories, the scientist must read the MSDS and discuss any concerns with the CHO. The following are additional requirements the scientist must adhere to:

a. If work with a particularly hazardous substance will involve quantities in excess of milligram or milliliter quantities, a designated work area must be established and posted to warn those that might use the area of the hazard in that area. A "designated area" may be the entire laboratory, an area of the lab or a lab hood.

b. Appropriate protective clothing will be worn at all times when handling particularly hazardous substances. This includes safety glasses, lab coat

and chemical resistant disposable gloves. Disposable gloves should be removed inside out. Gloves must always be removed before leaving the laboratory.

c. Do not eat, drink or smoke in designated areas.

d. Remove protective clothing before leaving the lab. Wash hands and any other potentially exposed area after handling particularly hazardous substances. This includes at break, lunch or the end of the day. In the event of a splash, all contaminated clothing must be removed and the exposed area washed.

e. Pipetting by mouth is prohibited.

f. All work involving a particularly hazardous substance will be performed in a lab hood unless doing so increases the potential of exposure. Before beginning work, employees must verify proper operation of the hood.

i. Confirm that the alarm is operational by pushing the test button while the hood is running. The audio and visual alarms should activate immediately.

ii. Keep hood sash open about 6 inches unless you are working in the hood, then keep it as low as possible.

iii. Keep materials stored in hood to minimum and do not block air flow through back slots.

g. Storage of particularly hazardous substances should be in a well ventilated area. Store breakable containers in unbreakable, chemical resistant secondary containers.

h. Laboratory analyses that may release a carcinogen into the exhaust air must incorporate an air cleaning device in the lab set-up to remove the carcinogen prior to discharge whenever feasible.

i. All carcinogens will be labeled in accordance with OSHA requirements.

j. Working quantities of particularly hazardous substances shall be kept to a minimum.

k. All surfaces on which a particularly hazardous substance is handled must be protected from contamination. If contamination does occur, contact the CHO for assistance.

l. Notify CHO of all exposures.

m. Notify the CHO to handle all generated waste streams.

6. Emergency Procedures

All employees are to be trained in the following emergency procedures. All accidents will be carefully analyzed with the results appropriately distributed.

Medical Emergency Procedure

a. For accidents involving personal injury, the injured person should be given immediate attention. In the case of acid, base or other water soluble chemical splashes, affected clothing should be quickly removed and showers and/or eyewashes immediately used to remove the chemicals from exposed areas. Render first aid as appropriate.

b. The person should be taken to an emergency medical facility. Emergency numbers are on each phone: 7777 or 9-911 or 911 can be dialed for immediate attention in an emergency.

c. Accident report forms can be found on the website of the NOAA Safety and Environmental Compliance Office (SECO) under Accident Reporting (http://www.seco.noaa.gov/HTML_Blue/Safety/Accident_Reporting.html). The completed forms must be turned in to your supervisor for filing with the Worker's Compensation Office and the Regional Safety Manager. The Health Services Unit can assist with this. Forms must be submitted to the Worker's Comp. office by your supervisor within 30 days of the injury to be considered for 'worker's comp' benefits. To minimize the risk of a delay in pay, forms should be submitted to your supervisor within two days of the injury.

Nongovernmental persons need to follow their institution's paperwork procedures.

Spill Avoidance Practices

- a. Think about the task before you begin working. Consider the potential situations that could result in a spill and take steps to eliminate them.
- b. Define and limit the work space you plan to use to minimize the potential spread of a spill.
- c. Pay attention to what you are doing and always ask yourself if you are minimizing spill possibilities.
- d. Work carefully with chemicals recognizing the potential hazard of exposure to chemically hazardous materials.
- e. Conduct work with chemicals such that if a spill occurs there will be no/minimal dispersion(e.g. working inside secondary containers, covering all horizontal surfaces with absorbent paper, etc.).
- f. Be familiar with the location of spill kits.

Spill Procedures

For most small scale laboratory spills, the following procedures will be adequate.

- a. Notify persons in the area a spill has occurred.
- b. If danger is imminent, sound the alarm and evacuate.
- c. Confine/contain the spill (e.g. erect tipped container, cover spill with adsorbent, turn on hood).If spilled material is flammable, turn off ignition and heat sources.
- d. Attend to any person that may have been contaminated.
- e. Unless spill is contained in hood, ask nonessential personnel to leave the lab area.

- f. Notify CHO if not done already.
- g. Retrieve supplies to clean up spill including personal protective equipment and obtain assistance from CHO as necessary.

Leaking Compressed Gas Cylinders

- a. Most leaks occur at the top of the cylinder at the valve threads, safety device, valve stem and valve outlet.
- b. If you suspect a leak, use a liquid leak detector (i.e. Snoop) to check. (Apply over area of suspected leak and watch for bubbles).
- c. If you have a leak, call the supplier for guidance. For example AGA Emergency # 1-866-546-3337

Fires

- a. Evacuate building upon hearing the fire alarm.
- b. If you are the one that discovers a small fire and 1) you are trained to use a fire extinguisher, 2) the proper type of extinguisher is available for the type of fire, and 3) you can maintain a safe exit route behind you, you may attempt to extinguish the fire if you choose to do so.
- c. Alert others in the area to evacuate and to activate the alarm.
- d. Direct the discharge of an extinguisher at the base of the flame and use a slow, sweeping motion. If after 30 seconds the fire is not extinguished, leave the area.
- e. Confine the fire (close hood sashes and doors) if possible as you leave the area and evacuate.

Evacuation Plan- DSRC

- a. Become familiar with your designated exit and evacuation route and alternative routes. Become

familiar with the [Occupant Emergency Plan](https://inside.boulder.doc.gov/emerg/emerg.html) for the DSRC which is on the secure *Inside the Department of Commerce Boulder Labs* website (<https://inside.boulder.doc.gov/emerg/emerg.html>).

b. The first person aware of an emergency (e.g. uncontrollable fire, explosion, uncontrollable spill/leak, bomb threat, must activate the nearest alarm and evacuate.

c. Upon hearing the evacuation alarm, leave your room and close the door behind you. Leave the building using the nearest exit. If that exit is blocked, go to the nearest alternative exit. Take any visitors with you. As you are exiting the building, inform any remaining occupants you notice to evacuate the building.

d. Once you have left the building, go to the **upper parking lot** and check in with your Evacuation Coordinators. They will be responsible for ensuring all personnel are accounted for. Provide any information you have on people that are missing.

e. If you pulled the alarm, phone X7777 or 9-911 or 911 and indicate:

- i. the reason the alarm was pulled
- ii. the control measures taken
- iii. the current status of the problem
- iv. any known injuries

The fire department will then be notified and given this information if they have not already arrived.

f. If you are accompanying a visitor, account for the visitor by checking in with an Administrative Office representative, after checking in yourself.

g. Remain outside until it has been announced that you can re-enter the building.

7. Medical Program

Employees are provided with medical attention under the scenarios detailed below. All medical

examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

a. Medical surveillance requirements specified in specific health standards will be complied with where applicable.

b. Whenever an event, such as a spill, leak, etc, takes place and there is a likelihood of an exposure, the employee shall be given the opportunity to seek medical attention. Follow the procedure in the "Emergency Procedures" Section D.6.

c. Whenever an employee develops symptoms of overexposure to a chemical to which the employee may have been exposed to during the course of work, the employee will be provided with the opportunity to seek medical attention.

d. The following information shall be provided to the physician:

- i. The identity of the hazardous chemical(s) to which the employee may have been exposed.
- ii. A description of the conditions under which the exposure occurred including quantitative data, if available.
- iii. A description of the signs and symptoms of exposure that the employee is experiencing.

e. The physician shall provide the following information to the employee who in return will provide it to their supervisor and/or CHO upon returning to work: (preferably Form CA-20, Attending Physician's Report):

- i. Any recommendations for further medical follow-up
- ii. The results of the exam/test
- iii. Any medical condition revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace.

iv. A statement that the employee has been informed of the results and any follow-up recommendations.

8. Control Measures

Good laboratory practices in combination with engineering controls are used to maintain exposure levels below permissible exposure limits. Prudent practices, laboratory hood exhaust systems, and the use of personal protective equipment specified in this CHP are control measures used in the laboratory to minimize, if not eliminate, exposures. In addition, training is a control measure that provides employees with a review of actions they can take to minimize/eliminate exposure.

9. Personal Protective Equipment and Safety Equipment

The following items will be available for each laboratory:

- a. Safety glasses, gloves, and lab coats.
- b. Safety shower and eyewash, if corrosives are handled.
- c. A fire extinguisher.
- d. A spill kit, telephone and fire alarm nearby.
- e. Any other safety equipment deemed necessary during a hazard assessment to ensure the safety of lab workers.

10. Housekeeping, Maintenance, and Inspections

Regular janitorial service provides cleaning of floors, etc. Formal safety inspections, including housekeeping and equipment inspections, are to be conducted on an annual basis by the CHO. Additionally, all personnel should regularly inspect their own work areas on an informal basis and verify proper location and operation of safety equipment. Any items not working properly will be repaired.

11. Signs & Labels

Prominent signs and labels of the following types may be posted:

- a. Emergency telephone numbers of emergency personnel and facilities, and contact personnel within the lab.
- b. Location signs for eyewashes, safety showers, first aid equipment and exits.
- c. Warnings at areas or equipment where special hazards exist. All personnel are responsible for keeping unauthorized or unknowing personnel or visitors from entering dangerous areas.

12. Exposure Monitoring

It is the responsibility of the RSM and CHO to anticipate the need for personal and/or area monitoring for any new or existing research activities. If there is a need, monitoring will be conducted to determine the concentration of exposure to a given health hazard. In addition:

- a. Initial monitoring will be conducted to measure employee exposure to any substance regulated by a specific health standard if there is a reason to believe the action level or permissible exposure limit (PEL) are exceeded.
- b. If initial monitoring indicates exposure above the action level or PEL, the routine monitoring requirements specified in the specific health standard will be followed. In addition, control measures will be implemented to minimize employee exposure.
- c. Employees will be notified in writing of their monitoring results within 15 days of receipt by the CHO.

13. Records

- a. All accidents will be documented and investigated. All accident records will be maintained.

b. Medical records will be retained in accordance with 29 CFR 1910.20.

c. Records of employee exposure will be maintained in accordance with 29 CFR 1910.20.

14. Safety Equipment

a. **Drying Ovens:** If chemical samples are volatile, they are to be dried in a vented oven.

b. **Vacuum Pumps:** When using a vacuum pump, the suction line from the system to the pump should be fitted with a trap to prevent liquids from being drawn into the pump. If vapors are being drawn off using the pump, a cold trap should be used to collect the volatiles and minimize the amount that enters the pump and dissolves in the pump oil. The discharge should be directed to an operating hood or other exhaust system.

c. **Refrigerators:** There should be no potential sources of electrical sparks on the inside of a lab refrigerator. When purchasing refrigerators for the storage of flammables, specify an explosion proof one. All existing refrigerators should be modified if they are for flammable storage. This can be done by removing any interior light activated by a switch mounted on the door frame, moving the contacts of the thermostat controlling the temperature to a position outside the refrigerated compartment, and moving the contacts for any thermostat present to control fans within the refrigerated compartment to the outside of the refrigerated compartment. Frost-free refrigerators can not be properly modified due to the spark hazards presented by the presence of a drain hole/tube (can carry vapor to compressor area) and their electric heaters. Uncapped containers of chemicals should never be placed in a lab fridge. The seal should be vapor tight and unlikely to permit a spill. Foil, wrapped corks, and glass stoppers often do not meet these criteria. Screw caps lined with polyethylene or teflon are the best.

15. Waste Disposal Program

The pickup and disposal of hazardous waste is provided by NIST. See separate written documents and forms available from the CHO. A note should be sent to the CHO if the last of a chemical or material is disposed of so that it can be removed from the Chemical Inventory.

- a. Hazardous waste stored at a temporary location (a.k.a. satellite accumulation point or SAP) has specific requirements. A hazardous waste satellite accumulation point (SAP) must be established at or near the point of generation and which is under the control of the operator of the process. Only waste that requires management as hazardous waste should be placed in SAPs. All hazardous waste containers in SAPs must be properly labeled with the words "Hazardous Waste" or other words that identify the contents. No more than 55 gallons of any single hazardous waste stream (or one quart of acutely hazardous waste) is allowed to be accumulated in the SAP. Containers in SAPs must be kept closed when not in use. Once the 55 gallon allowable limit of hazardous waste is exceeded, containers of hazardous waste must be labeled with an accumulation start date and time and picked up by NIST within 24 hours to be placed in their 180-day hazardous waste accumulation area. Note: even though the regulation allows for the accumulation of up to 55 gallons, the generator does not have to use a 55 gallon container. The generator should evaluate the quantity of waste generated over time and select an appropriately sized container. Hazardous waste satellite accumulation areas must be inspected at least weekly for leaks and container deterioration and the inspections must be documented.
- b. Used batteries are considered "Universal Waste" and as such have specific requirements. Universal waste batteries (each battery), or a container in which the batteries are contained, must be labeled or marked clearly with "Universal Waste – batteries", "Waste

Batteries", or "Used Batteries". Universal waste can not be accumulated for more than one year from the date that the universal waste is generated, or received from another handler. Place the universal waste in a container and mark or label the container with the earliest date than any universal waste in the container became a waste or was received. Batteries may not be stored outside or where they may be exposed to the elements. PSD provides a service to accumulate universal waste batteries for bulk disposal.