
CARLSBAD ENVIRONMENTAL MONITORING & RESEARCH CENTER
New Mexico State University

CHEMICAL HYGIENE PLAN

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A Chancellor
Author

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Date

[Signature]
Safety Committee Member
(other than author)

11-3-20
Date

[Signature]
CEMRC Director

11/02/2020
Date

**CARLSBAD ENVIRONMENTAL MONITORING &
RESEARCH CENTER**

NEW MEXICO STATE UNIVERSITY
1400 University Drive, Carlsbad, New Mexico 88220



TELEPHONE (575) 887-2759
FAX NUMBER (575) 887-3051

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CHEMICAL HYGIENE PLAN

1.0 INTRODUCTION

The Chemical Hygiene Plan (CHP) is readily available to personnel working in the laboratories of the Carlsbad Environmental Monitoring & Research Center (CEMRC) located at 1400 University Drive in Carlsbad, New Mexico. All personnel working in the CEMRC laboratories will be provided a copy of the CHP and will sign a form or list that they have read and understood it. Copies of codes of federal regulations referenced in the CHP are available from the CEMRC Chemical Hygiene Officer (CHO) or from the Occupational Safety and Health Administration's (OSHA) website at www.osha.gov, the U.S. Environmental Protection Agency's website at www.epa.gov, and the U.S. Department of Transportation's (DOT) website at www.dot.gov. The CHP was developed to establish a program that will ensure that adequate control methods are implemented to prevent unacceptable exposure to hazardous chemicals or materials as defined in [29 CFR 1910.1450](#) in the locations of the CEMRC where laboratory operations take place.

All operations performed in the laboratories at the CEMRC shall be planned and executed in accordance with the CHP. Each individual working in the CEMRC laboratories is expected to develop safe chemical hygiene habits aimed at the reduction of chemical exposures to themselves and coworkers. In conjunction, the CEMRC CHO position was established to review and provide advice on the guidelines, resources, and activities needed to implement a successful hazardous-chemical safety program.

1.1 Role of the Chemical Hygiene Plan

The CHP describes the CEMRC hazardous-chemical safety program for laboratories, including but not limited to personal protective equipment (PPE) used, control equipment operations (e.g. fume hoods), employee training programs, medical policies, and safety audits. It is supplemented by the safety precautions and procedures included in the Standard Operating Procedures (SOP) used in each laboratory. The CHP is designed as a tool to coordinate safety procedures.

1.2 Chemical Hygiene Plan Coverage

All personnel working in the CEMRC laboratories must comply with the provisions of the CHP. Contractors and other non-CEMRC workers performing operations in the laboratory and designated as laboratory workers are also subject to the requirements of the CHP.

2.0 DESCRIPTION OF CEMRC

The CEMRC has laboratories as defined by OSHA. Activities within the laboratories shall comply with the OSHA Laboratory Standard ([29 CFR 1910.1450](#)) along with other OSHA standards, including Hazard Communication. The CEMRC's *Hazard Communication/Right-To-Know Program* is covered under SM-02.

2.1 Description of the CEMRC Activities

The CEMRC is a division of the College of Engineering at New Mexico State University (NMSU). It is operated as a research institute within NMSU, supported through grants and service contracts. The CEMRC's primary objectives are to:

- a) Provide for objective, independent health, and environmental monitoring,
- b) Conduct research on environmental phenomena, with particular emphasis on natural and anthropogenic chemistry,
- c) Provide advanced training and educational opportunities,
- d) Develop improved measurement methods, procedures, and sensors, and
- e) Establish a health and environmental database accessible to all sectors.

The CEMRC is located in Light Hall, a state-of-the-art 26,000 ft² laboratory and office facility constructed adjacent to the NMSU-Carlsbad campus. The CEMRC's scientific activities are organized into six major areas of specialization, with corresponding assignment of staff roles and responsibilities. The six scientific program areas include:

- a) Environmental Chemistry,
- b) Information Management,
- c) Internal Dosimetry,
- d) Organic Chemistry,
- e) Radiochemistry, and
- f) Field Programs.

Although some of the CEMRC's projects involve only one or two of the program areas, all of the program areas collaborate in carrying out various research projects. Detailed descriptions of each program area and associated facilities and instrumentation are presented on the CEMRC web site at <http://www.cemrc.org>.

2.2 The CEMRC Laboratories

The CHP shall apply to the following rooms and locations at the CEMRC: rooms 149, 150, 151, 152, 153, 155, 156, 157, 158, 161, 167, 168, the mobile laboratory (CAA), and/or any other rooms/locations where the "laboratory use of hazardous chemicals" occur. A map of the CEMRC laboratories is posted throughout the facility at strategic locations and is also available on the internal computer network.

3.0 DEFINITIONS/ACRONYMS

Chemical Hygiene Officer (CHO) – An individual designated by the CEMRC Director to provide technical guidance in developing and implementing the provisions of the CHP and to seek ways to improve it.

Chemical Hygiene Plan (CHP) – A written plan developed to establish a program that will ensure adequate control methods are implemented to prevent unacceptable exposure to hazardous chemicals or materials as defined in [29 CFR 1910.1450](#) in the locations of the CEMRC where laboratory operations take place.

Contract Entity – An entity such as Los Alamos National Lab (LANL) that occupies space within the CEMRC facility as a lessee through a formal agreement.

Emergency Action Plan (EAP) – A written plan (SM-01) developed to present basic information needed by all individuals working at CEMRC for response to emergencies.

Hazard Communication/Right To Know Program – A written Hazard Communication Program (SM-02) in accordance with the current New Mexico Occupational Health and Safety Act; Federal Occupational Safety and Health Administration Regulation [29 CFR 1910.1450](#) and New Mexico State University policies.

Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS) – These are an important component of a products stewardship, occupational safety and health. It is intended to provide workers and emergency personnel with procedures for handling or working with a hazardous substance in a safe manner, and includes information such as physical data, toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures.

Radiation Safety Officer (RSO) – A qualified individual responsible for ensuring that the CEMRC operations are in compliance with New Mexico Radiation Protection Regulations (NMAC 20.3) and the provisions specified in the CEMRC's radioactive materials license to ensure the safe use, storage, and disposal of all radioactive materials and radioactive wastes used and generated at CEMRC. The RSO is also responsible for the implementation of the *Radiation Safety Manual* (SM-05).

4.0 RESPONSIBILITIES FOR THE CHEMICAL HYGIENE PLAN

4.1 Personnel Responsible for Implementing the Chemical Hygiene Plan

The CEMRC Director has the ultimate responsibility for chemical hygiene throughout the facility and, with the support of other staff members, shall ensure the health and safety of CEMRC employees. Responsibilities also include final approval of the initial CHP and all subsequent revisions. The CEMRC CHO is designated by the CEMRC Director to provide technical guidance in developing and implementing the provisions of the CHP and to seek ways to improve it. The CHO's name and contact number(s) is posted throughout the facility at strategic locations and is also available on the internal computer network. The CHO is also the CEMRC interface between the Center and the NMSU Environmental Health and Safety (EH&S) office on the Las Cruces campus. The NMSU EH&S office remains current on legal rules and regulations concerning chemicals used in the CEMRC and assists the CHO in administration of the chemical safety program as needed.

The CHO has the following responsibilities:

- a) Develop, biannually review, and evaluate the CHP including opportunities for improvement,
- b) Oversee the implementation of the CHP by laboratory supervisors,
- c) Provide technical assistance to Laboratory Supervisors in complying with the CHP and answer safety questions for all employees,
- d) Provide guidance to project leaders on developing appropriate safety precautions for new projects and procedures as part of the job hazard analysis including final approval of the safety precautions,
- e) Remain current on legal rules and regulations concerning chemicals used in the CEMRC,
- f) Ensure that the Laboratory Supervisors comply with SM-02, *Hazard Communication/Right-To-Know Program*, which includes stipulations related to chemical hygiene,
- g) Maintain appropriate chemical hygiene reference materials,
- h) Maintain a central file of MSDS/SDS sheets,
- i) Maintain a chemical inventory of hazardous chemicals at the CEMRC. The CHO should evaluate the chemicals in inventory and maintain lists of chemicals that qualify for special procedures and precautions,
- j) Monitor the procurement (with the assistance of a Chemical Procurement Form, Appendix A), storage, use, and disposal of chemicals used in the CEMRC operations, in conjunction with the Laboratory Supervisors,
- k) Ensure that periodic safety audits of the chemical hygiene program are conducted,
- l) Maintain auditable records of training and information related to chemical hygiene,
- m) Conduct and document inspections and testing of fume hoods, in conjunction with the Radiation Safety Officer (RSO), and
- n) Conduct and document inspections and testing of safety showers, eyewash stations, drench hoses, and fire extinguishers, in conjunction with the facility personnel.

Each room at the CEMRC that is designated as a laboratory will have an identified Laboratory Supervisor. The Laboratory Supervisor has overall responsibility for his/her laboratory. The Laboratory Supervisor has the following responsibilities:

- a) Ensure that all laboratory workers are re-certified annually on the provisions of the OSHA Laboratory Standard,
- b) Ensure that all personnel working in the laboratory know and comply with the provisions of the CHP,
- c) Inform contractors or other non-CEMRC workers working in the CEMRC laboratories of all hazards found in the immediate work area,
- d) Monitor the proper functioning of protective equipment such as fume hoods and notify the Director and/or facility personnel when repairs are needed,
- e) Conduct and document routine chemical hygiene and housekeeping inspections, including documentation of laboratory worker training,

- f) Ensure that employees under his/her supervision comply with SM-02, *Hazard Communication/Right-To-Know Program* which includes stipulations related to Chemical Hygiene,
- g) Know the current legal requirements concerning regulated substances stored, used, or generated in their area of responsibility,
- h) Ensure that a job hazard analysis is performed prior to the initiation of each new project or operation and that the specific health, safety, and environmental concerns identified in the job hazard analysis are addressed in a manner that is compliant with the CHP through the use of approved SOP(s),
- i) Ensure that the facilities are adequate for any new hazard introduced into the laboratory and that such facilities are maintained in adequate working condition,
- j) Ensure that appropriate training and information have been provided to laboratory workers prior to them working with a hazardous chemical or procedure in use in the laboratory. This includes maintaining MSDSs/SDSs and a chemical inventory for hazardous chemicals used in the laboratory under his/her supervision,
- k) Determine the appropriate level of protective apparel and ensure that required equipment is available, in working order, and specified in approved SOPs,
- l) Monitor the procurement (with the assistance of a Chemical Procurement Form, Appendix A), use, storage, and disposal of chemicals and wastes used or produced in the laboratory,
- m) Provide training to laboratory workers in proper mitigation procedures for chemical spills, including appropriate Personnel Protective Equipment (PPE), absorbents/adsorbents, and neutralizers.

4.2 Responsibilities of Laboratory Personnel

All personnel working in the CEMRC laboratories are required to read and understand the CHP and to comply with its requirements.

Each person working with or around chemicals, having been trained, is responsible for remaining aware of the hazards of those materials and handling those chemicals in a safe manner. Each person is responsible for wearing the proper PPE and knowing how to handle a hazardous chemical safely according to its types of hazards.

Everyone shares the responsibility to ensure that all containers of chemicals are properly labeled with the identity of the chemical and its hazards. Refer to SM-02, *Hazard Communication/Right-To-Know Program* for labeling requirements of hazardous chemicals.

All laboratory personnel should remain vigilant to unsafe practices and conditions in the laboratory and should immediately report such practices and/or conditions to the Laboratory Supervisor for prompt correction.

5.0 CHEMICAL HYGIENE AND SAFETY PLAN

This section describes appropriate procedures and practices for chemical hygiene and safety.

5.1 General Standard Operating Procedures

The general SOPs provide fundamental safety precautions that should be familiar to all laboratory personnel before performing a procedure.

5.1.1 General Rules

Awareness is the most fundamental rule of chemical safety. Everyone should remain constantly aware of:

- a) A chemical's hazards, as determined from the MSDS/SDS, labels, and other appropriate references.
Note: MSDSs/SDSs are available in the corresponding laboratory, from the CHO, and/or the CEMRC database.
- b) Appropriate safeguards for using that chemical, including PPE,
- c) Location and proper use of emergency equipment,
- d) How and where to properly store the chemical when not in use,
- e) The proper methods of transporting chemicals within the facility,
- f) Appropriate actions for emergencies (*Emergency Action Plan*, SM-01), spill cleanup, and proper waste disposal,
- g) The on-going work in the laboratory, and
- h) CEMRC discourages working alone in any laboratory at anytime but especially when hazardous procedures are being conducted.

5.1.2 Personal Hygiene

Personal hygiene is an important factor in chemical hygiene. To react with a person, a toxic chemical must contact that person. The four routes of chemical entry into the body are inhalation, ingestion, injection, and eye or skin contact. Personal hygiene practices should include:

- a) Wearing appropriate PPE at all times, and changing contaminated PPE immediately,
- b) Avoiding inhalation of chemicals (e.g. "sniff" testing chemicals),
- c) Avoid touching things that may be handled by any personnel not wearing PPE (i.e. door handles, writing utensils, cell phones, paperwork, and secondary containers, etc.),
- d) Inspect laboratory equipment regularly for sharp edges, leaks, and other problems which could compromise/contaminate PPE,
- e) Washing promptly if skin contact is made with any chemical, regardless of corrosiveness,
- f) Washing well before leaving the laboratory, and

- g) Changing clothes as soon as possible after leaving the laboratory (if no locker rooms are available) and laundering work clothes often.

5.1.3 Food, Drinks, and Tobacco

Eating, drinking, or use of tobacco is not permitted in areas where chemicals are either stored or used. Because chemical vapors can be absorbed by foodstuff (especially bread and tobacco), no food or tobacco products are allowed in chemical areas.

Refrigerators, freezers, glassware or utensils intended for laboratory use shall not be used for the consumption, storage, or handling of food or beverages. Such items should be labeled accordingly.

5.1.4 Personal Protective Equipment (PPE)

The CEMRC, or contract entity, provides appropriate PPE (e.g., eyewear, lab coats, gloves, aprons, face shields, dust masks, etc.). It is the responsibility of each employee to be certain that the appropriate equipment is worn as necessary.

The most fundamental piece of personal protective clothing is the normal clothing worn in the laboratory. Clothing should be worn to minimize exposure of skin surfaces by direct contact or splashing of hazardous chemicals.

The minimum PPE required for entry into any room or area designated as a laboratory and/or any other rooms/locations where “laboratory use of hazardous chemicals” occurs is safety glasses with side shields.

The minimum PPE required for performing laboratory operations where hazardous chemicals are involved is:

- a) Eye protection specified by the Laboratory Supervisor.
Note: Must be at least safety glasses with side shields,
- b) Long-sleeved lab coat, and
- c) Close-toed footwear (i.e. no sandals or other open-toed footwear).

Laboratory workers should inspect PPE prior to use and observe the guidelines for proper use of the equipment discussed in Section 4.4.6.

5.1.5 Housekeeping

Common housekeeping practices contribute greatly towards chemical hygiene and safety. A clean work area is much safer than a cluttered or dirty one. Some appropriate housekeeping measures include:

- a) Keep all aisles and hallways clear of all chemicals,

- b) Keep all work areas and especially workbenches clear of clutter and obstructions,
- c) All working surfaces and floors should be cleaned regularly,
- d) Access to emergency equipment, showers, eyewashes, and exits must never be blocked by anything,
- e) Wastes shall be kept in the proper containers and labeled properly,
- f) All chemicals shall be placed in proper storage areas by the end of each workday,
- g) All chemical containers shall be labeled with both the identity of the chemical and its hazards, and
- h) All spills should be promptly cleaned up and the spilled chemical properly disposed of.

5.1.6 Prior Approval

Prior approval may be required to perform **non-routine work or tasks**, involving hazardous chemicals, materials or locations. Refer to SM-02, *Hazard Communication/Right-To-Know Program*, for requirements.

5.1.7 Spills and Accidents

Spills of toxic substances or accidents involving any hazardous chemical(s) should be resolved immediately. In emergency situations, where a fire or explosion occurs, when the need for immediate medical attention arises, or if a chemical or radiological spill threatens safety and health, refer to SM-01, *Emergency Action Plan*, for the proper emergency response procedure.

In the event of any spill, the responsible employees may carry out cleanup when:

- a) The Laboratory Supervisor or CEMRC CHO determines that the spill DOES NOT pose a threat to laboratory workers, other occupants of the building, or the environment,
- b) Training has been provided and documented on proper mitigation procedures,
- c) Appropriate PPE has been designated, and
- d) Appropriate absorbents/adsorbents and neutralizers are available.

After mitigation and containment are complete, notify the CEMRC CHO to move all waste in the appropriate transfer containers to the Waste Accumulation Area (WAA).

5.2 Waste Chemicals

Chemical wastes are regulated by the Environmental Protection Agency under the Resource Conservation and Recovery Act and its amendments.

5.2.1 Hazardous waste management

The CEMRC is a conditionally exempt small quantity generator (CESQG) status by (a) limiting waste generation to <100 kg of hazardous and <1 kg of acutely hazardous waste monthly, and (b) limiting total accumulated amounts to <1000 kg hazardous waste and <1 kg of acutely hazardous waste ([40 CFR 261.5](#)). To maintain status as CESQG, all hazardous waste generated must be characterized by testing or process knowledge ([40 CFR 262.11](#)) and records of such characterization must be maintained.

Note: At no time shall more than 1000 kg of hazardous waste, 1 kg of acutely hazardous waste or 100 kg of acute hazardous waste spill cleanup debris be accumulated before disposal.

All waste designated for disposal as hazardous industrial waste by a licensed contractor will be characterized and labeled as "Hazardous Waste". In cases of an in-lab accumulation container, the container should have the date accumulation began, and when filled, the final date of accumulation along with a general description of the container contents. The container and waste should meet the following:

- a) The waste being placed in the container should be compatible with the container and other wastes already in the container
- b) The container should be in good condition
- c) A container holding hazardous waste should always be kept closed during accumulation except when it is necessary to add or remove waste
- d) Secondary containment will be provided during accumulation
- e) When the container is full or no longer in use, Laboratory Supervisors or workers should make arrangements with the CEMRC CHO to move the waste to the WAA.

Discharge into the plumbing and sewers, incineration, or addition to mixed refuse, of the following substances is prohibited:

- a) Concentrated acids and bases
- b) Highly toxic substances listed in [29 CFR 1910.119 App A](#)
- c) Malodorous, or lachrymatory substances
- d) Any chemical meeting the definition of hazardous or toxic waste and listed in the 'P' and 'U' series of [40 CFR 261](#)

- e) Any hazardous substance that might interfere with the biological activity of waste-water treatment, create fire or explosion hazards, cause structural damage or obstruct flow to plumbing

5.2.2 Non-hazardous chemical waste management:

The CEMRC generates, as part of routine instrumental measurements of inorganic constituents, liquid wastes containing non-hazardous concentrations of various metals, as determined by the Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act and its amendments. However, commitments were made to the community that “chemical wastes” would not be disposed of to the plumbing and municipal sewage. Therefore, these wastes are collected and neutralized, and disposed of as non-hazardous industrial waste by a licensed contractor.

5.3 Procedure-Specific Safety Practices

Written laboratory procedures normally have a brief description of specific safety practices for that particular procedure. Laboratory personnel shall read and review those practices before commencing with a procedure.

5.4 Control Measures and Equipment

Chemical safety is accomplished by awareness of the chemical hazards and by keeping the chemical under control through a variety of safeguards and engineered controls. Laboratory personnel should be familiar with these controls, and Laboratory Supervisors should be able to detect their malfunction. All engineered controls should be properly maintained, inspected on a regular basis, and never overloaded beyond their design limits.

5.4.1 Fume Hoods

Fume hoods **should** provide, on average, a minimum of **80** linear feet per minute of airflow or will be tagged out of service. When using a fume hood the worker should be aware that:

- a) The minimum face velocity for any exhaust hood should not be less than **80** linear feet per minute with sash in the half open position, **18”**.
- b) Fume hood sashes shall be lowered at all times except when doing any work in the hood.
- c) The apparatus inside the hood should be kept towards the rear of the hood to prevent vapors from escaping.
- d) The hood sash shall be adjusted according to the specific characteristics of the chemical(s) inside the hood (e.g., venting at the top or bottom sides is for chemicals of low and high vapor density, respectively).

- e) The storage of chemicals in fume hoods should be minimized to those amounts necessary for one operation or shift. An exception can be made for temporary placement in hoods of highly volatile/noxious/toxic materials in containers that may not be vapor tight and when placement in the hood does not interfere with normal hood operations. Inform the CEMRC CHO of any special storage needs.
- f) Evaporation of volatile hazardous or toxic waste materials in a chemical hood for the purpose of disposal is prohibited.
- g) The vent ducts and fans should be kept clean and clear of obstructions.
- h) The fume hood should remain "on" at all times when a chemical is inside the hood, regardless whether any work is being done in the hood.
- i) Personnel should be aware of steps to take in case of power failure or other causes of fume hood failure.

5.4.2 Chemical Storage Safeguards

Laboratory personnel should be aware that:

- a) Large bottles should be stored no more than two feet above ground level.
- b) Chemicals should be segregated by compatibility. Refer to the chemical MSDS/SDS or other appropriate reference to determine compatibility.
- c) Highly toxic liquid chemicals should be stored in unbreakable secondary containers or other form of secondary containment. For the purposes of this section, "highly toxic" is defined as any material having either the signal word "DANGER!" on the container label or MSDS/SDS, an $LD_{50} \leq 50$ mg/kg, a National Fire Protection Association (NFPA) health hazard classification of 3 or 4, or a NFPA storage color of blue which indicates the principle health hazard is Toxic.
- d) Short-term storage of compressed gas cylinders in use in the laboratories shall be in accordance with the requirements of the NMSU Guide to Laboratory Safety, Ch. 6 and [29 CFR 1910.101](#).
- e) Long-term storage of compressed gas cylinders should not occur in the laboratories. Cylinders of compressed gases should be stored in a designated gas cylinder storage area.

5.4.3 Flammable Storage Safeguards

Flammable and combustible liquids shall be properly stored in compliance with [29 CFR 1910.106](#). Under this regulation, storage cabinets of approved design and construction shall not hold more than 60 gallons of class I (IA, IB, IC) or Class II liquids, nor more than 120 gallons of Class III liquids. Always read the manufacturer's information of engineered safeguards and follow some prudent safety practices such as:

- a) Store only compatible materials inside the cabinet.

- b) Store chemicals of similar vapor density together when using mechanical ventilation (e.g., heavier than air vapors are vented through the bottom vent and lighter than air vapors through the top vent).
- c) Do not store paper or cardboard inside cabinets with the chemicals.
- d) Do not overload the cabinet.
- e) Protect against sources of ignition.
- f) Store in original container or in cans or containers specifically designed for the chemical.

5.4.4 Corrosive Chemical Storage Safeguards

Laboratory personnel should be aware that:

- a) All corrosive chemicals should be kept in cabinets especially designed to hold them.
- b) Care should be taken to separate acids from bases by distance or barrier.
- c) Mineral acids should be separated from flammable and combustible materials.
- d) Acid-resistant trays should be placed under bottles of mineral acids or mineral acids should be stored in a cabinet lined with an acid resistant material.
- e) Acid-sensitive materials such as cyanides and sulfides should be separated from acids or protected from contact with acids.

5.4.5 Eyewashes and Safety Showers

Wherever chemicals have the possibility of damaging the skin or eyes, an emergency supply of water must be available. All laboratories should have eyewashes and safety showers readily available. As with any safety equipment, these can only be useful if they can be used, therefore:

- a) Keep all passageways to the eyewash and shower clear of any obstacle (even a temporarily parked chemical cart).
- b) Laboratory eyewashes and drench hoses should be checked quarterly to verify proper operation.
- c) Safety showers should be checked quarterly to verify proper operation.

5.4.6 Protective Apparel

Protective clothing was briefly discussed in Section 4.1.4. Some additional information about the use of protective clothing includes:

Gloves - Employees should use appropriate hand protection when there is a risk that hands are exposed to hazards such as those from skin absorption or contact of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes. The gloves should be of a material compatible with their usage. Gloves used for handling chemicals should be inflated (by whipping it in air, not by mouth inflation) to check its integrity before each use.

Safety Glasses – Offer protection when working with solid materials. When more protection is needed when working with liquid chemicals, one of the alternatives listed below should be considered.

Goggles - Form the liquid proof seal around the eyes necessary when working with liquid chemicals.

Face-Shield - For more hazardous chemicals, corrosives, and hot chemicals, a face-shield should be worn over the safety glasses/goggles. The glasses/goggles protect the eyes in case a splash is from the side or beneath the shield.

Laboratory Coat - Long sleeved coats offer the wearer minimal skin protection against minor splashes, allowing the chemical something to react with before the skin, and offering the victim time to remove the coat and shower.

Apron - Rubberized aprons worn over a laboratory coat offer additional time to react to the splash than the coat alone. Arm guards should be worn when using an apron.

5.4.7 Respirators

Adequate local and exhaust ventilation exist for CEMRC operations. Therefore, a respirator program at the CEMRC is not required at this time. However, the CEMRC will evaluate a written respirator program in compliance with 29 CFR 1910.134 as warranted.

5.4.8 Vapor Detection

Because odor thresholds can be greater than the exposure limits, odors are not to be used as the primary means of vapor detection. If suspicious odors are noticed, contact your supervisor or the CEMRC CHO immediately.

5.5 Special Procedures for Select Carcinogens, Reproductive Toxins, and Substances that have a High Degree of Acute Toxicity

Exposures to select carcinogens and reproductive toxins (defined in [29 CFR 1910.1450](#)), and substances that have a high degree of acute toxicity, have an additive and possibly synergistic impact on risk. To limit the possible exposures, the CEMRC has specific procedures and precautions that must be followed for work with these types of substances.

5.5.1 Regulated and Controlled Work Areas

Signs displaying "Authorized Personnel Only" are posted at entrances to the CEMRC laboratories and access will be restricted. Only designated personnel are permitted access to the laboratories.

5.5.2 Engineering Controls

Personnel shall use adequate general or local exhaust ventilation to keep airborne concentrations below any permissible exposure limits.

5.5.3 Handling of Waste

Specific disposal considerations will comply with federal, state, and local hazardous waste regulations.

5.5.4 Personal Hygiene

Laboratory workers should take extra precautions to maintain good personal hygiene including changing gloves and/or washing hands after handling chemicals or before exiting the laboratory.

5.5.5 Protection of Vacuum Systems

To protect vacuum lines and pumps, High-Efficiency Particulate Air (HEPA) filters or high efficiency scrubber systems should be used to prevent contamination when applicable.

5.5.6 Protective Apparel

Personnel shall use proper PPE as indicated on the MSDS/SDS or from other sources of information.

5.5.7 Additional Precautions

To avoid expense and excessive inventory, chemical purchases should reflect the minimum quantity needed to provide uninterrupted operation. To reduce potential exposure, work should be performed with the smallest amount of chemical feasible.

6.0 CRITERIA FOR CONTROL MEASURES

This section examines criteria and guidelines that can or will be used to determine the use of engineered controls and PPE. Personnel must follow any special precautions specified by the CEMRC Safety Committee and implemented by the Laboratory Supervisors.

6.1 Exposure-Prevention Guidelines

Use the engineering control guidelines and suggested PPE outlined in the MSDS/SDS available for each hazardous chemical at the CEMRC for appropriate exposure-prevention guidelines.

6.2 Fire Guidelines

In general, a flammable chemical is determined by its flash point, the lowest temperature at which an ignition source can cause the chemical to ignite momentarily. Although the lowest temperature at which the chemical will catch fire with an ignition source is called the "fire point," it is rarely more than one or two degrees greater than the "flash point." Therefore, the flash point will be used as the reference of "fire hazard" here at the CEMRC.

OSHA and NFPA have guidelines on when a chemical is considered flammable. Those guidelines are herein adopted for use in the laboratory.

"Flammable" is generally used to refer to chemicals with a flash point below 100 degrees Fahrenheit (F). Chemicals with flash points between 100 and 200°F are termed "Combustible". Combustible chemicals have caused buildings to burn down; therefore, any chemical with a flash point below 200°F will be considered a "fire hazard" and will be stored in a flammable solvent storage area or flammable storage cabinet. They will be used in a vented fume hood, away from any source of ignition.

More detailed discussions on fire hazards can be found in OSHA's regulations ([29 CFR 1910.106](#)) and local fire codes.

6.3 Reactivity Guidelines

While the NFPA has developed some guidelines on what constitutes a reactive chemical, their emphasis is centered on a fire emergency.

Other guidelines on which chemicals are reactive can be found in regulations from the U.S. DOT (49 CFR) and the U.S. Environmental Protection Agency (40 CFR).

At the CEMRC, a reactive chemical is one that is:

- a) Ranked by NFPA as 3 or 4 for reactivity.
- b) Determined by the U.S. D.O.T. as either:
 - i. An oxidizer
 - ii. An organic peroxide
 - iii. An explosive (Classes A, B, or C)
- c) Fits the U.S. EPA definition of reactive in 40 CFR 261.
- d) Fits the OSHA definitions of unstable or polymerizable.
- e) Is found to be reactive with ordinary substances.

Once a chemical has been determined to be reactive, all proper safety precautions will be used including extra segregation in storage and prohibition on mixing with other chemicals without appropriate personal protection and precautions.

6.4 Corrosivity and Contact Hazards

A corrosive chemical is defined by OSHA, DOT, and EPA. So the CEMRC will consider a chemical corrosive if it fits the definition of corrosive found in regulations by:

- a) OSHA (29 CFR)
- b) DOT (49 CFR)
- c) EPA (40 CFR)

A skin or eye contact-hazard chemical is one where the chemical's route of entry for its toxic effects is through the skin or eyes. Chemicals will be determined as contact hazards by examining the MSDS/SDS and/or medical and industrial hygiene literature.

7.0 MEDICAL CONSULTATIONS AND DOCUMENTATION

7.1 Medical Consultation

The CEMRC provides all employees who work with hazardous chemicals the opportunity to receive medical attention if they have been exposed to a hazardous chemical. Medical consultations and examinations will be provided without cost to the employee, without loss of pay, and at a reasonable time and place. Medical consultations and examinations shall be administered by or under the direct supervision of a licensed physician.

The consulting or examining physician shall provide the employee and NMSU with a medical report and written opinion that includes the following:

- a) Recommendations for further medical follow-up.
- b) Results of the medical exam or consultation and any associated test results.
- c) Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous workplace.
- d) A statement that the employee has been informed by the physician of the results of the consultation or examination including any recommendation for further examination or treatment.

Note: The written opinion should not reveal specific findings of diagnoses unrelated to occupational exposure.

7.2 Documentation

All memos, notes, and reports related to a complaint or incident of possible exposure to toxic substances should be maintained in a file by the CHO, or a designated member of the Safety Committee, for easy retrieval with a cross-reference in the victim's personnel file. All on-the-job accidents or injuries must be reported immediately to the injured employee's supervisor by completing and submitting the 'Notice of Accident' form, whether or not medical care is needed. An 'Employer's First Report of Injury or Illness Form' and a 'Supervisor's Accident Investigation Report Form' will be completed by the supervisor for injuries requiring medical care. All three forms can be found in SM-01, *Emergency Action Plan* and are to be sent to the NMSU Personnel Office within 24 hours. Copies of all 'Employer's First Report of Injury or Illness' forms and 'Supervisor's Accident Investigation Report' forms are sent to the NMSU Safety Office by the NMSU Personnel Office. The NMSU EH&S office monitors all accidents and may conduct an investigation. For more on reports and record keeping, see Section 8.0.

8.0 EMPLOYEE INFORMATION AND TRAINING

8.1 Informational Requirements

The CEMRC will inform employees of:

- a) The existence, location and availability of the CHP,
- b) [29 CFR 1910.1450](#) and its appendices,
- c) The criteria to select, use, and the limits of PPE,
- d) Exposure limits as specified in [29 CFR 1910.1000](#),
- e) The emergency procedure and the location of emergency equipment, and
- f) The location of available reference materials including the MSDSs/SDSs.

8.2 Training Under 29 CFR 1910.1450

CEMRC training under [29 CFR 1910.1450](#) will include the following:

- a) Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc).
- b) The physical and health hazards of chemicals in the work area.
- c) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and PPE to be used.
- d) The signs and symptoms associated with exposure to hazardous chemicals used.

All personnel working in the CEMRC laboratories are required to read the CHP and will be given the opportunity to discuss any details of the CHP as part of training.

Laboratory Supervisor's will train all employees working in their laboratories about practices, procedures, hazards, etc., specific to their program areas.

9.0 RECORDS AND RECORDKEEPING

9.1 Records

CEMRC will establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests, reports, or written opinions as required in [29 CFR 1910.1450](#). In addition, records will be kept for:

- a) Surveillance and audit results
- b) Incident reports
- c) Training

9.2 Recordkeeping

Records of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests, reports, or written opinions will be maintained as required in [29 CFR 1910.1020](#).

10.0 REFERENCES

NMAC 20.3, New Mexico Radiation Protection Regulations

OSHA Laboratory Standard 29 CFR 1910

SHA Laboratory Standard 40 CFR 261

OSHA Laboratory Standard 49 CFR 261.5

SM-01, Current Revision, *Emergency Action Plan*, Carlsbad Environmental Monitoring & Research Center

SM-02, Current Revision, *Hazard Communication/Right To Know Program*, Carlsbad Environmental Monitoring & Research Center

SM-05, Current Revision, *Radiation Safety Manual*, Carlsbad Environmental Monitoring & Research Center

U.S. Department of Transportation, 49 CFR

11.0 APPENDIX

Appendix A: Chemical Procurement Form

12.0 REVISION HISTORY

<u>Revision #</u>	<u>Date</u>	<u>Description</u>
0	10/15/02	Initial document
1	04/13/05	Biennial review and revision
00	08/01/06	Removed from Document Control Program (old document control number was CP-PLAN-020)
01	10/12/07	Annual review and revision
02	10/01/08	Annual review and revision; no changes
03	10/15/09	Annual review; added signature lines on page 1
04	02/11/11	Revised Chemical Procurement Form
05	12/17/12	Annual review, major reformatting, and minor changes
06	12/15/14	Biennial review, minor changes
07	12/14/16	Biennial review, minor changes
08	01/07/19	Biennial review, minor changes
09	11/3/20	Biennial review

APPENDIX A:
CARLSBAD ENVIRONMENTAL MONITORING & RESEARCH CENTER
Chemical Procurement Form

Requested By: _____

Laboratory Manager: _____

Purchase Request Date: _____

Name of chemical:				
Chemical concentration: (ppm, molarity, normality, percentage, etc.)				
CAS #(s):				
Storage room # or location:				
Chemical is supplied in units of:				
Number of units requested:				
Total amount of chemical requested:				
Signature of person receiving chemicals:				
Date received:				

Requester MUST complete all requirements below and secure all signatures prior to approval of chemical order:

- Is this the first time your group has ever ordered any of the chemicals listed on this procurement?
 Yes **No** *(If yes, provide a copy of the SDS/MSDS's to the CHO)*
- Are the corresponding Safety Data Sheets (SDS/MSDS) on file in your laboratory notebook?
 Yes **No**
- If any chemicals listed on this procurement form is/are flammable or combustible as defined in this CEMRC Chemical Hygiene Plan (SM-03), will the designated cabinet and/or room storage limits be exceeded?
 Yes **No** **Non-flammable**
- Are there any specific procedures, precautions, or provisions for additional employee protection not listed in this CEMRC Chemical Hygiene Plan (SM-03)?
 Yes **No** *(If yes, list on an attached sheet)*

Requester's signature: _____

Date: _____

Lab Manager or designee signature: _____

Date: _____

CHO or designee signature: _____

Date: _____