

C-1. CHEMICAL HYGIENE PLAN

I. SCOPE

The Chemical Hygiene Plan applies to all NCI-Frederick operations involving laboratory use of hazardous chemicals as defined in 29 CFR 1910.1450. This definition follows below.

II. PURPOSE

To ensure laboratory employees using hazardous chemicals are:

- (1) provided a safe and healthful work environment;
- (2) receive the necessary information and training to perform their job safely, and
- (3) comply with the Occupational Health and Safety Administration (OSHA) Laboratory Standard (29 CFR 1910.1450).

III. DEFINITIONS

Action Level – A concentration specified in 29 CFR Part 1910 for a specific substance, calculated as an 8-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Chemical Hygiene Plan – An implemented written program which describes procedures, equipment, personal protective equipment and work practices, capable of protecting employees from health hazards presented by hazardous chemicals used in the laboratory.

Designated Area - An area which may be used for work with “select carcinogens”, reproductive toxins, or substances which have a high degree of acute toxicity. A designated area may comprise an entire laboratory room, a fume hood or glove box.

Hazardous Chemical - Any chemical which poses a physical or health hazard under typical use or storage conditions.

Laboratory Employee - An individual employed in a laboratory who may be exposed to hazardous chemicals in the course of his/her assignments.

Laboratory Use of Hazardous Chemicals - The handling or utilization of relatively small quantities of hazardous chemicals on a non-production basis, and in which:

1. Chemical containers may be safely and easily manipulated by one person;
2. Multiple chemical procedures or chemicals are used; and
3. Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Permissible Exposure Limit (PEL) – OSHA defined (29 CFR 1910 subpart Z) limits for safe employee exposure to toxic and hazardous substances.

Reproductive Toxins - Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

Select Carcinogens - Substances regulated by OSHA as carcinogens, listed under the category "known to be carcinogens" in the Annual Report on Carcinogens published by the National Toxicology Program, or listed in Group 1, 2A, or 2B by the International Agency for Research on Cancer (IARC) Monographs.

Substances With a High Degree of Acute Toxicity - A chemical falling within any of the following categories:

1. A chemical that has a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each;
2. A chemical that has a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each; or

3. A chemical that has a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

IV. **RESPONSIBILITIES**

A. Supervisor:

1. Notifies EHS of the use of hazardous chemicals to request exposure monitoring because he/she has reason to believe the exposure levels for that substance may exceed the action level or, in the absence of an action level, present a physical or health hazard.
2. Identifies to EHS each new laboratory operation, activity, or equipment installation which may introduce a new hazard into the work place.
3. Develops a written standard operating procedure (SOP) for laboratory operations or activities that are not addressed in the general laboratory safety rules within Section G of this Chemical Hygiene Plan or in the NCI-Frederick Safety and Health Manual. Assistance is available from EHS.
4. Ensures that training has been provided for new employees and for existing employees exposed to new hazards. Training is provided by the supervisor and is documented. (See Section V.C.3).
5. Refers employees to OHS when the employee suspects that he or she may have been overexposed to a chemical.
6. Enforces the requirements and practices contained in this procedure and any program-specific SOPs and documents testing.

7. Ensures that ANSI-approved emergency eyewash units in areas under their control are tested monthly to flush the line and verify proper operation. Documents this testing on an inspection tag attached on or near the eyewash.
- B. Employee
1. Immediately informs supervisor, EHS, and reports to OHS when overexposure to a chemical is suspected or a chemical is present in concentrations irritating to the senses.
 2. Uses information and training received and follows general laboratory safety practices to protect themselves and their fellow workers against undue exposures to hazardous chemicals.
- C. Building Manager
1. Tests ANSI-approved emergency eyewash units in common-use areas (e.g., hallways) monthly to flush the lines and verify proper operation. Documents this testing on an inspection tag attached on or near the eyewash.
- D. Facilities Maintenance and Engineering (FME):
1. Evaluates local exhaust systems every 6 months, or as needed after repairs or maintenance, and maintains a record of test results and ventilation system modifications.
 2. Tests emergency showers semi-annually to flush the line and to verify proper operation, and documents this testing on a tag attached to each shower unit.
- E. Occupational Health Services (OHS):
1. Provides or refers employees for medical consultation whenever an employee self-refers or is referred by EHS or the supervisor in the event of a potential overexposure

to a chemical. A written finding from the OHS clinician must be maintained.

2. Maintains a record of and provides restricted access to employee exposure measurements and any medical consultation or examinations, in accordance with 29 CFR 1910.20, Access to Employee Exposure and Medical Records.
3. Maintains all employee medical and exposure records for duration of employment plus 30 years.

F. Environment, Health and Safety Program (EHS):

1. Designates personnel responsible for implementation of the Chemical hygiene Plan including the assignment of a Chemical hygiene Officer (CHO). The CHO is the Industrial hygiene Safety Officer, Greg Ragan.
2. Coordinates the measurement and documentation of employee exposure to any substance that the supervisor or EHS have reason to believe may exceed the OSHA action level, the OSHA Permissible Exposure Limit (PEL), or in absence of an OSHA PEL, the ACGIH Theshold Limit Value (TLV).
3. Notifies affected employees in writing of the results of air monitoring within 15 working days after the results are established.
3. Maintains a copy of employee monitoring results in EHS files. One copy of the monitoring results will be maintained in the employee's medical record.
4. Consults with Occupational Health Services (OHS) in the event of suspected employee overexposure to a chemical.
5. Trains employees on the details of the NCI-Frederick Chemical Hygiene Plan and Laboratory Safety Program, general hazards posed by chemicals and by processes

used/performed, and methods to reduce the chance of accident or exposure.

6. Reviews standard operating procedures provided by supervisors describing any new laboratory operation, activity, or equipment installation to ensure compliance with applicable environmental and safety laws and regulations.

V. PROCEDURES

A. Permissible Exposure Limits (PEL)

For laboratory uses of OSHA-regulated substances, the NCI-Frederick will ensure that laboratory employees' exposures to such substances do not exceed the PELs specified in 29 CFR Part 1910, Subpart Z or in the absence of a OSHA PEL the American Conference of Governmental Industrial Hygienist (ACGIH) Threshold Limit Values (TLV).

B. Employee Exposure Determination

1. Initial Monitoring: EHS will coordinate the measurement of employee exposure to any substance which EHS or the supervisor has reason to believe the exposure levels for that substance may exceed the action level, or in the absence of an action level, the PEL. Final determination of air monitoring needs will be made by the Director, EHS.
2. Periodic Monitoring: If initial monitoring discloses employee exposure over the action level or, in the absence of an action level, the PEL, the NCI-Frederick will immediately initiate measures to comply with the periodic monitoring provisions of the applicable standard.
3. EHS will notify affected employees in writing of the results of initial or periodic monitoring within 15 working days after the results are established.

C. Employee Information and Training

1. Initial orientation/training of permanent or temporary laboratory employees with exposure to hazardous chemicals will be provided by EHS. Supervisors will coordinate with EHS to develop any additional job-specific training required for new employees and for employees exposed to new chemical hazards. Employees must complete training prior to working with or around hazardous chemicals.
2. In addition to the information provided in Section C-6 "Employee Right-to-Know: Non-Laboratory Operations", during New Employee Training, laboratory employees will be instructed on the:
 - a. Content and availability of the Chemical Hygiene Plan and requirements of the OSHA Laboratory Standard (29 CFR 1910.1450).
 - b. Function of PELs established by OSHA for certain substances and the responsibility for evaluating worker exposures.
 - c. Requirement to immediately report to the supervisor or EHS incidents where the employee feels he or she has been overexposed to a chemical or if a chemical is thought to be present in concentrations irritating to the senses.
3. Periodic supplemental training will be available to appropriate employees whenever a new hazard is introduced into their work area(s) and whenever new, significant information is received about chemicals already in their work area(s). The supervisor will coordinate delivery of this training with EHS, and EHS will provide general refresher information using Safetygrams or lectures, as appropriate.
4. All training must be documented with:
 - a. A sheet signed by participating employees;

- b. A description of topics covered (or a copy of materials presented);
 - c. The date training was given;
 - d. A course outline.
5. Subcontractors with exposure to hazardous chemicals from NCI-Frederick operations (laboratory or elsewhere) are referred to training requirements as described in Section C-6 "Employee Right-to-Know: Non-Laboratory Operations". Subcontractors are responsible for training their employees on their internal procedures in accordance with OSHA regulations. Subcontractors must train their personnel prior to commencement of work at the NCI-Frederick.
6. Subcontractors must provide the subcontract manager (i.e., generally this is the COTR for a construction project) with MSDSs for each product brought on-site to which NCI-Frederick employees may be exposed.

D. Medical Consultation and Examination

1. Employees working with hazardous chemicals will be provided medical attention under the following circumstances:
- a. Whenever an employee develops signs or symptoms of overexposure to a hazardous chemical to which the employee may have been exposed in the laboratory, the employee will be provided an opportunity to receive an appropriate medical examination.
 - b. Where exposure monitoring reveals an exposure level routinely above the action level or, in the absence of an action level, the PEL (for which there are medical surveillance requirements), medical surveillance will be provided for the affected employee as prescribed by the applicable OSHA standard.

- c. Whenever an event takes place in the laboratory, such as a spill, fire, or other occurrence resulting in the likelihood of overexposure, the employee will be provided an opportunity for a medical consultation. Such consultation will be for the purpose of determining the need for a medical examination.
2. All medical examinations and consultations will be performed by or under the direct supervision of a licensed physician and will be provided without cost to the employee, without loss of pay, and at a reasonable time and place.
3. For medical consultation or consultation required under the Laboratory Standard, Occupational Health Services (OHS) will provide or obtain from the examining clinician a written opinion which will include:
 - a. Any recommendation for further medical follow-up;
 - b. The results of medical examination and any associated tests;
 - c. 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;
 - d. A statement that the employee has been informed by the clinician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

Note: The written opinion shall not reveal specific findings or diagnosis unrelated to occupational exposure.
4. OHS will maintain, for each employee affected by the OSHA Laboratory Standard, an accurate record provided by EHS of any measurements taken to monitor employee exposures and medical consultation and examinations, including written opinions. All monitoring and medical records are to be maintained for the duration of employment plus thirty years.

E. Hazard Identification

1. Incoming Materials: Labels on incoming hazardous chemicals shall not be removed or defaced and MSDSs will be available as described in Section C-6 of the Health, Safety & Environmental Compliance Manual "Employee Right-to-Know: Non-Laboratory Operations".
2. Laboratory Generated Materials: The supervisor will ensure that all laboratory-generated materials are properly labeled. If the laboratory-generated materials will be used outside of the immediate laboratory where they were generated, the supervisor will ensure that a warning label and identification of the substances(s) are attached and that a MSDS is available. Questions on appropriate labeling and MSDSs should be referred to EHS.

F. Use of Respirators

Where EHS determines that the use of respirators is necessary to maintain exposure below PELs, the NCI-Frederick will provide, at no charge to the employee, the proper respirator. Training, fit-testing, and medical surveillance will be provided, and respirators will be selected and used in accordance with the requirements of 29 CFR 1910.134, OSHA Respiratory Protection Standard and the Section C-11 Respiratory Protection Program.

G. Laboratory Safety

NCI-Frederick laboratory safety rules will be followed by all employees. These rules can be found elsewhere in this manual. A synopsis of the basic rules follows:

1. Working alone with hazardous chemicals in the laboratory is highly discouraged.
2. Food, including beverages, shall not be stored or consumed in lab areas where chemicals are used or stored.
3. Food and beverages will not be stored in laboratory refrigerators.

4. Work areas must be kept clean and free of obstructions (minimum 28" aisles).
5. Pipetting by mouth is forbidden.
6. Laboratory employees handling chemicals must wash hands thoroughly with soap and water before leaving the laboratory area and before eating or drinking.
7. Application of cosmetics, etc. in labs where chemicals are used or stored is prohibited.
8. Protective lab clothing such as coveralls or lab coats can become contaminated and shall not be worn in administrative areas or outside a lab facility.
9. Chemical Storage
 - a. No chemicals will be kept on or in desks unless desks are considered part of the lab area.
 - b. Incompatible materials shall be physically separated in storage. For example:
 - i. Oxidizers from flammables and organic acids;
 - ii. Acids from bases and flammables;
 - iii. Water-reactive chemicals from potential water sources and flammable liquids.
 - c. All chemicals that may form peroxides when exposed to air shall be labeled with the date of receipt, date opened, and expiration date (outdated material is to be recycled or disposed of through EHS). It is recommended that unopened containers of peroxide forming chemicals be disposed of within one year and opened containers within six months.

- d. All vessels holding hazardous chemicals, including transfer containers and transfer lines, must be properly labeled in accordance with Section C-6 Employee Right-to-Know.
- e. Flammable liquids not in immediate use must be stored inside an approved flammable liquid cabinet. If refrigerators are used to store flammable liquids, they must be "explosion proof" or "laboratory safe" as defined in NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals.
- f. Broken or chipped glassware shall not be used in the laboratory and must be disposed of in labeled waste containers, specifically designated as a broken glass receptacle.
- g. All compressed gas cylinders (empty or full) shall be secured at all times and capped when not in use.

9. Waste Disposal

All chemicals shall be disposed of in accordance with Section D-1 Waste Management and Section D- 2 Hazardous Waste Disposal.

10. Emergency Procedures

Emergency Procedures to be followed in the event of a fire, medical emergency, chemical spill, or utility outages are contained in Section B-1 Emergency Response Procedures.

11. Accidents

- a. Accident reporting procedures to be followed in the event of a work-related accident are contained in Section B-2 Accident Reporting.
- b. Accessible ANSI-approved emergency eyewash units and shower equipment shall be available for use in the event of chemical contamination of skin or clothing. ANSI-approved emergency eyewash units shall be

inspected monthly as described in the C-1 IV Responsibilities, and emergency showers shall be inspected semi-annually by FME. Inspections will be documented on tags (available from EHS) attached to the eyewash or shower.

12. Control Methods

- a. The lab's general ventilation system is not to be relied on for protection from airborne contaminants. Local exhaust systems are to be used as the primary method of control.
- b. Lab hoods must be used when handling or working with hazardous chemicals where there is the possibility of inhalation exposure. Hood face velocity must be in compliance with Section C-13, Laboratory Ventilation Management Program.
- c. Alterations or modifications of the ventilation systems are permissible only if it is determined that adequate employee protection from inhalation exposures will be maintained.
- d. Local exhaust systems will be evaluated semi-annually by FME. Additional ventilation checks will be conducted as needed (i.e., after repairs or modifications to exhaust fan or ductwork). A record of results and modifications will be maintained by FME and made available to EHS.

13. Personal Protective Equipment

- a. ANSI-approved eye/face protection, as appropriate to the hazard, shall be worn when working with materials or processes that pose potential eye hazards. It is incumbent upon the lab supervisor to determine which materials and processes pose potential eye hazards.
- b. Chemical goggles or face shields with safety glasses will be worn when there is a possibility of exploding/implosion equipment (i.e., equipment under vacuum or pressure) or chemical splash.

- c. Protective clothing (i.e., gloves, aprons, lab coats) shall be used when there is potential for skin contact with hazardous chemicals from spills or splashes. Wearing protective clothing is prohibited from administrative areas.
- d. Refer to Sections C-11, Respiratory Protection Program and C-12, Personal Protective Equipment for further information.

14. New Procedures and Equipment

Any new laboratory operation, activity, or equipment installation that is likely to introduce new chemical hazards requires prior approval. It is incumbent upon the supervisor to notify EHS of relevant procedural or equipment changes prior to start up.

15. Designated Areas

- a. All chemicals of high acute toxicity, select carcinogens, or reproductive toxins shall be handled in “designated areas”. All laboratory areas at NCI-Frederick are classified as designated areas, unless exempted by EHS. Unescorted entry into designated areas is restricted to those employees instructed on the hazards and handling procedures specific to the operations performed, and hazardous chemicals present, in the areas.
- b. Non-laboratory employees (e.g., FME, Warehouse, or Property) may not work in designated areas or work on equipment which has been removed from designated areas unless a Work Authorization Tag has been prepared and signed. Other individuals should call one of the contacts noted on the laboratory door sign for escorted entry or training.