Highly Hazardous Chemicals Program

Purpose

This program outlines the additional provisions for employee protection for work with particularly hazardous substances, such as select carcinogens, reproductive toxin, and substances that have a high degree of acute or chronic toxicity. This program is part of the University’s compliance with occupational health standards set by the standard “Part 350. Carcinogens”.

Scope

This program applies to Western Michigan University employees who perform or supervise activities in laboratories.

Definitions

A. **Highly Hazardous Materials**: Select carcinogens, reproductive toxins, and highly acute and chronic chemicals.

B. **Chemicals with a high degree of acute and chronic toxicity**: Chemicals with a high degree of acute toxicity are chemicals that have a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight or a median lethal concentration (LC50) of 200 parts per million when administered to albino rats weighing between 200 and 300 grams each.

C. **LD50**: That dose at which a lethal response is observed in 50% of the test animals.

D. **Permissible Exposure Limit (PEL)**: The MIOSHA airborne exposure limit for chemicals—either 8-hour time weighted averages (TWA’s) or short term exposure limits (STEL’s) to which no employee shall be exposed.

E. **Reproductive Toxins**: Any chemical that affects the reproductive capabilities of males or females including chromosomal damage (mutagenesis) and has effects on fetuses (teratogenesis).

F. **Select Carcinogen**: See Appendix A.
   1. A chemical listed by MIOSHA as a carcinogen: or
   2. A chemical listed under the category, “known to be carcinogens,” in the Annual Report on Carcinogens published by the National Toxicology Program (NTP)(latest edition); or
   3. A chemical listed under Group 1 (“carcinogenic to humans”) by the International Agency for research on Cancer Monographs (IARC)(latest editions); or
   4. A chemical in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
a. after inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m3.
b. after repeated skin application of less than 300 (mg/kg of body weight) per week, or
c. after oral dosages of less than 50 mg/kg of body weight per day.

Guidelines

A. Designated areas.
   1. Each laboratory utilizing highly hazardous chemicals must designate an area for this purpose.
   2. The designated area may be an entire laboratory, an area of the laboratory or a device such as a fume hood or glove box.
   3. The designated area should be marked with DANGER, specific agent, AUTHORIZED PERSONNEL ONLY, or a comparable warning sign.
   4. Gloves and other appropriate protective apparel must be worn.

B. Containment devices
   1. Work with highly hazardous materials should be performed within a functioning fume hood, biological safety cabinet, ventilated glove box, sealed systems, or other system designed to minimize exposure to these substances.
   2. Trap released vapors to prevent their discharge in the fume hood exhaust.
   3. In all cases, work with these types of chemicals shall be done in such a manner that the MIOSHA permissible exposure limits or similar standards are not exceeded.
   4. Consult EHS for work with MIOSHA carcinogens.
   5. Compressed gas cylinders which contain acutely toxic chemicals such as arsine and nitrogen dioxide should (and may be required to) be kept in ventilated gas cabinets.
   6. Use chemical resistant trays when using breakable containers.
   7. Maintain a current inventory of carcinogens
   8. Ensure no connection of the ventilation system between designated areas and other areas.
   9. Test fume hoods semi-annually or after any modifications.

C. Waste Disposal.
   5. See the Chemical Hazard Control Program Section IV(F).

D. Decontamination
   1. Decontaminate and clean the work area at appropriate intervals and before normal work is resumed.
   2. On leaving the designated area, remove protective apparel, and thoroughly wash hands, forearms, face, and neck.
   3. Thoroughly decontaminate or dispose of contaminated clothing or shoes.
   4. Decontaminate vacuum pumps or other contaminated equipment, including glassware, before removing them from the designated area.
   5. Use a wet mop to decontaminate surfaces. Do not dry sweep spilled powders.
   6. Protect vacuum pumps against contamination with scrubbers or HEPA filters and vent effluent into the hood.
E. Animal Support Activities
   1. Wear appropriate protective clothing, personal protective equipment and respirators
   2. Remove and leave clothing at point of exit for disposal or decontamination
   3. Wash hands, forearms, face, and neck upon each exit
   4. Shower after the last exit of the day.
   5. Ensure air pressure in animal rooms is negative in relation to the air pressure in the surrounding areas.

Responsibilities

A. Office of Environmental Heat and Safety
   1. Approve the acquisition of any donated chemicals to the University.
   2. Perform exposure monitoring if there is reason to believe that the employee exposure levels routinely exceed the MIOSHA Permissible Exposure Limit (PEL).
   3. Perform periodic monitoring if initial monitoring reveals an exposure.

B. Deans and Directors
   6. Ensure that each laboratory has standard operating procedures specific to the highly hazardous chemical(s) in the laboratories.
   7. Ensure that each laboratory working with highly hazardous chemicals has established a designated area. See Section IVA

C. Laboratory Supervisors
   1. Establish a designated area for highly hazardous chemicals
   2. Review standard operating procedures for handling the highly hazardous chemical
   3. Contact EHS if there is reason to believe that the MIOSHA PEL will be exceeded.
   4. Determine the frequency that ventilation efficiency and operational effectiveness of mechanical and electrical equipment are evaluated. The interval of evaluating systems may vary from weekly to biannually depending upon the frequency of usage, quantities employed, and level of hazard.
   5. Contact EHS if any work with a highly hazardous chemical will be used in animal studies.

D. Laboratory Workers
   10. Wear appropriate personal protective equipment
   11. Review and follow the standard operating procedures for handling the highly hazardous chemical.
   12. Use and store chemicals only in designated areas
   13. Laboratory workers of child-bearing age should be especially cautious when handling reproductive toxins and consult their physician if intending to have a child.
   14. Consult the SDS for toxic properties.
   15. Notify the laboratory supervisor of all incidents of exposure or spills.
   16. Evaluate periodically the ventilation efficiency of the designated fume hood, glove box, or gas cabinet, and the operational effectiveness of mechanical and electrical equipment used to contain or manipulate these special substances at intervals determined by the laboratory supervisor.
Appendix A

Select Carcinogen References

International Agency for Research on Cancer:
Overall Evaluations of the Carcinogenicity to Humans

Evaluations are classified by group:

- **Group 1**: The agent (mixture) is carcinogenic to humans. The exposure circumstance entails exposures that are carcinogenic to humans.
- **Group 2** (two classifications):
  - Group 2A: The agent (mixture) is probably carcinogenic to humans. The exposure circumstance entails exposures that are probably carcinogenic to humans.
  - Group 2B: The agent (mixture) is possibly carcinogenic to humans. The exposure circumstance entails exposures that are possibly carcinogenic to humans.
- **Group 3**: The agent (mixture, or exposure circumstance) is not classifiable as to carcinogenicity in humans.
- **Group 4**: The agent (mixture, exposure circumstance) is probably not carcinogenic to humans.

**Websites:**

- National Institute of Health (NIH):
  [Report on Carcinogens](#)

- MIOSHA Part 350 Carcinogens