

WHICH CHEMICALS REQUIRE ADDITIONAL PROTECTION?

There are three classes of compounds that must receive special consideration, each defined by somewhat different criteria. The three are:

1. SELECT CARCINOGENS

Select carcinogens are defined as those substances that meet any of the following criteria:

- a. The chemicals that OSHA has specifically designated as carcinogens and written standards for. At this time, the following substances are OSHA regulated carcinogens:

Asbestos	Benzidine	Inorganic arsenic
4-Nitrobiphenyl	4-Aminodiphenyl	Benzene
alpha-Naphthylamine	Ethyleneimine	Coke oven emissions
Methyl chloromethyl ether	beta-Propiolactone	1,2-dibromo-3-chloropropane
3',3'-Dichlorobenzidine (and its salts)	2-Acetylaminofluorene	Acrylonitrile
bis-Chloromethyl ether	4-Dimethylaminoazobenzene	Ethylene oxide
Vinyl chloride	N-Nitrosodimethylamine	beta-Naphthylamine

This list is subject to expansion and revision by OSHA. Changes in this list can be identified by contacting your local OSHA office or consulting the current Code of Federal Regulations (29 CFR 1910.1000).

1. b. All chemicals listed in the "Annual Report on Carcinogens" published by the National Toxicology Program (NTP) as "known to be carcinogens." This list is reprinted at the end of this section.
- c. All chemicals listed in the publication called "International Agency for Research on Cancer Monographs" (IARC) under the list titles: "Group 1 - Carcinogenic to Humans." This list is also reprinted at the end of this section.
- d. Chemicals that appear in the same NTP document described in b. above on the list headed "reasonably anticipated to be carcinogens," or appear on the IARC publication referred to in c. above on the list headed 2A "probably carcinogenic to humans" and 2B "possibly carcinogenic to humans" and also meet the following criteria:

"Causes statistically significant tumor incident in experimental animals" in accordance with any of the following criteria:

- 1) After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to levels of less than 10 mg/m³.
- 2) After repeated skin application of less than 300 (mg/kg of body weight) per week.
- 3) After oral dosages of less than 50 mg/kg of body weight per day.

The criteria were added to "c." by OSHA, because the level of evidence and potency of the carcinogens appearing on the NTP "reasonably anticipated" and IARC 2A and 2B lists varied significantly, and the need for extra controls was not similar.

OSHA holds employers responsible for determining if evidence of the tumor incidence studies described above exists in the literature.

There is a great deal of overlap among the three lists. The literature search for the additional criteria described under d. can be time-consuming. Remember, however, that once the chemical is found on any of the lists, or once a single study meets the additional tumor evidence criteria, it becomes a "select carcinogen" for purposes of the Lab Rule, so that the lists and literature need not be searched beyond meeting the criteria in any one way. Once a chemical is found to be a select carcinogen, it only mandates consideration of special protection.

All three sources OSHA, NTP, and IARC regularly revise their lists, so it is important to check new additions periodically.

2. REPRODUCTIVE TOXINS

OSHA defines these chemicals as substances which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

OSHA officials have stated in discussion of the Lab Rule that employers would be responsible for awareness of this potential if it appeared on the MSDS for the substance, but that extensive searches beyond that would not be expected.

3. SUBSTANCES WHICH HAVE A HIGH DEGREE OF ACUTE TOXICITY

OSHA uses the appendix from the Hazard Communication Standard which defines high acute toxicity in the following way:

- a. Median LD 50 of 50 mg/kg orally in albino rats, 200-300 grams.
- b. Median LD 50 of 200 mg/kg by continuous contact for 24 hours with the bare skin of albino rabbits weighing between two and three kilograms
- c. Median LC 50 in air of 200 ppm (or 2 mg/liter) continuous inhalation for one hour.

All of the chemicals described above fall into a single category in the Lab Rule, particularly hazardous substances. For any such chemical, when it is used in a lab, the employer must make provisions for "additional protection" where appropriate. Employers must give special consideration to four types of controls, listed below.

WHAT KIND OF ADDITIONAL PROTECTION MUST BE CONSIDERED?

1. Establishment of "designated areas." Designated areas can be any discrete area, including a part of the lab, a hood, or any other area. The only requirements for a designated area in the Lab Rule is that it be posted, and all employees working there must be informed of the nature of the hazards. Use of the special hazards, however, must be contained in the designated areas.
2. Use of containment devices such as fume hoods or glove boxes. These devices must be considered under conditions such as:
 - a. Volatile substances.
 - b. Manipulations that may result in the generation of aerosols.
 - c. Any process that may result in an uncontrollable release of the substance.
3. Establishment of procedures for safe removal of contaminated waste. Disposal of any of the substances covered in this section are probably already regulated by state or local regulations, and possibly by your own institution. The rule requires, however, that such procedures be described in the plan.

4. Development of decontamination procedures: after working with special hazards, employees should follow a protocol designed to ensure that residues of the chemical do not remain on their bodies, clothes, or equipment.

Decontamination procedures will depend on the conditions under which the substance was used, but typically, they should address the following:

- a. Removal of any outer protective gear (gloves, aprons, gauntlets, etc.) and placement into a labeled container for cleaning by proper personnel or disposal.
- b. Washing of hands, face and removal of inner layer of protection (lab coats, eye protection, etc.).
- c. Placement of equipment, glassware, etc., in labeled containers to be cleaned by protected, trained personnel.
- d. Showing by employee, if skin contamination has possibly occurred.
- e. If the substance has been used on a bench or other surface that could be contaminated, proper cleansing of the surface should be required.

Employers, of course, may also add additional protection they feel is prudent, but at a minimum, the plan must consider each of these four points for each substance.

TASKS IN DEVELOPING ADDITIONAL EMPLOYEE PROTECTION POLICIES FOR PARTICULAR HAZARDS

1. Review the lists provided on the following pages to see if any of the substances you use in the lab are select carcinogens. Review MSDSs to see if any substances meet the criteria for reproductive toxins, or substances of high acute toxicity. If a substance appears on the NTP "reasonably anticipated" list, or the IARC 2A or 2B list, and you have grounds to believe it does not present a special hazard to your employees, you should search the literature to verify that the tumor incidence criteria have not been met. All this should be documented in this section of your Chemical Hygiene Plan.
2. Re-evaluate your need for use of this chemical, and the conditions you need to use it under. Minimize exposure as much as you can by changing procedures, if possible.
3. Establish a designated area which will be the only place the chemical can be handled. Post that area with signs giving the name and hazard of the substance. More than one substance can be assigned to a single designated area.
4. Make sure all employees who use the substance have been fully trained on the specific hazards of that substance.

5. If at all possible, confine all operations involving the substance to a glove box or fume hood. If there is a reason this cannot be done, and the substance must be handled in the open air, document that aerosols, volatility and accidental releases are not likely to occur. (If they are, it would probably be considered a violation of the Lab Rule to continue the use of the substance without containment.)
6. Establish a policy for waste disposal of the substances. Make sure employees know of it, and that it is in the plan.
7. Write a decontamination protocol for employees after use of the substance. Make sure employees are trained on it and follow it, and place a copy in this section of the plan.
8. Periodically re-evaluate the OSHA, NTP, and IARC lists; check revised MSDSs for evidence of reproductive hazards.

SAMPLE

CHEMICAL HYGIENE PLAN FOR: _____ DATE REVISED: _____

ADDITIONAL EMPLOYEE PROTECTION FOR SPECIAL HAZARDS:

Hazard: Aniline

Category: Select carcinogen: _____ Cited authority: _____
Reproductive toxin: X Cited source: Material Safety Data Sheet
High acute toxin: _____ LD 50/LC 50 data (source): _____

Protection considered and actions taken:

1. Designated Area:

Aniline is used in antioxidant research and spills, and low to moderate vapor generation is possible. Therefore, all work with aniline will be done in the toxins fume hood, which shall be posted "Caution: Reproductive Hazard Area." All employees will be informed of the mutagenic properties of aniline.

2. Containment devices:

As described above, only the fume hood will be used for aniline work.

3. Waste disposal policy:

Aniline is regulated in this state as hazardous waste. All waste aniline or contaminated waste will be maintained in five gallon "toxic waste" containers in the hazardous waste storage areas, and disposed of with other toxic waste.

4. Decontamination procedures:

Aniline is very readily absorbed through the skin. All employees using aniline must wear impervious gloves, face shield, and lab coat. All food, drink, and smoking near the designated area is prohibited. No mouth pipetting is allowed.

Following work with aniline, employees will wash their gloves off with soap and water, prior to removal, then remove the lab coat and place it in the contaminated laundry bin, and then wash face and hands.

If extensive contact has occurred, a shower will be required.

DANGER



Texas Operations

Compound: Chlorinated Organics
that may contain EDC,
Beta-tri, and Vinyl Chloride.

Contaminated With Vinyl Chloride
Cancer-Suspect Agent

Owner XXXX XXXXXX

Date XX-XX-XX Ref _____

On TSCA? No ☐ Yes ☒

*If no, for Research purposes ONLY

TIME Sheet ☐ MSDS ☒

	High	Moderate	Low
Flammability	☒	☐	☐
Reactivity	☒	☐	☐

HARMFUL BY

Absorption	☒	☐	☐
Inhalation	☒	☐	☐
Ingestion	☒	☐	☐
Eye/Skin Contact	☒	☐	☐

Other Hazards _____

PRECAUTIONS FOR AVOIDING INJURY: Wear neoprene gloves and apron
while handling. Material should be handled and stored in a
designated Vinyl Exhaust Hood or Device

FIRST AID INSTRUCTIONS: For skin exposures, use safety shower and/or
eye wash to clean exposed area of body and notify Industrial Security.
For inhalations, notify Industrial Security

ATTENTION: Hazardous properties unknown except as indicated above. Exercise due care. Avoid contact.

NOTICE: Research sample for use under technically qualified supervision. Upon completion of use, dispose of material safely and in accord with local, state, and federal regulations. If further information is needed on disposal or use, consult the owner.

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