

## Carcinogens Program

Responsible Administrator: Industrial Hygiene / Chemical Hygiene Officer

Revised: December 2023

**Summary:** All carcinogens in use at UC Irvine are regulated by Cal OSHA and categorized in several groups listed in this document. This includes more restrictive and reportable carcinogens based on usage and exposure limits.

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### 1. Program Description

The purpose of the UC Irvine Carcinogen program is to minimize or control risk of occupational exposure to the carcinogens listed in the tables above by:

- Conducting exposure assessments and monitoring
- Establishing safe handling practices and controls to minimize exposure.
- Providing health hazard information and training
- Maintaining an employee medical surveillance program

### 2. Scope

This document applies to all UC Irvine research and staff support personnel where potential exposure to the listed substances exists.

UC Irvine's Carcinogen program addresses:

- Exposure assessments and monitoring
- Regulated areas
- Hazard Communication
- Engineering Controls
- Protective Equipment
- Housekeeping

- Employee medical surveillance
- Emergencies
- Recordkeeping
- Reporting
- Training

### 3. Definitions

**Action Level (AL)** – Airborne concentration calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

**Exposure control devices (ECDs)** – Engineering control systems designed to reduce employee exposure to airborne contaminants (dust, mist, fume, vapor, and gas) such as fume hoods and local exhaust ventilation systems.

**NIOSH:** The National Institute for Occupational Safety and Health (NIOSH)

**Permissible Exposure Level (PEL)** –The PEL is a concentration that nearly all workers may be exposed to daily during a 40-hour workweek for a working lifetime without adverse effect. Exposures exceeding the AL or PELs trigger the initiation of:

- Regulated areas that require controlled access and warning posters
- Training (annual)
- Use of respiratory protection
- Implementation of work practices and engineering controls to lower exposure below the PEL as feasible
- Employee medical surveillance
- Exposure monitoring

**PLHCP:** Physician or Other Licensed Health Care Professional

#### **Regulated Area:**

- Listed carcinogens (8 CCR 5209): An area where entry and exit is restricted and controlled. This includes room(s) where a Listed Carcinogen is stored or handled.
- Reportable carcinogens (8 CCR Substance Specific Standards) – Any area where the airborne concentration of the listed substances exceeds either the PEL or STEL. Access is restricted to trained authorized personnel.

**SDS (Safety data sheet)** – Written or printed material concerning a hazardous chemical that is prepared in accordance with the Cal OSHA Hazard Communication standard.

**Short Term Exposure Level (STEL)** –The STEL shall not be exceeded at any time during the workday. Exposures exceeding the STEL or PEL trigger the initiation of:

- Regulated areas that require controlled access and warning posters

- Training (annual)
- Use of respiratory protection
- Implementation of work practices and engineering controls to lower exposure below the STEL as feasible
- Employee medical surveillance
- Exposure monitoring (annual)

**Listed** – The Listed carcinogens are the more restrictive class of carcinogens, See Table I. Cal OSHA has established extensive regulations governing their distribution, handling, and use. Any handling or use of the 13 “Listed” carcinogens below requires evaluation by EHS before the material is ordered and reporting to Cal/OSHA prior to use.

TABLE 1 – LISTED CARCINOGENS (Title 8 California Code of Regulations Section 5209)

<i>Chemical</i>	<i>Chemical Abstracts Registry Number</i>	<i>Percent *</i>
2-Acetylaminofluorene	53-96-3	1
4-Aminodiphenyl	92-67-1	0.1
Benzidine (and its salts)	92-87-5	0.1
3,3'-Dichlorobenzidine (and its salts)	91-94-1	1
4-Dimethylaminoazobenzene	60-11-7	1
alpha-Naphthylamine **	134-32-7	1
beta-Naphthylamine **	91-59-8	0.1
4-Nitrobiphenyl	92-93-3	0.1
N-Nitrosodimethylamine	62-75-9	1
beta-Propiolactone	57-57-8	1
bis-Chloromethyl ether	542-88-1	0.1
Methyl chloromethyl ether	107-30-2	0.1
Ethyleneimine	151-56-4	1

- Reporting is NOT required if the chemical content is less than the percent specified.
- See [Appendix D](#) for additional requirements for Listed Carcinogens

**Reportable** – If work with any of the carcinogens below leads to exposure above certain limits or exposure levels, reporting to Cal OSHA may be required. These chemical substances are listed in Table 2.

TABLE 2. REPORTABLE CARCINOGENS (Title 8 California Code of Regulations Substance Specific Standards).

Arsenic
Acrylonitrile
Benzene
Beryllium
1,3-Butadiene
Cadmium
Chromium (VI)
Crystalline Silica (Respirable)
Ethylene Dibromide
Ethylene Oxide
Formaldehyde
Methylene Chloride
4,4-Methylenedianiline
Vinyl Chloride

#### 4. Responsibilities

##### 4.1. Supervisors are responsible for:

- Notifying EHS when materials containing any of the carcinogens are in use in the area
- Table I Listed Carcinogens require authorized approval from EHS prior to purchasing or synthesizing the chemical. Use the notification form in [Appendix E](#) and submit to the IH manager for approval.
- Updating chemical inventories routinely to reflect use of the listed substances on UC Chemicals.
- Ensuring that employees receive and understand the Safety Data Sheet for the listed substances.
- Completing required training and ensuring that employees handling the list substances complete the required training. Register for required training at <http://www.uclc.uci.edu> for the following courses:
  - Online training based on the results of the Safety Training Self-Assessment (STSA)
  - Laboratory Safety Fundamentals (lab workplace) or Safety Fundamentals (non-lab workplace).
  - Respiratory Protection (if applicable)
- Ensuring that safe handling practices and exposure controls such as ventilation and/or personal protective equipment are used by employees.
- Reporting any symptoms of exposure to the listed substances by employees to EHS
- Preparing a written SOP that addresses specific tasks and safe handling procedures.
- Understand all regulatory requirements, PPE, and safety controls outlined in this program.

##### 4.2. Employees are responsible for:

- Reviewing the SDS (Safety Data Sheet) with their supervisor prior to handling the material
- Completing required training:
  - Online training based on the results of the Safety Training Self-Assessment (STSA)
  - Laboratory Safety Fundamentals (lab workplace) or Safety Fundamentals (non-lab workplace)
  - Respiratory Protection (if applicable)
  - Additional training required under the applicable standard.
- Following the SOP and using safe handling practices and exposure controls such as ventilation and/or personal protective equipment
- Reporting any symptoms of exposure to the carcinogen to their supervisor and EHS
- Reporting any spills or incidents to supervisors and EHS

#### 4.3. EHS is responsible for:

- Conducting exposure assessments and monitoring for operations involving potential exposure to exposure to the listed substances
- Recommending safe handling practices and exposure controls such as ventilation and/or personal protective equipment
- Ensuring that health hazard information and training are readily available.
- Facilitating the initiation of employee medical surveillance if the Action Level or STEL is exceeded.
- Implementing the provisions of the Cal OSHA standards

## 5. Program Components

### 5.1 Exposure Limits & Requirements Summary

Please see [Appendix A](#) for the exposure limits.

### 5.2 Exposure Monitoring

Please see [Appendix A](#) for the exposure monitoring requirements.

### 5.3 Labeling Containers of Carcinogens

Please see [Appendix B](#) for the labeling requirements.

### 5.4 Regulated Areas

#### 5.4.1. Posting:

- Table 1 carcinogens (8 CCR 5209) - Required in areas where chemicals are stored, handled, and used.
- Table 2 carcinogens (8 CCR Substance Specific Standards) -In areas where the concentration exceeds the PEL or the STEL, signs will be posted at all entrances.

5.4.2. Access - Only authorized personnel who have been trained to recognize the hazards of the listed substances will be allowed to access these areas.

## 5.5 Engineering Controls

Where feasible, Exposure Control Devices (ECDs) such as laboratory hoods, down draft systems, air curtains, and snorkels must be used to reduce and maintain employee exposures to the listed substances at or below the PEL and the STEL.

## 5.6. Work Practice Controls

Work practices that reduce the source of exposure or minimize the potential for the listed substances to become airborne must be implemented whenever possible.

## 5.7 Emergency Equipment

There must be an emergency eyewash and shower in the work areas when there is the potential for splashing.

## 5.8 Personal Protective Equipment

Please see UC Irvine EHS Research Laboratory and Personal Protective Equipment Program and Respiratory Protection Program for detailed information.

## 5.9 Housekeeping

Preventative maintenance of equipment must be undertaken to provide periodic inspection of equipment and to minimize accidental chemical spills or leaks.

## 5.10. Spills

Assess the extent of danger. Help contaminated or injured persons if safe to do so. Evacuate the spill area. Avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area.

All personnel handling incidental spills of dilute the listed substances solutions must be properly trained. Contact EHS for training information on spill kits and clean-up procedures.

- Small (< 100 ml) spill – If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label, and request a chemical waste pick-up.
- Large (>100 ml) spill – Dial 911 and EHS at x46200 for assistance.  
If a spill is large:
  - i. Employees are not to clean it up.
  - ii. Immediately evacuate the area and close any doors.
  - iii. Alert others not to enter the area.
  - iv. Contact EHS for assistance in cleaning up the spill.
  - v. Do not reenter the area until the area has been monitored by EHS.

The listed substances contaminated waste and debris resulting from spills must be disposed of through EHS as hazardous waste.

#### 5.11 Medical Surveillance

Please see [Appendix A](#) for the medical surveillance requirements.

5.11.1. If an employee requires medical surveillance, EHS will notify the employee and facilitate enrollment in a medical surveillance program.

5.11.2. If the employee has developed signs and symptoms related to the carcinogens, they shall seek medical attention immediately and notify their supervisor and EHS.

#### 5.13 Record Retention

- Exposure records will be kept for at least 30 years.
- Medical records will be kept for the duration of employment plus 30 years.
- Respirator fit testing records will be kept until replaced by a more recent record.
- Records are available upon request to the employee or his/her designated representative for inspection and copying.

#### 5.14 Training

Please see [Appendix C](#) for the training requirements.

5.14.1 All employees who handle the listed substances will be trained at the time of initial assignment and annually thereafter on the hazards of the listed substances. This training shall include:

- A discussion of the contents of the Cal OSHA the listed substances regulation and the contents of the listed substances material safety data sheet.
- A description of the potential health hazards associated with exposure to the listed substances and a description of the signs and symptoms of exposure to the listed substances.
- Instructions to immediately report to the supervisor the development of adverse signs or symptoms that the employee suspects are attributable to the listed substances exposure.
- The purpose for and a description of the medical surveillance program.
- A description of operations in the work area where the listed substances is present and an explanation of the safe work practices appropriate for limiting exposure to the listed substances in each job.
- An explanation of the importance of engineering and work practice controls for employee protection and any necessary instruction in the use of these controls.
- The purpose for, proper use of, and limitations of personal protective equipment.
- Instructions for the handling of spills, emergencies, and clean-up procedures.
- A review of emergency procedures including the specific assignments of each employee in the event of an emergency.

## 6. Reporting Requirements

California Code of Regulations, Title 8, Section 5203 Carcinogen Report of Use Requirements

## 7. Information and External References

California State Regulations:

- California Code of Regulations, Title 8, Section §5213. Acrylonitrile
- California Code of Regulations, Title 8, Section §5214. Arsenic (Inorganic)
- California Code of Regulations, Title 8, Section §5218. Benzene
- California Code of Regulations, Title 8, Section §5201. 1,3-Butadiene
- California Code of Regulations, Title 8, Section §5205. Beryllium.
- California Code of Regulations, Title 8, Section §5207. Cadmium
- California Code of Regulations, Title 8, Section §5209. Carcinogens
- California Code of Regulations, Title 8, Section §5206. Chromium (VI)
- California Code of Regulations, Title 8, Section §5219. Ethylene Dibromide (EDB).
- California Code of Regulations, Title 8, Section §5220. Ethylene Oxide.
- California Code of Regulations, Title 8, Section §5217. Formaldehyde
- California Code of Regulations, Title 8, Section §5202. Methylene chloride
- California Code of Regulations, Title 8, Section §5200. 4,4-Methylenedianiline
- California Code of Regulations, Title 8, Section §5210. Vinyl Chloride
- California Code of Regulations, Title 8, Section §504. Crystalline Silica



## Appendices

[Appendix A – Exposure and Medical Surveillance Requirements Summary](#)

[Appendix B - Signs and Labels](#)

[Appendix C - Training Requirements](#)

[Appendix D - Additional Requirements for Listed Carcinogens](#)

[Appendix E: Listed Carcinogens Request Form](#)

Appendix A. Exposure Monitoring and Medical Surveillance Requirements Summary

Substance	Exposure Guidelines	Exposure Monitoring	Medical Surveillance
<b>Acrylonitrile</b>	Action Level: 1ppm  PEL: 2 ppm  Ceiling: 10 ppm	<ul style="list-style-type: none"> <li>▪ Initial Monitoring: within 30 days of the introduction of benzene into the workplace.</li> <li>▪ Exposure at or above the AL, but below PEL, repeat monitoring within 3 months.</li> <li>▪ Repeat monitoring at least monthly if exposure above the PEL</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Accuracy of Monitoring: A confidence level of 95 percent, to within +/- 35% at or above PEL. Within +/- 50% below PEL.</li> <li>▪ Employee Notification: Within 5 working days after the receipt of monitoring results, notify each employee of the results in writing.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL</li> <li>▪ Medical examinations and procedures are performed by or under the supervision of a California-licensed physician.</li> <li>▪ Initial medical examination – within 30 days.</li> <li>▪ Periodic medical examinations – At least annually.</li> </ul>
<b>Arsenic (Inorganic)</b>	PEL: 0.01 mg/m3  Action Level: 5 ug/m3	<ul style="list-style-type: none"> <li>▪ Collect full shift personal samples - at least 7 continuous hours.</li> <li>▪ At least one sample for each shift for each job classification in each work area.</li> <li>▪ Repeat monitoring at least quarterly if exposure above the PEL</li> <li>▪ Exposure at or below the PEL, but, at or above the AL, repeat monitoring at 6-month intervals.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Additional Monitoring: When a change in the production, process, control equipment,</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL, without regard to the use of respirators, at least 30 days per year.</li> <li>▪ Medical examinations and procedures are performed by or under the supervision of a licensed physician.</li> <li>▪ Initial and periodic medical examinations.</li> <li>▪ Annual medical examination for each affected employee under 45 years of age with fewer than 10 years of exposure over the AL.</li> <li>▪ Semi-annual medical examination for each affected employee either 45 years of age or older or with 10 or more years of exposure over the AL.</li> </ul>

		<p>personnel or work practices may result in new or additional exposure.</p> <ul style="list-style-type: none"> <li>▪ Employee Notification: Within five working days from the receipt of monitoring results, notify each employee of the results in writing.</li> <li>▪ Accuracy of Monitoring: A confidence level of 95 percent, to within +/- 25% for airborne concentrations equal to or greater than the TWA PEL.</li> <li>▪ A confidence level of 95 percent, not less than +/- 35% for airborne concentrations greater than 0.005 mg/m<sup>3</sup> but less than 0.01 mg/m<sup>3</sup> of air.</li> <li>▪ Exposure monitoring records and physician's written reports shall be maintained for at least 40 years or for the duration of employment plus 20 years, whichever is longer.</li> </ul>	
<b>Benzene</b>	<p>Action Level: 0.5 ppm</p> <p>PEL: 1 ppm</p> <p>STEL: 5 ppm</p>	<ul style="list-style-type: none"> <li>▪ Initial Monitoring: within 30 days of the introduction of benzene into the workplace.</li> <li>▪ Exposure at or above the AL, repeat monitoring at least every year.</li> <li>▪ Exposure above the 8-Hr PEL, perform monitoring at least every 6 months.</li> <li>▪ Monitoring schedule can be changed from every 6 months to annually if two consecutive measurements taken at least 7 days apart indicate that the exposure has decreased to PEL or below, but is at or above AL.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Additional Monitoring: When a change in the production, process, control equipment, personnel or work practices may result in new or additional exposure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year;</li> <li>▪ At or above the PELs 10 or more days per year;</li> <li>▪ Above 10 ppm of benzene for 30 or more days in any year prior to December 10, 1989.</li> <li>▪ Medical examinations and procedures are performed by or under the supervision of a licensed physician.</li> <li>▪ Emergency Examinations: Employees provide a urine sample at the end of the shift.</li> <li>▪ Within 72 hours, perform urinary phenol test. Urine S.G. shall be corrected to 1.024.</li> <li>▪ If the result of urinary phenol test is below 75 mg phenol/L, no further testing.</li> <li>▪ If the result of urinary phenol test is equal to or greater than 75 mg phenol/L, a</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Accuracy of Monitoring: A confidence level of 95 percent, to within +/- 25%.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of monitoring results, notify each employee of these results in writing.</li> </ul>	complete blood count including an erythrocyte count, leukocyte count with differential and thrombocyte count at monthly intervals for a duration of three (3) months following the emergency exposure.
<b>Beryllium</b>	<p>Action Level: 0.1 <math>\mu\text{g}/\text{m}^3</math></p> <p>PEL: 0.2 <math>\mu\text{g}/\text{m}^3</math></p> <p>STEL: 2.0 <math>\mu\text{g}/\text{m}^3</math></p>	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring.</li> <li>▪ Exposure at or above the AL repeat monitoring every 6 months.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of the results, notify the affected employees of these results in writing and post the results in an appropriate location that is accessible to affected employees.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year.</li> <li>▪ Initial medical examination – within 30 days after initial assignment to a job with exposure to beryllium.</li> <li>▪ Periodic medical examinations – At least biennially.</li> </ul>
<b>1,3 Butadiene</b>	<p>Action Level: 0.5 ppm</p> <p>PEL: 1 ppm</p> <p>STEL: 5 ppm</p>	<ul style="list-style-type: none"> <li>▪ Initial monitoring to determine accurately the airborne concentrations of BD to which employees may be exposed.</li> <li>▪ Exposure at or above the AL, but at or below 8-Hr TWA, repeat monitoring every twelve months.</li> <li>▪ Exposure above the 8-Hr PEL, perform monitoring at least every 3 months.</li> <li>▪ Exposure above STEL, perform monitoring at least every 3 months.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year;</li> <li>▪ At or above the PELs 10 or more days per year.</li> <li>▪ Initial and periodic medical examination</li> <li>▪ Emergency Examinations: As quickly as possible, but not later than 48 hrs. after exposure.</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Initial monitoring may be discontinued if exposure to be below the AL and at or below the STEL.</li> <li>▪ Employee Notification: Within 5 business days after the receipt of the results, notify the affected employees of these results in writing either individually or by posting of results in an appropriate location that is accessible to affected employees.</li> <li>▪ Within 15 business days after receipt of any monitoring performed indicating the 8-hour TWA or STEL has been exceeded, provide the affected employees, in writing, with information on the corrective action being taken by the employer to reduce employee exposure to or below the 8-hour TWA or STEL and the schedule for completion of this action.</li> </ul>	
<b>Cadmium</b>	<p>Action Level: 2.5 ug/m3</p> <p>PEL: 5 ug/m3</p>	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring.</li> <li>▪ Exposure at or above the AL repeat monitoring every 6 months.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of the results, notify the affected employees of these results in writing and post the results in an appropriate location that is accessible to affected employees.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year.</li> <li>▪ Initial medical examination – within 30 days after initial assignment to a job with exposure to Cd.</li> <li>▪ Periodic medical examinations – Within one year after the initial examination and thereafter at least biennially.</li> <li>▪ Biological sampling: At least annually</li> </ul>
<b>Chromium VI</b>	<p>Action Level: 2.5 ug/m3</p>	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring</li> <li>▪ Exposure at or above the AL, perform monitoring at least every 6 months.</li> <li>▪ Exposure above the PEL, perform monitoring at least every 3 months.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year.</li> <li>▪ When experiencing signs or symptoms of adverse health effects associated with Cr (VI)</li> <li>▪ When exposed in an emergency</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Employee Notification: As soon as possible but not more than 5 working days after making an exposure determination.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Initial medical examination – within 30 days after initial assignment</li> <li>▪ Annual medical examination</li> </ul>
<b>Crystalline Silica (Respirable)</b>	<p>Action Level: 25 <math>\mu\text{g}/\text{m}^3</math></p> <p>PEL: 50 <math>\mu\text{g}/\text{m}^3</math></p>	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring.</li> <li>▪ Exposure at or above the AL repeat monitoring every 6 months.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of the results, notify the affected employees of these results in writing and post the results in an appropriate location that is accessible to affected employees.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year.</li> <li>▪ Initial medical examination – within 30 days after initial assignment.</li> <li>▪ Periodic medical examinations – At least every three years, or more frequently if recommended by the PLHCP</li> </ul>
<b>Ethylene Dibromide (EDB)</b>	<p>Action Level: 15 ppb</p> <p>PEL: 130 ppb</p> <p>STEL: 130 ppb</p> <p>No Dermal &amp; Eye Exposure: contact with liquid EDB or liquid mixtures containing greater</p>	<ul style="list-style-type: none"> <li>▪ Initial Monitoring: within 30 days of the introduction of EDB into the workplace.</li> <li>▪ Exposure at or above the AL, repeat monitoring at least quarterly.</li> <li>▪ Exposure at or above the PEL, repeat monitoring at least monthly.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL and PEL.</li> <li>▪ Additional Monitoring: When a change in the production, process, or engineering control change or leak or spill which may result in any new or additional exposure to EDB. Monitoring shall be conducted as soon as possible but not later than 15 days after the change.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL</li> <li>▪ Pre-assignment and annual examinations</li> </ul>

	<p>than 0.1% EDB by weight.</p>	<ul style="list-style-type: none"> <li>▪ Accuracy of Monitoring: NIOSH Method No. P&amp;CAM 260 or a method of equivalent accuracy.</li> <li>▪ Employee Notification: Within 5 working days after the receipt of monitoring results, notify each employee of these results in writing.</li> <li>▪ If exposure is above the PEL, a statement that the PEL was exceeded, and a description of the corrective action being taken to reduce exposure to or below the PEL shall be included in the written notice.</li> </ul>	
<p><b>Ethylene Oxide</b></p>	<p>Action Level: 0.5 ppm</p> <p>PEL: 1 ppm</p> <p>STEL: 5 ppm</p>	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring.</li> <li>▪ Exposure at or above the AL repeat monitoring at least every 6 months.</li> <li>▪ Exposure above the PEL, repeat monitoring at least every 3 months.</li> <li>▪ Exposure above the STEL, repeat monitoring at least every 3 months.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of the results, notify the affected employees of these results in writing and post the results in an appropriate location that is accessible to affected employees.</li> <li>▪ If exposure is above the PEL, a statement that the PEL was exceeded, and a description of the corrective action being taken to reduce exposure to or below the PEL /STEL shall be included in the written notice.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL</li> <li>▪ Pre-assignment and annual examinations</li> </ul>




<p><b>Formaldehyde</b></p>	<p>Action Level: 0.5 ppm</p> <p>PEL: 0.75 ppm</p> <p>STEL: 2.0 ppm</p>	<ul style="list-style-type: none"> <li>▪ Initial and periodic exposure monitoring</li> <li>▪ Repeat initial monitoring if there is a change in equipment, process, personnel, or control measures.</li> <li>▪ Exposure at or above the AL, repeat monitoring at least every 6 months.</li> <li>▪ Exposure at or above the STEL, repeat monitoring at least once a year under worst conditions.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL and STEL.</li> <li>▪ Accuracy of Monitoring: A confidence level of 95 percent, to within +/- 25%.</li> <li>▪ Employee Notification: Within 15 days after the receipt of monitoring results, notify each employee of these results in writing.</li> <li>▪ If exposure is over the 8-hour TWA or STEL, develop and implement a written plan to reduce exposure to or below both PELs. And provide the affected employees with written notice containing a description of the corrective action to decrease exposure.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL or STEL</li> <li>▪ Employees who develop signs and symptoms of overexposure.</li> <li>▪ All employees exposed during emergencies.</li> <li>▪ The examination shall include a medical and work history, physical examination and pulmonary function test in accordance with the provisions under California Code of Regulations, Title 8, Section 5217, (I) Medical Surveillance. An employee work history and copy of the standard and Appendices A, C, D, and E shall be provided to the examining physician.</li> <li>▪ Where medical removal or restrictions are recommended by a physician, the employee may seek a second opinion. Employee medical removal protection benefits must comply with the California Code of Regulations, Title 8, Section 5217, (I) Medical Surveillance.</li> <li>▪ Medical examinations and procedures are performed by or under the supervision of a licensed physician.</li> <li>▪ Emergency Examinations: Employees provide a urine sample at the end of the shift.</li> </ul>
<p><b>Methylene Chloride</b></p>	<p>Action Level: 12.5 ppm</p> <p>PEL: 25 ppm</p> <p>STEL: 125 ppm</p>	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring</li> <li>▪ Below AL and at or below STEL: No TWA or STEL monitoring required.</li> <li>▪ At or above AL, at or below TWA, and at or below STEL: TWA monitoring every 6 months.</li> <li>▪ At or above AL, at STEL: TWA monitoring every 6 months and STEL every 3 months.</li> <li>▪ Above TWA and at or below STEL: TWA every 3 months and STEL every 3 months.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year;</li> <li>▪ At or above the PELs 10 or more days per year.</li> <li>▪ Initial, periodic, and emergency medical examinations.</li> <li>▪ For employees 45 years of age or older, physical examination within 12 months of initial surveillance or any subsequent medical surveillance.</li> <li>▪ For employees younger than 45 years of age, physical examination within 36 months</li> </ul>










		<ul style="list-style-type: none"> <li>▪ Above TWA and above STEL: TWA and STEL monitoring every 3 months.</li> <li>▪ Accuracy of Monitoring: A confidence level of 95 percent, to within +/- 25% for airborne MC concentrations above 8-Hr TWA PEL or STEL.</li> <li>▪ A confidence level of 95 percent, within +/- 35% for airborne MC concentrations at or above AL but at or below 8-Hr TWA PEL.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of the results, notify each affected employee of these results in writing, either individually or by posting of results in an appropriate location that is accessible to affected employees.</li> </ul>	of initial surveillance or any subsequent medical surveillance.
<b>4,4-Methylenedianiline (MDA)</b>	Action Level: 5 ppb  PEL: 10 ppb  STEL: 100 ppb	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring</li> <li>▪ At or above AL, but at or below PELs: repeat monitoring at least every 6 months</li> <li>▪ Above PELs: repeat monitoring at least every 3 months.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least two consecutive measurements taken at least 7 days apart are below the AL.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of the results, notify each affected employee of these results in writing, either individually or by posting results in an appropriate location that is accessible to affected employees.</li> </ul>	<ul style="list-style-type: none"> <li>▪ At or above AL 30 or more days per year;</li> <li>▪ Dermal exposure to MDA for 15 or more days per year;</li> <li>▪ Exposed in an emergency situation;</li> <li>▪ Employees who show signs/symptoms</li> <li>▪ Initial medical examination: Before the time of initial assignment.</li> <li>▪ Periodic medical examination: At least annually following the initial examination.</li> </ul>
<b>Vinyl Chloride</b>	Action Level: 5 ppb  PEL: 1 ppm  STEL: 5 ppm  No direct contact	<ul style="list-style-type: none"> <li>▪ Initial and periodic monitoring</li> <li>▪ Above AL: repeat monitoring not less than quarterly.</li> <li>▪ Above PELs: repeat monitoring at least monthly.</li> <li>▪ Termination of Monitoring: Periodic monitoring may be discontinued if at least</li> </ul>	<ul style="list-style-type: none"> <li>▪ Initial, periodic, and emergency medical examinations.</li> <li>▪ &gt;10 year working with chemical, every 6 month.</li> <li>▪ Annually for other employees</li> </ul>

	with liquid VCM	<p>two consecutive measurements taken at least 5 working days apart are below the AL.</p> <ul style="list-style-type: none"> <li>▪ Accuracy of Monitoring: A confidence level of 95 percent, not less than +/- 50% 0.25 – 0.5 ppm, +/- 35% 0.5 ppm – 1.0 ppm, and +/- 25% over 1.0 ppm.</li> <li>▪ A confidence level of 95 percent, within +/- 35% for airborne MC concentrations at or above AL but at or below 8-Hr TWA PEL.</li> <li>▪ Employee Notification: Within 15 working days after the receipt of the results, notify each affected employee of these results in writing, either individually or by posting results in an appropriate location that is accessible to affected employees.</li> </ul>	
<b>8CCR5209 (Listed) Carcinogens</b>	<p>beta-Propiolactone: 0.5 ppm, 1.5 mg/m<sup>3</sup></p> <p>bis-Chloromethyl ether: 0.001 ppm, 0.005 mg/m<sup>3</sup></p> <p>Ethyleneimine: 0.5 ppm, 1 mg/m<sup>3</sup></p>	<ul style="list-style-type: none"> <li>▪ Initial exposure assessment and monitoring (if sampling and analytical methods are available) and when there is a change in operation.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Prior to handling the chemical</li> <li>▪ Pre-assignment medical exam</li> <li>▪ Periodic medical exam: Not less often than annual</li> </ul>

## Appendix B. Signs and Labels

Substance	Regulated Areas	Labels - Containers and Equipment
<b>Acrylonitrile</b>	DANGER ACRYLONITRILE (AN) MAY CAUSE CANCER RESPIRATORY PROTECTION MAY BE REQUIRED IN THIS AREA AUTHORIZED PERSONNEL ONLY	Chemical Name and GHS symbol 
<b>Arsenic (Inorganic)</b>	DANGER INORGANIC ARSENIC MAY CAUSE CANCER DO NOT EAT, DRINK OR SMOKE WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY	DANGER CONTAINS INORGANIC ARSENIC CANCER HAZARD HARMFUL IF INHALED OR SWALLOWED USE ONLY WITH ADEQUATE VENTILATION OR RESPIRATORY PROTECTION
<b>Benzene</b>	DANGER BENZENE MAY CAUSE CANCER HIGHLY FLAMMABLE LIQUID AND VAPOR DO NOT SMOKE WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY	Chemical Name and GHS symbol 
<b>Beryllium</b>	DANGER REGULATED AREA BERYLLIUM MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS AUTHORIZED PERSONNEL ONLY WEAR RESPIRATORY PROTECTION AND PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT IN THIS AREA	DANGER CONTAINS BERYLLIUM MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS AVOID CREATING DUST DO NOT GET ON SKIN
<b>Crystalline Silica (Respirable)</b>	DANGER RESPIRABLE CRYSTALLINE SILICA MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY	Chemical Name and GHS symbol 
<b>Cadmium</b>	DANGER CADMIUM MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS AND KIDNEYS WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY	DANGER CONTAINS CADMIUM MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS AND KIDNEYS AVOID CREATING DUST

<b>1,3 Butadiene</b>	Demarcation	Chemical Name and GHS symbol 
<b>Chromium VI</b>	Demarcation	Chemical Name and GHS symbol 
<b>Ethylene Dibromide</b>	DANGER ETHYLENE DIBROMIDE MAY CAUSE CANCER MAY DAMAGE FERTILITY OR THE UNBORN CHILD	Chemical Name and GHS symbol 
<b>Ethylene Oxide</b>	DANGER ETHYLENE OXIDE MAY CAUSE CANCER MAY DAMAGE FERTILITY OR THE UNBORN CHILD RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING MAY BE REQUIRED IN THIS AREA AUTHORIZED PERSONNEL ONLY	Chemical Name and GHS symbol 
<b>Formaldehyde</b>	DANGER FORMALDEHYDE MAY CAUSE CANCER CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION AUTHORIZED PERSONNEL ONLY	DANGER FORMALDEHYDE-CONTAMINATED (CLOTHING) EQUIPMENT MAY CAUSE CANCER CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION DO NOT BREATHE VAPOR DO NOT GET ON SKIN
<b>Methylene Chloride</b>	Demarcation	- Chemical Name and GHS symbol 
<b>4,4-Methylenedianiline</b>	Demarcation	- Chemical Name and GHS symbol 
<b>Vinyl Chloride</b>	DANGER VINYL CHLORIDE MAY CAUSE CANCER AUTHORIZED PERSONNEL ONLY	CONTAMINATED WITH VINYL CHLORIDE MAY CAUSE CANCER

<b>Listed Carcinogens</b>	DANGER (CHEMICAL NAME) MAY CAUSE CANCER AUTHORIZED PERSONNEL ONLY	Chemical Name and GHS symbol 
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## Appendix C. Training Requirements

Substance	Training
<p><b>Acrylonitrile (AN)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees shall be trained about AN and AN-based materials at the time of their initial assignment.</li> <li>▪ Annual Training: At least annually thereafter.</li> <li>▪ In addition to the information required under section 5194 Hazard Communication standard, each employee shall be informed of the following:               <ul style="list-style-type: none"> <li>▪ The information contained in Appendices A, Substance Safety Data Sheet, and B, Substance Technical Guidelines,</li> <li>▪ The quantity, location, manner of use, release, or storage of AN, and the specific nature of operations which could result in exposure to AN, as well as any necessary protective steps;</li> <li>▪ The purpose, proper use, and limitations of respirators and protective clothing;</li> <li>▪ The purpose and a description of the medical surveillance program required by Section 5213(n);</li> <li>▪ The emergency procedures developed, as required by Section 5213(i);</li> <li>▪ First-aid measures for acute exposure to AN;</li> <li>▪ Engineering and work practice controls, their function, and the employee's relationship to these controls; and</li> <li>▪ A review of this standard.</li> </ul> </li> <li>▪ New information or revised safety data sheet: All employees shall be trained on the new information indicating significantly increased risks to, or measures necessary to protect, employee health as compared to those stated on a safety data sheet previously provided within 30 days after the employer receives it.</li> </ul>
<p><b>Arsenic (Inorganic)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial Training: All employees who may be exposed to inorganic arsenic above the action level without regard to respirator use or for whom there is the possibility of skin or eye irritation from inorganic arsenic shall be trained about inorganic arsenic at the time of an employee's initial assignment.</li> <li>▪ Annual Training: At least annually thereafter.</li> <li>▪ The training program shall include, as a minimum, the following:               <ul style="list-style-type: none"> <li>▪ The information contained in Appendix A of Cal/OSHA standard section 5214 Inorganic Arsenic standard, Substance Information Sheet;</li> <li>▪ The quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations which could result in exposure to inorganic arsenic as well as any necessary protective steps;</li> <li>▪ Work and hygienic practices to be followed to preclude exposure to inorganic arsenic;</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ The purpose, proper use, and limitations of respiratory protective equipment and protective clothing and equipment;</li> <li>▪ The purpose and a description of the medical surveillance program as required by Section 5214(n);</li> <li>▪ The engineering controls and work practices associated with the employee's job assignment; and</li> <li>▪ A review of this standard.</li> </ul>
<b>Benzene</b>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees who may be exposed to benzene shall be trained at the time of their initial assignment.</li> <li>▪ Annual Training: At least annually thereafter if exposures are above the action level.</li> <li>▪ The training program shall be in accordance with the requirements of Cal OSHA Hazard Communication section 5194(h) and include specific information on benzene for each category of information prescribed by the 5218 Benzene section.</li> <li>▪ In addition to the information required under Cal OSHA section 5194 Hazard Communication standard, employees shall be provided with: <ul style="list-style-type: none"> <li>▪ An explanation of the contents of this section, including Appendices A, Substance Safety Data Sheet, and B, Substance Technical Guidelines of Cal OSHA 5218 Benzene section and where this regulation is available; and</li> <li>▪ Description of the medical surveillance program required under 5218 subsection (i) and an explanation of the information contained in Appendix C Medical Surveillance Guidelines of 5218 Benzene section.</li> </ul> </li> </ul>
<b>Beryllium</b>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees who may be exposed to benzene shall be trained at the time of their initial assignment.</li> <li>▪ Annual Training: At least annually thereafter if exposures are above the action level.</li> <li>▪ The training program shall include the following: <ul style="list-style-type: none"> <li>▪ The health hazards associated with airborne exposure to and contact with beryllium, including the signs and symptoms of CBD;</li> <li>▪ The written exposure control plan, with emphasis on the location(s) of beryllium work areas, including any regulated areas, and the specific nature of operations that could result in airborne exposure, especially airborne exposure above the TWA PEL or STEL;</li> <li>▪ The purpose, proper selection, fitting, proper use, and limitations of personal protective clothing and equipment, including respirators;</li> <li>▪ Applicable emergency procedures;</li> <li>▪ Measures employees can take to protect themselves from airborne exposure to and contact with beryllium, including personal hygiene practices;</li> <li>▪ The purpose and a description of the medical surveillance program</li> <li>▪ The purpose and a description of the medical removal protection;</li> <li>▪ The contents of the standard; and</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ The employee's right of access to records under Section 3204 (Access to Employee Exposure and Medical Records).</li> </ul>
<p><b>Cadmium</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: Each affected employee shall be provided information and training prior to or at the time of initial assignment to a job involving potential exposure to cadmium.</li> <li>▪ Annual Training: At least annually thereafter.</li> <li>▪ Each affected employee shall be informed of the following: <ul style="list-style-type: none"> <li>▪ The health hazards associated with cadmium exposure, with special attention to the information incorporated in Appendix A of Cal OSHA 5207 Cadmium standard, Substance Safety Data Sheet;</li> <li>▪ The quantity, location, manner of use, release, and storage of cadmium in the workplace and the specific nature of operations that could result in exposure to cadmium, especially exposures above the PEL;</li> <li>▪ The engineering controls and work practices associated with the employee's job assignment;</li> <li>▪ The measures employees can take to protect themselves from exposure to cadmium, including modification of such habits as smoking and personal hygiene, and specific procedures the employer has implemented to protect employees from exposure to cadmium such as appropriate work practices, emergency procedures, and the provision of personal protective equipment;</li> <li>▪ The purpose, proper selection, fitting, proper use, and limitations of respirators and protective clothing;</li> <li>▪ The purpose and a description of the medical surveillance program required by the Cal OSHA 5207 Cadmium standard;</li> <li>▪ The contents of the 5207 section and its appendices, and,</li> <li>▪ The employee's rights of access to records under section 3204(e) and (g).</li> </ul> </li> <li>▪ A copy of the Cal OSHA 5207 Cadmium section and its appendices shall be readily available without cost to all affected employees.</li> </ul>



	<ul style="list-style-type: none"> <li>▪ Upon request, all materials relating to the employee information and the training program shall be provided to the Cal OSHA Chief or NIOSH.</li> </ul>
<p><b>Chromium (VI)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees who may be exposed to chromium VI shall be trained at the time of their initial assignment.</li> <li>▪ The training program shall include the following information required under section 5194 Hazard Communication standard: <ul style="list-style-type: none"> <li>▪ Any operations in their work area where chromium VI can be present.</li> <li>▪ Location and availability of the written hazard communication program and safety data sheets.</li> <li>▪ Methods and observations that may be used to detect the presence or release of the chemical in the work area.</li> <li>▪ Potential health hazards associated with exposure to the chemical.</li> <li>▪ Measures that can be used to protect themselves from the hazards, including procedures such as appropriate work practices, emergency procedures, and personal protective equipment to be used.</li> <li>▪ Details of the hazard communication program including an explanation of the labels received on shipped containers and the workplace labeling system and the safety data sheet, and how employees can obtain and use the appropriate hazard information.</li> <li>▪ The right to personally receive information regarding hazardous chemicals to which they may be exposed.</li> <li>▪ The right for their physician or collective bargaining agent to receive information regarding hazardous chemicals to which the employee may be exposed according to provisions of this section.</li> <li>▪ The right against discharge or other discrimination due to the employee's exercise of the rights afforded pursuant to the provisions of the Hazardous Substances Information and Training Act.</li> </ul> </li> <li>▪ Each employee shall be able to demonstrate knowledge of at least the following: <ul style="list-style-type: none"> <li>▪ The contents of Cal OSHA Section 5206 Chromium (VI) standard</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ The purpose and a description of the medical surveillance program required by the Cal OSHA Section 5206.</li> <li>▪ A copy of the Cal OSHA 5206 Chromium (VI) section shall be readily available without cost to all affected employees.</li> </ul>
<p><b>Crystalline Silica (Respirable)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees who may be exposed to benzene shall be trained at the time of their initial assignment.</li> <li>▪ The training program shall include at least the following: <ul style="list-style-type: none"> <li>▪ The health hazards associated with exposure to respirable crystalline silica;</li> <li>▪ Specific tasks in the workplace that could result in exposure to respirable crystalline silica;</li> <li>▪ Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;</li> <li>▪ The contents of this section; and</li> <li>▪ The purpose and a description of the medical surveillance program required by subsection (i).</li> </ul> </li> </ul>
<p><b>1,3 Butadiene (BD)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: Training shall be provided prior to or at the time of initial assignment to a job potentially involving exposure to BD at or above the action level or STEL.</li> <li>▪ Annual Training: At least annually thereafter.</li> <li>▪ Each employee exposed to BD over the action level or STEL is informed of the following: <ul style="list-style-type: none"> <li>▪ The health hazards associated with BD exposure, and the purpose and a description of the medical screening and surveillance program required by section 5201 1,3-Butadiene;</li> <li>▪ The quantity, location, manner of use, release, and storage of BD and the specific operations that could result in exposure to BD, especially exposures above the PEL or STEL;</li> <li>▪ The engineering controls and work practices associated with the employee's job assignment, and emergency procedures and personal protective equipment;</li> <li>▪ The measures employees can take to protect themselves from exposure to BD.</li> <li>▪ The contents of BD standard and its appendices, and</li> <li>▪ The right of each employee exposed to BD at or above the action level or STEL to obtain: <ol style="list-style-type: none"> <li>a. medical examinations as required by subsection (j) of section 5201 at no cost to the employee;</li> <li>b. the employee's medical records required to be maintained by subsection (m)(4) of section 5201; and</li> <li>c. all air monitoring results representing the employee's exposure to BD and required to be kept by subsection (m)(2) of section 5201.</li> </ol> </li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ A copy of the Cal OSHA 5201 1,3 Butadiene section and its appendices shall be readily available without cost to all affected employees and their designated representatives.</li> <li>▪ Upon request, all materials relating to the employee information and the training program shall be provided to the Cal OSHA Chief or NIOSH.</li> </ul>
<p><b>Ethylene Dibromide (EDB)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees who may be exposed to EDB shall be trained at the time of their initial assignment.</li> <li>▪ Annual Training: At least annually thereafter if exposures are above the action level.</li> <li>▪ The training program shall include at least the following: <ul style="list-style-type: none"> <li>▪ A Safety Data Sheet on EDB or the EDB-containing mixture;</li> <li>▪ Safe work practices on EDB;</li> <li>▪ The purpose for, proper use, and limitations of respiratory protective devices, if such devices are required;</li> <li>▪ The purpose for, proper use, and limitations of personal protective clothing and equipment, if such clothing and equipment are required;</li> <li>▪ The purpose for and a description of the medical surveillance program, if one is required;</li> <li>▪ Emergency procedures as required by subsection (i);</li> <li>▪ The interaction of disulfiram (Antabuse) and similar compounds with EDB; and</li> <li>▪ Section 5219, including employee rights granted by paragraphs (a)(1) and (e)(5).</li> <li>▪ In addition, for uses of EDB as a pesticide, a copy and discussion of the Hazard Evaluation System and Information Service (HESIS) Hazard Alert on EDB.</li> </ul> </li> </ul>
<p><b>Ethylene Oxide (EtO)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees who may be exposed to EtO shall be trained at the time of their initial assignment.</li> <li>▪ Annual Training: At least annually thereafter if exposures are at or above the action level.</li> <li>▪ The training program shall include at least the following: <ul style="list-style-type: none"> <li>▪ The requirements of this regulation with an explanation of its contents, including Appendices A, SDS, and B, Substance Technical Guidelines,</li> <li>▪ All operations in their work area where EtO is present;</li> <li>▪ The location and availability of this regulation within the workplace; and</li> <li>▪ The medical surveillance program required by subsection (i) with an explanation of the information in Appendix C.</li> <li>▪ Methods and observations that may be used to detect the presence or release of EtO in the work area (such as monitoring conducted by the employer, continuous monitoring devices, etc.);</li> <li>▪ The physical and health hazards of EtO;</li> <li>▪ The measures employees can take to protect themselves from hazards associated with EtO exposure, including specific procedures the employer has implemented to protect employees from exposure to EtO, such as work practices, emergency procedures, and personal protective equipment to be used; and</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ The details of the hazard communication program developed by the employer in accordance with Section 5194, including an explanation of the labeling system and how employees can obtain and use the appropriate hazard information.</li> </ul>
<p><b>Methylene Chloride (MC)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: Each affected employee shall be provided information and training prior to or at the time of initial assignment to a job involving potential exposure to MC.</li> <li>▪ In addition to the information required under Cal OSHA section 5194 Hazard Communication standard: <ul style="list-style-type: none"> <li>▪ Each affected employee shall be informed of the requirements of Cal OSHA 5202 methylene chloride section and information available in its appendices, as well as how to access or obtain a copy of it in the workplace;</li> <li>▪ Wherever an employee's exposure to airborne concentrations of MC exceeds or can reasonably be expected to exceed the action level, each affected employee shall be informed of the quantity, location, manner of use, release, and storage of MC and the specific operations in the workplace that could result in exposure to MC, particularly noting where exposures may be above the 8-hour TWA PEL or STEL;</li> </ul> </li> <li>▪ Retraining: Each affected employee shall be re-trained as necessary to ensure that each employee exposed above the action level, or the STEL maintains the requisite understanding of the principals of safe use and handling of MC in the workplace.</li> <li>▪ Updating the training: If there are workplace changes, such as modifications of tasks or procedures or the institution of new tasks or procedures, which increase employee exposure, and where those exposures exceed or can reasonably be expected to exceed the action level, the training shall be updated as necessary to ensure that each affected employee has the requisite proficiency.</li> <li>▪ An employer whose employees are exposed to MC at a multi-employer worksite shall notify the other employers with work operations at that site in accordance with the requirements of Cal OSHA section 5194.</li> </ul>
<p><b>4,4-Methylenedianiline (MDA)</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: All employees who may be exposed to MDA shall be provided with information and training on MDA, in accordance with Cal OSHA Hazard Communication section 5194(h), at the time of initial assignment.</li> <li>▪ Annual Training: At least annually thereafter.</li> <li>▪ In addition to the information required under section 5194, each employee shall be informed of the following: <ul style="list-style-type: none"> <li>▪ An explanation of the contents of Cal OSHA 5200 section, including Appendices A and B, and where a copy of the standard is available;</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ Description of the medical surveillance program required under subsection (m), and explain the information contained in Appendix C; and</li> <li>▪ Description of the medical removal provision required under subsection (m).</li> </ul> <ul style="list-style-type: none"> <li>▪ All written materials relating to the employee training program, including a copy of this regulation, Cal OSHA 5200 4,4-Methylenedianiline section and its appendices shall be readily available without cost to all affected employees.</li> <li>▪ Upon request, all information and training materials relating to the employee information and training program shall be provided to the Cal OSHA Chief or NIOSH.</li> </ul>
<p><b>Vinyl Chloride</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: Each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use.</li> <li>▪ Annual Training: At least annually thereafter.</li> <li>▪ The training program shall include, as a minimum, the following: <ul style="list-style-type: none"> <li>▪ The nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard;</li> <li>▪ The specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps;</li> <li>▪ The purpose for, proper use, and limitations of respiratory protective devices;</li> <li>▪ The fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps;</li> <li>▪ The purpose for and a description of the monitoring program;</li> <li>▪ The purpose for and a description of the medical surveillance program;</li> <li>▪ Emergency procedures;</li> <li>▪ Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride; and</li> <li>▪ A review of this standard at the employee's first training and indoctrination program, and annually thereafter.</li> </ul> </li> <li>▪ Vinyl chloride shall be included in the employer's hazard communication program established to comply with the Cal OSHA Hazard Communication Section 5194.</li> </ul>
<p><b>8 CCR 5209 Listed Carcinogens</b></p>	<ul style="list-style-type: none"> <li>▪ Initial training: Each employee engaged in listed carcinogens operations shall be provided training in a program relating to the hazards and precautions for its safe use: <ul style="list-style-type: none"> <li>▪ Carcinogenic hazards - local and systemic effects</li> <li>▪ Situations which could result in an exposure.</li> <li>▪ Decontamination and emergency procedures</li> <li>▪ Employee's specific role in the prescribed emergency procedures</li> <li>▪ Recognition of a release or emergency situation</li> </ul> </li> </ul>

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|  | <ul style="list-style-type: none"><li>▪ A review of this standard at the employee's first training and indoctrination program, and annually thereafter.</li></ul> |
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## Appendix D: Additional Requirements for Listed Carcinogens

### 1. Reporting Requirements

#### A. Procurement, Registration, and Authorization for use

1. Purchases of all Listed carcinogens must be made through the UC Irvine Purchasing Department as a high value requisition and requires approval from EHS. **EHS will approve the purchase after ensuring that the lab is suitably equipped to comply with the applicable regulations. Administrative tools such as Standard Operating Procedures and training will also be reviewed prior to approval.**
  - a) Procurement: prior to any purchase, the PI must submit the order information for the intended carcinogen(s) to EHS for review and approval. Compliance with all requirements as described in the “Use Requirements” section below is a prerequisite for such approval.

#### B. Registration & Authorization for use

1. In order to register and become an authorized user of a Listed carcinogen, the PI shall follow the steps below:
  - a) Obtain approval from EHS, Use the notification form in [Appendix B](#) and submit to the Industrial Hygiene manager for approval.
  - b) Complete and submit the Listed Carcinogens Notification Form ([Appendix E](#)).
  - c) Add the chemical carcinogen into the Chemical Inventory System;
  - d) Add the names of all users to the authorized personnel list;
  - e) Submit all users for mandatory medical evaluation prior to any work;
    - i. Notify EHS within 5 days of any changes to a listed carcinogen possession, location, and/or users;
    - ii. Post the Cal OSHA Carcinogen Registration Form provided by EHS while the chemical is in use;

If you have existing material in your laboratory which was not previously registered, please complete the notification form ([Appendix E](#)).

### 2. Use Requirements

#### A. Regulated Area, Storage, and Containment

1. The following activities must be performed in an established Primary Regulated Area which can be an enclosed glove box or a ducted chemical fume hood with the appropriate safety controls in place as listed in the definitions:
  - a. Working with any solid Listed Carcinogen (for example: mixing, weighing, etc.);
  - b. Working with any Listed Carcinogen in concentrations greater than the concentrations as described in the table of Listed Carcinogens. See Section

- c. High risk operations with a greater risk of exposure involving Listed Carcinogens (volatilizing or aerosolizing the solution, sonication, operations involving intrinsically highly volatile materials, working with a stock solution that is highly concentrated);
  - d. Working with large amounts of material that have the potential to produce any of the listed carcinogens via reactivity or degradation.
2. Access to all Regulated Areas shall be restricted to authorized users only.
  3. Fume hoods used as a Primary Regulated Area shall have an average face velocity of 150 feet per minute with no point lower than 125 feet per minute and shall be inspected at a minimum every six months.
  4. Laboratory vacuum systems within or part of a Primary Regulated Area shall be protected with high efficiency scrubbers or with disposable absolute filters. Only high efficiency scrubbers shall be used with beta-propiolactone, bis- chloromethyl ether, methyl chloromethyl ether, or ethyleneimine.
  5. **Secondary Regulated Areas** are laboratories and rooms where Listed Carcinogens are used or stored, shall have ventilation that is negative with respect to the adjoining non-regulated areas and the external environment and have the required signage.
  6. Work surfaces which might come into contact with a Listed Carcinogen are to be protected from contamination. Plastic backed absorbent material is suggested.

## B. Written Procedures

1. The principal investigator or project supervisor is required to prepare a written Standard Operating Procedure for review. This procedure shall include the following information for each chemical carcinogen used in the laboratory:
  - a. Name of principal investigator and/or project supervisor and their contact information;
  - b. Names of all other personnel associated with the project and their contact information;
  - c. Names, amounts, physical form, concentrations, and storage/use locations of the carcinogens involved;
  - d. Proper precautions for handling during normal use, including personal protective equipment and location restrictions;
  - e. Outline waste disposal and decontamination procedures;
  - f. A brief description of the experiment, including:
    - i. Concentrations of stock and working solutions;
    - ii. Techniques and equipment to assure containment;
    - iii. Emergency procedures including deactivation and/or decontamination;
    - iv. Personal protective measures to be employed and/or equipment to be used;
    - v. Duration of the proposed project;
    - vi. An appropriate means of detecting spills and contamination and decontaminating surfaces that may become contaminated with the Listed Carcinogen. This information can often be found in the Safety Data Sheet (SDS) for the chemical of concern;



- vii. Emergency procedures for spills must be specified.

### C. Labels and Signs

1. Warning signs should be placed at the following areas associated with the Listed Carcinogen Regulated Areas:
  - a. All entrances to Secondary Regulated areas
  - b. All equipment used in as a Primary Regulated Area (fume hoods, gloveboxes, Closed Systems for Storage, etc.).
  - c. Any cabinets, drawers, and refrigerators where Listed Carcinogens are stored.
  - d. Warning signs should contain the following information:

DANGER  
(CHEMICAL IDENTIFICATION)  
MAY CAUSE CANCER  
AUTHORIZED PERSONNEL ONLY

2. All primary and secondary containers and storage cabinets should be labeled with any other applicable hazard warnings such as corrosive, flammable etc. necessary for compliance with the Hazard Communication Standard (Section 5194).
3. All primary containers should be labeled with the date and initials of the person who prepared the mixture.

### D. Protective Clothing, Equipment, and Hygiene Requirements

1. Minimum laboratory protective clothing and equipment for handling hazardous materials or animals include, but are not limited to, a laboratory coat, closed-toed/heel shoes, safety glasses, goggles and/or face shield if there is a risk of a splash hazard, and gloves if there is a risk of skin irritation, absorption or injury. Additional safety equipment and clothing requirements e.g., respiratory protection and/or disposal garments, may be required as part of a specific protocol (radiological, biological, carcinogen, or animal care and use).
2. Appropriate and necessary protective clothing and personal protective equipment (PPE) will be determined by performing a laboratory hazard assessment as part of the Injury and Illness and Prevention Plan (IIPP). The assessment is to be administered by the supervisor and employee(s).
3. A daily change of clean, protective laboratory clothing, such as a solid-front gown, surgical scrub suit, or fully buttoned laboratory coat is required for activities involving the use of a Listed Carcinogen. The required change of clean, protective clothing for employees engaged in animal support shall include coveralls or shirt and pants, foot covers, head covers, gloves and appropriate respiratory equipment or devices.
  - a. Clothing contaminated by Listed Carcinogens should be removed immediately. Place contaminated clothing in an impervious container, labeled with the name of the carcinogen and its hazards for decontamination through an approved industrial laundry service or disposal.
  - b. Prior to each exit from a regulated area, protective clothing and equipment shall

be left at the point of exit, and at the last exit of the day, used clothing and equipment shall be collected in impervious containers, labeled with the name of the carcinogen and its hazards for decontamination through an approved industrial laundry service or disposal.

- c. When clothing decontamination methods are not known or are not practical, disposable protective clothing should be worn.
4. Gloves should be selected to provide both appropriate chemical resistance as well as protection to any other physical hazards present while being compatible with the physical operation being performed.
  - a. Disposable gloves shall be discarded after each use and immediately after contamination with a Listed Carcinogen. Used gloves should be collected as dry hazardous waste.
  - b. If manipulations of a Listed Carcinogen are conducted within an approved fume hood, double gloving or the use of an inner and outer gloving strategy is encouraged so that the outer glove may be removed and collected within the hood.
  - c. Additional care should be taken to remove potentially contaminated gloves prior to touching doorknobs, telephones, computers or in other situations where contamination could be readily transferred out of the regulated area.
5. Eye protection shall be worn in the laboratory any time chemical work is performed.
6. Proper use of approved engineering controls will provide sufficient protection to maintain exposure levels below Cal OSHA permissible exposure limits. In some instances, non-routine operations may require the use of respirators. Contact EHS for further evaluation of non- routine operations.
7. Employees shall be required to wash hands, forearms, face, and neck upon each use of a Listed Carcinogen and exit from a Regulated Area.
8. Employees working with animals in conjunction with Listed Carcinogens shall be required to shower after the last exit of the day from a Regulated Area.

#### E. Information and Training

1. Hazard information and safety procedures should be reviewed and updated annually with laboratory and animal care personnel who work with or who may be exposed to Listed Carcinogens. Training records should be documented with the name and signature of each attendee, the name of the trainer, the content of the class and the date. Training is generally conducted in house and provided by the PI or a laboratory supervisor, competent in the risks and hazards associated with the scope of work.
2. Training for all authorized users should include the following:
  - a. A description of the use that could result in exposure including written experimental procedures;
  - b. The nature of the physical and health hazards (i.e., fire, explosion, carcinogenic, toxicity) associated with exposure;
  - c. Local and systemic toxicity, and review of the Safety Data Sheet for the carcinogen;

- d. Engineering controls, administrative controls, personal protective equipment and laboratory or general work practices to limit exposure;
  - e. Employee responsibilities for following prudent laboratory practices to reduce risk of exposure;
  - f. Monitoring methods and observations that may be used to detect or evaluate the presence or release of a carcinogen;
  - g. Proper storage, labeling and disposal practices.
3. Training is required prior to the employee's initial work with the Listed Carcinogen. Refresher training should be completed and documented at least annually.

#### F. Waste Management

1. Before beginning an activity that involves the use of a Listed Carcinogen, plans should be developed for the handling and disposal of contaminated wastes and surplus carcinogens.
2. Whenever practical, carcinogens should be inactivated prior to disposal as hazardous waste. It is the responsibility of the principal investigator to document the validity of the inactivation method. All inactivation procedures must be approved by EHS and documented according to the Benchtop Waste Treatment Regulations.
3. Waste containing or contaminated with any amount of listed carcinogen is considered hazardous unless evaluated and determined to be non-hazardous by the EHS Waste Coordinator.
4. Before requesting a waste pick-up:
  - a. Segregate listed carcinogen waste from other waste;
  - b. Contaminated materials that are to be transferred from work areas to disposal areas should first be placed in a plastic bag, or other suitable impermeable container, and then in a primary container. Label the outer container with (i) the name of the carcinogen and (ii) "Danger: May Cause Cancer";
  - c. Waste must be labeled with a standard Hazardous Waste label as well as labels stating: "Danger: May Cause Cancer." Labels are available from EHS;
  - d. Submit chemical waste pick-up requests via the EHS web site. A separate form is used for sharps disposal;
  - e. Spill waste must be collected, labeled and disposed as hazardous waste;
  - f. Contaminated wastes and animal carcasses shall be incinerated in such a manner that no carcinogenic products are released;
  - g. Mixed chemical and radiological or biological wastes require special consideration. Contact EHS for guidance.

G. An annual medical surveillance program will be provided in consultation with the Occupational Health Program. This includes annual follow-ups and exit physicals. Medical clearance is a requirement prior to any work with Listed Carcinogens. All personnel working with Listed Carcinogens must be provided access to medical surveillance:

1. Prior to working with a Listed Carcinogen;

2. When an employee develops signs and symptoms of exposure;
3. Whenever an event takes place in the work area such as spill, leak, explosion, or other occurrence resulting in the likelihood of hazard exposures;

#### H. Carcinogen Use in Animals

Listed Carcinogen use in animal experiments may present a significant risk of exposure to animal handlers. The Principal Investigator must take special precautions to ensure that animal handlers are not at risk of exposure to chemical carcinogens and other hazardous materials. For example, contamination may be present on the fur or skin of an animal, in animal body fluids or excreta. Carcinogen-treated food may contaminate the floor of the animal room. Rooms housing animals treated with Listed Carcinogens must meet the same containment and engineering controls as required for laboratories.

If animal experiments are planned with a listed carcinogen, the submitted SOP should provide a robust description of the entire experiment including post-exposure handling and list all locations associated the animal maintenance during and after exposure.

If you are planning animal research with a listed carcinogen, please contact Chemical Safety ([chemsafety@uci.edu](mailto:chemsafety@uci.edu)) as early as possible to arrange a consultation prior to submitting any of the required forms.

**Appendix E: Listed Carcinogens Request Form**

PI Name: \_\_\_\_\_ Room used: \_\_\_\_\_ Date: \_\_\_\_\_

I am using (circle all that apply):

<i>Chemical</i>	<i>Chemical Abstracts Registry Number</i>
2-Acetylaminofluorene	53-96-3
4-Aminodiphenyl	92-67-1
Benzidine (and its salts)	92-87-5
3,3'-Dichlorobenzidine (and its salts)	91-94-1
4-Dimethylaminoazobenzene	60-11-7
alpha-Naphthylamine **	134-32-7
beta-Naphthylamine **	91-59-8
4-Nitrobiphenyl	92-93-3
N-Nitrosodimethylamine	62-75-9
beta-Propiolactone	57-57-8
bis-Chloromethyl ether	542-88-1
Methyl chloromethyl ether	107-30-2
Ethyleneimine	151-56-4

Briefly describe the process where the carcinogens are being used:

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What quantities are used per experiment? \_\_\_\_\_

What is the largest size reagent bottle of listed carcinogen used? (500g, 1gal, etc.)

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Explain exactly where in the room the carcinogens will be used. (fume hood number, left bench, etc.)

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Are any operations done outside a fume hood? (Dispensing, weighing, etc.) Explain.

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List the names of lab workers working with the Listed Carcinogen:

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