

# CASE WESTERN RESERVE UNIVERSITY

## Regulated Carcinogen Program

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## I. Overview

The purpose of this program is protect all Case Western University Reserve (CWRU) employees and students from OSHA select carcinogens identified in 29 CFR 1910 Subpart Z “Toxic and hazardous substances.” The Definition of an OSHA select carcinogen is a carcinogen or potential carcinogens which is regulated by detailed, substance-specific standards. These chemicals have additional, labeling, training, and medical monitoring standards that that must be followed to ensure occupational safety and compliance with safety standards established by OSHA.

## II. Scope

This program will apply to all employees and students working on the CWRU premises who perform procedures or operations with any of the select carcinogens identified in 29 CFR 1910 Subpart Z. All requirements of this document shall be met by all individuals described in this section.

## III. Definitions

**Chemical Hygiene Plan (CHP):** A written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace

**OSHA:** The Occupational Safety and Health Administration, an agency of the US government under the Department of Labor with the responsibility of ensuring safety at work and a healthful work environment

**NIOSH:** The National Institute for Occupational Safety and Health, a US Federal agency responsible for conducting research and making recommendations for the prevention of work-related disease and injury.

**Action Level (AL):** An OSHA defined concentration for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

**Permissible Exposure Limit (PEL):** A legal limit, established by OSHA, for exposure of an employee to a chemical substance or physical agent such as loud noise.

**8 hr. TWA:** A PEL, established by OSHA, as the highest level of exposure an employee may be exposed to without incurring the risk of adverse health effects over and 8-hr shift of a 40-hour work week.

**Short Term Exposure Limit (STEL):** the OSHA PEL for a particular substance over a short period of time, usually 15 minutes.

**PPE:** Protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection.

**Authorized Person:** Any person authorized by the employer and required by work duties to be present in regulated areas.

**Regulated area:** An area established by the employer to demarcate areas where work with regulated carcinogens is conducted, and any adjoining area where debris and waste from such work accumulate; and a work area within which airborne concentrations of a regulated carcinogen, exceed or there is a reasonable possibility they may exceed the PEL.

**Engineering Controls:** Measures that eliminate or reduce exposure to a chemical or physical hazard through the use or substitution of engineered machinery or equipment.

#### **IV. Responsibilities**

##### **A. CWRU EHS**

1. Review the CHP and Regulated Chemical-Use Questionnaire and provide a risk assessment for the use of regulated carcinogens.
2. Approve/Deny the use of regulated chemical in the laboratory.
3. Conduct exposure monitoring when required by OSHA and write and issue a report describing the findings to the PI and students/employees.
4. Notify the PI when a medical surveillance program must be implemented when chemical levels exceed the OSHA action level.
5. Updated the regulated carcinogen program as necessary

##### **B. Principle Investigator (PI)**

1. Submit a new or updated CHP and Regulated Chemical-Use Questionnaire to EHS for approval before purchasing or using any regulated carcinogens listed in section V.
2. Ensure that proper signage is posted on entrance door(s), fume hood(s), and storage cabinet(s), or any other area(s) required by section VI, B.
3. Designate regulated areas for regulated carcinogens and keep access limited to only the authorized persons appointed in the CHP.
4. Ensure that employees and/or students receive site specific training that covers use of the regulated carcinogen(s) in the laboratory. Training requirements can be found in section VI, C.
5. Ensure that students and/or employees undergo medical surveillance when EHS determines it is necessary under OSHA guidelines.

##### **C. Employee/Student**

1. Only work with select carcinogens in a regulated area and designated work area.
2. Allow EHS to conduct personal exposure monitoring when it is required by OSHA.
3. Follow all medical surveillance procedures required by EHS and OSHA when regulated carcinogens exceed the action level.
4. Receive laboratory safety training from EHS and site-specific training from PI or supervisor.

## V. List of Regulated Select Carcinogens

- 4-Nitrobiphenyl
- alpha-Naphthylamine
- Methyl chloromethyl ether
- 3,3'-Dichlorobenzidine (and its salts)
- bis-Chloromethyl ether
- beta-Naphthylamine
- Benzidine
- 4-Aminodiphenyl
- Ethyleneimine
- beta-Propiolactone
- 2-Acetylaminofluorene
- 4-Dimethylaminoazobenzene
- N-Nitrosodimethylamine
- Vinyl chloride
- Inorganic arsenic
- Cadmium
- Benzene
- 1,2-dibromo-3-chloropropane
- Acrylonitrile
- Ethylene oxide
- Formaldehyde
- Methylenedianiline
- 1,3-Butadiene
- Methylene Chloride
- Chromium (VI)

## VI. CWRU process

Persons who intend to perform any procedure or operation with a regulated select carcinogen are required to submit a chemical hygiene plan (CHP) along with a Regulated Chemical-Use Questionnaire. Once the risk assessment has been conducted and the procedure or operation has been approved, EHS may choose to measure the employee's exposure to any regulated chemical if there is reason to believe that exposure levels for that substance could exceed the OSHA action level or if exposure monitoring is required under OSHA's individual chemical standard. Tasks that require monitoring include tasks where high concentrations are handled, tasks in which fume hood usage is infeasible, and task with low levels of engineering controls.

If any student or employee is found to have an exposure above the Permissible Exposure Limits (PELs) action will be taken to eliminate or reduce the exposure below the PEL. Engineering and work practice controls will be the primary means to reduce employee exposure to toxic chemicals, where feasible. Respiratory protection will be required to be used if engineering or work practice controls are infeasible. The use of respirators is not permitted by any CWRU student or employee until EHS has conducted a risk assessment of the area in question. Information on respirator use can be located in the CWRU Respiratory Protection Program.

### A. Designation of an Area

The PI, supervisor, or work unit shall establish a regulated area wherever there is usage or storage of a select carcinogen. Regulated areas shall be determined from the rest of the workplace in any manner that minimizes the number of employees exposed to carcinogen within the regulated area. Access to regulated areas shall be limited to authorized persons. "Authorized person" means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe

monitoring and measuring procedures. All regulated areas need to post the appropriate signage as described in section IV, B.

For traditional, closed-type laboratories all entrances shall be labeled as well as storage areas for chemicals with the entrance legends described in section IV, B. For open-bench laboratories all benches, fume hoods, storage areas, and any other select carcinogen designated work areas shall be labeled with the entrance legends described in sections IV, B.

**B. Labeling and Signage**

The supervisor or PI shall ensure that signs required by this paragraph are illuminated and cleaned as necessary so that the legend is readily visible. The supervisor or PI shall also ensure that no statement appears on or near any sign or label required by this paragraph which contradicts or detracts from the meaning of the required sign or label.

The following signage/labeling is required by OSHA under CFR 1910.1003 through CFR 1910.1052:

Chemical(s)	Required Signage/Labeling
<p>4-Nitrobiphenyl  alpha-Naphthylamine  methyl chloromethyl ether  3,3'-Dichlorobenzidine (and its salts)  bis-Chloromethyl ether  beta-Naphthylamine  Benzidine  4-Aminodiphenyl  Ethyleneimine  beta-Propiolactone  2-Acetylaminofluorene  4-Dimethylaminoazo-benzene  N-Nitrosodimethylamine</p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER  (CHEMICAL IDENTIFICATION)  MAY CAUSE CANCER  AUTHORIZED PERSONNEL ONLY</b></p> <p>Post signs at entrances to regulated areas containing any operations involving direct contact. The signs shall bear the legend:</p> <p><b>DANGER  (CHEMICAL IDENTIFICATION)  MAY CAUSE CANCER  WEAR AIR-SUPPLIED HOODS, IMPERVIOUS SUITS, AND PROTECTIVE EQUIPMENT  IN THIS AREA  AUTHORIZED PERSONNEL ONLY</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>

<p><b>Vinyl Chloride</b></p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER VINYL CHLORIDE MAY CAUSE CANCER AUTHORIZED PERSONNEL ONLY</b></p> <p>Areas containing hazardous operations or where emergencies currently exist. The signs shall be legible and bear the legend:</p> <p><b>DANGER VINYL CHLORIDE MAY CAUSE CANCER WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA AUTHORIZED PERSONNEL ONLY</b></p> <p>In addition to the other requirements, containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride are legible and include the following information:</p> <p><b>CONTAMINATED WITH VINYL CHLORIDE MAY CAUSE CANCER</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Inorganic Arsenic</b></p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER INORGANIC ARSENIC MAY CAUSE CANCER DO NOT EAT, DRINK OR SMOKE WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY</b></p> <p>The employer shall ensure that the containers of contaminated protective clothing and equipment in the workplace or which are to be removed from the workplace are labeled and that the labels include the following information:</p> <p><b>DANGER: CONTAMINATED WITH INORGANIC ARSENIC. MAY CAUSE CANCER. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF INORGANIC ARSENIC CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE OR FEDERAL REGULATIONS.</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p> <p>Labels are not required when the inorganic arsenic in the product is bound in such a manner so as to make unlikely the possibility of airborne exposure to inorganic arsenic. (Possible examples of products not requiring labels are semiconductors, light emitting diodes and glass.)</p>

<p><b>Lead</b></p>	<p>The employer shall post the following warning signs in each work area where the PEL is exceeded:</p> <p><b>DANGER LEAD MAY DAMAGE FERTILITY OR THE UNBORN CHILD CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM DO NOT EAT, DRINK OR SMOKE IN THIS AREA</b></p> <p>The employer shall ensure that labels of bags or containers of contaminated protective clothing and equipment include the following information:</p> <p><b>DANGER: CLOTHING AND EQUIPMENT CONTAMINATED WITH LEAD. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM. DO NOT EAT, DRINK OR SMOKE WHEN HANDLING. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Chromium VI</b></p>	<p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Cadmium</b></p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER CADMIUM MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS AND KIDNEYS WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY</b></p> <p>The warning labels for containers of contaminated protective clothing, equipment, waste, scrap, or debris shall include at least the following information:</p> <p><b>DANGER CONTAINS CADMIUM MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS AND KIDNEYS AVOID CREATING DUST</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Benzene</b></p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER BENZENE MAY CAUSE CANCER HIGHLY FLAMMABLE LIQUID AND VAPOR DO NOT SMOKE WEAR RESPIRATORY PROTECTION IN THIS AREA AUTHORIZED PERSONNEL ONLY</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>

<p><b>1,2-Dibromo-3-chloropropane</b></p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER</b>  <b>1,2-Dibromo-3-chloropropane</b>  <b>MAY CAUSE CANCER</b>  <b>WEAR RESPIRATORY PROTECTION IN THIS AREA</b>  <b>AUTHORIZED PERSONNEL ONLY</b></p> <p>Containers of DBCP-contaminated protective devices or work clothing which are to be taken out of change rooms or the workplace for cleaning, maintenance or disposal shall bear labels with the following information:</p> <p><b>CONTAMINATED WITH 1,2-Dibromo-3-chloropropane (DBCP),</b>  <b>MAY CAUSE CANCER.</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Acrylonitrile</b></p>	<p>The employer shall post signs to clearly indicate all workplaces where AN concentrations exceed the permissible exposure limits. The signs shall bear the following legend:</p> <p><b>DANGER</b>  <b>ACRYLONITRILE (AN)</b>  <b>MAY CAUSE CANCER</b>  <b>RESPIRATORY PROTECTION MAY BE REQUIRED IN THIS AREA</b>  <b>AUTHORIZED PERSONNEL ONLY</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Ethylene Oxide</b></p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER</b>  <b>ETHYLENE OXIDE</b>  <b>MAY CAUSE CANCER</b>  <b>MAY DAMAGE FERTILITY OR THE UNBORN CHILD</b>  <b>RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING MAY BE REQUIRED IN THIS AREA</b>  <b>AUTHORIZED PERSONNEL ONLY</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Formaldehyde</b></p>	<p>The employer shall establish regulated areas where the concentration of airborne formaldehyde exceeds either the TWA or the STEL and post all entrances and access ways with signs bearing the following legend:</p> <p><b>DANGER</b>  <b>FORMALDEHYDE</b>  <b>MAY CAUSE CANCER</b>  <b>CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION</b>  <b>AUTHORIZED PERSONNEL ONLY</b></p> <p>(continued on next page)</p>



<p><b>Formaldehyde</b> (continued)</p>	<p>Storage areas for contaminated clothing and equipment shall have signs bearing the following legend:</p> <p><b>DANGER FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT MAY CAUSE CANCER CAUSES SKIN, EYE AND RESPIRATORY IRRITATION DO NOT BREATHE VAPOR DO NOT GET ON SKIN</b></p> <p>The employer shall ensure containers for contaminated clothing and equipment are labeled consistent with the following legend:</p> <p><b>DANGER FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT MAY CAUSE CANCER CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION DO NOT BREATHE VAPOR DO NOT GET ON SKIN</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Methylenedianiline</b></p>	<p>Entrances to regulated areas shall be posted with signs bearing the legend:</p> <p><b>DANGER MDA MAY CAUSE CANCER CAUSES DAMAGE TO THE LIVER RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING MAY BE REQUIRED IN THIS AREA AUTHORIZED PERSONNEL ONLY</b></p> <p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>1,3-Butadiene</b></p>	<p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>
<p><b>Methylene Chloride.</b></p>	<p>Label all containers as per the Hazard Communication Standard (HCS) (§ 1910.1200)</p>

### C. Training

Each employee prior to being authorized to enter a regulated area, shall receive training by EHS for laboratory safety training as well as site-specific training by their supervisor or PI. The training program for regulated carcinogens must cover the following topics:

1. The nature of the carcinogenic hazards of a carcinogen addressed by this section (see list above), including local and systemic toxicity;
2. The specific nature of the operation involving a carcinogen addressed by this section that could result in exposure;
3. The purpose for and application of the medical surveillance program, including, as appropriate, methods of self-examination;
4. The purpose for and application of decontamination practices and purposes;
5. The purpose for and significance of emergency practices and procedures;
6. The employee's specific role in emergency procedures;

7. Specific information to aid the employee in recognition and evaluation of conditions and situations which may result in the release of a carcinogen addressed by this section;
8. The purpose for and application of specific first aid procedures and practices;

Each student/employee shall review the topics of this section at the employee's first training and indoctrination program and annually thereafter.

#### **D. Engineering Controls**

To achieve compliance with CWRU policies and OSHA regulations administrative or engineering controls must first be determined and implemented whenever feasible. Engineering controls may include but are not limited to: fume hoods, enclosures, shields, ventilation systems, and other equipment or machinery that eliminates or reduces exposure to a chemical. When such controls are not feasible to achieve full compliance, PPE or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section.

#### **E. Personal Protective Equipment (PPE)**

PPE shall be issued in accordance with the SDS and hazard communication materials. Respirators will be issued in accordance with the CWRU respiratory protection program when air concentrations are at or exceed the PELs for a particular chemical. Before respirators are permitted for use, EHS will perform air quality monitoring to determine if the use of respirators is required.

#### **F. Waste Disposal**

Chemical waste of all select carcinogens is regulated by the Environmental Protection Agency (EPA) through the Resource Conservation and Recovery Act (RCRA). It cannot be disposed of in regular trash or in the sewer system. Regulated carcinogen chemical wastes must be disposed of through the EHS Hazardous Waste Program. Chemical waste containers must be labeled with the following information:

- Full chemical name and quantity of the waste. For mixtures, each chemical must be listed. Abbreviations, acronyms and ditto marks ("") to replace words are not allowed, as this does not comply with The Hazard Communication Standard;
- Place of origin (department, room number);
- PI's name and telephone number;
- Bottle number assigned on corresponding waste sheet; and
- The tag or label must have the words: "Hazardous Waste."

A completed Hazardous Waste Information Form must be submitted to the EHS office (Instructions are on the back of the form). On this form, please include:

- Full chemical name and quantity of the waste. For mixtures, each chemical and its volume or weight must be listed. Abbreviations, acronyms and ditto marks ("") to

replace words are not allowed, as this does not comply with The Hazard Communication Standard;

- Place of origin (department, room number);
- PI's name and telephone number;
- A contact name is required to answer any questions or open the door;
- Bottle number (in numerical order) assigned on bottle; and
- A speedtype or account number.

Send the completed form to the Environmental Health and Safety Office, Service Building, 1st floor, Location Code 7227. The form must be received by EHS by Tuesday at noon. Chemical waste removal will then happen on Thursday of that week. Each container must be listed separately, tagged and sealed. Leaking or open containers will not be removed.

### **G. Medical Surveillance**

A medical surveillance program will be enacted when levels of a regulated carcinogen exceed the action level defined by OSHA. The employer shall make medical surveillance available at no cost to the employee, and at a reasonable time and place for all employees. Medical surveillance may include questionnaires, physical examinations, biological monitoring (i.e. blood and urine sampling), and examinations of health and employment history. Medical surveillance procedures will be established and enforced by EHS when required under the standard. It is the responsibility of EHS to establish a program and the responsibility of the PI or unit supervisor to ensure that their employees follow all surveillance procedures required by the medical surveillance program. Failure to comply with the requirements of the medical surveillance program will result in disciplinary action. All medical surveillance procedures will be conducted by licensed health care professionals and will include the information outlined in the specific chemical's standard.

#### **1. Initial**

Initial medical surveillance and monitoring will be conducted if exposure levels for that substance exceeds the action level or PEL for the time frame specified by the individual chemical's standard. For the first 13 carcinogens listed in section III, medical surveillance and monitoring will be conducted prior to an employee being assigned to a regulated area. Medical surveillance shall also be initiated when an employee experiences any characteristic symptoms of a particular chemical. Medical surveillance shall also be conducted when an employee is exposed to a chemical as a result of an emergency situation such as a chemical spill exposure or PPE malfunction.

#### **2. Periodic**

When the action level is met or exceeded, periodic medical surveillance will be conducted on an interval described in the specific chemical standard. Periodic monitoring will also be conducted anytime an employee experiences any characteristic symptoms of a particular chemical.

### 3. Termination

Termination of surveillance can occur only when the level of exposure is under the action level and is permitted by OSHA under the individual chemical standard.

### H. Exposure Monitoring

Exposure monitoring will take place when the airborne regulated carcinogen concentration has the potential to reach or exceed the OSHA Action Level (AL) or OSHA Permissible Exposure Limits (PELs) for either the 8 hr. Time Weighted Average (TWA) or the Short Term Exposure Limit (STEL). Potential areas where monitoring will be conducted include but are not limited to: areas where high volumes and/or concentrations of regulated carcinogens are used; areas where engineering controls (i.e. fume hoods, enclosures, etc.) are infeasible; and areas where persistent exposure take place. Exposure monitoring will also be conducted anytime an employee reports symptoms related to the carcinogen that they work with or around. Exposure monitoring will be conducted on intervals described by OSHA. Reexaminations of exposure will be conducted when a previously monitored experiment or operation changes its processes or protective systems including use of engineering and administrative controls.

### I. Reporting

- A detailed report including a summary of procedures, methods of analysis, results of individual exposures, and any other significant information will be generated by EHS.
- EHS will send the monitored individuals a copy of the report via email within 15 days of receiving the analysis.
- EHS will provide the PI or unit supervisor with a copy of the report so it can be posted in a location assessable to all individuals whom were involved in the same experiment or operation as the monitored individuals.
- If exposure is above the PEL, EHS shall provide the affected individuals with a description of the corrective actions being taken to decrease exposure.

## VII. PELs

Chemical	Action Level	8-Hr TWA	STEL
4-Nitrobiphenyl	nd	nd	nd
alpha-Naphthylamine	nd	nd	nd
Methyl chloromethyl ether	nd	nd	nd
3,3'-Dichlorobenzidine (and its salts)	nd	nd	nd
bis-Chloromethyl ether	nd	nd	nd
beta-Naphthylamine	nd	nd	nd
Benzidine	nd	nd	nd
4-Aminodiphenyl	nd	nd	nd
Ethyleneimine	nd	nd	nd
beta-Propiolactone	nd	nd	nd
2-Acetylaminofluorene	nd	nd	nd
4-Dimethylaminoazobenzene	nd	nd	nd
N-Nitrosodimethylamine	nd	nd	nd

Vinyl chloride	0.5 ppm	1 ppm	5 ppm
Inorganic arsenic	5 µg/m <sup>3</sup>	10 µg/m <sup>3</sup>	nd
Lead	30 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>	nd
Chromium VI	2.5 µg/m <sup>3</sup>	5 µg/m <sup>3</sup>	nd
Cadmium	2.5 µg/m <sup>3</sup>	5 µg/m <sup>3</sup>	nd
Benzene	0.5 ppm	1 ppm	5 ppm
1,2-dibromo-3-chloropropane	nd	1 ppb	nd
Acrylonitrile	1 ppm	2 ppm	10 ppm*
Ethylene oxide	0.5 ppm	1 ppm	5 ppm
Formaldehyde	0.5 ppm	0.75 ppm	2.0 ppm
Methylenedianiline	5 ppb	10 ppb	100 ppb
1,3-Butadiene	0.5 ppm	1 ppm	5 ppm
Methylene Chloride	12.5 ppm	25 ppm	125 ppm

\* identified as Ceiling limit per OSHA

nd= not defined

#### VIII. Sampling Methods

Chemical	Published Sampling Methodology
4-Nitrobiphenyl	OSHA PV2082
alpha-Naphthylamine	OSHA 93
Methyl chloromethyl ether	OSHA 10
3,3'-Dichlorobenzidine (and its salts)	OSHA 65
bis-Chloromethyl ether	OSHA 10
beta-Naphthylamine	OSHA 93
Benzidine	OSHA 65
4-Aminodiphenyl	OSHA 93
Ethyleneimine	NIOH 3514
beta-Propiolactone	npm
2-Acetylaminofluorene	npm
4-Dimethylaminoazobenzene	NIOSH 284
N-Nitrosodimethylamine	OSHA 27
Vinyl chloride	NIOSH 1007
Inorganic arsenic	NIOSH 7303 NIOSH 7303-MS ASTM D7439-14
Lead	NIOSH 7303 OSHA ID 125G NIOSH 7303-MS ASTM D7439-14

Chromium VI	NIOSH 7303 OSHA ID 125G NIOSH 7303-MS ASTM D7439-14
Cadmium	NIOSH 7303 OSHA ID 125G NIOSH 7303-MS ASTM D7439-14
Benzene	OSHA 7 NIOSH 1501 OSHA 1005
1,2-dibromo-3-chloropropane	npm
Acrylonitrile	OSHA 37 NIOSH 1604
Ethylene oxide	OSHA 1010 OSHA 49
Formaldehyde	OSHA 52* NIOSH 2016 OSHA 1007 OSHA ID 205
Methylenedianiline	OSHA 57 NIOSH 5029
1,3-Butadiene	OSHA 56 NIOSH 1024
Methylene Chloride	OSHA 80 OSHA 7 NIOSH 1005

npm = no published method

\*= A CWRU SOP has been established  
for this method

#### IX. Forms and additional information

- CWRU Chemical Hygiene Plan form with Regulated Chemical-Use Questionnaire can be found at: <https://case.edu/ehs/media/caseedu/ehs/documents/CHP.pdf>
- CWRU Methylene Chloride Policy can be found at: <https://case.edu/ehs/media/caseedu/ehs/documents/Methylene.pdf>
- CWRU Formaldehyde Policy can be found at: <https://case.edu/ehs/media/caseedu/ehs/documents/Formaldehyde.pdf>
- CWRU Benzene Policy can be found at: <https://case.edu/ehs/media/caseedu/ehs/documents/Benzene.pdf>
- CWRU Methylene Chloride Policy can be found at: <https://case.edu/ehs/media/caseedu/ehs/documents/Vinyl.pdf>