

Methylene Chloride Workplace Chemical Protection Program

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ENVIRONMENTAL HEALTH & SAFETY

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University of Nebraska Medical Center (UNMC)

Methylene Chloride Workplace Chemical Protection Program

Applicability

This program applies to all laboratories, facilities, shops, studios, and work areas where methylene chloride, mixtures, and products containing methylene chloride at 0.1% concentrations or greater are used, handled, or possessed. This program applies to all faculty, employees, students, and visitors, including persons not employed by UNMC, wherever there is potential for methylene chloride exposure in UNMC spaces.

Adherence to this program meets the Workplace Chemical Protection Program (WCPP) and Exposure Control Plan requirements of 40 CFR Part 751, Methylene Chloride, Regulation Under the Toxic Substances Control Act (TSCA).

The end user must complete and maintain a written Operation Specific Control Plan.

Background

Methylene chloride (CAS # 75-09-2) is a volatile, colorless liquid with a chloroform-like odor. Synonyms include: Dichloromethane; DCM; MeCl & MeCl₂; Methane dichloride; Methylene bichloride; Methylene dichloride; Freon-30 (R-30); Solmethine, Narkotil. This Program applies to all isotopologues of methylene chloride, including its deuterated form (CAS # 1665-00-5).

Regulatory Information

In April 2024, the [EPA finalized prohibitions and workplace protections under the Toxic Substances Control Act \(TSCA\) for methylene chloride](#), which prohibits most industrial and commercial uses of methylene chloride. Thirteen conditions of use of methylene chloride are not subject to complete prohibition under this rule. This Program pertains to the following two conditions of use permitted by the EPA rule:

Use as a Laboratory Chemical: refers to the industrial or commercial use of methylene chloride in a laboratory process or in specialized laboratory equipment for instrument calibration/maintenance, chemical analysis, chemical synthesis, extracting and purifying other chemicals, dissolving other substances, executing research, development, test and evaluation methods, and similar activities, such as use as a solvent, reagent, analytical standard, or other experimental use.

Use as a bonding agent for solvent-welding: refers to the industrial or commercial use of methylene chloride or a solvent blend including methylene chloride to chemically bond polymer substrates including, but not limited to, acrylic or polycarbonate, creating an airtight, waterproof, and in some cases seamless joint.

For these conditions of use, the EPA has mandated that employers institute a Workplace Chemical Protection Plan (WCPP). All other uses of methylene chloride are prohibited.

[1910.1052](#) is the general industry standard enforced by the Occupational Safety and Health Administration (OSHA) to regulate occupational exposure to methylene chloride. Compliance with this program meets the requirements of both the EPA rule and the OSHA standard.

Potential Hazards

- Methylene chloride exposure can cause adverse health effects to the central nervous system (CNS), liver, and cardiovascular system, including mental confusion, light-headedness, nausea, vomiting, and headache.
- The body metabolizes Methylene Chloride to carbon monoxide, reducing the blood’s ability to transport oxygen. It is also a suspected carcinogen.
- Exposure may also cause eye and respiratory tract irritation.
- Skin exposure to liquid may cause irritation and skin burns after extended exposures.
- For more information, consult the manufacturer’s Safety Data Sheet for methylene chloride, the UNMC SDS eBinder, and the references section.

Occupational Exposure Limits (OELs)

Existing OELs enacted by the EPA TSCA regulation are significantly more restrictive than the OSHA OELs and must be adhered to. Contact [UNMC EHS](#) for assistance in performing an exposure assessment.

EPA Existing Chemical Exposure Limit (ECEL)	EPA Action Level	EPA Short-Term Exposure Limit (STEL)
2 ppm as an 8-hour TWA	1 ppm as an 8-hour TWA	16 ppm as a 15-minute TWA

OSHA Permissible Exposure Limit (PEL)	OSHA Action Level	OSHA Short-Term Exposure Limit (STEL)
25 ppm as an 8-hour TWA	12.5 ppm as an 8-hour TWA	125 ppm as a 15-minute TWA

Exposure Monitoring

Exposure monitoring is mandatory to ensure that all potentially exposed persons are not exposed to methylene chloride above the EPA exposure limits and to ensure regulatory compliance for all persons exposed above the EPA action level. Before commencing any new operations involving methylene chloride at or above 0.1% concentration or altering existing operations that may present increased exposure potential, users shall contact [UNMC Environmental Health and Safety \(EHS\)](#) for assistance in performing an exposure assessment.

EHS shall complete exposure monitoring for all new operations and when a change is made to existing operations involving methylene chloride. If the initial monitoring results indicate the exposure is below the EPA action level and the EPA STEL, subsequent monitoring shall be conducted at least once every 5 years. Under scenarios where the action level, ECEL, or STEL are exceeded or the task

to be monitored does not occur within the required monitoring period, subsequent monitoring shall be conducted in accordance with 40 CFR 751.109(d)(3).

Exposure monitoring shall be conducted for all potentially exposed persons or for an individual or group of individuals determined to be representative of the exposure group. EHS shall determine when representative samples are appropriate.

The PIs, departments, units using methylene chloride will pay for sampling badges and shipping charges.

Potentially exposed persons will be notified of monitoring results within fifteen business days of receipt. EHS will maintain recordkeeping of all exposure monitoring events for 30 years from the monitoring event.

Operation Specific Exposure Control Plan

The PI, manager, supervisor, or a competent representative of the unit or group that conducts operations involving methylene chloride shall complete and maintain a written Operation Specific Exposure Control Plan (ECP). The ECP documents exposure control measures used by the unit or group, how the controls are implemented, and why alternative controls were not selected. The unit or group's PI or supervisor is ultimately responsible for developing, implementing, complying with, and maintaining the ECP within their work areas.

Whenever feasible, personnel are required to substitute methylene chloride with a safer alternative or eliminate it from operations entirely. If substitution or elimination are not feasible, a detailed explanation shall be documented in the ECP explaining why these controls are not feasible.

The ECP must include procedures for responding to any change that may reasonably be expected to introduce additional sources of exposure, or otherwise result in increased exposure, including procedures for implementing corrective actions to mitigate exposure to methylene chloride. PIs, supervisors, or a competent representative will review and update the exposure control plan to ensure the effectiveness of the exposure controls, identify any necessary updates to the exposure controls, and confirm that all persons are properly implementing the exposure controls.

Engineering Controls

- Work with open containers of methylene chloride should be conducted only in a fume hood, glovebox, or other containment device.
- Operations that involve handling methylene chloride outside of a fume hood or glove box must be assessed via exposure monitoring to ensure they do not exceed exposure limits.
- Emergency eyewash and showers must be readily available within the work area in case of personal exposure, allowing immediate flushing of eyes or skin.

Administrative and Work Practice Controls

- Designate an area for working with methylene chloride and label it as such.

- Keep containers closed as much as possible. Handle open containers only in a chemical fume hood.
- Use in the smallest practical quantities for the experiment being performed.
- Purchase small unit volumes of stock containers.
- If large quantities of methylene chloride are used, contact [UNMC EHS](#) for assistance performing an exposure assessment.
- Once work with the methylene chloride is complete, wipe down the area with a soap and water.
- Keep away from ignition sources. Incompatible with strong oxidizers and metals.
- Wash hands thoroughly after use. Do not eat, drink, or smoke in areas where methylene chloride or other chemicals are used.

Regulated Areas

As defined by the EPA, a regulated area distinguishes places where airborne concentrations of methylene chloride exceed, or there is a reasonable possibility they may exceed, the applicable EPA ECEL or STEL.

- Regulated areas must be established within three months of receiving monitoring data that indicates the EPA ECEL or STEL has been exceeded.
- A regulated area must be visibly marked from the rest of the workplace in a manner that adequately establishes and alerts potentially exposed personnel to the boundaries of the area and minimizes the number of authorized personnel exposed to methylene chloride within the regulated area.
- Delineation of the regulated area will be accomplished by posting signage that displays “Danger: Regulated Area. Methylene Chloride. Authorized Personnel Only. Respiratory protection and protective clothing required”. In addition to the signage, barriers, caution tape, or any other highly visible indicator that would effectively identify the boundaries of the regulated area may be used.
- Access to the regulated area is restricted to authorized individuals who have received appropriate training and personal protective equipment.
- All personnel who enter the regulated area while operations involving methylene chloride are conducted are required to wear respiratory protection. This protection shall be issued and used in compliance with the Personal Protective Equipment Section (below).

Personal Protective Equipment

Hand & Dermal Protection

- Methylene chloride penetrates through standard nitrile, natural rubber, and polyvinyl chloride gloves.
- Wear two pairs of gloves when using methylene chloride. Disposable gloves provide minimum protection for general laboratory use and should be changed frequently or any time contamination is suspected.

- Inner gloves should be made of polyethylene (PE), ethylene vinyl alcohol (EVOH) (e.g., Silvershield®), butyl rubber (e.g., Viton®), polyethylene vinyl alcohol (PVA), ethylene vinyl alcohol (EVA), polyvinyl alcohol (PVA), or other laminate materials that are resistant to methylene chloride to prevent penetration through the skin.
- Outer gloves made of nitrile or neoprene are recommended to prevent cuts, tears, punctures, or rips to the inner methylene chloride-resistant gloves.
- A fully buttoned laboratory coat must be worn when working with methylene chloride. A chemical-resistant apron should be used if transferring or using large quantities of methylene chloride in open containers.

Eye Protection

- Contact lenses should not be worn when working with methylene chloride.
- Eye protection must meet the requirements of ANSI/ISEA Z87.1.
- Safety glasses with side shields are required at a minimum when methylene chloride is used in a closed system.
- Chemical splash goggles are required when a splash hazard exists.

Respiratory Protection

- When elimination, substitution, engineering, and administrative controls cannot feasibly reduce exposures below the EPA OELs, respiratory protection is mandatory.
- Air-purifying respirators may not be permitted due to the short service life of chemical cartridges when used for methylene chloride exposure; therefore, supplied-air respirators may be required.
- EHS will prescribe all use of respiratory protection, and all users must comply with the UNMC Respiratory Protection Program requirements.
- If prescribed, users must receive training on using, maintaining, and caring for the prescribed respirator.
- When prescribed, respirator selection criteria shall comply with [40 CFR 751.109\(f\)\(2\)](#).

Concentration Condition	Minimum Required Respiratory Protection: Respirators Must Be NIOSH Approved
At or below the EPA ECEL and STEL	No respirator required
Above ECEL (2 ppm) and less than or equal to 50 ppm (25 times the ECEL)	Any Supplied-Air Respirator (SAR) or airline respirator in a continuous-flow mode equipped with a loose-fitting facepiece or helmet/hood (Assigned Protection Factor – APF 25)
Above 50 ppm and less than or equal to 100 ppm (50 times the ECEL)	Either: Any SAR or airline respirator in a demand mode equipped with a full facepiece (APF 50) or Any Self-Contained Breathing Apparatus (SCBA) in demand-mode equipped with a full facepiece or helmet/hood (APF 50)

<p>Unknown concentration or at any value above 100 ppm and up to 2,000 ppm (1,000 times the ECEL)</p>	<p>One of:</p> <p>Any SAR or Airline Respirator in a continuous-flow mode equipped with a full facepiece or certified helmet/hood (APF 1,000) or</p> <p>Any SAR or Airline Respirator in a pressure-demand or other positive-pressure mode equipped with a full facepiece (APF 1,000) or</p> <p>Any SCBA in a pressure-demand or positive-pressure mode equipped with a full facepiece or certified helmet/hood (APF 10,000).</p>
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Transportation and Storage

- Methylene chloride should not be transported in motor vehicles (except Shipping & Receiving and EHS personnel who have completed approved Department of Transportation Hazardous Materials training).
- Methylene chloride being hand-carried or transported on carts should be in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.

Please review the [UNMC EHS Chemical Transportation Fact Sheet](#) for additional guidance.

- Store containers in a cool, dry, and well-ventilated area.
- The container must be tightly closed and sealed until ready for use.
- Store containers in secondary containment and away from moisture, strong oxidizers, strong caustics, plastics, rubber, nitric acid, and chemically active metals such as aluminum and magnesium powder, sodium, potassium, and lithium.
- Never store any chemicals on the floor.
- Do not store near ignition sources.

Please review the [UNMC EHS Chemical Storage Fact Sheet](#) for additional guidance.

Medical Surveillance

Medical surveillance will be available for personnel who may be exposed above the EPA action level on 30 or more days per year or above the EPA ECEL or STEL on 10 or more days per year. When applicable, Employee Health will provide medical surveillance services.

Personal Exposure and Spill Response

In the case of personal exposure, remove the affected person from the exposure immediately. Flush the affected area for at least 15 minutes with an emergency eyewash or shower. Immediately notify Public Safety (402-559-5555) and seek medical attention.

The goal is to minimize the potential and prepare for chemical spills. Chemical spill kits should be available in laboratory areas where chemicals are used. Please review the [UNMC EHS Chemical Spill Kits Fact Sheet](#) for additional guidance.

There are three types of spill responses:

Controlled Spills: Spills that can be cleaned up by personnel in the spill area.

- These are spills of chemicals that are not reasonably expected to be a threat to human health or the environment. The chemicals' properties are well known and have been previously determined to be safely cleaned by laboratory personnel.
- Evacuate other personnel from the area.
- Review the Safety Data Sheet (SDS) for guidance.
- Don the appropriate PPE.
- Use spill pads or absorbents to contain the spill.
- Containerize the spilled material, fill out a chemical collection tag, submit a [chemical waste pickup request](#), and contact [UNMC EHS](#) (402-559-6356).
- Complete the Incident/Accident & Near-Miss Reporting Form at: <https://www.unmc.edu/ehs/safety/incident-reporting.html>

Controlled Spills, Requiring Assistance: Spills that are beyond the capabilities of personnel in the spill area.

- These are spills of chemicals that are not reasonably expected to pose a threat to human health or the environment. Their properties are well known, but they are beyond the capabilities of laboratory personnel.
- Evacuate other personnel from the area.
- Contact UNMC Environmental Health and Safety (EHS) 402-559-6356 between the hours of 7:00 a.m. to 4:30 p.m., Monday - Friday, or call UNMC Security/Public Safety at 402-559-5555 after hours/weekends for assistance.
- Provide the SDS for guidance.
- The UNMC EHS Office will assist and containerize the spilled material and clean up the area if they can safely do so utilizing level C PPE.
- Lab personnel will fill out a chemical collection tag.
- Complete the Incident/Accident & Near-Miss Reporting Form at: <https://www.unmc.edu/ehs/safety/incident-reporting.html>

Uncontrolled Spills: spill may pose a threat to human health and/or the environment and personnel in the vicinity are not able to contain the spill.

These are spills of chemicals that involve personnel injury, fire or explosion and can pose a threat to human health, the environment or UNMC property. It also includes large uncontrollable chemical spills, unknown chemical spills that are reasonably expected to cause serious injury or damage, or spills of chemicals that are water-reactive, pyrophoric, shock-sensitive, temperature-sensitive, or highly toxic materials and cannot be safely cleaned by laboratory personnel.

- Evacuate other personnel from the area.
- Contact UNMC Security/Public Safety at 402-559-5555.
- Provide the SDS for guidance.
- Complete the Incident/Accident & Near-Miss Reporting Form at: <https://www.unmc.edu/ehs/safety/incident-reporting.html>

Please reference the [UNMC EHS Chemical Spill Emergency Response Fact Sheet](#) for additional guidance.

Waste Disposal

Spent, unused, and expired methylene chloride is considered hazardous waste and must be properly disposed of in accordance with state and federal regulations. Hazardous waste must be collected and tagged, and a [chemical waste pickup request](#) submitted to EHS for proper disposal.

Please review the UNMC EHS [Chemical Disposal Fact Sheet](#), [Chemical Collection Containers and Storage Fact Sheet](#), and [Empty Chemical Container Disposal Fact Sheet](#) for additional guidance.

Please email ehspickups@unmc.edu for any questions regarding waste disposal.

Training

The PI or lab supervisor will provide training to potentially exposed persons prior to or at the time of initial assignment to a task involving potential exposure to methylene chloride. Training shall include:

- Availability of this Workplace Chemical Protection Program document.
- Presentation of the Operation Specific Exposure Control Plan(s) and acknowledgment of ECP by the trainee.
- Requirements and accessibility of the OSHA Methylene Chloride Standard and the EPA TSCA Final Rule on Methylene Chloride.
- Hazard communication, labeling, and safety data sheets.
- Methods and observations to detect the presence of methylene chloride.
- Operations where methylene chloride may be present.
- Measures individuals must take to protect themselves from hazards associated with methylene chloride. This includes:
 - The proper use of engineering controls.
 - When to use PPE.
 - Proper donning, doffing, adjustment, and wearing of PPE.
 - PPE limitations.
 - Proper care, maintenance, useful life, and disposal of PPE.

Resources

[EPA Final Risk Management Rule for Methylene Chloride](#)
[EPA Guide to Complying with the 2024 Methylene Chloride Regulations Under TSCA](#)
[EPA Fact Sheet: 2024 Final Risk Management Rule for Methylene Chloride under TSCA](#)

[EPA Risk Management for Methylene Chloride Overview](#)

[OSHA Methylene Chloride Standard](#)

[OSHA Methylene Chloride Overview](#)

The American Chemical Society (ACS) Green Chemistry Institute [Solvent Tool](#)

The Organic Photonics and Electronics Group (OPEG) [Green Solvent Selection Tool](#)

The Green Chemistry Teaching and Learning Community [Methylene Chloride \(DCM\) Replacements](#)