

Formaldehyde Management Plan

The university is dedicated to providing safe and healthful work facilities for students and employees and complying with federal and state occupational health and safety standards. Engineering controls should be instituted to the maximum extent feasible to maintain exposures below permissible limits, followed by other control methods including work and hygienic practices, and the use of personal protective equipment such as eye, face, skin, and respiratory protection. Administrators, managers, faculty, staff, and students all share responsibility for minimizing their exposure to formaldehyde.

Scope

This plan applies to all university employees, not covered by the CHP, who are exposed or potentially exposed to formaldehyde gas (0.5ppm), its solutions (>1%), and materials that release formaldehyde.

This program has the following objectives:

- Identify whether employees are exposed to formaldehyde vapors at or greater than 0.1 ppm averaged over an eight-hour workday and provide information and training to this group about the hazards of formaldehyde exposure.
- Improve engineering and work practice controls, if necessary, to limit exposure to less than the action level (0.5 ppm) for an eight-hour time weighted average or less than the short-term exposure limit (STEL) of 2.0 ppm for any 15-minute period.
- Provide personal protective equipment, signs, and labels to protect and notify employees of the hazards involved.
- Provide information for emergencies involving exposure or spill cleanup.
- Institute a medical surveillance plan, if warranted.

Definitions

Action Level (AL)

A concentration of formaldehyde of 0.5 parts formaldehyde per million parts of air (0.5 ppm) calculated as an 8- hour time-weighted average (TWA) concentration.

Authorized Person

Any person required by work duties to be present in regulated areas or authorized to do so by the University.

Formaldehyde

The chemical substance, HCHO, Chemical Abstracts Service Registry No. 50-00-0. The precise hazards associated with exposure depend both on the form (solid, liquid, or gas) of the material and the concentration present. 37-50% solutions of formaldehyde used in preserving specimens present a much greater hazard to the skin and eyes due to splashes than solutions containing less than 1%.

Formaldehyde is also found in urea-formaldehyde resins (e.g., glues used in plywood and particle board) and can generate formaldehyde-bearing dust when cut, sanded, drilled, or broken.

Initial Monitoring

Identification of all employees who may be exposed at or above the action level or at or above the STEL and accurately determine the formaldehyde exposure of each employee so identified. Initial monitoring shall be repeated each time there is a change in production, equipment, process, personnel, or control measures which may result in new or additional exposures to formaldehyde.

Methods of Compliance

Engineering and work practices implemented to reduce and maintain employee exposures to formaldehyde at or below the TWA and the STEL.

PPM

Parts per million.

Permissible Exposure Limit (PEL)

The allowable exposure that an employee can be exposed to over an 8-hour Time-Weighted Average (TWA). For formaldehyde, the limit is 0.75 parts per million (ppm).

Periodic Monitoring

Employees shown by initial monitoring to be at or above the action level or at or above the STEL shall be periodically monitored. If the last monitoring showed the employee exposure at or above the action level, then repeat monitoring of the employee shall be performed at least once a year under worst-case conditions.

Short Term Exposure Limit (STEL)

A limit of 2 ppm of formaldehyde, averaged over a 15-minute period.

Regulated Areas

Areas where the concentration of airborne formaldehyde exceed the PEL or STEL. All entrances and access ways shall be posted with a sign as indicted in this Plan.

Time-weighted average (TWA)

The average exposure to formaldehyde an individual receives for a full eight-hour day.

Duties and Responsibilities

Environment Occupational Health and Safety (EOHS)

- Develop and distribute a written Formaldehyde Management Plan.
- Provide or coordinate training for employees who are exposed to formaldehyde at or above an 8-hour average exposure of 0.5 parts per million (ppm). Employees who require training will be identified through exposure monitoring.
- Conduct exposure monitoring and notify employees in writing of monitoring results within 15 days of receipt.
- Maintain records of all training, exposure monitoring, and respirator fit testing, if needed.
- Provide consultative technical guidance to personnel at all levels of responsibility concerning formaldehyde, hazard evaluation, hazard control, and hazard information.
- Annually review the Formaldehyde Management Plan for effectiveness and revise as necessary.

Department Heads and Supervisors

- Assure that all employees who have potential for exposure to formaldehyde are monitored by EOHS and made aware of the hazards associated with formaldehyde.
- Ensure control measures and personal protective equipment is used as appropriate for the situation. If it is determined that personal protective equipment is required to perform the job, it will be provided at no cost to the employee.
- Communicate to their employees the elements of the Formaldehyde Plan when EOHS determines through surveys and monitoring that there is occupational exposure.
- Assure that employees are aware of the potential hazards associated with working with formaldehyde and receive appropriate training.
- Notify EOHS when new products or processes are used that might result in formaldehyde exposure and arrange for exposure monitoring where needed to document exposure levels.
- Initiate medical surveillance for any employee who has formaldehyde exposure in excess of regulated limits as determined by EOHS, or who develops signs and symptoms of overexposure to formaldehyde. (See acute effects section)
- Report any problem associated with implementation of the Formaldehyde Management Plan to EOHS.

Employees Determined to be Exposed to Formaldehyde at or Greater Than 0.1 ppm

- Review the Formaldehyde Management Plan concerning formaldehyde hazards and use.
- Comply with the provisions of the Formaldehyde Management Plan and work practices instituted by the University.
- Report to their supervisor if they develop signs and symptoms of overexposure to formaldehyde. (See acute effects section)

Formaldehyde Assessment and Monitoring

All laboratories, not covered by the CHP, having any form of formaldehyde in the workplace must monitor employee exposure unless the occupants can objectively document (i.e. through calculations) that the presence of airborne formaldehyde will not exceed the action level (AL) or short-term exposure level (STEL) under foreseeable conditions.

When there are different processes where employees may be exposed to formaldehyde, EOHS will select a maximum risk employee. This will be accomplished by observing the worksite. If measurements show exposure to formaldehyde at or above the action level or the STEL, then all employees identified in the same working group will be monitored.

A personal air sample will be taken for all routine users of formaldehyde and those who are believed to be exposed from an identified source. TWA's are usually determined for an 8-hour work shift. STEL assessments are 15-min samples taken during periods of maximum expected concentrations. Multiple STEL measurements may be collected per shift, and only the highest concentration is used to represent the employee's STEL. Employee exposures determine the need for compliance with provisions of the regulation and the Formaldehyde Management Plan.

For those exposed continuously to formaldehyde in the workplace (currently the University only has people exposed to formaldehyde for less than 4 hours 2 days per week), their exposure will be compared to the eight-hour time weighted average (TWA) limit of 0.75 ppm and the action level of 0.5 ppm. For employees who experience brief exposures, their exposure will be compared to the 15-minute short-term exposure limit (STEL). Monitoring results determine the need and extent of employee training, hygiene procedures, personal protective equipment, follow-up monitoring, and medical surveillance.

This initial monitoring will serve to separate TWA exposures into three categories:

1. Employees exposed to less than 0.1 ppm.
 2. Those exposed at 0.1-0.5 ppm.
 3. Those exposed at greater than 0.5 ppm.
- Employee exposure to less than 0.1 ppm indicates a minimal exposure requiring no further action or training.

- Those exposed to 0.1-0.5 ppm are required to attend an information and training program but no additional air sampling is required.
- For employees exposed at greater than 0.5 ppm (or 2.0 ppm for a 15-minute STEL), there are several actions required. This third group must attend an information and training session and repeat air sampling will be conducted every six months. In addition, standard industrial hygiene methods will be employed to reduce occupational exposure.

Employees will be notified within 15 days of when the test results are received about their personal exposure levels. If personal exposure is greater than the permissible exposure limits of 0.75 ppm for a TWA and 2.0 ppm for a STEL, a written plan to reduce exposure must be provided to the affected employee.

Periodic monitoring will be terminated when two consecutive air samples (at least 7 days apart) result in concentrations below the action level and the STEL.

Air sampling will be repeated when there is a change in procedure, equipment, personnel, or control measures. It is the responsibility of the department supervisor to notify EOHS when any of these changes occur. Air sampling will also be repeated when an employee reports respiratory or dermal conditions believed to be caused by formaldehyde.

Health Effects of Formaldehyde

Following are the health hazards as reported in Appendix A of this OSHA regulation. Specific information about commercial mixtures or formulations may be obtained from manufacturers' safety data sheets (SDSs).

Acute Effects of Exposure

- Ingestion (Swallowing): Liquids containing 10 to 40% formaldehyde cause severe irritation and inflammation of the mouth, throat, and stomach. Severe stomach pains will follow ingestion with possible loss of consciousness and death. Ingestion of dilute formaldehyde solutions (0.03-0.04%) may cause discomfort in the stomach and pharynx.
- Inhalation (Breathing): Formaldehyde is highly irritating to the upper respiratory tract and eyes. Concentrations of 0.5 to 2.0 ppm may irritate the eyes, nose and throat of some individuals. Concentrations of 3 to 5 ppm also cause tearing of the eyes and are intolerable to some persons. Concentrations of 10 to 20 ppm cause difficulty in breathing, burning of the nose and throat, cough, and heavy tearing of the eyes, and 25 to 30 ppm causes severe respiratory tract injury leading to pulmonary edema and pneumonitis. A concentration of 100 ppm is immediately dangerous to life and health.
- Skin (Dermal): Formalin (37% aqueous formaldehyde) is a severe skin irritant and a sensitizer. Contact with formalin causes white discoloration, smarting, drying, cracking, and scaling.

Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin. Previously exposed persons may react to future exposure with allergic eczematous dermatitis or hives.

- Eye Contact: Formaldehyde solutions splashed in the eye can cause injuries ranging from transient discomfort to severe, permanent corneal clouding and loss of vision. The severity of the effect depends on the concentration of formaldehyde in the solution and whether or not the eyes are flushed with water immediately after the accident.
- Note — The perception of formaldehyde by odor and eye irritation becomes less sensitive with time as one adapts to formaldehyde. This can lead to overexposure if a worker is relying on formaldehyde's warning properties to alert him or her to the potential for exposure.

Chronic Effects of Exposure

- Carcinogenicity — Formaldehyde has the potential to cause cancer in humans. Repeated and prolonged exposure increases the risk. Various animal experiments have conclusively shown formaldehyde to be a carcinogen in rats. In humans, formaldehyde exposure has been associated with cancers of the nasopharynx, oropharynx and nasal passages. Formaldehyde exposure has also been recently linked to leukemia and brain cancer.
- Toxicity — Prolonged or repeated exposure to formaldehyde may result in respiratory impairment. Rats exposed to formaldehyde at 2 ppm developed benign nasal tumors and changes of the cell structure in the nose as well as inflamed mucous membranes of the nose. Structural changes in the epithelial cells in the human nose have also been observed. Some people have developed asthma or bronchitis following exposure to formaldehyde, most often as the result of an accidental spill involving a single exposure to a high concentration of formaldehyde.

Information and Training

Employees who are assigned to workplaces where exposure to formaldehyde has been documented at or above 0.1 ppm will participate in the formaldehyde training program. The elements include:

- A discussion of the contents of OSHA 29 CFR 1910.1048, Formaldehyde
- An explanation of the specific safety data sheet (SDS) used in the work area
- The purpose for and a description of the medical surveillance program including:
 - A description of the potential health hazards associated with exposure to formaldehyde and a description of the signs/symptoms of formaldehyde exposure
 - Instructions to immediately report to the Supervisor any adverse signs or symptoms that the employee suspects are attributable to formaldehyde exposure
- Description of operations in the work area where formaldehyde is present and an explanation of the safe work practices appropriate to limit exposure to formaldehyde in each job
- The purpose for, proper use of, and limitations of personal protective clothing and equipment

- Instructions for the handling of spills and emergencies
- An explanation of the importance of engineering and work practice controls for employee protection and any necessary instruction in the use of these controls
- A review of emergency procedures including the specific duties or assignments of each employee in the event of an emergency
- Information as to the location and availability of written training materials

Employees shall receive information and training at the time of initial assignment, and whenever there is a change in procedure that may result in a new exposure. EOHS shall provide the training annually to each affected employee.

Medical Surveillance

A medical surveillance program will be instituted, if warranted, for all employees exposed to formaldehyde at concentrations at or exceeding the action level or exceeding the STEL.

Medical surveillance will be available for employees who develop signs and symptoms of overexposure to formaldehyde, and for all employees exposed to formaldehyde in emergencies.

Hazard Communication

Labels

Hazard warning labels should be affixed to all containers of formaldehyde gas, all mixtures, or solutions composed of greater than 0.1% formaldehyde, and materials capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use, at concentrations reaching or exceeding 0.5 ppm.

For all materials capable of releasing formaldehyde at levels of 0.5 ppm to 0.75 ppm, required label information includes:

- That the product contains formaldehyde
- The name and address of the responsible party
- That physical and health hazard information is readily available from EOHS, the department, and from Safety Data Sheets (SDS).

For materials capable of releasing formaldehyde at levels above 0.5 ppm, labels will address all hazards included in OSHA 1910.1200 Appendices A and B, including respiratory sensitization and the words "Potential Cancer Hazard."

Safety Data Sheets

Safety data sheets for formaldehyde-containing products will be located in the workplace ([SciShield](#)) where it is used and will be readily accessible. The SDS must be in English and contain the identity of the chemical and its chemical and common name(s).

The name, address and telephone number of the chemical manufacturer, who can provide additional information on the chemical and appropriate emergency procedures, if necessary, must be listed on the SDS.

Signage

Areas where the concentration of airborne formaldehyde exceeds either the PEL or STEL shall be established as regulated areas. All entrances and access ways shall be posted with a sign bearing the following information.

[Formaldehyde Warning Sign.](#)

Formaldehyde Sign

1910.1048(e)(1)(i)

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:

DANGER
FORMALDEHYDE
MAY CAUSE CANCER
CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION
AUTHORIZED PERSONNEL ONLY

1910.1048(h)(2)(ii)(A)

Signs. Storage areas for contaminated clothing and equipment shall have signs bearing the following legend:

DANGER
FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT
MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY IRRITATION
DO NOT BREATHE VAPOR
DO NOT GET ON SKIN

1910.1048(h)(2)(ii)(B)

Labels. The employer shall ensure containers for contaminated clothing and equipment are labeled consistent with the Hazard Communication Standard, § 1910.1200, and shall, as a minimum, include the following:

DANGER
FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT

MAY CAUSE CANCER
CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION
DO NOT BREATHE VAPOR
DO NOT GET ON SKIN

Additional information that can be added:

Contact information for the PI and EOHS contact number x6866

Engineering and Work Practice Controls

Ventilation is the most widely applied engineering control method for reducing the concentration of airborne substances in the breathing zones of workers. Either local exhaust ventilation or general dilution ventilation should be used for this purpose whenever possible.

Work practices and administrative procedures are also an important part of a control system. If an employee is asked to perform a task in a certain manner to limit the exposure to formaldehyde, it is extremely important that the recommended procedures are followed.

This may include limiting splashing of formalin solutions, washing formaldehyde-soaked materials in water, and maintaining the covers on containers that emit formaldehyde as much as possible. Surfaces contaminated with formalin solutions should be cleaned as soon as possible in order to limit skin and inhalation exposures. Food and drink consumption and storage should be prohibited from areas where formaldehyde is used and stored to eliminate the potential for ingestion.

Eyewash facilities must be placed within the immediate work area for emergency use if there is any possibility that an employee's eyes may be splashed with solutions containing 0.1 percent or greater of formaldehyde.

Personal Protective Equipment

Personal Protective equipment shall be required according to the task or area where formaldehyde is used or stored. Parts of the body that may need to be protected include eyes, nose and mouth, hands, arms and the trunk of the body. Butyl and nitrile rubber are materials that are effective in limiting penetration of formalin solutions to the skin.

If an employee might be splashed in the eyes with formalin solutions, goggles are the appropriate eye protection. If significant splashing is likely, a face shield in combination with goggles is recommended.

Gloves of appropriate material and thickness for the task should be used to protect hands. For a task that may produce splashes to the trunk of the body, an impermeable suit or rubber apron should be worn to prevent work or street clothing from becoming wet and contacting the skin.

At minimum, personnel working around specimens containing formalin or formaldehyde shall wear safety glasses with side shields and gloves, preferably nitrile.

If an employee must work in an area where the formaldehyde concentration cannot be controlled within the TWA or STEL, a respirator must be worn. Respirator use requires a medical examination, training, and fit testing prior to its first use. Other than for emergency situations, this should not be necessary if appropriate work practices and engineering controls are implemented.

Respiratory Protection

Whenever feasible engineering and work practice controls (for example, local exhaust ventilation) cannot reduce employee exposure below the PEL or STEL, the employer shall continue to apply these controls to reduce employee exposures to the maximum extent feasible and shall supplement them with respirators when required.

Respirators must be used:

- When exposures meet or exceed the PEL;
- During periods necessary to install or implement feasible engineering controls;
- When work operations, such as maintenance and repair activities or vessel cleaning, for which the employer establishes that engineering and work-practice controls are not feasible;
- In work operations for which feasible engineering and work practice controls are not yet sufficient to reduce employee exposure below the PEL; or
- During emergencies.

The use of respiratory protection shall be in accordance with the University's Respiratory Protection Program and OSHA 1910.134. All workers must be medically evaluated and fit tested to determine the ability of the worker to perform the work while wearing a respirator. EOHS can provide referrals to local agencies who can conduct these evaluations (student health services), if needed. Training in the care and use of respirators will be conducted by EOHS, or an EOHS approved contractor, for only those employees who are authorized to wear a respirator. Any worker who is not authorized will be prohibited from engaging in activities that may expose the worker to airborne formaldehyde at or above the PEL.

Recordkeeping

Employee exposure monitoring results shall be maintained by EOHS and the PI. The records shall include: the date of the measurement; the operation being monitored; the methods of sampling and analysis and evidence of their accuracy and precision; the number, duration, time, and results of samples taken; types of protective devices worn, if any, and the names, job classifications, and exposure estimates of the employees whose exposures are represented by the actual monitoring results.

Where EOHS has determined that no monitoring is required under this policy, a record of the objective data relied upon to support the determination that no employee is exposed to formaldehyde at or above the action level shall be maintained.

If deemed necessary through exposure, EOHS shall maintain all Respiratory Protection Records mandated.

EOHS will retain records required by this standard for at least the following periods:

- Exposure records and determinations will be kept for at least 30 years.
- Respirator fit testing records will be kept until replaced by a more recent record.

Upon request, EOHS will make all records maintained as a requirement of this standard available for examination and copying to the Assistant Secretary of Labor and the Director of NIOSH.

EOHS will make employee exposure records, including estimates made from representative monitoring and available upon request for examination, and copying to the subject employee, or former employee, and employee representatives in accordance with the OSHA regulation covering Access to Employee Exposure and Medical Records.

Employee medical records required by this standard will be provided upon request for examination and copying, to the subject employee or former employee or to anyone having the specific written consent of the subject employee or former employee in accordance with the OSHA regulation covering Access to Employee Exposure and Medical Records.

Emergencies and Spill Cleanup

For areas where formaldehyde solutions of 1% or greater are used or stored, an emergency shower must be located within a 10 second walk of the work area. Areas that use formaldehyde solutions of 0.1% or greater must have an emergency eyewash located within the immediate work area. If a person's eyes, skin, or clothing are splashed with a formalin solution, the affected area should be washed with

water for at least 15 minutes. For overexposure to formaldehyde gas, the affected person should be moved away from the source into fresh air. If there are symptoms of overexposure, the person should report to their supervisor, EOHS, and seek medical attention.

Small spills (less than one pint) may be cleaned up by those responsible for creating the spill. The spilled material, if not biohazardous, should be absorbed with paper towels or other absorbing media. The absorbing material should be rinsed thoroughly with water in a sink or if biohazardous it should not be rinsed but [disposed of through EOHS](#). Washed media may then be discarded with the regular trash.

Spills of more than one pint may create significant exposure for those responsible for cleaning up the spills. A spill of this size should be handled through EOHS. Contact EOHS x6866 directly during normal working hours, or University Police at after hours or on weekends 330-972-2911

The use of [Infutrace](#) will help reduce the exposure of formaldehyde and phenol vapors and should be applied to any surface that has been preserved with formaldehyde and the tissue is well fixed. Infutrace contains additional ingredients to inhibit the growth of mold.

Labs should also have a container of formaldehyde (aldehyde) destroying spill cleanup material like [formaldehyde eater](#) to use in case of a spill.

Formaldehyde Management Plan

Signature Page

I _____ (print Name) have been given and reviewed the Formaldehyde Management Plan and am familiar with OSHA regulator levels when it comes to working with Formaldehyde. I am also aware of the signs and symptoms of over exposure to Formaldehyde. I know how to locate the SDS for Formaldehyde and will do my best to use environmental controls such as working in a fume hood anytime I am working with Formaldehyde to reduce any airborne exposure. If at anytime, I feel I might have been exposed to/or near an action level, I will leave the area immediately and contact EOHS at extension 6866.

Signature: _____

Date: _____