

Formaldehyde Policy

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Table of Contents (Sections)

1. Purpose
2. Scope
3. Policy
4. Standard
5. Definitions and Key Terms
6. Glutaraldehyde Hazard Assessment
7. Exposure Monitoring Strategy
8. Health Effects
9. Medical Surveillance
10. Monitoring – Reporting Results
11. Training Program
12. Engineering Controls
13. Work Practices/Administrative Controls
14. Personal Protective Equipment (PPE)
15. Emergency Situations
16. Housekeeping and Spill Response
17. Sources and Further Reading

1. Purpose. The purpose of the formaldehyde policy is to establish procedures/guidelines to protect the health and safety of all employees of the Virginia Commonwealth University (VCU) community who may be occupationally exposed to formaldehyde gas, its solutions and/or materials that release formaldehyde.

2. Scope. This formaldehyde policy applies to all VCU or Virginia Commonwealth University Health System (VCUHS) employees in those work areas where there is potential exposure to formaldehyde. The university areas covered by this program include, but are not limited to: anatomy, biology, dialysis, pathology, and the morgue. Any other departments in the university or hospital which currently use or intend to use formaldehyde and are not addressed in this policy should contact the Office of Environmental Health and Safety (OEHS) to insure compliance with the applicable guidelines.

3. Policy. It is the policy of the university to ensure that formaldehyde is handled in the safest manner possible and in compliance with all applicable codes and standards. Engineering controls should be utilized to the maximum extent feasible to maintain exposures below the recommended exposure limits followed by other control methods including work practices and the use of personal protective equipment.

4. Standard. The Occupational Safety and Health Administration (OSHA) has issued a standard to assure proper protection of all workers exposed to formaldehyde. OSHA established a permissible exposure limit (PEL) of 0.75 parts formaldehyde per million parts of air (0.75 ppm) as an 8-hour time weighted average (TWA) and a short-term exposure limit (STEL) of two parts formaldehyde per million parts of air (2 ppm) in a 15-minute period.

5. Definitions and Key Terms.

A. Action-Level: The exposure level below which respiratory protection and many other requirements of the Formaldehyde Standard need not be implemented. The current action level for formaldehyde is 0.5 ppm TWA.

B. Formaldehyde: The chemical formaldehyde (HCHO) has an irritating pungent odor and is classified as an upper respiratory irritant because of its high solubility in water. Formaldehyde is used in a variety of operations but tissue preservation is the primary source of exposure within the university community. See Substance Technical Guideline and Material Safety Data Sheet (MSDS) for additional information.

C. PEL: Permissible Exposure Level. The maximum permissible airborne exposure limit to formaldehyde, that no employee can be exposed to, that is published and enforced by OSHA as a legal standard. The PEL for formaldehyde is 0.75 ppm.

D. STEL: Short-Term Exposure Level. The maximum concentration of formaldehyde that workers can be exposed to continuously over a period of 15 minutes. The STEL for formaldehyde is currently 2.0 ppm.

E. TLV/TWA: Threshold Limit Value-Time Weighted Average. The time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which it is believed nearly all workers may be repeatedly exposed, day after day, without adverse effect. These values are published yearly by the American Conference of Governmental Industrial Hygienists (ACGIH).

F. Time Weighted Average (TWA): The actual measured exposure level averaged over an 8-hour time period.

6. Formaldehyde Hazard Assessment. Processes or occupational activities that may result in formaldehyde exposure include:

A. Handling biological specimens preserved in formaldehyde. Formaldehyde is commonly used as a preservative in medical laboratories and as a sterilizer. Healthcare professionals and lab technicians, as well as students and teachers, are among high risk groups for such type exposure.

B. The treatment of textiles and the production of resins. Formaldehyde is found in household products, permanent press fabrics, paper product coatings and plywood. Formaldehyde is also used as an industrial disinfectant.

C. Sources of formaldehyde emissions into the air include uncontrolled emissions or venting with other gases in industrial settings.

7. Exposure Monitoring Strategy. Employees in work areas of the university, which may involve exposure to formaldehyde, are monitored periodically to accurately determine exposure concentrations. Representative monitoring will be conducted to determine employee short-term and full-shift exposures to formaldehyde. Every employee need not be measured if a "high" exposure employee can be identified. TWA measurements shall be primarily determined through the use of SKC Passive Bubbles. However, other measurements shall be determined by the use of OSHA-approved impinger methods and passive dosimeters including 3M badges, Assay Technology Chem Chip badges or other approved passive dosimeters. Formaldehyde levels, for the SKC Passive Bubbles, will be determined colorimetrically, in the OEHS laboratory in McGuire Hall. If the formaldehyde monitoring indicates a TWA above 0.5 ppm then the area supervisor will be contacted and recommendations made to reduce employee exposure. In addition, a written exposure control plan is required to be developed, describing the corrective actions that are being taken to reduce employee exposures. Every effort should be made by the area supervisor and exposed personnel to reduce exposure levels to below 0.5 ppm on a high priority basis. If there are tasks that involve brief but intense exposure to formaldehyde, employee exposure must be measured to assure compliance with the STEL. Sample collections are for brief periods (15 minutes) but several samples may be needed to identify the peak exposure.

A. Monitoring will be conducted by OEHS in such manner as to be representative of the 8-hour TWA of each employee. Representative 8-hour TWA employee exposures shall be determined on the basis of one or more samples representing full-shift exposure for each shift for

each job classification in each work area; the frequency of such monitoring is required as follows:

1. Initially, wherever there may be exposure by employees above the PEL to establish a baseline exposure level.

2. Whenever there is a change in processes, equipment, personnel or control measures which may result in new or additional exposure to formaldehyde by hospital staff.

3. Semiannually, whenever the most recent monitoring result reveals a TWA exposure above the 0.5 ppm action level.

4. Annually, whenever the most recent monitoring result reveals employee exposure at or above the STEL.

B. Semiannual and annual monitoring, as specified above, are not required when two consecutive formaldehyde monitoring sessions, which have been executed at least 7 calendar days apart, both indicate TWA and/or STEL exposures below 0.5 ppm and/or 2.0 ppm respectively. TWA levels measured to be in excess of 0.5 ppm are considered to remain above this level until 2 consecutive monitoring periods performed at least 7 calendar days apart confirm that the exposure has been dropped to below 0.5 ppm.

8. Health Effects.

A. There are several health effects, both short and long-term, that can result from exposure to formaldehyde, which is classified as a human carcinogen by OSHA. Formaldehyde has been linked to nasal and lung cancer.

B. Health effects that may result as a consequence of contact with formaldehyde liquid or vapor include irritation and/or burning of the eyes, nose, throat, and respiratory tract, which may lead to wheezing and coughing and/or severe allergic reactions. Fatigue and the development of a skin rash can also be health effects from formaldehyde exposure.

C. In addition to acute health effects, there are also long-term or chronic health effects that may result from exposure to formaldehyde. Formaldehyde is a sensitizer which means people who work with it or are exposed to it may become sensitive and have strong reactions when exposed to even small amounts. Reactions could include asthma like symptoms, i.e., difficulty breathing, coughing, and/or tightness in chest. In addition, skin reactions including rashes and severe itching may also result from prolonged exposure.

9. Medical Surveillance. If an employee has been exposed to formaldehyde with regards to the following conditions, he or she should notify his or her supervisor and seek medical attention from the university's Employee Health Services office.

A. If the employee has been exposed to formaldehyde in an emergency situation.

B. If the employee shows signs/symptoms of formaldehyde exposure.

10. Monitoring and Reporting Results.

A. The area supervisor shall report the results of all formaldehyde monitoring to the person(s) monitored within 15 calendar days of the date on which the area supervisor receives the results. Notification must either be in writing, either by distributing copies of the results of the exposure monitoring to the effected (those conducting the same job tasks) employees or by posting the results (Results should be posted for a minimum of three days). Once the results have been reviewed by all effected employees, a copy should be filed in the Department's Formaldehyde Program and Training Manual. If the PEL has been exceeded, effected employees must be notified, in writing, of the corrective action being taken.

B. TWA measurements may be taken at any time, at the discretion of the area supervisor. If monitoring results indicate that either the PEL or the STEL has been exceeded, the use of respirators and/or other protective equipment is required by all personnel in the area, as soon as the report is received (NOTE: Gloves, goggles, face shields, and other protective clothing may be necessary at much lower exposure levels). Virginia Occupational Safety and Health Administration (VOSH) specifies full-facepiece respirators with cartridges specifically approved for formaldehyde exposure. The employer shall select protective clothing and equipment based upon the form of formaldehyde to be encountered, the condition of use, and the hazard to be prevented. The employer shall provide these protective devices to the employee at no cost and assure that the employee wears them. The rotation of employees in order to lower formaldehyde exposure levels is prohibited by VOSH.

11. Training Program. All employees exposed to formaldehyde concentrations of 0.1 ppm or greater must be trained on an annual basis to confirm their understanding of formaldehyde, its hazards, and methods of protection. The training program shall be conducted in a manner in which the employee is able to understand and apply the following information:

A. The requirements of the VOSH regulations concerning Formaldehyde (29 CFR 1910.1048), as well as the Hazard Communication standard (29 CFR 1910.1200), and a discussion of the material safety data sheet.

B. A description of the operations in the work area where formaldehyde is present and an explanation of the safe work practices appropriate for limiting the exposure to formaldehyde.

C. The location and availability of the VOSH Formaldehyde Standard, written program and all training information within the department.

D. A description of the potential health hazards associated with an exposure to formaldehyde and a description of the signs and symptoms of an exposure to formaldehyde. As a minimum, specific health hazards include: cancer, irritation and sensitization of the skin and respiratory system, eye and throat irritation, and acute toxicity.

E. A discussion of monitoring and other methods used to detect the presence of formaldehyde in the work area.

F. The measures employees must take to protect themselves from hazards associated with formaldehyde exposure. The purpose for, proper use of, and limitations of the required personal protective clothing and equipment.

G. The purpose for and a description of the medical surveillance program required by the standard. A medical surveillance program is required for all employees exposed to formaldehyde at concentration at or exceeding the action level or exceeding the STEL. Medical surveillance is also required during the following instances:

1. Whenever an employee develops signs and symptoms of an overexposure to formaldehyde.

2. Whenever an employee is exposed to formaldehyde during an emergency.

3. Whenever requested by an employee's examining physician.

H. The instructions for the safe handling of spills, emergencies, and clean-up procedures.

I. An explanation of the importance of engineering and work practice controls for employee protection and any necessary instruction in the use of these controls.

J. A review of emergency procedures, including the specific duties or assignments of each employee, in the event of an emergency.

12. Engineering Controls.

A. 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.

B. The university/hospital shall establish regulated areas where the concentration of airborne formaldehyde exceeds either the TWA or the STEL and post and maintain legible signs bearing the following information at all entrances or access ways:

**DANGER
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD
AUTHORIZED PERSONNEL ONLY**

C. If the facility ventilates containers of contaminated clothing and equipment, the facility shall establish an appropriately labeled storage area for this purpose and locate and arrange this area in a manner that minimizes formaldehyde exposure. The facility shall allow only persons trained in recognizing the hazards of formaldehyde to remove containers from the storage area. Containers for contaminated clothing and equipment and the storage areas where these containers are kept should be labeled and have signs posted containing the following information:

DANGER
FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT
AVOID INHALATION AND SKIN CONTACT

13. Work Practices/Administrative Controls. 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, then the recommended procedures should be followed exactly as outlined. In context with minimizing formaldehyde exposure, the following work practices should be applied:

A. Minimize the amount of formaldehyde used by using only the amount required to perform the required procedure.

B. Ensure that formaldehyde containers are appropriately labeled with proper health hazards.

C. Keep formaldehyde stored in closed containers in well ventilated areas. Use posted signs to remind personnel to replace lids after using product.

D. When possible, ensure that formaldehyde solutions are handled within a properly functioning chemical fume hood.

E. Provide continuing training and education to personnel.

14. Personal Protective Equipment (PPE). Certain types of PPE are effective in controlling formaldehyde exposure. In normal work situations, PPE should be used only as a supplement to engineering controls. Employees must not take formaldehyde-contaminated materials, clothing, or equipment home.

A. Impermeable Gloves: Gloves made of natural or butyl rubber, Nitrile, or Neoprene are recommended to protect skin from contact with formaldehyde. Latex gloves should only be used when short-term, incidental contact is expected.

B. Eye and Face Protection: Eye and face protection in the form of goggles will reduce exposure in cases of splash hazards. For work operations requiring a face shield to be worn due to danger of formaldehyde reaching the eye, chemical safety goggles must also be worn.

C. Lab coats/aprons: For additional protection, lab coats or aprons made of an appropriate material can be used.

D. Respiratory Protection: If an employee may be exposed to formaldehyde vapor concentrations where respiratory protection is warranted, please contact OEHS for guidance on appropriate respirators for formaldehyde vapor protection. When employees are required to wear respirators to reduce exposure, they must be enrolled in VCU's Respiratory Protection Program as required by OSHA. Work operations which may warrant respiratory protection include the following:

1. During the installation of engineering controls.
2. Work operations for which engineering controls and work practices are not feasible.
3. Work operations for which engineering controls and work practice controls do not reduce employee exposure below the PEL.
4. Emergencies.

15. Emergency Situations. A written plan for emergency situations shall be developed for each workplace within the university where there is the possibility of an emergency involving formaldehyde. In the event that an emergency situation should occur, the employer shall assure that appropriate procedures are implemented to minimize injury and loss of life.

- A. Personnel should immediately evacuate the effected area, and assist injured personnel to safety.
- B. Seek medical assistance for injured personnel.
- C. Isolate any hazard area and deny entry except for necessary personnel with proper PPE.
- D. Call OEHS (828-1392) or VCU Telepage operator immediately.
- E. Never re-enter contaminated area without proper PPE and back-up personnel.

16. Housekeeping and Spill Response.

A. Managers of facilities where formaldehyde is utilized shall create and maintain a program to detect leaks and spills. The leak and spill detection program should include:

1. Regular visual inspections for leaks and spills.
2. Preventive maintenance of equipment, including surveys for leaks, at regular intervals.
3. Regular testing of monitoring equipment to assure proper function.
4. Provisions for formaldehyde spill containment, surface decontamination, and

waste disposal in work areas where spillage may occur.

5. Prompt cleanup of spills and repair of leaks using persons who wear appropriate protective clothing and equipment and are trained in the proper methods for formaldehyde cleanup and decontamination.

B. For areas where large amounts of formaldehyde could be released from an accident or from equipment failure, the area supervisor should develop and maintain procedures to be followed in the event of an emergency spill/leak. Any excessive formaldehyde exposure may be detected by eye or skin irritation, or respiratory distress. Should it be determined that a leak has occurred it is important to evacuate the area immediately, contain and clean up the spill (only if properly trained and personally protected to do so) and to try and keep the vapors from spreading using any ventilation or protective measures available. (NOTE: A spill kit is available to treat spills of up to 10% formalin (4% formaldehyde). Information on the purchase of these kits is available through OEHS.) Emergency spill procedures should include/address the following:

1. Spilled material should not be touched by those not properly trained and lacking proper PPE.

2. All ignition sources should be shut off.

3. Isolate the hazard area and deny entry to unnecessary persons.

4. All persons in severe respiratory distress or suffering from dizziness or serious skin disorders or other significant medical problems should be taken to Employee Health immediately for evaluation.

5. Contact OEHS at 828-1392 and notify the Chemical Safety staff of the hazardous chemical leak or spill.

17. Sources & Further Reading.

A. Agency for Toxic Substances and Disease Registry, Medical Management Guidelines for Formaldehyde <http://www.atsdr.cdc.gov/mhmi/mmg111.html>

B. Argonne National Laboratory, U.S. Department of Energy
http://www.aps.anl.gov/Safety_and_Training/User_Safety/gloveselection.html

C. OSHA Formaldehyde Fact Sheet (2002)
http://www.osha.gov/OshDoc/data_General_Facts/formaldehyde-factsheet.pdf

D. OSHA Safety and Health Topics: Formaldehyde (2006)
<http://www.osha.gov/SLTC/formaldehyde/index.html>

E. U.S. EPA Formaldehyde Basic Information, Indoor Air Quality (2007)
<http://www.epa.gov/iaq/formalde.html>