

**FORMALDEHYDE**

**MANAGEMENT**

**PLAN**

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# Review and Approval Authority

Prepared by:

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Industrial Hygienist

\_\_\_\_\_  
Date

Reviewed and Approved by:

\_\_\_\_\_  
Chair- UM EH&S Operations Committee

\_\_\_\_\_  
Date

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Chair - UM EH&S Policy Committee

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Date

Approved as University of Maryland Policy:

\_\_\_\_\_  
President

\_\_\_\_\_  
Date

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## Emergency and Assistance Telephone Numbers

<b>UM Emergency (Fire - Police - Rescue) - 24 hours #</b>	<b>911</b>
CALL IMMEDIATELY FOR <u>ANY</u> EMERGENCY INCLUDING CHEMICAL SPILL, FIRE, PERSONAL SECURITY, INJURED OR SICK PERSON	
Environmental Safety (Main Office) (Industrial Hygiene, Biological Safety, Occupational Safety, Hazardous Waste Management, Fire Protection, Radiation Safety, Insurance Services, Hazard Communication, Accident Investigation, Air Monitoring and Safety Education)	(40)5-3960
University Health Center - Occupational Health (Medical Consultation and Evaluation)	(31)4-8172
Facilities Management Work Control Center (Repair of Facility Equipment Deficiencies, e.g., steam line leaks, electrical failures, ventilation problems, etc.)	(40)5-2222
Maryland Poison Control Center	1-800-492-2414

# UM Policy on Formaldehyde

Approved by the President (date)

## I. Purpose

This is a statement of official University policy to establish the process for compliance with OSHA 29 CFR 1910.1048, Formaldehyde.

## II. Scope

This plan applies to all University employees who are exposed or potentially exposed to formaldehyde gas, its solutions, and materials that release formaldehyde.

## III. Policy

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, including 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.

## IV. Duties and Responsibilities

1. Department of Environmental Safety (DES) shall:
  - (a) Develop and distribute a written Formaldehyde Management Plan;
  - (b) Provide or coordinate training for employees who are exposed to formaldehyde at or above an 8-hour average exposure of 0.1 parts per million (ppm). Employees who require training will be identified through exposure monitoring;
  - (c) Conduct exposure monitoring and notify employees in writing of monitoring results within 15 days of receipt;
  - (d) Maintain records of all training, exposure monitoring, and respirator fit testing;
  - (e) Provide consultative technical guidance to personnel at all levels of responsibility concerning formaldehyde, hazard evaluation, hazard control and hazard information; and
  - (f) Annually review the Formaldehyde Management Plan for effectiveness and revise as necessary.
2. University Health Center Occupational Health Unit shall:
  - (a) Coordinate and direct all required or recommended medical surveillance for employees with formaldehyde exposure;

- (b) Provide medical consultations and examinations for workers who have been overexposed or believe they may have been overexposed to formaldehyde; and
  - (c) Maintain medical records relating to consultations, examinations and medical surveillance as required by the Plan.
- 3. Department of Architecture, Engineering and Construction shall:
  - (a) Identify to DES construction locations where formaldehyde is used or where building materials contain or may reasonably be expected to off-gas formaldehyde.
- 4. Department Heads and Supervisors shall:
  - (a) Assure that all employees who have potential for exposure to formaldehyde are evaluated by DES and made aware of the hazards associated with formaldehyde; and
  - (b) Insure control measures and personal protective equipment use as appropriate for the situation.
  - (c) Communicate to their employees the elements of the Formaldehyde Plan when it is determined by DES through surveys and monitoring that there is occupational exposure;
  - (d) Assure that employees are aware of the potential hazards associated with working with formaldehyde and receive appropriate training;
  - (e) Notify DES when new products or processes are used that might result in formaldehyde exposure and arrange for exposure monitoring through DES where needed to document exposure levels;
  - (f) Initiate medical surveillance for any employee who has formaldehyde exposure in excess of regulated limits as determined by DES, who develops signs and symptoms of overexposure to formaldehyde, or who is exposed to formaldehyde in emergencies;
  - (g) Report any problem associated with implementation of the Formaldehyde Management Plan to DES; and
- 5. Employees shall:
  - (a) Comply with the provisions of the Formaldehyde Management Plan and work practices instituted by the Supervisor; and
  - (b) Report to their supervisor if they develop signs and symptoms of overexposure to formaldehyde, or who are exposed to formaldehyde in the course of an emergency.

## **V. Information**

Assistance will be provided by the Department of Environmental Safety to any Department or individual requesting guidance and assistance for implementation of control measures or training to satisfy implementation of this policy.

Departmental telephone number : (301) 405-3960

## Glossary of Terms

**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 of Maryland.

**ESLI:** End-of service life indicator.

**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.

## Formaldehyde Assessment and Monitoring

The following processes or work operations may result in formaldehyde exposure:

- Any process that uses formaldehyde for tissue preservation.
- Any operation that involves grinding, sanding, sawing, cutting, crushing, screening, sieving, or any other manipulation of a material that contains urea-formaldehyde resin and generates formaldehyde-bearing dust, for example, working with some particle boards, plywoods, decorative laminates, textiles, paper, and foundry sand molds.
- Any processes where there have been employee complaints or symptoms indicative of exposure to formaldehyde.
- Any liquid or spray process involving formaldehyde.
- Any process that involves the heating of a formaldehyde-bearing resin.
- Disposing or processing formaldehyde waste.

To conduct formaldehyde assessments, DES requires an inventory of locations where formaldehyde is used. This may be accomplished by:

- Reviewing manufacturers information on particle board and plywood fabrication.
- Reviewing material safety data sheets (MSDS).
- Reviewing formaldehyde chemical waste inventories.
- Checking historical use data.
- Conducting walkthroughs of laboratories where there is formaldehyde tissue preservation.
- Reviewing laboratory signage data.
- Any other type of pertinent data, including University Health Center Occupational Health Unit notifications and employee complaints.

Upon identification, DES will identify operations where formaldehyde is used in a manner such that it may be released into the workplace atmosphere or contaminate the skin.

### Exposure Assessment Methods

DES will use appropriate methods to assess formaldehyde levels, which include:

- Use of objective data. (i.e., previously documented information that confirms or rebuts

- formaldehyde exposures at regulated concentrations).
- Appropriate workplace contaminant sampling methods.

### **Monitoring Strategy**

When there are different processes where employees may be exposed to formaldehyde, DES 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 group will be monitored.

TWA's are usually determined for an 8-hour work shift. A personal sampling pump is affixed to the employee and is collected at the end of the shift. The sample is then analyzed for formaldehyde. 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.

Monitoring results determine the need and extent of employee training, hygiene procedures, personal protective equipment, follow-up monitoring, and medical surveillance. The Formaldehyde Requirements Matrix (Appendix A) summarizes institutional and supervisory responsibilities for employees meeting the specified criteria.

Department heads, supervisors, or users may contact DES to initiate exposure monitoring in their worksites.



## Training

All employees with any potential exposure to formaldehyde must receive training to provide an understanding of hazards and protection methods. This training is a component of the Chemical Hygiene Program in laboratories, and is addressed by the Hazard Communication Program in all other worksites. Please review these programs if formaldehyde is present in your workplace.

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

- (a) A discussion of the contents of OSHA 29 CFR 1910.1048, Formaldehyde;
- (b) An explanation of the specific material safety data sheet (MSDS) used in the work area;
- (c) The purpose for and a description of the medical surveillance program including:
  - (1) A description of the potential health hazards associated with exposure to formaldehyde and a description of the signs/symptoms of formaldehyde exposure, and
  - (2) Instructions to immediately report to the Supervisor any adverse signs or symptoms that the employee suspects is attributable to formaldehyde exposure;
- (d) 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;
- (e) The purpose for, proper use of, and limitations of personal protective clothing and equipment;
- (f) Instructions for the handling of spills and emergencies;
- (g) An explanation of the importance of engineering and work practice controls for employee protection and any necessary instruction in the use of these controls;
- (h) A review of emergency procedures including the specific duties or assignments of each employee in the event of an emergency; and
- (i) 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. DES shall provide the training annually to each affected employee.

# Labels and Signs

## Labels

The chemical manufacturer, importer, or distributor shall ensure that each container is labeled according to the University's Hazard Communication Program. This includes:

- 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 0.1 ppm.

Labels shall include:

- The identity of the hazardous chemical;
- Appropriate hazard warning; and
- Name and address of the manufacturer, importer, or distributor.

It is the responsibility of the user to ensure that containers remain labeled with the identity and appropriate hazard warnings. Temporary containers require only the identity of the material if it is intended for immediate use (within one work shift) by an employee and must be returned to a container with appropriate warnings by the end of the work shift.

Materials capable of releasing formaldehyde at levels between 0.1 ppm and the action level shall also be labeled with the following additional information:

- Identified as containing formaldehyde;
- Name and address of the person responsible for the material; and
- State that physical and health hazard information can be found on the material safety data sheet.

For the materials listed above capable of releasing formaldehyde at levels above the action level, labels shall also:

- Address all hazards as defined in OSHA 29 CFR 1910.1200 (d), Hazard Determination;
- Address Appendices A and B, 29 CFR 1910.1200, including respiratory sensitization; and
- Contain the words "Potential Cancer Hazard".

## 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:

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

for further information contact (Supervisor's name, location, phone) or the Dept. of Environmental Safety x53960

## Medical Surveillance

A medical surveillance program will provide annual examinations for all employees who:

- Are exposed to formaldehyde at or above the action level or the STEL.
- Develop signs and symptoms of overexposure to formaldehyde and for all employees exposed to formaldehyde in emergencies. (When determining whether an employee may be experiencing signs and symptoms of possible overexposure to formaldehyde, the employer may rely on the evidence that signs and symptoms will occur only in exceptional circumstances when airborne exposure is less than 0.1 ppm and when formaldehyde is present in material in concentrations less than 0.1 percent.)

Note: Medical examinations shall be provided as soon as possible to all employees exposed in an emergency.

The following information shall be provided to the University Health Center Occupational Health Unit by the Supervisor:

- A description of the affected employee's job duties as they relate to the employee's exposure to formaldehyde;
- The representative exposure level for the employee's job assignment;
- Information concerning any personal protective equipment and respiratory protection used or to be used by the employee;
- Information from previous medical examinations of the affected employee within the control of the employer; and
- In the event of a nonroutine examination because of an emergency exposure to formaldehyde, the supervisor shall provide to the physician as soon as possible a description of how the emergency occurred and the exposure the victim may have received.

All medical procedures shall be performed by or under the supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place. The details of the medical examination can be found in OSHA 29 CFR 1910.1048 (l).

For each examination required under medical surveillance, the employer shall obtain a written opinion from the University Health Center Occupational Health Unit. This written opinion shall contain the results of the medical examination except that it shall not reveal specific findings or diagnoses unrelated to occupational exposure to formaldehyde.

A physician may authorize medical removal from exposure to formaldehyde when an employee reports significant irritation of the mucosa of the eyes/upper airways, respiratory sensitization, dermal irritation, or dermal sensitization attributed to workplace formaldehyde exposure if the physician determines that the exposure was caused by formaldehyde.

After consulting with the University Health Center Occupational Health Unit regarding the determination of medical removal from exposure to formaldehyde or any restrictions involved, the

employee may designate a second physician to review any findings, determinations, or recommendations of the initial physician and have the second physician conduct examinations, consultations, and laboratory tests as necessary to evaluate the effects of formaldehyde exposure and to facilitate the review.

## **Personal Hygiene Practices**

Employees who are required to change from work clothing into protective clothing to prevent skin contact with formaldehyde shall be provided change rooms by their department.

Conveniently located quick drench showers shall be used where employees' skin may become splashed with solutions containing 1 percent or greater formaldehyde (including provisions for equipment failure or improper work practices) and employees must be aware of the location of the shower and required to use it immediately.

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.

## **Protective Equipment and Clothing**

Employers shall comply with the provisions of OSHA 29 CFR 1910.132 (Personal Protective Equipment), 29 CFR 1910.133 (Eye and Face Protection) and the University of Maryland's Personal Protective Equipment Program.

Personal protective equipment and clothing shall be selected based on the form of formaldehyde encountered, the conditions of use, and the hazard presented.

All eye and skin contact with liquids containing 1% or more of formaldehyde shall be prevented by the use of chemical protective clothing made of material impervious to formaldehyde and the use of other personal protective equipment, such as goggles and face shields, as appropriate to the operation. Clothing selection will be made using chemical clothing resistance guides found in manufacturer's literature.

Where a face shield is worn, chemical safety goggles are also required if there is a danger of formaldehyde reaching the eye.

Full body protection shall be worn for entry into areas where concentrations exceed 100 ppm and for emergency entry into areas of unknown concentration.

## **Maintenance of Protective Equipment and Clothing**

The employer shall assure that protective equipment and clothing contaminated with formaldehyde are cleaned and laundered before reuse.

When ventilating formaldehyde-contaminated clothing and equipment, the employer shall establish a storage area so that employee exposure is minimized. Containers for contaminated clothing/equipment and storage areas shall have labels and signs containing the following information:

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

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The employer shall inform any person who launders, cleans, or repairs such clothing or equipment of formaldehyde's potentially harmful effects and of procedures to safely handle the clothing and equipment.

### **Housekeeping and Preventative Maintenance**

For operations involving formaldehyde solutions or gas, the employer shall implement a program to detect leaks and spills, including regular visual inspections.

Preventative maintenance of equipment, including surveys for leaks, shall be undertaken at regular intervals. In work areas where spillage may occur, the employer shall make provisions to contain the spill, to decontaminate the work area, and to dispose of the waste.



# 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 of Maryland’s Respiratory Protection Program. All workers must be medically evaluated by the Occupational Health Unit of the University Health Center to determine the ability of the worker to perform the work while wearing a respirator. Training in the care and use respirators and fit-testing will be conducted by DES for only those employees who are authorized by Occupational Health to wear a respirator. Any worker who is not authorized by the Occupational Health Unit will be prohibited from engaging in activities which may expose the worker to airborne formaldehyde at or above the PEL.

If air-purifying chemical cartridge respirators are used, the following must be followed:

- If the cartridge contains a NIOSH-approved end-of service life indicator (ESLI), replace the cartridge when breakthrough occurs.
- If the cartridge does not contain an ESLI, replace the cartridge after three (3) hours of use or at the end of the work shift, whichever occurs first.
- If the cartridge does not contain an ESLI, replace canisters used in atmospheres up to 7.5 ppm (10 times the PEL) every four hours or at the end of the work shift, whichever occurs first.

Appropriate respirators must be selected based upon employee exposure levels.

The following types of respirators are appropriate for the indicated exposures:

Formaldehyde exposure (ppm)	Minimum respirator required <sup>1</sup>
Up to 7.5 ppm (10 X PEL)	Full face piece with cartridges or canisters specifically approved for protection against formaldehyde. <sup>2,3</sup>

<b>Formaldehyde exposure (ppm)</b>	<b>Minimum respirator required<sup>1</sup></b>
Up to 75 ppm (100 X PEL)	Full-face mask with canister especially approved for protection against formaldehyde, Type C supplied air respirator, demand type, or continuous flow type, with full face piece, hood, or helmet.
Above 75 ppm or unknown. (Emergencies), 100 X PEL	Self-contained breathing apparatus (SCBA) with positive pressure full face piece. Combination supplied-air, full face piece positive pressure respirator with auxiliary self-contained air supply
Firefighting	SCBA with positive pressure full face-piece
Escape	SCBA in demand or pressure demand mode. Full face mask with canister approved for protection against formaldehyde.

1. Respirators specified for use at higher concentrations may be used at lower concentrations.

2. A half-mask respirator with cartridges specifically approved for protection against formaldehyde can be substituted for the full face piece respirator providing that effective gas-proof goggles are provided and used in combination with the half-mask respirator.

3. The employer must provide a powered air-purifying respirator adequate to protect against formaldehyde exposure to any employee who has difficulty using a negative-pressure respirator.

## Appendix A- Formaldehyde Requirements Matrix

	< 0.1 ppm exposure	0.1 ppm	0.5 ppm	.75 ppm	2 ppm STEL	> 100 ppm or unknown	≥1% vol	≥ 0.1% vol	Symptoms of Exposure <sup>2</sup>	Eye hazard	At any conc.
Awareness Training <sup>8</sup>	x						x				
Comprehensive Training		x	x	x	x						
Respirator <sup>3</sup>				x	x						
Med. Surv.			x	x	x				x		
Signs				x	x						
Regulated Area				x	x						
Waste Disposal <sup>1</sup>	x	x	x	x	x		x	x			x
Record keeping	x	x	x	x	x						
Work Practices		x	x	x	x						
Hygiene Practices				x	x						
Engineering Controls				x	x						
Protective Clothing							x				
Contaminated PPE laundering, signage, labeling, containers											x
Full body protection						x					
Chemical goggles										x	
Emergency Eyewash								x		x	
Emergency Shower								x			
Labels <sup>5</sup>		x	x	x	x						
MSDS	x	x	x	x	x		x	x			x
Initial monitoring <sup>6</sup>											x
Periodic monitoring <sup>7</sup>			x	x	x						
Preventative Maintenance and leak surveys											x
Housekeeping and leak detection inspections											x
Spill containment, decontamination											x
Medical Removal <sup>4</sup>									x		
Written Hazcom Program <sup>8</sup>											x


1. Waste from spills shall be placed in sealed containers and labeled. Preserved tissue may be incinerated. Contact Environmental Affairs for specific information.

2. Only if airborne exposure is more than 0.1 ppm and formaldehyde concentration is more than 0.1 %.

3. Includes medical surveillance, training, and fit testing.

4. Does not apply in cases of dermal irritation or sensitization when less than 0.05 % formaldehyde.

5. For materials capable of releasing formaldehyde above 0.5 ppm, labels shall address all hazards as defined in 29 CFR 1910.1200 (d) and Appendices A and B, including respiratory sensitization, and contain the words "Potential Cancer Hazard". Does not apply if the laboratory falls under 29 CFR 1910.1450. Then see Chemical Hygiene Plan.

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6. Unless it can be shown by objective data that there will be no exposure at or above the action level or STEL under foreseeable conditions of use.
  7. Repeat every 6 months if at or above the action level. If above STEL, repeat every year. Monitoring may be discontinued if results from 2 consecutive samples taken at least 7 days apart are below the action level and the STEL.
  8. For laboratories falling under 29 CFR 1910.1450, they shall use the Chemical Hygiene Plan for compliance.