



Formaldehyde Safety Program

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ACRONYMS & DEFINITIONS

Action Level (AL)	Level of exposure to a harmful substance or other hazard (present in a work environment or situation) at which an employer must take the required precautions to protect the workers.
Permissible Exposure Limit (PEL)	A legal/regulatory limit for exposure of an employee to a chemical substance or physical agent.
Short Term Exposure Limit (STEL)	The maximum concentration of a chemical to which workers may be exposed continuously for up to 15 minutes without danger to health or work efficiency and safety.
CRF	Code of Federal Regulations
EHS	Environmental Health and Safety
EOHS	Employee Occupational Health Services
ml	Milliliters
OSHA	Occupational Safety & Health Administration
PPE	Personal Protective Equipment
ppm	Parts per million
SDS	Safety Data Sheets

TABLE OF CONTENTS

1. SCOPE..... 1

2. RESPONSIBILITIES..... 1

 2.1. Environmental Health and Safety (EHS) is responsible for:..... 1

 2.2. Deans, Directors and Department Heads are responsible for:..... 1

 2.3. Supervisors and/or PI’s are responsible for:..... 1

 2.4. Employee Occupational Health Services (EOHS) is responsible for:..... 1

 2.5. Employees are responsible for: 2

3. HAZARD DATA..... 2

 3.1. Acute Health Effects – Symptoms that develop rapidly during short-term exposures 2

 3.2. Chronic Health Effects – Symptoms that develop slowly due to long-term exposures to low concentrations of a hazardous substance 3

 3.3. Physical Hazards..... 3

4. PERMISSIBLE EXPOSURE LIMITS..... 3

5. EMPLOYEE EXPOSURE ASSESSMENTS..... 4

6. REDUCING EMPLOYEE EXPOSURE TO FORMALDEHYDE..... 4

 6.1. Substitution..... 4

 6.2. Engineering Controls..... 4

 6.3. Administrative Controls 4

 6.4. Personal Protective Equipment (PPE)..... 5

 6.5. Hygiene 5

 6.6. Emergency Eyewash and Shower 5

7. SIGNAGE AND LABELING..... 6

 7.1. Regulated Areas 6

 7.2. Container Labels 6

8. STANDARD OPERATING PROCEDURES..... 6

9. EMPLOYEE INFORMATION AND TRAINING..... 7

10. MEDICAL SURVEILLANCE..... 7

11. SPILLS 8

12. STORAGE 8

13. DISPOSAL..... 8

1. SCOPE

This program applies to all locations at the University of New Mexico (UNM) that use formaldehyde, formalin or other formaldehyde-containing solutions.

2. RESPONSIBILITIES

2.1. Environmental Health and Safety (EHS) is responsible for:

- Preparing, reviewing and periodically revising this program.
- Monitoring compliance with this program.
- Providing general formaldehyde safety training.
- Conducting exposure assessments and evaluating exposure control measures.
- Providing or coordinating emergency response for chemical spills.
- Investigating accidents.
- Maintaining employee exposure records.

2.2. Deans, Directors and Department Heads are responsible for:

- Ensuring departmental compliance with all the procedures outlined in this program.

2.3. Supervisors and/or PI's are responsible for:

- Ensuring compliance with this program in their work area(s).
- Developing Standard Operating Procedures (SOPs) that address the specific safety measures to be implemented when using formaldehyde.
- Ensuring employees with the potential for exposure to formaldehyde receive the appropriate training before working with it.
- Coordinating the provision of medical examinations, exposure monitoring and record keeping.
- Arranging for immediate emergency response, if necessary, for chemical spills, injuries and overexposures.
- Maintaining a Safety Data Sheet (SDS) for formaldehyde products and all other hazardous chemicals used in the work area.
- Notifying EHS when there is a change in equipment, processes, or controls which may result in additional exposure to formaldehyde.

2.4. Employee Occupational Health Services (EOHS) is responsible for:

- Conducting medical surveillance in accordance with 29 CFR 1910.1048.
- Maintaining records of physical examinations and tests.
- Providing written medical opinions to both employee and employer.

2.5. Employees are responsible for:

- Knowing the provisions of the Formaldehyde Safety Program.
- Reporting accidents, possible exposures or unsafe conditions to their supervisor.
- Utilizing engineering controls and PPE.

3. HAZARD DATA

Formaldehyde is a colorless, strong-smelling gas often found in aqueous (water-based) solutions. Commonly used as a preservative in medical laboratories and mortuaries, formaldehyde is also found in many products such as chemicals, glues, permanent press fabrics, particleboard and plywood. It is also widely used as an industrial fungicide, germicide and disinfectant.

Formaldehyde may affect the body through inhalation, skin/eye contact or accidental ingestion. Formaldehyde exposure is associated with irritation to the human respiratory tract, cancers of the nose and lung, and loss of vision. Repeated formaldehyde exposure can cause sensitization in some members of the population; once sensitized, even very low levels of formaldehyde exposure may cause symptoms.

Sensory fatigue causes the senses of smell and eye irritation to become less sensitive with formaldehyde exposure; therefore, formaldehyde's warning properties are not reliable as a means to prevent overexposure. The dose, or amount of exposure, determines the type and degree of health effects.

3.1. Acute Health Effects – Symptoms that develop rapidly during short-term exposures

- **Inhalation** -- According to the National Cancer Institute, when formaldehyde is present in the air at levels exceeding 0.1 ppm, some individuals may experience adverse effects such as watery eyes; burning sensations in the eyes, nose, and throat; coughing; wheezing; nausea; and skin irritation. Some people are very sensitive to formaldehyde, whereas others have no reaction to the same level of exposure.
- **Skin Exposure** -- Formaldehyde is a potent skin sensitizer and a primary irritant. Exposure to formaldehyde solutions can cause irritation of the skin and allergic contact dermatitis. These skin diseases and disorders can occur at levels well below those encountered by many formaldehyde workers. Once an individual is sensitized, exposure to liquid formalin or formaldehyde vapor can provoke skin reactions even when airborne concentrations of formaldehyde are well below 1 ppm.
- **Eye Contact** -- Formaldehyde solutions splashed in the eyes 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 and whether or not the eyes were flushed with water immediately after the accident.
- **Ingestion** -- Ingestion of as little as 30 ml of a 37 percent solution of formaldehyde (formalin) can result in death. Gastrointestinal toxicity after ingestion is most severe in the stomach. Symptoms may include nausea, vomiting, and severe abdominal pain. Diverse

damage to other organ systems including the liver, kidney, spleen, pancreas, brain, and central nervous system can occur from the acute response to ingestion of formaldehyde.

3.2. Chronic Health Effects – Symptoms that develop slowly due to long-term exposures to low concentrations of a hazardous substance

Long-term exposure to formaldehyde has been associated with an increased risk of cancer including leukemia and cancers of the nose, nasopharynx and accessory sinuses. The evidence for causing lung cancer in humans is mixed, with some studies demonstrating an effect and others showing no effect.

Long-term exposure to formaldehyde has the potential to cause various respiratory impairments, such as bronchitis, and may trigger symptoms in individuals with reactive airway disease such as asthma.

3.3. Physical Hazards

Formaldehyde poses a moderate fire and explosion hazard when exposed to heat or flame.

Formaldehyde is classified as a Class IIIA combustible liquid by the National Fire Protection Agency. Class IIIA combustible liquids have a flash point at or above 140°F (60°C) and below 200°F (93°C).

Avoid contact and do not store with strong oxidizing agents, strong alkalis/bases, isocyanates, anhydrides and inorganic acids.

Formaldehyde reacts with nitrogen dioxide, nitromethane, peroxyformic acid, perchloric acid and aniline to yield explosive compounds.

4. PERMISSIBLE EXPOSURE LIMITS

OSHA has established the following limits for employee exposures to formaldehyde, with regulatory requirements triggered by each limit.

- **Action Level (AL)** -- The AL is defined as 0.5 parts formaldehyde per million parts of air (0.5 ppm), calculated as an 8-hour time-weighted average. At or above this concentration, OSHA mandates that employers initiate certain required activities such as exposure monitoring and medical surveillance.
- **Permissible Exposure Limit (PEL)** -- The PEL is 0.75 parts formaldehyde per million parts of air (0.75 ppm), calculated as an 8-hour time-weighted average. At concentrations at or above this limit, OSHA requires employers to provide protective equipment such as respirators, to establish administrative controls, to study and install engineering controls (if feasible), to establish regulated areas, and to perform other OSHA-required procedures and duties.
- **Short Term Exposure Limit (STEL)** -- A limit defined as 2 parts formaldehyde per million parts of air (2 ppm), averaged over any one 15-minute period. If the STEL is exceeded, the same mandates as those for exceeding the PEL are triggered.

5. EMPLOYEE EXPOSURE ASSESSMENTS

When formaldehyde is used in a work area and no objective data are available demonstrating that exposures are not above the Action Level, EHS will conduct air monitoring to determine employee exposures. Measurements of employee exposures will be representative of a full shift or STEL and will be taken for each job classification in each work area.

- If employee exposures are found to be at or above the action level, EHS will repeat air monitoring every six (6) months.
- If exposures are above the STEL, air monitoring will be conducted at least once per year.

Monitoring will continue until exposures can be reduced below these levels by engineering or administrative controls.

Air monitoring will be conducted promptly in a work area if employees are experiencing signs or symptoms of formaldehyde exposure. The affected employee(s) should report to Employee Occupational Health Services (EOHS) for evaluation.

Air monitoring must be repeated in an area each time there is a change in equipment, processes or controls that may result in additional or reduced exposure to formaldehyde.

To schedule an exposure assessment, call EHS at 505-277-2753. You can also submit an online request via the Quick Links at the bottom of the EHS website home page: EHS.unm.edu

6. REDUCING EMPLOYEE EXPOSURE TO FORMALDEHYDE

EHS uses the hierarchy of controls to reduce exposures. The hierarchy of controls methods are listed below in the order in which they should be implemented to reduce exposure. PPE is used as a last resort, in an emergency, or as an extra layer of protection. PPE alone is not sufficient protection for employees.

6.1. Substitution

Substitution of a less hazardous chemical or process will be used to reduce or eliminate formaldehyde use and exposures.

6.2. Engineering Controls

Chemical fume hoods and/or local exhaust ventilation will be used to reduce exposures to formaldehyde. Local exhaust is used to capture and exhaust formaldehyde vapors, preventing the accumulation of high exposures in the employee's breathing zone.

6.3. Administrative Controls

If engineering controls cannot be implemented, alteration of work practices will be used to reduce exposures to formaldehyde. This could include limiting the amount of time employees spend working in high exposure areas such as by rotating personnel between various job duties.

6.4. Personal Protective Equipment (PPE)

Prevent direct contact with the eyes or skin with liquids containing 1% or more formaldehyde by the use of protective garments and equipment which are resistant to formaldehyde (Neoprene, Nitrile, rubber and PVC have all been rated as “excellent” for resistance to formalin solutions). The type of PPE necessary will vary depending on the concentration, the amount used, and the potential for splashing. PPE may include goggles, face shield, gloves gowns, lab coats, aprons and arm sleeves. EHS can provide your area with guidance on the appropriate PPE for your area.

- Respirators: If employee exposures are found to exceed the PEL or STEL, work will be stopped. Supervisors will provide respirators until feasible engineering or administrative controls can be implemented, if necessary. EHS, based on air monitoring results, will determine respirator use and type. If respirator use is necessary, employees must be medically cleared by Employee Occupational Health Services (EOHS) and fit-tested and trained by EHS before using a respirator.

In areas where the formaldehyde concentration is unknown or greater than 75 ppm, full body protective clothing and Self-Contained Breathing Apparatus (SCBA) are required. This concentration may be encountered during a large quantity spill of formaldehyde in a confined or small, enclosed area. **UNM uses a trained HazMat Response team to handle this type of situation. Evacuate the area and call Campus Police (911 landline or 505- 277-2241 on mobile phone).**

All PPE must be inspected by employees prior to each use. PPE must be stored in a clean and sanitary manner, away from direct sunlight. Respirators should be inspected by supervisors each month to ensure they are being used, stored and cleaned properly.

6.5. Hygiene

To prevent the accidental ingestion of formaldehyde, eating, drinking and smoking are prohibited in areas where formaldehyde is used. In addition, employees must wash their hands after using formaldehyde.

If employees are required to change from work clothing into protective clothing, change rooms will be provided. Protective clothing contaminated with formaldehyde must not be taken home by employees. Reusable protective clothing must be laundered by the University or a company that is trained to recognize the hazards of formaldehyde.

6.6. Emergency Eyewash and Shower

If there is a possibility that employees’ skin may be splashed by formaldehyde-containing solutions, an emergency shower will be provided in the work area. If there is a possibility that employees’ eyes may be splashed by formaldehyde-containing solutions, a plumbed eyewash station will be provided in the work area.

Employees must be instructed on the proper use of the eyewash and emergency showers. If an employee’s eyes or skin are splashed by formaldehyde-containing solutions, the employee must flush them immediately and continue for at least 15 minutes. The employee should then seek immediate medical attention.

7. SIGNAGE AND LABELING

7.1. Regulated Areas

Areas where the airborne levels of formaldehyde are found to exceed the PEL and/or the STEL will be regulated areas. Access to these areas will be limited to persons trained to recognize the hazards of formaldehyde. All entrances and access ways will be posted with signs bearing the following information:

DANGER!
Formaldehyde
May Cause Cancer
Causes Skin, Eye, and Respiratory Irritation
Authorized Personnel Only

7.2. Container Labels

OSHA Hazard Communication regulations require that all containers must be labeled with the name of the product and the most significant hazards(s) associated with the contents. When a chemical product containing greater than 0.1% formaldehyde is transferred into a container other than the original, it must be labeled with the following information (at minimum):

CAUTION
Contains Formaldehyde
Toxic
Potential Cancer Hazard

Pictograms may also be used on the label for hazard communication. Pictograms for formaldehyde include the following:



8. STANDARD OPERATING PROCEDURES

Work with formaldehyde or formalin requires a written Standard Operating Procedure (SOP) as part of the laboratory chemical hygiene plan that addresses the following:

- Hazards of formaldehyde
- Engineering control devices (i.e. chemical fume hoods, glove boxes) that will be used
- PPE requirements

- Designated storage and use areas
- Waste disposal information
- Decontamination and spill clean-up procedures

9. EMPLOYEE INFORMATION AND TRAINING

Supervisors are responsible for ensuring that employees with potential exposure to formaldehyde receive the appropriate training before working with it. All training must be documented by the individual presenting the training session or through Learning Central. A training module will be provided to supervisors with employees who work with formaldehyde. Supervisors should review this information with employees annually. It will cover the following:

- Requirements of the OSHA Formaldehyde Standard
- Explanation of UNM's Formaldehyde Safety Program
- Contents of the Safety Data Sheet for formaldehyde
- Description of the medical surveillance program
- Description of the health hazards associated with exposure
- Signs and symptoms of exposure
- Instructions to report any signs or symptoms that may be attributable to formaldehyde exposure
- Description of the operations in the work area where formaldehyde is present
- Work practices to reduce exposure, including engineering and administrative controls and required PPE
- Instructions for handling spills and emergency procedures

This training must be conducted whenever a new hazard is introduced into the work area, when there is a change in procedure, and whenever the employee demonstrates behavior that indicates a lack of understanding of the basic rules for the safe handling of formaldehyde.

10. MEDICAL SURVEILLANCE

Medical evaluation and surveillance as described in the OSHA Formaldehyde Standard (29 CFR 1910.1048(l)) is available through Employee Occupational Health Services (EOHS) to all employees exposed to formaldehyde at or above the STEL or AL. In addition, medical surveillance will be made available to employees who develop signs and symptoms of exposure to formaldehyde and for all employees exposed to formaldehyde in emergencies. The results of medical surveillance and personal exposure monitoring are automatically provided to EOHS by Environmental Health and Safety for inclusion in the employee's medical record.

UNM employees may obtain free medical consultation regarding concerns about formaldehyde exposures by contacting EOHS at 505-272-8043. Students with concerns about formaldehyde or other exposures should contact Student Health and Counseling Services at 505-277-3136.

Medical Removal -- The University will abide by the medical removal provisions of the OSHA Formaldehyde Standard that outline when an employee should be medically removed due

to occupational exposure or other medical conditions identified during periodic medical surveillance. In the event a medical removal is required, EHS will work with management to coordinate an employee's medical removal and reassignment to a comparable job for which the employee is qualified (or can be trained for in a short amount of time). The employee may not suffer a reduction in wage rate, seniority, or other benefits because of the reassignment.

11. SPILLS

A formaldehyde spill kit must be kept in areas where large volumes of formaldehyde are used and/or stored. The spill kit should contain absorbent material specific to formaldehyde and formalin to ensure that vapor generation is minimized. Minor, incidental spills can be cleaned up by lab personnel. Large spills must be cleaned up by appropriately-trained emergency responders.

- Minor spills (one gallon or less) – Minor spills in well-ventilated areas can be cleaned up by lab personnel using materials from the formaldehyde spill kit. Minimum PPE required to clean up a formaldehyde spill are a lab coat, safety glasses/goggles and gloves. If there is any concern for inhalation exposures, respiratory protection is required. The spill clean-up materials must be double-bagged, tightly closed, labeled and picked up by EHS for disposal.
- Major spills (more than one gallon) – Lab personnel should not attempt to clean up major spills of formaldehyde solutions or spills in confined areas where ventilation is poor. **In the event of a major spill, evacuate the area and call Campus Police (911 on a landline or 505-277-2241 on a mobile phone and the EHS duty officer pager 505-951-0194).**

12. STORAGE

Formaldehyde should be stored in a well-ventilated cabinet in an unbreakable, chemically resistant secondary container (spill tray) to contain spills.

Formaldehyde and formaldehyde-containing solutions should not be stored with inorganic acids, caustics, strong alkalis/bases, isocyanates, anhydrides or oxidizing agents.

13. DISPOSAL

All chemical waste must be disposed of according to federal and state regulations and UNM's Chemical Hygiene Plan. Formaldehyde-containing wastes should be placed in a labeled waste container in a flammable storage cabinet. Call EHS at 277-2753 to schedule a pickup of waste formaldehyde and/or other waste chemicals.

Formaldehyde Safety Program

Final Audit Report

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