

## **6.10 FORMALDEHYDE SAFETY PROGRAM**

The purpose of this program is to protect employees from the hazards associated with formaldehyde and maintain formaldehyde exposures below the regulatory limits.

### **A. SCOPE**

This program applies to all locations at the University and University Hospitals that use formaldehyde, formalin or other formaldehyde-containing solutions.

### **B. RESPONSIBILITIES**

1. Safety and Risk Services (SRS) and UH Safety are responsible for:
  - program development and implementation at the University;
  - monitoring compliance with the OSHA Standard-29 CFR 1910.1048;
  - providing general formaldehyde safety training;
  - conducting exposure assessments and evaluating exposure control measures as necessary;
  - providing or coordinating emergency response for chemical spills;
  - investigating accidents; and
  - maintaining employee exposure records.
2. Deans, Directors and Department Heads are responsible for:
  - ensuring departmental compliance with all the procedures outlined in this program.
3. Supervisors' responsibilities include:
  - ensuring compliance with this program in their work area(s);
  - developing Standard Operating Procedures (SOP) that address the specific safety measures to be implemented when using formaldehyde;
  - coordinating the provision of medical examinations, exposure monitoring and record keeping, as required;
  - ensuring employees with potential exposure to formaldehyde receive the appropriate training before working with it;
  - arranging for immediate emergency response, if necessary, for chemical spills, injuries and overexposures;
  - maintaining a MSDS for the formaldehyde products used and all other hazardous chemicals in the work area; and
  - notifying SRS when there is a change in equipment, processes or controls which may result in additional exposure to formaldehyde.

4. Employees/students are required to:

- know the provisions of the Formaldehyde Safety Program;
- report accidents, possible overexposures or unsafe conditions to their supervisor; and
- wear/utilize Personal Protective Equipment and engineering controls when recommended and provided.

**C. HAZARD DATA**

Formaldehyde exposure has been associated with irritation to the human respiratory tract, cancers of the nose and lung, and loss of vision. Formaldehyde may affect the body through inhalation, skin/eye contact or accidental ingestion. Your senses of smell and eye irritation become less sensitive with time as you adapt to formaldehyde exposure; therefore, you cannot rely on formaldehyde's warning properties to alert you to the potential for overexposure. The dose, or amount of exposure, determines the type and degree of beneficial or adverse health effects.

**1. Acute Health Effects** – Symptoms that occur at very high concentrations of exposure.

**Inhalation.** Formaldehyde is highly irritating to the upper respiratory tract and eyes. Severity of the symptoms depends upon the concentration in air coupled with the length of the exposure.

0.5 to 2.0 ppm	may irritate eyes, nose, throat
3 to 5 ppm	may cause irritation and tearing of the eyes
10 to 20 ppm	causes difficulty breathing, burning nose and throat, cough and heavy tearing of the eyes
25 to 30 ppm	causes severe respiratory tract injury leading to pulmonary edema and pneumonitis
>100 ppm	immediately dangerous to life and health

**Skin Absorption.** Formaldehyde is a severe skin irritant and sensitizer. Contact with formaldehyde causes white discoloration, drying, cracking and scaling. Prolonged and repeated contact can cause numbness or hardening of the skin. Previously exposed persons may react to future exposure with an allergic eczematous dermatitis or hives.

**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.** 10% to 40% solutions of formaldehyde can cause severe irritation of the mouth, throat and stomach. Severe stomach pains will follow ingestion with possible loss of

consciousness and death. Ingestion of dilute solutions (0.03%-0.04%) may cause discomfort in the stomach and throat.

## 2. Chronic Health Effects

Formaldehyde has the potential to cause various respiratory impairments, such as bronchitis and nasal cancer that may appear over a relatively long period of time after repeated and prolonged exposures above the OSHA permissible exposure limits (PEL). In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages. Some people have allegedly developed asthma or bronchitis following exposure to formaldehyde, apparently after a single exposure to a high concentration.

## 3. Physical Hazards

Formaldehyde poses a moderate fire and explosion hazard when exposed to heat or flame. The flash point for 37% formaldehyde is 185 degrees Fahrenheit with an explosion range of 7 to 73% by volume in air, and is classified as a Class III A flammable liquid in the OSHA regulations. Avoid contact with strong oxidizing agents, strong alkalies, isocyanates, anhydrides, and inorganic acids. Formaldehyde reacts with nitrogen dioxide, nitromethane, peroxyformic acid, perchloric acid and aniline to yield explosive compounds.

## D. PERMISSIBLE EXPOSURE LIMITS

OSHA has issued several types of limits for employee exposures to trigger various regulator requirements.

**Action Level.** A limit defined as 0.5 part 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).** A limit defined as 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, establish administrative controls, to study and install engineering controls (if feasible), establish regulated areas, and 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 this STEL limit is exceeded, the OSHA mandates which must be followed by an employer are identical to those required above for exceedance of the OSHA PEL. .

## **E. EMPLOYEE EXPOSURE ASSESSMENTS**

Whenever formaldehyde is used in a work area, SRS 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.

Call 277-2753 to arrange for a SRS industrial hygienist to utilize special sampling equipment to collect representative air samples for laboratory analysis of the formaldehyde. If employee exposures are found to be at or above the action level, SRS 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. Air monitoring will be repeated in an area each time there is a change in equipment, processes or controls which may result in additional exposure to formaldehyde. SRS must be notified at 277-2753 to conduct this monitoring.

## **F. REDUCING EMPLOYEE EXPOSURE TO FORMALDEHYDE**

### **1. Substitution**

When possible, substitution of a less hazardous chemical or process will be used to reduce or eliminate formaldehyde use and exposures.

### **2. Engineering Controls**

When possible, 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.

### **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.

### **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 Personal Protective Equipment necessary will vary depending on the concentration, amount used and the potential for splashing and may include goggles, face shield, gloves, gowns,

lab coats, aprons and arm sleeves. SRS and/or UH Safety 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, respirators will be provided until feasible engineering or administrative controls can be implemented. Respirator use and type will be determined by SRS/UH Safety, based on air monitoring results. If respirator use is necessary, employees must be medically cleared by Employee Occupational Health Services (EOHS)/Occupational Health to wear a respirator and fit-tested and trained by SRS/UH Safety 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. **Currently, no UNM personnel are trained to handle this type of situation. Campus Police must be contacted in these situations (911 landline or 277-2241 on mobile phone).**

All Personal Protective Equipment must be inspected by employees prior to each use. Personal Protective Equipment must be stored in a clean and sanitary manner. Respirators should be inspected by supervisors each month to ensure they are being used, stored and cleaned properly.

## 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. Emergency Eyewash and Shower

If there is a possibility that employees' skin may be splashed by formaldehyde-containing solutions, an emergency shower or drench hose 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 medical attention.

## G. SIGNAGE AND LABELING

### 1. Regulated Areas

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

**DANGER**  
**Formaldehyde**  
**Irritant and Potential Cancer Hazard**  
**Authorized Personnel Only**

### 2. Container Labels

The 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. Because OSHA has designated formaldehyde as a carcinogen, 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:

***Small Containers:***

**CAUTION**

Contains Formaldehyde  
 Potential Cancer Hazard

***Large Containers:***

**CAUTION**

Contains Formaldehyde  
 Toxic by inhalation and if swallowed.  
 Potential Cancer Hazard  
 May cause respiratory sensitization.  
 Irritating to eyes, skin and respiratory system.

SRS will provide these labels upon request.

When labeling containers using UNM labeling policy, use the following hazard ratings: **Health-3**, **Flammability-2**, **Reactivity-0**, and **Personal Protective Equipment**-this will vary based on the use and must be at least a B rating from the Lab Safety Supply Hazardous Material Identification Guide. Labels are provided by SRS. Refer to *SRS's Hazard Communication Program* (Section 4.05) for more information.

## H. STANDARD OPERATING PROCEDURES

Work with formaldehyde requires a written Standard Operating Procedure (SOP) that addresses the following:

- the hazards of formaldehyde

- what containment devices (i.e., chemical fume hoods, glove boxes) will be used when working with formaldehyde
- what Personal Protective Equipment is required
- designated storage and use areas
- how to dispose of waste formaldehyde solutions
- decontamination and spill clean-up procedures

## **I. EMPLOYEE INFORMATION AND TRAINING**

Every employee working with formaldehyde must receive training regarding the hazards of formaldehyde. A training module will be provided to supervisors with employees working with formaldehyde. Supervisors should review this information with employees annually. It will cover the following:

- requirements of the Standard;
- explanation of UNM's Formaldehyde Safety Program;
- contents of the Material 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 Personal Protective Equipment required; and
- instructions for handling spills and emergency procedures.

This training must be conducted whenever a new hazard is introduced into the work area, when the employee transfers to another job, 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 chemicals.

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 and a copy of the training records will be submitted to SRS/UH Safety.

## **J. MEDICAL SURVEILLANCE**

Employees found to have exposures that exceed the action level or the STEL will be included in a medical surveillance program. These employees will fill out a medical questionnaire form annually and receive a physical examination if EOHS/Occupational Health determines it is necessary based on a review of the employee's responses on the questionnaire.

Employees exposed to formaldehyde will be provided with the opportunity to receive medical attention under the following circumstances:

- whenever an employee has developed signs or symptoms associated with exposure to formaldehyde; and/or
- whenever an employee is involved in a spill, leak or other occurrence resulting in a possible overexposure to formaldehyde.

UNM employees may obtain free medical consultation regarding concerns about formaldehyde exposures by contacting Employee Occupational Health Services (EOHS) at 272-8043. UH employees can contact Occupational Health at 272-2517. Students with concerns about chemical or other exposures should contact Student Health Services at 277-3136.

It is the intent of UNM and UH to provide a work environment which does not compromise the reproductive health of any employee or student, regardless of gender, or the health of a fetus. Counseling on reproductive health matters may be obtained by contacting EOHS, Occupational Health or Student Health Services.

Employees that are required to wear respirators, as determined by SRS/UH Safety, must be medically cleared by EOHS/Occupational Health to use a respirator.

**Medical Removal.** Employees experiencing significant irritation of the eyes, upper airways or skin, respiratory sensitization or dermal sensitization attributed to formaldehyde exposure will be seen by EOHS or Occupational Health. If EOHS/OH determines that the symptoms may be the result of a possible overexposure, SRS/UH Safety will evaluate the work area to determine if the symptoms are the result of an over-exposure. If exposures are in excess of the OSHA PEL or STEL, SRS industrial hygienists will determine which further administration and/or engineering control measures are necessary. If the employee's symptoms have not subsided within a two-week period and EOHS/OH has determined that the employee was sensitized, restrictions or transfer from the work area may be recommended.

## **K. SPILLS**

Laboratory personnel can clean up the vast majority of chemical spills that occur in the lab. **The individual(s) who caused the spill is(are) responsible for prompt and proper clean-up.** It is the responsibility of the supervisor and/or chemical safety officer to have spill control clean-up materials and personal protective equipment, which are appropriate for the chemicals being handled, readily available. Supervisors are also responsible for ensuring that spills are cleaned up as soon as possible. The types and quantities of hazardous chemical substances used on the UNM campus require preplanning in order for accidental chemical releases to be handled in a safe manner. Two categories of chemical spills and response procedures are identified for this purpose.

**Minor spills** – Minor spills can be cleaned up with absorbent material. The appropriate Personal Protective Equipment, such as safety glasses and formaldehyde resistant gloves, must be used to

prevent skin contact with the formaldehyde. The spill clean-up materials must be double-bagged, tightly closed, labeled and picked up by SRS for disposal. If you experience any eye or upper respiratory irritation while cleaning up the spill, stop immediately and call SRS at 277-2753 for assistance.

**Major** spills - Employees should not attempt to clean up large quantity (more than 5 gallons) spills of formaldehyde, particularly in confined or restricted spaces, unless training has been received, appropriate spill clean-up materials, and personal protective equipment are readily available. In the event of a very large spill for which you are not properly trained or prepared, evacuate the area and call Campus Police (911 on a landline or 277-2241 on a mobile phone). If an area contains large quantities of formaldehyde, procedures to be followed in the case of a large spill or an emergency must be included as part the Standard Operating Procedures for formaldehyde in that area. Refer to UNM's Chemical Spill Response Program (Section 4.02) for more information.

#### **L. DISPOSAL**

All chemical waste must be disposed of according to UNM's Hazardous Chemical Waste Program (Section 4.07). This document must be referenced before any chemical is disposed of into the trash, into the sewer or allowed to evaporate. Formaldehyde-containing wastes should be placed in a labeled waste container in a flammable storage cabinet. Call SRS at 277-2753 for pickup of waste materials and chemicals. When in doubt, contact SRS at 277-2753 for clarification.

#### **M. STORAGE**

Ideally, formaldehyde should be stored in a well-ventilated cabinet in an unbreakable, chemically resistant secondary container to contain spills. The storage area should exhibit a sign warning of the presence and hazards of formaldehyde. Formaldehyde should not be stored with inorganic acids, caustics, strong alkalies, isocyanates, anhydrides or oxidizing agents. Refer to UNM's Chemical Storage Program (Section 4.03) for more details.