Introduction

Purpose
In accordance with applicable regulations and Temple University, this policy was developed to minimize exposure to formaldehyde.

Applicability
This policy is applicable to all Temple University employees, to all work conducted under the authority of Temple University, and to all equipment and property managed by Temple University. Non-Temple and contractor personnel must follow the provisions of this policy while at Temple University facilities.

This policy applies to facilities, branches, or divisions with any of the following situations:
1. An employee who may be exposed to formaldehyde at levels greater than or equal to 0.5, parts per million (ppm).
2. Employees who work with solutions that contain greater than 0.1 percent formaldehyde.
3. Employees who show symptoms of formaldehyde exposure.

Health Effects
Formaldehyde irritates the skin, eyes, throat, and respiratory system, is an acute toxin, and is a potential carcinogen. Formaldehyde can also cause allergic sensitization of the respiratory system and skin after an individual receives an initial high exposure. This means an individual who develops formaldehyde sensitization may experience an allergic respiratory or skin reaction. Because of this fact, a formaldehyde management system must be based primarily on exposure prevention.

Responsibilities for Formaldehyde Safety

Environmental Health and Radiation Safety Department (EHRS)
The EHRS has the following responsibilities related to formaldehyde activities:
- Policy implementation.
- Surveillance as requested by responsible supervisor.
- Training as requested by responsible supervisor.
- Exposure monitoring.

Supervisors and Managers must:
- Assess their site and operations to determine whether formaldehyde is present or used.
- All persons designated as formaldehyde users shall be issued a copy of this section by their supervisor. The copy should be kept in the user's laboratory for reference. Additional copies are available through the EHRS.
- Inform all individuals who work with formaldehyde regarding health risks and safety precautions. They must also be provided a copy of the formaldehyde policy.
- Provide employee training regarding the safe use, storage, and disposal of formaldehyde.
- Provide appropriate stock of required personal protective equipment (PPE).
- Provide safety equipment such as eyewash stations, showers, and, if applicable, ventilation devices.
• Request surveillance and exposure monitoring by EHRS
• Inform EHRS of areas of formaldehyde use
• Maintain relevant Material Safety Data Sheets (MSDSs) for formaldehyde products used.
• Contact EHRS for transportation and disposal of formaldehyde-related waste.
• Perform periodic visual inspections of areas where formaldehyde is used and stored.

Formaldehyde Users
Formaldehyde users are those workers who work with or handle formaldehyde-containing products in their job. These workers have the following responsibilities related to formaldehyde activities:
• Attend required training classes.
• Use and maintain safety devices and PPE.
• Follow the instructions of the PI/supervisor and EHRS
• Comply with the requirements as stated in this policy.

Exposure Monitoring
Exposure monitoring must be conducted to determine likely exposure for a work area or activity. The OSHA time-weighted average for formaldehyde is .75 parts per million (ppm) averaged over 8 hours. The OSHA defined short-term exposure limit for formaldehyde is 2.0 ppm. The OSHA action-level for formaldehyde is .5 ppm, which is averaged over an eight hour period.

Additional monitoring must be conducted:
• Whenever there is a change in procedure, work area, safety equipment, or the engineering of administrative control.
• Whenever an employee shows any sign or symptom of formaldehyde exposure.
• Whenever requested by appropriate safety committees or the Director of EHRS

Exposures above the Action Level
If the exposure monitoring indicates that an employee exposure is at or above the Action Level, the supervisor must implement the following:
• Perform periodic personal exposure monitoring must be conducted at least every six months. This monitoring can be terminated if two consecutive monitoring results, at least seven days apart, indicate exposure less than the AL
• A medical monitoring program for affected employees.

Exposures Above the Short Term Exposure Limit PEL
The OSHA-defined Short Term Exposure Limit (STEL) PEL for formaldehyde is 2.0-ppm over a 15 minute period. If exposure monitoring indicates that an employee exposure is at or above the STEL PEL, the supervisor must:
• Periodic exposure monitoring must be conducted at least every year under the worst conditions. This periodic monitoring may be terminated if two consecutive monitoring results, at least seven days apart, indicate exposures less than the STEL.
• Regulate areas by posting formaldehyde danger signs. The signs must be posted at all entrances and accessways and bear the following information: “Danger: Formaldehyde irritant and potential cancer hazard. Authorized Personnel Only!”
• Establish a formaldehyde medical monitoring program for affected employees.
• Implement engineering controls, improved work practice control, and, if necessary, increase PPE.

Exposures Above The Time-Weighted Average PEL

The OSHA-defined time-weighted average (TWA) PEL for formaldehyde is 0.75-ppm, which is the maximum allowable exposure concentration, calculated as an 8-hr TWA. If the exposure monitoring indicates that an employee exposure is at or above the TWA, the supervisor must ensure that the following activities are implemented:
1. Periodic exposure monitoring must be continued at least every six months under the worst conditions. Performance of this periodic monitoring may be terminated if two consecutive monitoring results, at least seven days apart, indicate exposures less than the AL.
2. Establish regulated areas by posting formaldehyde danger signs.
3. Train employees to recognize the danger of formaldehyde exposure.
4. Provide respiratory protection adequate to reduce the employees' exposure to less than the TWA PEL.
5. Implement engineering controls and improved work practices to reduce employee exposures to less than the TWA.

Controlling Formaldehyde Exposure

Engineering Controls - Ventilation Systems

Engineering controls should be implemented when there is a potential for exceeding action levels. Examples of engineering controls include ventilation systems, air pollution control devices, laboratory hoods, enclosures, shields, barriers, isolation chambers, automatic emergency shut off valves, and remote-control equipment.

The following considerations should be included in the design and installation process for such equipment:
1. The ventilation systems must be 100-percent exhausted to the outside of the building; thus, dilution ventilation is prohibited. Laboratory fume hoods must be evaluated for proper operation annually. If requested, EHRS can provide evaluation of the fume hood.
2. To minimize formaldehyde exposure and control the buildup of gases and vapors in the general work area, it is important that adequate room ventilation be provided. The recommended ventilation rate for laboratory areas is 4 to 12 air changes per hour. To prevent gas and vapor migration into adjacent areas, the formaldehyde work area should be maintained at a negative air pressure with respect to surrounding rooms. In addition, it is essential that air in the formaldehyde work area be 100-percent exhausted to the outdoors. The exhaust duct stack should be located away from any building air intakes to prevent re-introduction of contaminated air.
Personal Protective Equipment (PPE)

PPE provides additional protection even with proper engineering controls in place. While working with formaldehyde solutions of more than 1%, proper PPE must be used. It is required that employees wear chemical protective clothing and eye protection.

The following are examples of proper PPE:

_Impermeable Gloves and Body Covering_: Impermeable gloves and body covering, such as chemical-resistant aprons, will reduce exposure in cases of splash hazards or other skin contact. Butyl and nitrile rubber are appropriate choices for glove material. Consult EHRS for additional information.

_Eye and Face Protection_: Eye protection in the form of goggles will reduce exposure in cases of splash hazards.

_Respiratory Protection_
Respiratory protection, in the form of supplied air or air-purifying type, is not allowed as a substitute for engineering controls, but may be required in cases where engineering controls alone will not adequately reduce exposures. For air purifying respirators, specific formaldehyde cartridges are available. When employees are required to wear respirators to reduce exposure, they must be enrolled in a Respiratory Protection Program, as required by OSHA. The Temple University requires respirator use in the following situations:
1. During emergencies and entry into areas of unknown concentrations of formaldehyde
2. During the period to evaluate, purchase, and install engineering control equipment and/or modify work practices to achieve compliance with the PELs.
3. In work situations where engineering and work practice controls are not yet capable of reducing employee formaldehyde exposure to or below the PEL.
4. During cleaning, maintenance, repair, and other work where engineering and work practice controls are not feasible.

Work Practices
Each facility shall review each employee’s work practices with formaldehyde and implement alternative work practices that will minimize exposure. Please contact EHRS to evaluate the effectiveness of any change.

Leak and Spill Detection
Facilities with formaldehyde shall maintain a program to detect leaks and spills. The leak and spill detection program shall include:
1. Regular visual inspections for leaks and spills
2. Preventative maintenance of equipment
3. Program should include spill containment and clean-up, surface decontamination, and waste disposal in work areas where spillage may occur
4. Methods for surface decontamination and proper waste disposal
Emergency Showers and Eyewash Stations

Eyewash unit shall be located in the same area and must be accessible within ten seconds. Path to eyewash station shall be free of all obstructions.

Emergency showers may be required in some cases. Please contact EHRS for additional information.

Emergency Situations

For any emergencies, please follow instructions in EHRS policy 5.7. Laboratory workers can clean up a small spill that does not present an immediate health risk, such as a spill within a fume hood. Any resulting waste must then be packaged, and then disposed of as a hazardous waste. Consult with the EHRS for specific disposal requirements.

For larger spills, the EHRS provides cleanup assistance. If a worker is unsure of his/her ability to clean up a formaldehyde spill outside the control of a local exhaust ventilation device, he/she should call EHRS.

Any time respiratory irritation occurs, leave the area and get to fresh air. In case of skin/eye contact with liquid, immediately remove contaminated clothing and flush affected areas with water. Any exposure (inhalation, absorption, ingestion) to formaldehyde shall require a visit to the Employee Occupational Health Office for evaluation.

Spill control supplies (adsorbent, gloves, goggles, and disposal bags) shall be made accessible to chemical laboratories and storage sites.

Contact the EHRS for more information and details.

Formaldehyde-Contaminated Waste

Any formaldehyde waste must be characterized in accordance with EPA regulations. Waste determined to be hazardous will be affixed with a hazardous waste label, and handled on site for proper disposal by a hazardous waste contractor, as arranged by the EHS Chemical Hygiene Officer. Items and materials contaminated with formaldehyde must be handled in accordance to EHRS policy. Personnel from the EHRS must sign all manifests for hazardous waste disposal.

Employee Training Requirements

Formaldehyde training shall be provided to all employees and their supervisors where formaldehyde is used in the workplace. Information regarding this training can be obtained from the EHRS. This training must be provided at the time of the initial job assignment and whenever there is a change in work practice. The topics covered in this class may include:

1. The contents of the OSHA formaldehyde standard (29 CFR 1910.1048), as well as the location and availability of these regulations.
2. The contents of MSDSs.
3. Health risks of formaldehyde: skin, respiratory tract, eye, and throat irritation; sensitizing effects of formaldehyde; acute and chronic toxic effects.
4. The medical surveillance program.
5. PPE use and limitations.
6. Instructions for the use of engineering controls in minimizing exposure.
7. Instructions for handling spills and emergency situations.
8. Access and location of training materials for the affected employees.

Record-keeping Requirements

The following records must be maintained in accordance to Temple University policy. The records shall consist of:

1. *Exposure Monitoring Records* shall include the following information:
   - Date of measurement.
   - Operation being monitored.
   - The methods of sampling and analysis used and evidence of their precision and accuracy.
   - The number, duration, time of day, and results of samples obtained.
   - The types of protective devices worn.
   - The names, job classifications, social security numbers, and exposure estimate of employees whose exposure is represented by actual monitoring results.
   - When it is felt that objective data will relieve exposure-monitoring requirements, records shall consist of the objective data and calculations that demonstrate that no employee is exposed to formaldehyde at or above the Action Level.
   - Exposure monitoring records shall be kept for at least 30 years.

2. *Medical Evaluation Records* shall consist of:
   - The name and social security number of the employee.
   - The physician's written opinion.
   - A list of employee health complaints that may be related to exposure to formaldehyde.
   - A copy of the employee's medical examination results, medical questionnaires, and results of medical tests that are required by the regulation or mandated by the examining physician.
   - Medical evaluation records shall be kept for the duration of the employee's employment plus at least 30 years.

3. *Respirator Fit Test Records* shall consist of:
   - A copy of protocol used to test the fit of negative-pressure respirators.
   - The name and social security number of each employee assigned to wear a negative-pressure respirator.
   - The date of the employee's most recent respirator fit test and a copy of the test results.
   - A list of the brands, types, and sizes of respirators available at the facility from which respirator selection and assignment was made.
   - Respirator fit test records shall be kept until replaced by a more recent record.
Contractors are responsible for complying with these record-keeping requirements for their own employees.