

1.0 Purpose and Applicability

- 1.1 It is the policy of the University of Pennsylvania in coordination with the Office of Environmental Health and Radiation Safety (EHRS) to provide the University community with a safe and healthful environment. The primary goal of the University of Pennsylvania Formaldehyde Exposure Control Plan is to minimize employee exposures to formaldehyde. The University shall strive to ensure that no employee is exposed to an airborne concentration of formaldehyde more than the Occupational Health and Safety Administration (OSHA) formaldehyde Permissible Exposure Levels (PEL) of 0.75 parts per million (ppm) as an 8-hour time-weighted average (TWA) and 2.0 ppm as a 15-minute short-term exposure limit (STEL). The University also strives to limit airborne concentrations of formaldehyde to below the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) of 0.10 ppm as an 8-hour TWA and the STEL of 0.30 ppm. The ACGIH is a scientific organization that establishes health-data based exposure guidelines for many chemicals. ACGIH limits are frequently lower than OSHA limits because they are based on current scientific data and are more frequently updated.
- 1.2 This policy applies to all University employees involved with activities where exposure to formaldehyde is possible.

2.0 Definitions

- 2.1 **American Conference of Industrial Hygienists Threshold Limit Value (ACGIH TLV)** – an exposure to an airborne concentration of formaldehyde of 0.10 parts per million (ppm) formaldehyde as an eight-hour time-weighted average (TWA).
- 2.2 **American Conference of Industrial Hygienists Short Term Exposure Limit (ACGIH STEL)** – an exposure to an airborne concentration of formaldehyde of 0.30 parts per million (ppm) over a fifteen-minute duration
- 2.3 **Designated Area** - A location within the laboratory where acutely toxic, carcinogenic, or reproductive hazards are handled and stored. The areas should be demarcated with designated area caution tape or yellow tape with the words *designated area* written on it.
- 2.4 **Formaldehyde** - The chemical substance HCHO. Chemical Abstracts Service Registry No. 50-00-0.

- 2.5 **Formaldehyde Exposure Assessment** - A quantitative determination of employee exposure to formaldehyde. Includes full shift personal samples that are representative of the monitored employee's regular, daily exposure to formaldehyde and fifteen-minute short term exposure limit samples during tasks that are believed to result in the highest exposures.
- 2.6 **Occupational Safety and Health Administration Action Level (OSHA AL)** - an exposure to an airborne concentration of 0.50 parts per million (ppm) formaldehyde as an eight-hour time-weighted average (TWA).
- 2.7 **Occupational Safety and Health Administration Permissible Exposure Limit (OSHA PEL)** - an exposure to an airborne concentration of 0.75 parts per million (ppm) formaldehyde as an eight-hour time-weighted average (TWA).
- 2.8 **Occupational Safety and Health Administration Short Term Exposure Limit (OSHA STEL)** - an exposure to an airborne concentration of formaldehyde of 2.0 parts per million (ppm) over a fifteen-minute duration.
- 2.9 **Regulated Area** – Any area where the concentration of airborne formaldehyde exceeds either the OSHA PEL or the OSHA STEL.

3.0 Roles and Responsibilities

- 3.1 The ***Office of Environmental Health and Radiation Safety (EHRS)*** is responsible for:
- 3.1.1 Reviewing and updating the University's Formaldehyde Exposure Control Program on a yearly basis.
 - 3.1.2 Identifying job categories and tasks where the exposure to formaldehyde has the potential to exceed the OSHA AL of 0.50 ppm.
 - 3.1.3 Performing exposure monitoring of personnel within job categories and tasks identified as having the potential to exceed the OSHA AL of 0.50 ppm.
 - 3.1.4 Performing follow-up exposure monitoring semi-annually for any employee exposed to formaldehyde above the OSHA AL of 0.50 ppm and annually for any employee exposed to formaldehyde above the ACGIH STEL of 0.30 ppm.

- 3.1.5 Recommending engineering controls, work practices, and/or personal protective equipment to reduce employee exposure to formaldehyde below the OSHA PEL of 0.75 ppm and the OSHA STEL of 2.0 ppm.
 - 3.1.6 Defining regulated areas where formaldehyde concentrations may exceed the OSHA TWA or OSHA STEL and ensuring that appropriate signs are posted.
 - 3.1.7 Performing annual fit testing of workers wearing respirators as part of this program under the University's respiratory protection program.
 - 3.1.8 Providing annual training (initial and refresher) of workers that have any exposure to formaldehyde.
 - 3.1.9 Notifying employees of monitoring results. All employees shall be notified of the results of their exposure monitoring within 15 days of receiving the results from the laboratory.
 - 3.1.10 Maintaining all formaldehyde hazard assessments and sampling records.
- 3.2 The ***Hospital of the University of Pennsylvania – Occupational Medicine*** is responsible for:
- 3.2.1 Implementation of the medical surveillance program.
 - 3.2.2 Performing initial medical evaluation of employees that are required to wear a respirator.
 - 3.2.3 Performing annual follow-up medical evaluations.
 - 3.2.4 Maintaining medical surveillance program records.
- 3.3 ***Supervisors*** are responsible for:
- 3.3.1 Notifying EHRS of unusual conditions or changes in work practices that would render EHRS initial determination monitoring as being unrepresentative of typical formaldehyde exposures.
 - 3.3.2 Enforcing the use of personal protective equipment, engineering controls, and administrative work practices designed to minimize employee exposures to formaldehyde.
 - 3.3.3 Ensuring employees are provided with required personal protective equipment without cost to the employee.
 - 3.3.4 Enrolling employees exposed to formaldehyde above the 0.50 ppm OSHA AL into a medical surveillance program with HUP Occupational Medicine.
 - 3.3.5 Ensuring employee attendance at initial and annual EHRS Laboratory Safety Training.

3.4 ***Affected employees*** are responsible for:

- 3.4.1 Using personal protective equipment, engineering controls, and adhering to administrative work practices as instructed.
- 3.4.2 If air purifying respirators are used, replacing respirator cartridges after every three hours of use or at the end of the shift, whichever is shorter, unless the cartridges contain a NIOSH-approved end-of-service indicator to show when formaldehyde breakthrough occurs.
- 3.4.3 Notifying supervisors of unusual conditions or changes in work practices that would render EHRS initial determination monitoring as being unrepresentative for formaldehyde exposures.
- 3.4.4 Participating in annual EHRS Laboratory Safety Training and Occupational Medicine medical surveillance programs including initial and follow-up medical evaluations if required.

4.0 Procedures

- 4.1 **Initial Determination of Employee Formaldehyde Exposure** - EHRS will perform formaldehyde exposure assessments on all tasks suspected of having the potential to expose employees to levels of formaldehyde at or above the OSHA AL or OSHA STEL. The assessments shall include air monitoring and observation of work practices and engineering controls used for each task.
- 4.2 **Design of Engineering Controls and Work Practices** - EHRS will observe and evaluate all job tasks involving the use of formaldehyde and make recommendations to minimize exposures to a level as low as reasonably attainable. Where engineering controls and work practices are not sufficient to reduce exposures below the PEL or OSHA STEL, EHRS shall recommend the use of appropriate respiratory protection.
- 4.3 **Safety Equipment** – Quick drench showers must be provided when an employee’s skin may be splashed with solutions containing 1 percent or greater formaldehyde. If eyes may be splashed with solutions containing 0.1 percent or greater formaldehyde, eyewash facilities must be available for emergency use.
- 4.4 **Follow-Up Sampling** - Any employee whose formaldehyde exposure reaches or exceeds the OSHA AL shall be monitored semi-annually. Any employee whose formaldehyde exposure exceeds the ACGIH STEL shall be monitored annually.

- 4.5 **Designation of Regulated Area** - Regulated areas shall be established in any area where the concentration of formaldehyde exceeds either the OSAH PEL or the OSHA STEL. All entrances and access ways to the regulated area shall be posted with signs bearing the following information:

**DANGER
FORMALDEHYDE
MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY IRRITATION AUTHORIZED
PERSONNEL ONLY**

- 4.6 **Labeling** - Formaldehyde gas, and all mixtures or solutions composed of greater than 0.10 percent formaldehyde and materials capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use, at concentrations reaching or exceeding 0.10 ppm must be labeled with hazard warning labels. The original manufacturer labels are sufficient and should not be removed. Where the original manufacturer labels are not present, new labels must be applied to the containers indicating that the product contains formaldehyde and include the words "Sensitizer" and "May Cause Cancer" on the label. List the name and address of the responsible party, and state that physical and health hazard information and safety data sheets are available from EHRS. Chemicals that produce formaldehyde gas must be stored in an area within the laboratory that is conspicuously labeled as a "Designated Area". The laboratory room sign must have a "Designated Area" sticker affixed to the sign. Designated area room sign stickers are available from EHRS.
- 4.7 **Storage**- Storage of formaldehyde-contaminated equipment and clothing shall have signs with the following information:

**DANGER
FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT
MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY IRRITATION
DO NOT BREATHE VAPOR
DO NOT GET ON SKIN**

The university 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.

5.0 Medical Surveillance

- 5.1 **Notification** - Upon identification of employees whose 8-hour TWA equals or exceeds the 0.50 ppm OSHA AL or the 2.0 ppm OSHA STEL, EHRS will inform the employee, Occupational Medicine, and the employees' supervisor, in writing, of the need to enroll the employee in a medical surveillance program for formaldehyde exposure. Information supplied to Occupational Medicine will include the employee's name, supervisor's name, telephone number, and air sampling data indicating the employee's exposure. It will be the responsibility of the supervisor to enroll the employees in the medical surveillance program with Occupational Medicine and Health Services.
- 5.2 **Implementation** - Occupational Medicine at the Hospital of the University of Pennsylvania shall implement the formaldehyde medical surveillance program in accordance with 29 CFR 1910.1048 Occupational Exposure to Formaldehyde - Final Rule.

6.0 Training Requirements

- 6.1 OSHA's Formaldehyde Standard 29 CFR 1910.1048 requires annual training for all employees exposed to levels of formaldehyde greater than 0.10 ppm.
- 6.2 EHRS conducts Introduction to Laboratory Safety and periodic Laboratory Safety Update training for all laboratory workers. These training programs provide a comprehensive introduction to laboratory safety practices and procedures at Penn and familiarize the laboratory employee with the Chemical Hygiene Plan. Formaldehyde safety is covered in these classes. The University provides Hazard Communication training for all employees who may work with formaldehyde outside of a laboratory.

7.0 Recordkeeping

- 7.1 Formaldehyde Exposure Control Plan records shall include the following:

Record

Location

Air sample results

EHRS Documents/IH Samples/Formaldehyde

Employee exposure notification letter

EHRS Documents/IH Samples/Formaldehyde

Respirator fit test data

EHRS Respirator Program File

Medical records

Occupational Medicine

7.2 All formaldehyde sample data shall be maintained indefinitely.

8.0 References/Resources

8.1 Occupational Safety & Health Administration – Safety & Health Topics – Formaldehyde <http://www.osha.gov/SLTC/formaldehyde/index.html>

8.2 American Conference of Governmental Industrial Hygienist Threshold Limit Values
for Chemical Substances and Physical Agents & Biological Exposure Indices 2021