HEALTH & SAFETY POLICY AND PROCEDURE: FORMALDEHYDE MANAGEMENT PLAN

Department: Health & Safety, Anatomic Pathology

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1. Policy

   The University of Washington Harborview Medical Center (HMC) is committed to providing safe and healthful work facilities for employees, visitors, and patients.

   HMC will comply with *WAC 296-856 Formaldehyde* which is enforced by the WA Department of Labor and Industries Division of Occupational Safety and Health (DOSH). Engineering controls will be implemented to the extent feasible to maintain exposures in air below exposure limits, and controls will be supplemented with safe work practices and the use of personal protective equipment. Administrators, managers, faculty, staff and students all share responsibility for minimizing exposures to formaldehyde.

2. Purpose

   The purpose of the Formaldehyde Management Plan program is to establish guidelines and procedures to minimize and control potential occupational exposures to formaldehyde. The main components of the Plan are the following:

   - Conduct hazard assessments and employee exposure monitoring.
   - Establish engineering controls and safe handling practices to minimize exposure.
   - Provide health hazard information and training.
   - Maintain an employee medical surveillance program.

3. Definition of Terms

   - 37% Formaldehyde solution is a colorless, aqueous solution that has an irritating pungent odor and is classified as an upper respiratory irritant because of its high solubility in water. Solutions containing greater than 0.1% formaldehyde are considered “formaldehyde containing solutions”.

   - Formalin is a 10% dilution of 37% formaldehyde solution, or 4% formaldehyde, which is frequently used as a preservative.

   - Exposure Limits

     - *Action Level (AL):* A concentration of airborne formaldehyde of 0.1 ppm calculated as an 8-hour time weighted average.

- *Permissible Exposure Limits (PEL):* A concentration of airborne formaldehyde of 0.75 ppm calculated as an 8-hour time weighted average.
- *Short Term Exposure Limit (STEL):* A concentration of airborne formaldehyde of 2 ppm averaged over a sampling period of 15 minutes.

4. Responsibilities

4.1 Department Manager or Supervisor

- Inform HMC Safety Officer when new processes are proposed that will cause formaldehyde containing materials to be routinely used in the area.
- Update chemical inventories routinely to reflect formaldehyde use on the MyChem system.
- Ensure material safety data sheet (MSDS) for formaldehyde containing materials are incorporated into the EH&S MyChem system; and/or maintain current hard copy MSDS in the area.
- Ensure that employees can access and understand the MSDS for formaldehyde containing materials.
- Conduct or complete required formaldehyde training and ensure that affected employees complete the training.
- Ensure that employees use safe handling practices and exposure controls (such as ventilation and/or personal protective equipment (PPE).
- Report any symptoms of formaldehyde exposure experienced by employees to Employee Health.

4.2 Employee Responsibilities

- Review the applicable MSDS or other Hazard Communication materials prior to handling the material.
- Complete required formaldehyde training.
- Use safe handling practices and exposure controls (such as ventilation and/or PPE).
- Report any symptoms of formaldehyde exposure to their supervisor or Employee Health

4.3 EH&S and Safety Officer Responsibilities

EH&S will assist HMC as requested. Service can include the following:

- Develop Formaldehyde Management Plan.
- Work with departments to develop and/or implement work practices and SOPs.
- Identify and assess exposure risks for various activities that involve working with formaldehyde.
- Conduct employee exposure monitoring and environmental air sampling.
- Maintain air sampling/monitoring records
- Advise on provisions of the WAC Formaldehyde Standard (WAC 296-856) and maintain knowledge of current formaldehyde regulations

- Work with managers and supervisors to help them determine required level of protection.

5. Hazard Assessment

5.1 Use and Hazards

Use. Formaldehyde is used in multiple applications throughout the institution, primarily in Anatomic Pathology and Laboratory Medicine. Formalin,is the most commonly used formaldehyde containing solution

- In Anatomic Pathology, formalin is the primary preservative/ fixative used to fix tissues for gross examination, autopsy specimens, and Cytology cell blocks.
- In Laboratory Medicine, formaldehyde and formalin solutions are used to fix samples and preserve reagents.

Hazards. Formaldehyde is a colorless, aqueous solution that has an irritating pungent odor. Formaldehyde is classified as a known carcinogen, an irritant to the skin, eyes, throat, and respiratory system, and an acute toxin. Formaldehyde can also cause allergic sensitization of the respiratory system and skin after an individual receives an initial high exposure. An individual sensitive to formaldehyde may experience serious allergic respiratory or skin reactions with later exposures even at low levels. Because of these effects, a formaldehyde exposure control program has been developed.

5.2 Hazard Assessment

Department Managers and Supervisors that have employees who actively work with formaldehyde containing materials must assess the hazards of the work activities and develop written procedures to minimize potential exposures. The assessment will include factors such following best work practices, use of local exhaust ventilation, and use of personal protective equipment to minimize exposures.

The Safety Officer and EH&S can assist with the hazard assessment and conduct exposure monitoring to determine the extent of formaldehyde exposure for a work area or activity. Risk assessments have been performed and departments are defined to be “actively using formaldehyde”, when they are conducting the following operations:

- Dispensing and pouring formalin or formaldehyde solutions capable of releasing formaldehyde at the level above 0.1 ppm
- Storing bulk containers (> 500mL) of formalin or formaldehyde
- Processes where individuals may be exposed to formaldehyde at or above an airborne concentration of 0.1 ppm at any time

The Department of Pathology and Laboratory Medicine are considered active users of formaldehyde.

The results of hazard assessments are provided in *Appendix A. Formaldehyde Exposure Control Guidelines*.

6. Exposure Monitoring

6.1 Need for Exposure Monitoring

Formaldehyde exposure monitoring may be required if any of the following occur:

- Employees report concerns about formaldehyde odor or exposures.
- Employees report sign or symptoms of exposure to formaldehyde.
- There is change in a process, production, equipment, personnel, or a control measure that may result in a new or additional exposure to formaldehyde.
- A new piece of equipment is installed and used or a new process is introduced to the Department for the first time which utilized formaldehyde containing materials.

6.2 Formaldehyde Exposure Limits and Requirements

The WAC exposure limits and requirements are summarized in the table below.

Table 1
Exposure Limits and Requirements

Formaldehyde Airborne Level	**Exposure Duration**	**WAC Requirements Level is Exceeded**
At or above 0.1 ppm	Any period of time	• Annual formaldehyde training
8-Hour Action Level (AL) = 0.5 ppm	8-hour time weighted average	Same as above plus: • Employee medical surveillance • Periodic exposure monitoring
8-Hour Permissible Exposure Limit (PEL) = 0.75 ppm	8-hour time weighted average	Same as above plus: • Establish and Post Regulated Areas • Use respiratory protection • Implement work practice and engineering controls to lower exposure below the PEL and STEL as feasible
15-Minute Short-Term Exposure Limit (STEL) = 2.0 ppm	15-minute time weighted average	

6.3 Frequency of Exposure Monitoring

The frequency of monitoring is determined by the air monitoring results as follows:

Table 2
Monitoring Results and Additional Air Monitoring Requirements

If employee exposure monitoring results	**Then**
Are above the action level (AL) of 0.5 ppm	Conduct additional exposure monitoring at least every 6 months for the employees represented by the monitoring results
Are above the short-term exposure limit (STEL) of 2 ppm	Repeat exposure monitoring at least once a year, or more often as necessary to evaluate employee exposure
Have decreased to below the AL and the STEL	You may stop periodic employee exposure

and the decrease is demonstrated by 2 consecutive exposure evaluations made at least 7 days apart	monitoring for employees represented by the monitoring results. You need to monitor again if there's a change in any of the following that may result in new or increased employee exposures: • Production • Processes • Exposure controls such as ventilation systems or work practices • Personnel • Equipment

6.4 Air Sampling Procedure

Method. EH&S conducts employee exposure monitoring following either an OSHA or NIOSH approved method. EH&S has been collecting samples following OSHA Method 1007 Formaldehyde (Diffusive Monitors) with an SKC UMEX 100 passive sampler for formaldehyde.

Procedure. Air samples are collected as follows:

- Initial monitoring is performed in areas where there is potential for employees to be exposed at or above the AL, or at or above the STEL.
- Activities that require the use of formaldehyde containing materials and could result in airborne formaldehyde are identified.
- Employees who perform each suspect activity are identified and at least one individual who performs representative tasks for the suspect activity is evaluated during the exposure monitoring survey.
- Representative air samples are collected and the job titles of employees performing tasks are identified in each work area.
- Follow up monitoring is performed based on the results of the laboratory results.
- This monitoring will be repeated when there is a change in production, equipment, process, personnel, or control measures which may result in new or additional exposures to formaldehyde.

6.4 Employee Notification of Results

- EH&S will notify the department of assessment/monitoring results at least 15 days after the laboratory analysis is received. The department is then responsible for providing the information to affected employees.

- If monitoring results indicate personal exposure levels above the PEL and STEL, the department must develop a plan to reduce employee exposure. The plan should be submitted to the HMC Safety Officer and EH&S.

7. Engineering Controls

HMC implements and identifies and installs engineering controls to reduce and maintain formaldehyde exposures to employees at or below the AL and STEL. When engineering and

work practice controls cannot reduce employee exposure below the standards, controls will be supplemented with appropriate PPE.

Areas actively using formaldehyde, such as Anatomic Pathology and Lab Medicine, use a combination of general room ventilation and ventilated work enclosures as the engineering controls to minimize exposures to employees. Specific equipment used is identified in the hazard assessments provided in *Appendix A. Formaldehyde Exposure Control Guidelines* of this Plan.

8. Work Practices

HMC uses engineering controls and best work practices to minimize exposures. The following work practices are applied:

- Do not eat or drink where formaldehyde is handled, processed, or stored, since the chemical can be ingested**.**
- Always wash hands thoroughly after using formaldehyde, even though gloves are worn.
- Minimize the amount of formaldehyde used by using only the amount required to perform the required procedure.
- Label formaldehyde containers with the appropriate hazard warning label.
- Keep formaldehyde stored in closed containers and only open when needed. Use in well-ventilated areas.
- When possible, ensure that formaldehyde solutions are handled within a properly functioning chemical fume hood or grossing station hood.
- When possible, use secondary containment when utilizing formaldehyde, such as using a tray and lining it with spill pad to contain potential spills and vapors.
- Spill cleanup material should be available in any area where formaldehyde is used or stored. Use neutralizing powders and pads for clean up, or use formaldehyde neutralizing pads where leaks or drips might occur.
- Provide continuing training and education to personnel.

9. Personal Protective Equipment Including Respiratory Protection

9.1 Personal Protective Equipment

Minimum personal protective equipment (PPE) when working with formaldehyde solutions include:

- Eye protection or faceshield
- Butyl or nitrile gloves
- Lab coat or disposable gown

See Appendix B: Personal Protective Equipment Usage at HMC Anatomic Pathology

9.2 Respiratory Protection.

An employee may be exposed to formaldehyde vapor concentrations where respiratory protection is needed on a mandatory or voluntary basis. EH&S provides guidance on appropriate respirators for formaldehyde vapor protection.

When employees are required to wear respirators to reduce exposure, they must be enrolled in the HMC Respiratory Protection Program and have a medical evaluation to wear a respiratory, be trained on the designated respirator to wear to provide protection, and be fit tested to ensure an appropriate size and fit is achieved.

Work operations which may warrant respiratory protection include the following:

- During the installation of engineering controls.
- Work operations for which engineering controls and work practices are not feasible.
- Work operations for which engineering controls and work practice controls do not reduce employee exposure below the PEL and STEL.
- Individuals with recurring symptoms when exposed to levels below the PEL may be assessed by the Safety Officer and EH&S for additional Respiratory Protection.

10. Hazard Warning Sign and Label

10.1 Warning Sign

The entrance to designated areas at HMC where formaldehyde or formalin solutions are actively used and have the capability to exceed exposure limits will have the following signage posted:

DANGER FORMALDEHYDE IRRITANT AND POTENTIAL CANCER HAZARD AUTHORIZED PERSONNEL ONLY

10.2 Warning Label

Any container of formaldehyde solutions containing greater than 0.1% formaldehyde and have the capability to exceed exposure limits must have a label to include at a minimum:

FORMALDEHYDE CAUTION: Respiratory Sensitization Potential Cancer Hazard May Cause Eye Damage

Containers must be kept closed at all times to reduce formaldehyde vapor in the air.

10.3 Waste Label

Hazardous waste that contains formaldehyde solutions, and the waste containers must be immediately labeled as soon as the waste is generated. Labels must include Hazardous Waste notation, information regarding chemical constituents and hazards and contact information of department.

11. Emergency Response Procedures

11.1 Exposure to Employee

- For a splash to the eyes, flush eyes with water for at least 15 minutes and rinse/wash mouth and nose.
- Remove soiled clothing, wash skin, and replace with clean clothing.
- Notify supervisor.
- If medical symptoms persist, report immediately to Employee Health (during day shift) or Emergency Department (during evening, night, and weekend hours)
- Complete and submit a PSN report.

11.2 Spill Clean Up Response: Incidental Spill

The small or incidental formalin spill cleanup procedure is in Appendix C: Formalin: Small Spill Procedure.

An incidental or small formalin spill has been defined as 250 ml./1 cup or less, and can be cleaned up by staff provided the following are met:

- The spill is cleaned up following the ‘small spill formalin clean up procedure’ that is attached to this plan.
- Appropriate supplies are readily available to clean up small spills.
- All employees who clean up incidental spills of formalin solutions are properly trained and have appropriate PPE.

Small or incidental spills of other formaldehyde containing materials may be defined by the Department using the material, based on ventilation and volume of the spill.

11.3 Spill Clean Up Response: Major Spill

The Code Orange Hazardous Material Spill response for large spills is summarized in the HMC Emergency Reference Guide (Flipchart) and Administrative Policy and Procedure (APOP) 50.12. Departments that actively use formaldehyde may have additional site-specific procedures for major hazardous material spills.

If the spill is greater than 250mL or is to the extent where signs and symptoms of exposure are present, employees do not clean up the spill.

11.4 Emergency Eyewash and Shower

Emergency washing facilities will be available in areas that actively use formaldehyde containing materials. See APOP 50.15: Emergency Eyewashes and Showers for maintenance and department requirements for emergency washing facilities.

12. Formalin Waste Collection and Disposal

Chemical waste including formalin waste is managed under UW EH&S procedures.

12.1 Waste Accumulation and Disposal

Hazardous waste is accumulated in designated locations prior to collection by EH&S. Up to fifty-five gallons per waste stream can be accumulated at or near the point of generation. The Department schedules pick up by EH&S as needed or when the 55-gallon limit is reached. All formaldehyde containing waste not picked up by EH&S will be neutralized with an appropriate neutralizer and wasted via sanitary sewer.

Hazardous waste is stored as follows:

- The location is under the control of the Department generating the waste, or the storage area is kept locked and secured. The generator must be able to prevent improper waste from being added to the container.
- Waste is collected in compatible containers with no signs of deterioration or leaking.
- Waste containers are labeled with a complete UW Hazardous Waste label (including indicating appropriate hazards – when in doubt, check hazards you think may apply.)
- Waste containers are always closed except when waste is being added.
- Waste is stored away from floor drains, storm drains and sinks and/or in secondary containment.

13. Medical Surveillance

13.1 Medical Surveillance

Medical surveillance activities will be coordinated by Employee Health Services.

Medical surveillance will be provided for all employees:

- Exposed to formaldehyde at concentrations at or exceeding the action level or exceeding the STEL
- Who develop signs and symptoms resulting from exposure to formaldehyde
- Exposed to formaldehyde in emergencies.

Medical surveillance includes employee assessment by use of a medical questionnaire and/or medical examination. Information will be made available to exposed employees within 15 days of the medical assessment and medical records will be retained for 30 years from the last day of employment at the University of Washington.

The hospital emergency departments will provide emergency health care for exposures causing acute distress.

13.2. Medical Removal

Medical removal must be provided as required by WAC 296-856.

Employees reporting significant irritation of the eyes, skin or upper respiratory system attributed to workplace exposure to formaldehyde must be evaluated by HMC Occupational Medicine. In lieu of HMC Occupational Medicine, employees may choose to be evaluated by a physician of their choice.

A medical opinion regarding removal from workplace exposure must be presented to the employee within 15 days. A copy of the medical opinion will be given to Employee Health, EH&S and the employee's supervisor.

Alterations of work assignment will be managed by the supervisor in collaboration with the area personnel representative.

The employee has the right to obtain a second opinion from a physician of his or her choice. Differing opinions will be reconciled on a case by case basis. The reconciliation will be conducted by representatives from HMC Occupational Medicine, Labor Relations, Risk Management, employee representative and EH&S.

14. Training

Individuals who may be exposed to formaldehyde at or above an airborne concentration of 0.1 ppm must be trained. Training and information must be provided at all of the following times:

- At the time of initial assignment to a work area where there is formaldehyde exposure.
- Whenever there is a new exposure to formaldehyde in their work area.
- At least every 12 months after initial training.

Training must include at least the following:

- Contents of WAC 296-856 and MSDS for formaldehyde.
- Health hazards and signs and symptoms associated with formaldehyde exposure, including:
  - Cancer hazard
  - Skin and respiratory system irritant and sensitizer
  - Eye and throat irritation
  - Acute toxicity
- How employees will report any signs or symptoms suspected to be from formaldehyde exposure.

- Descriptions of operations where formaldehyde is present.
- Explanations of safe work practices to limit employee exposure to formaldehyde for each job.
- Purpose, proper use, and limitations of personal protective clothing.
- Instructions for the handling of spills, emergencies, and clean-up procedures.
- Explanation of the importance of exposure controls, and instructions in their use.
- Review of emergency procedures, including the specific duties or assignments of each employee in the event of an emergency.
- Purpose of medical evaluations if applicable.
- Purpose, proper use, limitations, and other training requirements for respiratory protection if applicable.

  Training required for employees who do not actively use formaldehyde but may have incidental contact (such as placing specimens into formalin vials) are trained on formalin hazards following the HMC Environment of Care Hazardous Materials and Waste Management Plan corresponding to the Hazard Communication rule (WAC 296-800-170).

15. Record Keeping

University departments must maintain a record of safety training received by each employee, emergency/spill response plans, exposure assessments and control measures.

EH&S will maintain records of hazard assessments and air monitoring data, respiratory protection training and fit tests, regulated areas.

Records will be kept for at least the following periods:

- Hazard assessments and air monitoring data – 30 years
- Medical records – employment plus 30 years