100-05-01-07

Formaldehyde Management Plan

Department: UWMC Anatomic Pathology
Date Revised: June 2013

1. Policy

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

   The UW Medical Center 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 levels 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 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.
   - Provide engineering controls, personal protective equipment, and follow safe handling practices to minimize exposure.
   - Provide health hazard information and training.
   - Maintain an employee medical surveillance program.

3. Definition of Terms

   - Formaldehyde 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.

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

   - 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

- Notify EH&S when formaldehyde containing materials are in use in the area.
- Update chemical inventories routinely to reflect formaldehyde use on the MyChem system (link to http://www.ehs.washington.edu/epomychem/index.shtm).
- Send material safety data sheet (MSDS) to EH&S to incorporate into the MyChem system; and/or maintain current hard copy MSDS in the area.
- Ensure that employees can access and understand the MSDS for formaldehyde.
- 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 EH&S.

4.2 Employee Responsibilities

- Review the formaldehyde MSDS with their supervisor 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 and EH&S.

4.3 EH&S Responsibilities

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

- Develop the 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 296-856 Formaldehyde* 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. Formalin is the primary preservative/ fixative used in Anatomic Pathology. It is used to fix tissues for gross examination, autopsy specimens, and cytology cell blocks.

Hazards. Formaldehyde 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.

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 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 work with formaldehyde assess the hazards of the work activities and develop written procedures to minimize potential exposures. Based on the assessment, protective measures will be identified including engineering controls and ventilation, following best work practices, and use of personal protective equipment to minimize exposures.

EH&S can assist with the hazard assessment and conducts exposure monitoring to determine the extent of formaldehyde exposure for a work area or activity.

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 odor or exposures.
- Employees report signs 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.

6.2 Formaldehyde Exposure Limits and Requirements

The 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 and the decrease is demonstrated by 2 consecutive exposure evaluations made at least 7 days apart	You may stop periodic employee exposure 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 formalin and could result in airborne to 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.

6.5 Employee Notification of Results

- EH&S will notify the department of assessment/monitoring results within 15 days after the laboratory results are received. The department is then responsible for providing the information to affected employees.
- If monitoring results indicate personal exposure levels are above the PEL and STEL, the department must develop a plan to reduce employee exposure. The plan should be submitted to EH&S.

7. Engineering Controls

UWMC Pathology 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.

Anatomic Pathology uses a combination of general room ventilation, ventilated gross examination hoods, ventilated lab fume hoods, and recirculating lab hoods with chemical filters as the engineering controls to minimize exposures to employees. The specific equipment used in each location is identified in Table 3.

Table 3

Engineering Controls Provided by UWMC Anatomic Pathology

Room/Use	Type of Control	Work Activity
General Room With Chemical Use	100% indoor air supply and 100% ducted exhaust to outdoors. Rooms provided with negative air pressure relative to adjacent spaces. 10 air changes per hour provided whenever feasible.	Anatomic Pathology lab spaces.
Frozen Section Room, EE207	General room ventilation Mopec lab hood with filter for air filtration and recirculation.	Preparation of specimens by frozen section processes for the Operating Room.
Gross Room, NW211C	(3) Shandon Grosslab Senior adjustable height ventilated grossing hoods.	Gross examination of small, medium, and large sized specimens.
Gross Room, NW211C	Thermo Scientific lab hood with filter for air filtration and recirculation.	Gross examination of small sized specimens.
Processing Room, NW209	Ventilated enclosure for one processing machine.	Specimen processing.
Specimen Store Room, BB250A	Thermo Scientific floor mounted ventilated lab hood.	Specimen discard that requires separation of specimens (Pathology Waste) from formalin fixative (Chemical Waste).
Autopsy Room, BB250G		Perform autopsy work.

8. Work Practices

UWMC 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.
- Use a tray and line it with spill pad for work with formaldehyde, in order to contain potential spills and vapors.
- Keep formaldehyde stored in closed containers use in ventilated areas.
- When possible, ensure that formaldehyde solutions are handled within a properly functioning chemical fume hood or grossing station hood.
- Spill cleanup material should be available in any area where formaldehyde is used or stored. Use neutralizing powders and pads for clean up, and 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

Pathology assisted by EH&S conducted a hazard assessment and identified personal protective equipment (PPE) that will be worn during work activities for protection. The specific PPE used in each location is identified in the Table.

Table 4
Personal Protective Equipment Used by UWMC Anatomic Pathology

Work Activity	Face Note: Prescription glasses are not adequate	Hand	Body
Frozen Section Room, EE207	Disposable safety glasses, or faceshield	Butyl or nitrile exam gloves	Scrubs, and formalin-impervious lab coat
Specimen Log In and Preparation For Gross Examination, NW211C	Disposable safety glasses, or faceshield	Butyl or nitrile exam gloves	Scrubs
Gross Examination of Specimens, NW211C	Disposable safety glasses, or faceshield	Butyl or nitrile exam gloves	Scrubs, and Formalin-impervious apron and sleeves, or formalin-impervious lab coat
Operating Processing Machines	Disposable safety glasses, or faceshield	Butyl or nitrile exam gloves	Scrubs, and formalin-impervious lab coat
Specimen Discard, BB250G	Disposable safety glasses, or faceshield	Butyl or nitrile exam gloves	Scrubs, and Formalin-impervious apron and sleeves, or formalin-impervious lab coat

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 UWMC 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.

10. Hazard Warning Sign and Label

10.1 Warning Sign

The entrance to designated areas at UWMC where formaldehyde or formalin solutions are required to be used or stored will have the following signage posted:

DANGER FORMALDEHYDE IRRITANT AND POTENTIAL CANCER HAZARD AUTHORIZED PERSONNEL ONLY

10.2 Warning Label

Any container of formaldehyde or formalin solutions must be labeled. The label must include at a minimum:

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

At UWMC Anatomic Pathology, all secondary containers and/or working solutions/reagents of formaldehyde are labeled with hazard warning labels to comply with Pathology guidelines:

CAUTION: CONTAINS FORMALDEHYDE Toxic by inhalation and if swallowed. Irritating to the eyes, respiratory system, and skin. May cause sensitization by inhalation or by skin contact. Risk of serious damage to eyes. Potential cancer hazard; repeated or prolonged exposure increases the risk.

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

10.3 Waste Label

UWMC Anatomic Pathology collects hazardous waste that contains formaldehyde solutions, and the waste containers must be immediately labeled as soon as the waste is generated. UW EH&S developed a waste label specifically for these containers that are generated by UWMC Anatomic Pathology.

UNIVERSITY OF WASHINGTON HAZARDOUS WASTE

For additional containers, call EH&S at 616-5835

Room Number	**465**	**Bldg:**	UNW	**Room:**	NW211C	
Dan Luff				(206)	616-4029	
	DISPOP1	**A**	**B**	**C**	**DispOP2**	
	ENV	XX			TREAT	
Main Constituent		ETHANOL				
Main Constituent		FORMALDEHYDE SOLUTIONS 37%				
WATER						80%
FORMALDEHYDE SOLUTIONS 37%						10%
ETHANOL						10%

SHIPPING CODES

Shipping Name:	Environmentally Hazardous Substances, Liquid, N.O.S.		
9	UN3082	III	

11. Emergency Response Procedures

11.1 Exposure to Employee

- For a splash to the eyes, flush eyes with water for at least 5 minutes and rinse/wash mouth and nose.
- Remove soiled clothing, wash skin, and replace with clean clothing.
- Notify supervisor.
- Report immediately to Employee Health Center (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

A small or incidental formalin spill cleanup procedure is provided in Appendix A of this Plan. An incidental or small spill has been defined as 250 ml./1 cup or less, and it 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 the small spill.
- Employees who may clean up incidental spills of formalin solutions are properly trained and have appropriate PPE.

11.3 Spill Clean Up Response: Large Spill

The Code Orange Internal Chemical Spill response for large spills is summarized in the UWMC Emergency Manual (Rainbow Chart). A large spill is any spill that the employees consider to be too large to safety cleanup.

If there is a major spill, address it following the Medical Center Code Orange procedure found in the *Emergency Manual* rainbow chart.

- By phone, call extension 222. Announce “This is a CODE ORANGE INTERNAL” and give room number.
- Immediately evacuate the area and close any doors
- Alert others not to enter the area
- Do not reenter the area until the area has been cleared
- Complete and submit a PSN report.

11.4 Emergency Eyewash and Shower

As needed, wash eyes and body for 15 minutes if splashed with a chemical.

Emergency flushing equipment must be evaluated periodically as follows:

- Emergency eyewash facilities must be tested weekly. The date and identity of the tester must be documented on an emergency eyewash test log.
- Emergency shower facilities must be tested annually. The date and identity of the tester must be documented on the tag attached to the emergency shower.

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 55 gallons per waste stream can be accumulated at or near the point of generation. The Department schedules pick up by EH&S following the EH&S procedure when 55-gallon limit is reached.

Flammable wastes cannot exceed the storage limit specified by the local fire department. Call the EH&S Facilities Safety Office at (206) 543-0465 for storage limits in your area if large amounts of flammable waste are accumulated.

Hazardous waste 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 checking 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.

12.2 Waste Accumulation and Disposal: BB250G

Unwanted specimens (pathology waste) preserved in formalin (chemical waste) are segregated during the specimen discard process in the ventilated fume hood in BB250G. Formalin is collected in reservoir, treated, and drain disposed following procedures developed by EH&S in collaboration UWMC Pathology.

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. In emergencies call:

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 Campus Health Services. In lieu of Campus Health Services, 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 Environmental Health and Safety 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 Campus Health Services, 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 at any time 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 Formaldehyde* 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.

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

APPENDIX A

SMALL FORMALDEHYDE SPILL CLEANUP PROCEDURE

Formalin (or 10% Formaldehyde) Small Spill Cleanup Procedure

Purpose of Procedure: Cleanup of a small spill less than 250 ml./1cup in size.

Examples:

- Fixative during dispensing to fill specimen container
- Waste formalin during specimen discard

Permissible Exposure Limit (PEL)

- Permissible Exposure Limit (PEL): 0.75 ppm
- Short Term Exposure Limit (STEL): 2.0 ppm

Physical Properties of Spilled Material

- Liquid
- Some evaporation

Possible Health Effects During Spill Clean Up

- If inhaled: May irritate nose and throat. May result in coughing and wheezing.
- Symptoms may include difficulty breathing, tightness in chest, burning eyes/nose/throat, skin rashes, nausea, allergic reactions.
- If contact with skin: May cause skin irritation. Repeated exposure may cause cracking and drying, and may lead to dermatitis.
- If contact with eyes: Vapor may cause eye irritation or burning sensation. Splash may cause eye irritation or tissue damage
- Sensitizer: Formaldehyde is classified as a chemical sensitizer.
- Carcinogen: Formaldehyde is classified as cancer-causing agent.

Personal Protective Equipment For Spill Clean Up

- Disposable apron
- Chemical-resistant gloves
- Goggles
- Optional: Shoe covers (for incidental contact only)

Spill Supplies For Clean Up

- Spill pads
- Formalin absorbent/neutralizer and scoop
- Hazardous waste bag and label
- EH&S Chemical Collection Request Form

Spill Prevention Suggestions

- Container selection: Purchase chemicals in non-breakable bottle or container.
- Handling: Pick up and handle container with two hands.
- Use: If a chemical is dispensed by spigot from a stock container, place a spill pad under the point of dispensing to absorb drips and spills from the spigot. Replace pad when drips or spills occur.

- Inspect: If the chemical is dispensed by spigot from a stock container enclosed by a cardboard box, inspect the cardboard after use. Liquid drips or spills may absorb into the cardboard and slowly evaporate resulting in airborne exposures.

Formalin (or 10% Formaldehyde) Spill Cleanup

Action	Description
Secure the Spill Control Zone	Leave the immediate spill control zone. Do not step in the spilled material as you leave. As needed, put up warning signs, caution tape, or exit room and close door to prevent entry. Restrict access or entry to the spill area to staff that is trained to clean the spill.
Notify Dept. Personnel	Notify a supervisor and co-workers in the immediate area who may be affected by the spill.
Assist Injured or Contaminated Persons	Remove injured person from exposure if safe to do so. If splashed with a hazardous material, flush skin or eyes with water for 15 minutes. Send exposed person to Employee Health Center (M-F 8am-430pm)) or the Emergency Department (after hours) for medical evaluation/treatment.
Avoid Excessive Exposure	If you are exposed to excessive vapor levels, STOP, leave area, Notify Supervisor and (in a safe area) call 222 and report a CODE ORANGE (chemical spill). Go to Employee health center (M-F 8am-4:30pm) or the Emergency Department (after hours) for medical evaluation/attention. and call 222 and report a chemical spill.
Identify the Spilled Material	If not immediately known, either (1) check the label on a different container of the same material; or (2) refer to MSDS. If you do NOT know what is spilled, STOP and in a safe area, call 222 (911 for offsite phones) to report a chemical spill (implement CODE ORANGE) to get assistance from an outside trained spill response team. If you can identify the material and safely clean it up, proceed as described below.
If You Can SAFELY Perform It: Control the Hazardous Material Release	Stop a release: Put tipped bottle in upright position or turn off open valve to reservoir. Place pads or absorbent at perimeter of hazardous material spill to prevent further spread, and put over spilled material to minimize evaporation.
Gather Spill Control Supplies	Retrieve spill control supplies from the nearest spill kit or supply location before starting cleanup activities: Pads and/or absorbent and scoop, and hazardous waste collection bag.
Put on Personal Protective Equipment (PPE)	Put on PPE over lab coat or scrubs: Disposable apron, goggles, and chemically resistant-gloves. Avoid breathing vapors from spilled material. Keep the liquid off of your skin, clothing and shoes during cleanup. Do not touch or walk through spilled liquid. Optional: Put on foot covers to protect against incident contact with chemical.
Clean up the Spill	Circle the spill. Use neutralizer/absorbent in bottle or absorbent pads to surround the spill and limit the spread of spilled material to the smallest area possible. Do not walk in spilled material. Cover the spill. Work from the perimeter of the spill towards the center and cover the spill with neutralizer/absorbent or pads. **Do not add water**. Wipe up or absorb the spill. If broken glass is present, carefully pick up and place in sharps container. When pads or absorbent no longer absorb material, pick up pads and/or scoop up absorbent and put in hazardous waste bag. Repeat cleanup with pads and/or absorbent until hazardous material is removed.
Final Cleanup of Spill Zone	• Thoroughly wash yourself – hands, face and any potentially exposed area • Wash reusable equipment (goggles, scoop etc.) or dispose of as hazardous waste • Request Environmental Services to clean surfaces and floor where spill occured
Collect Waste	• Label hazardous waste bag. Accurately fill out the hazardous waste label. • Collect used pads, absorbent, disposable apron, gloves, foot covers, and other disposable protective equipment, etc. and place in hazardous waste bag.
Dispose of Hazardous Waste	For waste pick up: Fill out the EH&S *Chemical Collection Request* form and submit to EH&S (Fax: 685-2915 or Email: chemwaste@u.washington.edu). Contact EH&S (Phone: 616-5835) and schedule a waste pick up.
Finish Spill Response	• Supervisor reports the incident by submitting a PSN

	• Make sure supplies in the spill kit/s are replaced

APPENDIX B

FORMALDEHYDE WASTE DISPOSAL PROCEDURE

University of Washington
ENVIRONMENTAL HEALTH AND SAFETY

Formaldehyde Treatment

General Rules

Formaldehyde, or formalin, is commonly used at concentrations near 3.7% in water to preserve specimens and samples. It also qualifies as hazardous waste when it is no longer needed. However, King County Wastewater Treatment Division allows us to discharge toxic formaldehyde to the sewer at concentrations of less than 0.1%. Therefore, formaldehyde must be treated to reduce its concentration before it is poured down the drain.

Treatment of formaldehyde in your laboratory is simple and easy. We currently recommend Neutralex or a similar product to destroy the formaldehyde. Use of Neutralex according to instructions will reduce formaldehyde concentrations to well below 0.1%. The concentration of formaldehyde after treatment can be determined with an indicator that looks much like pH paper.

Formaldehyde filtration is also available.

By law we are required to keep track of all hazardous waste treatment on campus. We can help you get set up. We will also be in contact with you yearly to see how you are doing and to collect your numbers for the year.

The protocol for formaldehyde is on the other side of this sheet.

Formaldehyde treatment protocol

These are instructions for using a packet of Neutralex to destroy 5 gallons of formaldehyde at concentrations of roughly 4% or less in water.

1. First, put on nitrile gloves, an apron or lab coat, and goggles.
2. Work in a fume hood or an appropriately ventilated workstation.
3. Fill the waste container (formaldehyde neutralization container) up to the fill line (5 gallons).
4. Add one packet of Neutralex powder.
5. Mix the solution. This can be accomplished by stirring or by sealing the container and tipping or swirling the container from side to side. Then let the waste container sit for 15 minutes. Swirl once again right before testing.
6. Check the pH.
    - ☐ Using a pipette, extract 5 ml of the treated waste solution and transfer it to the plastic cuvette.
    - ☐ Compare the color of the solution with the color chart provided.
    - ☐ The solution must be between 6 and 9 to be suitable for discharge.
7. Test for residual aldehydes.
    - ☐ Add 20 drops from the brown squeeze bottle labeled "Aldehyde Test Reagent."
    - ☐ Mix the solution thoroughly.
    - ☐ Remove test strip from vial and immerse reaction zone into solution for a minimum on one second.
    - ☐ Shake off excess liquid from the strip and wait sixty seconds.
    - ☐ Compare the reaction zone color of the strip to the color scale on the side of the vial. The matching color will designate a number. This is the residual aldehyde content in parts per million (ppm) of the treated waste solution. The reading must be below 100ppm.
8. If the results are below 100 ppm, use the siphon and discharge neutralized formaldehyde solution to the sewer. Record the quantity, pH, and formaldehyde concentration on the Sewer Discharge Log.
9. If the reading is above 100 ppm, stir or swirl the solution and let sit for another 15 minutes. Test again. If the residual aldehyde content remains at or above 100 ppm, the waste solution cannot be sewered and must be disposed of as hazardous chemical waste.

Troubleshooting

The above procedure should neutralize formaldehyde without any trouble. The only times in our experience that it has not worked is when other chemicals, such as formic acid, were accidentally added, or if the formaldehyde concentrations much greater than 4%. To ensure that the treatment protocol works every time, keep your formaldehyde waste stream separate from other wastes and make sure that you only treat working solutions (ie, 3.7% solutions) of formaldehyde. Any waste solution that does not pass both the pH and the formaldehyde tests cannot be sewered and must be disposed of as hazardous chemical waste.

Environmental Health and Safety
UNIVERSITY of WASHINGTON

Protocols for Tissue Discard and Formaldehyde disposal In UWMC Pathology BB250	
1. Process	Sample disposal and tissue discard.
2. Chemicals	**Formaldehyde**: All use of formaldehyde and formaldehyde-containing solutions is regulated under Occupational Health regulation WAC 296-62-07540. Flammable liquid, irritant, sensitizer and potential human carcinogen. Permissible exposure limit (PEL) (8hrs.): 0.75 ppm, short term exposure limit (STEL) (15 min.) 2 ppm, action level (8hrs.): 0.5 ppm. Spent formaldehyde solutions are capable of releasing vapors and must be labeled to provide warning to employees. Labels must include physical and health hazard information, the name and address of the responsible party, and the warnings "respiratory sensitizer" and "potential cancer hazard". **Fixed human tissue: Follow existing protocols and biological safety prudent practices.**
3. Personal Protective Equipment (PPE)	Safety glasses, nitrile gloves, and a lab coat or apron are required.
4. Environmental Controls	Formaldehyde-containing solutions and samples should be opened and discarded inside the fume hood only. Use outside of a fume hood is acceptable only when formaldehyde levels are monitored and are below 0.5 ppm. An employee concerned about exposure to formaldehyde should contact their Supervisor. UW EH&S, the Occupational Health and Safety Office, will determine by breathing zone air monitoring if employees are over exposed. **Follow use protocols and fume hood prudent practices.**
5. Handling Procedures	Sample discard and tissue separation shall be done inside the fume hood.
6. Spill and Accident Procedures	**Call 911** if it is an emergency such as a fire, injury, or risk of exposure to others. **If skin is exposed**, wash immediately with soap and water. Flush mucus membranes with large amounts of water. Use drench shower in case of extensive contamination. **Notify supervisor**.

	Spills inside the fume hood: Use absorbent pads from the spill kit or blue towels to clean up small spills. Notify supervisor. **Spills outside of the fume hood:** Exit room, notify supervisor. Respiratory protection is required to clean up spills of formaldehyde outside of the fume hood. Supervisor will contact EH&S. 1. **Large spills:** If uncontrolled, exit the room and deny entry. **CALL 222:** *Report* **Code Orange-- Internal** and *Provide* **Location** 2. **Business hours (8am - 5pm):** Contact Administrator on Call (AOC) through paging at 598-6190 ***OR*** **Off hours:** Page Stat Nurse at 598-6190 3. Notify supervisor. Supervisor will contact EH&S. **For EH&S assistance -call 206-543-0467** for the EH&S spill hotline for assistance, including contacting a spill cleanup contractor. After cleanup, room air must be monitored by EH&S prior to occupancy. Do not use the discard station if the **leak alarm** is flashing red. Notify supervisor immediately. Do not use the fume hood if the **low-air alarm** is flashing red. Notify supervisor immediately. If there is a **malfunction** with the pump or treatment tank, stop work immediately and notify the supervisor. There is a spill kit is located inside the room. It's on the floor, to the left of the treatment tank.Sample discard and tissue separation shall be done inside the fume hood.
7A. Waste Disposal: Physical separation	Samples should be opened and discarded inside the fume hood only. Formaldehyde solutions will be removed from the containers by either the suction hose, or dumping onto the strainer inside sink. Liquids will drain directly to tank for treatment, testing, and discharge.
7B. Waste Disposal: Formaldehyde solutions	Once the treatment tank is near full, EHS will treat and discharge the spent formaldehyde solutions.
7C. Waste Disposal: Human tissue	Human tissue will be separated from the sample container. Once dry, the tissue will be placed inside the red bag and **infectious waste box**. **Once full, the box will be closed, labeled and removed from site.**
8. Approval Required	Users must receive specified physical and health hazard information and safe laboratory work practices training from their supervisor. At least two representative breathing zone air samples must happen before use is authorized. For further information, contact UW EH&S Occupational Health and Safety Office at (206-543-7388).

9. Decontamination of equipment and workstation	Dispose of trash and remove contaminated equipment. Wash affected area with **soap and water**. (Merisuds) Restock supplies and report any maintenance issues to the supervisor.

Name:	Title:
Signature:	Date:

Waste Disposal Protocols For Tissue Discard Station

Treatment of formaldehyde solutions

1. Work is to be done at the consolidated discard station in room BB250. Make sure the room is available to work in, and that the "warning – keep out during discard" sign is posted.
2. All required materials such as PPE, paperwork, and treatment supplies will be stored in room BB250.
3. Put on nitrile gloves, lab coat, safety glasses, and face shield.
4. Check the waste container to confirm that the waste matches the routine.
5. Using the inlet port on top of the treatment tank, add one packet of Neutralex powder for each 5 gallons of waste.
6. Mix or agitate the solution. This can be accomplished by stirring the contents of the tank, or suctioning a small volume of clean water from the sink to the tank. Let the waste container sit for at least 15 minutes.
7. Check the pH.
    - Extract 5 ml of the treated waste solution and transfer it to the plastic cuvette.
    - Compare the color of the solution with the color chart provided.
    - The solution must be between 6 and 9 to be suitable for discharge.
8. Test for residual aldehydes.
    - Add 20 drops from the brown squeeze bottle labeled "Aldehyde Test Reagent."
    - Mix the solution thoroughly.
    - Remove test strip from vial and immerse reaction zone into solution for a minimum of one second.
    - Shake off excess liquid from the strip and wait sixty seconds.
    - Compare the reaction zone color of the strip to the color scale on the side of the vial. The matching color will designate a number. This is the residual aldehyde content in parts per million (ppm) of the treated waste solution. The reading must be below 100ppm.
9. If the results are below 100 ppm, treatment has been successful, and the waste is now reclassified as "non-regulated wastewater."
10. Record the quantity, pH, and formaldehyde concentration on a treatment log.
11. Discharge the contents of the treatment tank. Use the key and turn on "pump-2." (The light will go on) Press the green button and the contents of the tank will be automatically discharged. Turn off the pump once the tank is empty.
    - If the reading is above 100 ppm, stir or swirl the solution and let sit for another 15 minutes. Test again. If the residual aldehyde content remains at or above 100 ppm, the waste solution cannot be sewered. If this happens, please contact the P2 staff at 206.616.5837 for assistance in troubleshooting. (If treatment efforts fail, contents of the tank will be removed and disposed of as a dangerous waste)
12. Clean work area, then stow test kit and PPE. Restock when needed.

Waste Disposal Protocols For Tissue Discard Station	
Disposal of fixed human tissue	Separate liquids from solids. • Select samples for discard • Using carts, move sample containers to fume hood • Set up box in hood (line with red bag, put on cart) • All sample containers will remain closed until inside fume hood and sash is at appropriate settings • Open sample containers and remove liquids • Use suction hose • Pour remaining liquids through strainer into sink • Allow solid samples to drain and dry on strainer • Once dry, put solid tissue into the box • Close and seal box once full or task is complete • Once dry, close empty sample containers and put in trash • Deliver box to Biological Structures site • Clean workstation using soap and water • Flush suction hose and rinse sink • Return carts and tools • Close fume hood sash and put fan on low setting while not in use • Notify supervisor or EHS (6-5837) once treatment tank is full or near full.

Contact list For Tissue Discard Station		
Dan Luff	Director	(206) 598-4029
Jessica Norberg	Autopsy Supervisor	(206) 598-4205
Maureen Griffo	Pathology Manager	(206) 598-4028
	Biological Structures	(206) 543-1861
	Environmental Services	(206) 598-6181
John Wallace	UW EHS (treatment)	(206) 616-5837
Phil Numoto	UW EHS (Air monitoring)	(206) 616-6212
Tracy Harvey	UW EHS (Fume hood testing)	(206) 616-3778
	Operations & Maintenance	(206) 598-4911
	Cascade Machinery	(206) 762-0500

University of Washington
ENVIRONMENTAL HEALTH AND SAFETY

Training Record - Formaldehyde Treatment at the UWMC Consolidated Discard Station

Employee Name: _____

Employee Signature: _____

Date and Time: _____

Presenter: _____

References: UW EHS Formaldehyde Treatment Protocol
UWMC Anatomical Pathology Operating Procedures
Manual for fume hood
Manual for pump and tank system (Cascade Machinery)

□ Protocols for tissue discard and formaldehyde disposal have been read and are understood.

Formaldehyde containing solutions are a respiratory sensitizer and potential cancer hazard.

Samples should be opened and discarded inside the fume hood only.

Once the treatment tank is near full, EHS will treat, test, and discharge the spent formaldehyde solutions.

Notify supervisor immediately for injury, spill, or equipment failure.

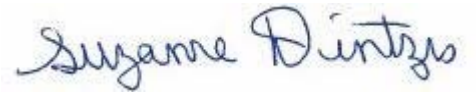
□ Demonstrated competency with the tissue discards protocols.

Demonstrated competency with the standard fume hood operations.

Protocols and operating manuals will be available on site.

Support from UW EHS will be available during standard business hours.

UWMC Pathology Chief of Service:
(Signature and Date)



6/28/13
Suzanne Dintzis, MD, PhD

Written by:
(Signature and Date)

Phil Numoto 5/2011

Revised by:
(Signature and Date)

Dan Luff 6/2013