



ARIZONA STATE UNIVERSITY

Formaldehyde Exposure Management Plan
Pursuant to 29 CFR § 1910.1048

Arizona State University
Department of Environmental Health & Safety, May 2002

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Arizona State University Environmental Health & Safety
Formaldehyde Exposure Management Plan

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Arizona State University Environmental Health & Safety

Formaldehyde Exposure Management Plan

Introduction and Scope

The Occupational Safety and Health Administration's (OSHA) Formaldehyde Standard, 29 CFR §1910.1048, became effective on February 2, 1998. The intent of the Formaldehyde Standard is to protect employees against harmful over-exposures to formaldehyde through inhalation, skin contact, or eye contact. The rule making effort is based on studies that indicate that formaldehyde is a potential human carcinogen and the determination that occupational exposure to formaldehyde is a significant health risk. The standard applies to formaldehyde gas, its solutions, and a variety of material such as trioxane, para-formaldehyde, formalin, and resin formulations, and solids and mixtures containing formaldehyde that serve as sources of the substance.

Formaldehyde is a colorless gas with a strong, pungent, irritating odor. Commercially, formaldehyde is sold as formalin (usually stabilized with methanol) in a water solution containing 37%, 44%, or 50% formaldehyde. Formaldehyde is also available in the polymerized form as para-formaldehyde. The precise hazards associated with exposure to formaldehyde depend both on the form (solid, liquid, or gas) of the material and the concentration of formaldehyde present.

The potential for formaldehyde exposure may occur in any laboratory currently using the chemical, particularly bio-medical, anthropology, and life-sciences researchers handling preserved tissue specimens. Non-laboratory personnel that may come into contact with formaldehyde are in the Facilities Management trades who work with formaldehyde releasing products. Formaldehyde is used in the manufacturing process for many new building materials such as carpet, particleboard, plywood boards, and fabrics used in office areas.

The Arizona State University (ASU) Formaldehyde Exposure Management Plan includes a summary of permissible exposure levels, exposure monitoring and training, medical surveillance and medical removal, record keeping, regulated areas, hazard communication, emergency procedures, primary reliance on engineering and work practices to control exposure, and maintenance and selection of personal protective equipment.

Responsibilities

Department administrators and laboratory supervisors have the primary responsibility for ensuring that their personnel are trained appropriately and that departmental activities are compliant. Ultimately, each employee is responsible for being knowledgeable about the hazardous materials they work with and complying with applicable institutional, local, State, and Federal regulations. However, ASU Environmental Health & Safety will assist individual departments and units to adequately protect university employees from potential occupational exposures to formaldehyde and to achieve regulatory compliance with the OSHA requirements by:

- Identifying locations where exposure to formaldehyde is possible:
- Evaluating the process(es) in which formaldehyde is used:
- Evaluating the airborne concentration of formaldehyde in areas at higher risk for over-exposure; and
- Educating employees about the risks of over-exposure, and safe handling and use of formaldehyde.

Exposure Control

Exposure Limits

OSHA sets Permissible Exposure Limits (PEL) for many chemicals. A PEL is the greatest concentration of a chemical in air to which exposure may occur over an 8-hour workday. The current PEL for formaldehyde is 0.75 parts formaldehyde per million parts air (ppm). Since this is an 8-hour average, short-term exposures above the PEL are permitted as long as the average exposure over an 8-hour period does not exceed the PEL.

However, OSHA has set a Short Time Exposure Limit (STEL) for formaldehyde that cannot be exceeded. The STEL is the greatest concentration of formaldehyde in air to which exposure may occur for a fifteen-minute period. The current STEL is 2 ppm.

The action level is 0.5 parts formaldehyde per million parts air, measured over 8 hours. At this level, certain provisions of the standard such as employee exposure monitoring, and medical surveillance, are initiated. The action level is set lower than the PEL to better protect against overexposure.

Effects of Exposure

Formaldehyde is a potential human carcinogen, sensitizer and irritant. It may affect the body through accidental ingestion, inhalation, skin contact, and/or eye contact. Although formaldehyde has a strong odor, this should not be relied upon as an alert to the potential for overexposure. The sense of smell becomes less sensitive with time as adaptation to formaldehyde occurs which can lead to overexposure.

Effects of Short-Term (Acute) Overexposure:

If ingestion (swallowing) is the route of exposure, those liquids containing 10 to 40% formaldehyde can cause severe irritation of the mouth, throat, and stomach and may result in unconsciousness and death. Ingestion of dilute formaldehyde solutions containing 0.03-0.04% may cause discomfort in the stomach and pharynx.

If inhalation (breathing) is the route of exposure, then irritation of the upper respiratory tract and eyes is the main concern. Severity of the symptoms depends upon the concentration in air.

Table 1

| Inhalation Exposure | Possible Effects of Exposure |
|----------------------------|--|
| 0.5 to 2. ppm | May irritate eyes, nose and throat (0.5 ppm is the action level; 0.75 ppm is the PEL) |
| 3 to 5 ppm | Causes tearing of the eyes |
| 10 to 20 ppm | Causes difficulty breathing, burning of the nose and throat, cough and heavy tearing of the eyes (15 ppm is the STEL) |
| 20 to 30 ppm | Causes severe respiratory tract injury leading to pulmonary edema and pneumonitis |
| 30 - 100 ppm | Is immediately dangerous to life and health (IDLH) |

If skin absorption (dermal) is the route of exposure, then skin sensitization is the main concern. Previously exposed persons may react to future exposure with allergic eczematous dermatitis or hives. Contact with formalin causes white discoloration, stinging, drying, cracking, and scaling of

the skin. Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin.

Eye contact can result in injuries ranging from transient discomfort to severe, permanent corneal clouding and loss of vision can occur. The severity of the effect depends on the concentration of formaldehyde in the solution and whether or not the eyes are flushed with water immediately after the accident.

Employees must immediately report to their supervisor any adverse signs or symptoms that may be attributable to formaldehyde exposure.

Effects of Long-Term (Chronic) Overexposure:

Formaldehyde has the potential to cause cancer in humans. Repeated and prolonged exposure increases the risk. In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages. Prolonged or repeated exposure to formaldehyde may result in respiratory impairment. Structural changes in the surface cells in the human nose have also been observed. Some persons have developed asthma or bronchitis following exposure to formaldehyde (usually after a single exposure to a high concentration of formaldehyde). Weak scientific evidence exists in which formaldehyde has been shown to cause genetic alterations. There is no conclusive evidence that formaldehyde exposure causes any adverse reproductive or developmental effects in humans.

Formaldehyde is also considered to be a sensitizer. Sensitizers are chemicals that cause a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure. Formaldehyde may have no immediate health effect, however if an individual is exposed to formaldehyde several times, allergies can develop. Typical reactions to sensitizers can include skin disorders such as eczema. Once an individual is sensitized to a particular chemical, even minute amounts will cause symptoms. Sensitization is usually a life-long effect.

Exposure Determination and Monitoring

ASU Environmental Health & Safety will conduct representative initial and periodic monitoring for each job classification or process where a potential for formaldehyde exposure may exist. Initial monitoring will consist of identifying those employees who may be exposed at or above the action level or STEL. This monitoring process will be repeated each time there is a change in production, equipment, process, personnel, or control measures which may result in new or additional exposure to formaldehyde. Employees or their designated representative will be able to observe any monitoring under this program.

Determination of initial monitoring will be based upon the laboratory's current chemical inventory that is submitted yearly by each laboratory to ASU Environmental Health & Safety. Any laboratory that has formaldehyde on its inventory is given a *Formaldehyde Use Evaluation Form* (Appendix D) to complete. If the chemical is no longer in use, the laboratory must contact ASU's Hazardous Waste Unit to have all formaldehyde products picked up for proper disposal and then submit an updated chemical inventory to reflect this change. If formaldehyde is used in the laboratory, Environmental Health & Safety will evaluate the use forms and determine if monitoring is warranted.

Periodic personal monitoring will be determined by the results of the initial monitoring and the frequency will be determined by the results. The frequency is summarized in the following table.

Table 2

| Results | Frequency |
|--|----------------------------|
| < 0.5 ppm (Action Level) twice within 7 days | May discontinue monitoring |
| 0.5-0.75 ppm (PEL) | Semi-annual |
| ≥ 2.0 ppm (STEL) | Annual (worst case) |

ASU Environmental Health & Safety will ensure that personal and area air monitoring is conducted in accordance with OSHA Analytical Methods for Formaldehyde, 29 CFR § 1910.1048 Appendix B, and/or the National Institute for Occupational Safety and Health (NIOSH) recommended methods and that samples are analyzed by an AIHA accredited lab. Monitoring techniques will be accurate, at the 95% confidence level, to within plus or minus 25% for airborne concentrations at the PEL (0.75 ppm) and STEL (2 ppm); and to within plus or minus 35% at the action level (0.5 ppm).

Affected employees will be notified, in writing, within 15 working days after receipt of the monitoring results. All exposure monitoring records will include:

- Date of Measurement;
- Operation involving formaldehyde exposure being monitored;
- Sampling and analytical methods used and accuracy of methods;
- Number, duration and results of samples taken;
- Type of protective devices worn, if any; and
- Name, Social Security or ASU ID number and exposure data.

Method of Compliance

Each department will institute administrative, engineering and work practice controls to reduce and maintain employees exposure to formaldehyde at or below the PEL and STEL. If these controls cannot reduce employees' exposure below the permissible exposure limits, respiratory protection will be provided to reduce employee exposure to or below the PEL's.

Any employee(s) who may be required to wear a respirator or chooses to wear one during certain operations is required to participate in the [ASU Respiratory Protection Program](#), as required by OSHA's Respiratory Protection Standard, 29 CFR § 1910.134.

Protective clothing and equipment will be provided to each employee based on the form of formaldehyde to be encountered. All contact of the eyes and skin with liquids containing 1 percent or more formaldehyde will be prevented by the use of chemical protective clothing made of material impervious to formaldehyde and the use of other personal protective equipment, such as gloves, goggles and face shields, as appropriate to the operation. Full body protection should be worn for entry into areas where concentrations exceed 100 ppm and for emergency reentry (e.g. spills or emergency response) into areas where the concentration is unknown. Rooms to change from work clothing into protective clothing must be provided by the department.

Laboratory supervisors will ensure that protective equipment and clothing that has become contaminated with formaldehyde is cleaned or laundered before its reuse. If ventilating formaldehyde-contaminated clothing and equipment, the laboratory supervisor will establish a storage area so that employee exposure is minimized. Containers for contaminated clothing and equipment and storage areas will have labels and signs containing the following information:

DANGER
FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT
AVOID INHALATION AND SKIN CONTACT.

The supervisor will assure that no employee takes home equipment or clothing that is contaminated with formaldehyde and repair or replace all required protective clothing and equipment for each affected employee as necessary to assure its effectiveness. Only those people trained to recognize the hazards of formaldehyde may remove the contaminated material from the storage area for purposes of cleaning, laundering, or disposal.

Each department will ensure that safety showers and eyewash facilities are within the immediate work area for emergency use if there is any possibility that an employees' skin or eyes may become splashed with solutions containing 1 percent or greater formaldehyde.

Communication of Hazards to the Employee

Information and Training

ASU employees who are assigned to workplaces where they are exposed to formaldehyde at or above 0.1 ppm must participate in a training program. Training is not required if the department can show using objective data, with assistance from Environmental Health & Safety, that employees are not exposed to formaldehyde over 0.1 ppm. The laboratory supervisor will conduct training at the time of initial assignment, and whenever a new exposure to formaldehyde is introduced into the work area. The training will be repeated at least annually.

The training program will be conducted in a manner which the employee is able to understand and will include:

- A discussion of the contents of this regulation and the contents of the Material Safety Data Sheet;
- The purpose for and a description of the medical surveillance program required by this standard, including a description of the potential health hazards associated with exposure to formaldehyde, including cancer, irritation and sensitization of the skin and respiratory system, eye and throat irritation, and acute toxicity, as well as a description of the signs and symptoms of exposure to formaldehyde;
- Instructions to immediately report to their supervisor the development of any adverse signs or symptoms that the employee suspects is attributable to formaldehyde exposure;
- Description of operations in the work area where formaldehyde is present and an explanation of the safe work practices appropriate for limiting exposure to formaldehyde in each job;
- The purpose for, proper use of, and limitations of personal protective clothing and equipment;
- Instructions for the handling of spills, emergencies, and clean-up procedures;
- An explanation of the importance of engineering and work practice controls for employee protection and any necessary instruction in the use of these controls; and
- A review of emergency procedures including the specific duties or assignments of each employee in the event of an emergency.

The supervisor will inform all affected employees of the location of written training materials and will make these materials readily available, without cost, to the affected employees.

In addition, all laboratory employees are required to attend ASU's Laboratory Safety Training which includes a review of ASU's Chemical Hygiene Plan (CHP), Material Safety Data Sheets, chemical inventorying and labeling, general laboratory safety, personal protective equipment, respirators, audits and compliance, local ventilation, and emergency procedures for laboratory incidents.

Labeling and Signs

Laboratory supervisors will ensure that hazard warning labels are affixed to all containers of formaldehyde gas, all mixtures or solutions composed of greater than 0.1 percent formaldehyde, and materials capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use, at concentrations reaching or exceeding 0.1 ppm. At a minimum, for all materials listed above capable of releasing formaldehyde at levels of 0.1 ppm to 0.5 ppm, labels will identify that the product contains formaldehyde; list the name and address of the responsible party; and state that physical and health hazard information is readily available from the employer and from Material Safety Data Sheets.

For materials listed above capable of releasing formaldehyde at levels above 0.5 ppm, labels will appropriately address all hazards, including respiratory sensitization, and will contain the words "Potential Cancer Hazard."

In making the determinations of anticipated levels of formaldehyde release, the laboratory supervisor may rely on objective data indicating the extent of potential formaldehyde release under reasonably foreseeable conditions of use.

Regulated Areas

Areas where the concentrations of airborne formaldehyde exceeds the PEL and STEL, all entrances and access-ways will be posted with signs bearing the following information:

DANGER
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

Only those employees who have been trained to recognize the hazards of formaldehyde will be allowed to enter these areas.

Material Safety Data Sheets

Any laboratory that uses formaldehyde-containing materials will have a Material Safety Data Sheet in the workplace for each hazardous chemical that they use.

Emergency Procedures

In order to prevent emergencies in those areas using formaldehyde liquids and gases, laboratory supervisors will establish a procedure to detect leaks and spills, including regular visual inspections and preventative maintenance on equipment. Supervisors will ensure that spills are contained and cleaned up promptly, only by those individuals wearing suitable personal protective equipment and who are trained in proper methods of cleanup and decontamination. Any formaldehyde-generated waste must be appropriately contained and labeled in accordance with [ASU's Hazardous Waste Management Compliance Guidelines](#).

Employees who discover or are involved in an emergency involving formaldehyde are responsible for notifying the appropriate authorities and following established protocol. This protocol is outlined in the [Arizona State University Emergency Procedures Flipchart](#), the [Arizona State University Emergency Operations Manual](#), and the [ASU's Chemical Hygiene Plan](#).

Medical Surveillance

Each department administrator or laboratory supervisor will institute medical surveillance programs for all employees exposed to formaldehyde at concentrations at or exceeding the action level or the STEL.

The supervisor will make medical surveillance available for employees who develop signs and symptoms of overexposure to formaldehyde and for all employees exposed to formaldehyde in emergencies. When determining whether an employee may be experiencing signs and symptoms of possible overexposure to formaldehyde, the supervisor may rely on the evidence that signs and symptoms associated with formaldehyde exposure will occur only in exceptional circumstances when airborne exposure is less than 0.1 ppm and when formaldehyde is present in material in concentrations less than 0.1 percent.

All medical procedures, including administration of medical disease questionnaires (Appendix C), will be performed by or under the supervision of a licensed physician and will be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

The supervisor will make the following medical surveillance available to employees prior to assignment to a job where formaldehyde exposure is at or above the action level or above the STEL and annually thereafter. The supervisor will also make the following medical surveillance available promptly upon determining that an employee is experiencing signs and symptoms indicative of possible overexposure to formaldehyde.

- Administration of a medical disease questionnaire (Appendix C), which is designed to elicit information on work history, smoking history, and any evidence of eye, nose, or throat irritation. In addition, chronic airway problems or hyper-reactive airway disease, allergic skin conditions or dermatitis, and upper or lower respiratory problems should be noted on the questionnaire; and
- A determination by the physician, based on evaluation of the medical disease questionnaire, of whether a medical examination is necessary for employees not required to wear respirators to reduce exposure to formaldehyde.

Medical examinations will be given to any employee who the physician determines, based on information in the medical disease questionnaire, may be at increased risk from exposure to formaldehyde and at the time of initial assignment and at least annually thereafter to all employees required to wear a respirator to reduce exposure to formaldehyde. The medical examination will include:

- A physical examination with emphasis on evidence of irritation or sensitization of the skin and respiratory system, shortness of breath, or irritation of the eyes;
- Laboratory examinations for respirator wearers consisting of baseline and annual pulmonary function tests. As a minimum, these tests will consist of forced vital capacity (FVC), forced expiratory volume in one second (FEV(1)), and forced expiratory flow (FEF);
- Any other test which the examining physician deems necessary to complete the written opinion; and
- Counseling those employees having medical conditions about the increased risks to their health that would be directly or indirectly aggravated by exposure to formaldehyde.

The supervisor will make medical examinations available as soon as possible to all employees who have been exposed to formaldehyde in an emergency. The examination will include a medical and work history with emphasis on any evidence of upper or lower respiratory problems, allergic conditions, skin reaction or hypersensitivity, and any evidence of eye, nose, or throat irritation. Other examinations will consist of those elements considered appropriate by the examining physician.

The supervisor will provide the following information to the examining physician:

- A copy of OSHA's Formaldehyde Standard and Appendix A, C, D, and E of the standard;
- A description of the affected employee's job duties as they relate to the employee's exposure to formaldehyde;
- The representative exposure level for the employee's job assignment;
- Information concerning any personal protective equipment and respiratory protection used or to be used by the employee; and
- Information from previous medical examinations of the affected employee within the control of the employer.

In the event of a non-routine examination because of an emergency, the supervisor will provide to the physician a description of how the emergency occurred and how the employee was exposed to formaldehyde as soon as possible.

The examining physician must provide a written opinion to the department administrator that contains the results of the affected employees medical examination. The written opinion should not reveal any specific findings or diagnoses unrelated to formaldehyde exposure and must include the following items:

- The physician's opinion as to whether the employee has any medical condition that would place the employee at an increased risk of material impairment of health from exposure to formaldehyde;
- Any recommended limitations on the employee's exposure or changes in the use of personal protective equipment, including respirators; and
- A statement that the employee has been informed by the physician of any medical conditions which would be aggravated by exposure to formaldehyde, whether these conditions may have resulted from past formaldehyde exposure or from exposure in an emergency, and whether there is a need for further examination or treatment.

The department administrator or laboratory supervisor will retain results of the affected employee's medical examination and tests for the duration of their employment plus thirty years. These results must be provided to the employee within 15 working days after receipt of the results.

Medical Removal

This portion of the ASU Formaldehyde Exposure Management Plan applies when an employee reports significant irritation of the mucosa of the eyes or the upper airways, respiratory sensitization, dermal irritation, or dermal sensitization attributed to workplace formaldehyde exposure. Medical removal provisions do not apply to dermal irritation or dermal sensitization when the product suspected of causing the dermal condition contains less than 0.05% formaldehyde.

An employee's report of signs or symptoms of possible overexposure to formaldehyde shall be evaluated as described in the medical surveillance portion of this plan. If the examining physician determines that a medical examination is not necessary, then a two-week evaluation and remediation period is established to permit the department administrator or laboratory supervisor, in conjunction with Environmental Health & Safety personnel, to ascertain whether the signs and symptoms subside untreated or with the use of creams, gloves, first aid treatment or personal protective equipment. Industrial hygiene measures, as prescribed by Environmental Health & Safety, that limit the employee's exposure to formaldehyde may also be implemented during this period. The employee will be referred immediately to a physician prior to the

expiration of the two-week period if the signs or symptoms worsen. Earnings, seniority, and benefits may not be altered during the two-week period by virtue of the report.

If the signs and symptoms have not subsided or been remedied by the end of the two-week period, or earlier if signs or symptoms warrant, the employee shall be examined by a physician selected by the department administrator or laboratory supervisor. The physician shall presume, absent contrary evidence, that observed dermal irritation or dermal sensitization is not attributable to formaldehyde when the products to which the affected employee is exposed contain less than 0.1% formaldehyde.

Medical examinations shall be conducted in compliance with this plan's medical surveillance program as indicated above. The physician must refer to Appendix C of 29 CFR § 1910.1048 for additional guidelines for conducting the medical examination.

If the physician finds that significant signs and symptoms result from workplace exposure to formaldehyde and recommends restrictions or removal, the department administrator or laboratory supervisor will promptly comply with the restrictions or recommendations of removal. In the event of a recommendation of removal, the department administrator or laboratory supervisor will remove the effected employee from the current formaldehyde exposure and if possible, transfer the employee to work having no or significantly less exposure to formaldehyde.

When an employee is removed from the exposure area, the department administrator or laboratory supervisor will transfer the employee to comparable work for which the employee is qualified or can be trained in a short period (up to 6 months), where the formaldehyde exposures are as low as possible, but not higher than the action level. The department administrator or laboratory supervisor will maintain the employee's current earnings, seniority, and other benefits. If there is no such work available, the department administrator or laboratory supervisor shall maintain the employee's current earnings, seniority and other benefits until such work becomes available, until the employee is determined to be unable to return to workplace formaldehyde exposure, until the employee is determined to be able to return to the original job status, or for 6 months, whichever comes first.

The department must arrange for a follow up medical examination within 6 months after medical removal. The examination will determine if the employee can return to the original job status, or if the removal is to be permanent. The physician will give a written opinion as to this condition.

Objective data in literature available on formaldehyde, i.e. the MSDS, may be relied on by the department administrator or laboratory supervisor, Environmental Health & Safety, or attending physician in making determinations of formaldehyde content of materials covered in this policy.

Multiple Physician Review

The affected employee has the right to request a second opinion by another physician to review the findings of the initial examining physician. In addition, the employee may have other tests performed that the second physician deems necessary and appropriate to evaluate the effects of any formaldehyde exposure and to facilitate this review. The department administrator or laboratory supervisor must promptly notify the affected employee of this right to a second opinion after the initial physician conducts an examination or consultation for the purpose of medical removal or restriction.

The following must occur in seeking a second opinion for ASU to participate in or pay for the multiple physician review mechanism:

- The review must occur within 15 days after receipt of the notification of the right to seek a second opinion or receipt of the initial physician's written opinion, whichever is later;
- The employee must inform the department administrator or laboratory supervisor of the intention to seek a second medical opinion;

- The employee must initiate steps to make an appointment with a second physician;
- If the findings, determinations or recommendations of the second physician differ from those of the initial physician, then the department and the employee shall assure that efforts are made for the two physicians to resolve the disagreement. If the two physicians are unable to resolve their disagreement, then the department and the employee, through the respective physicians, shall designate a third physician who is a specialist in the field at issue:
 - To review the findings, determinations or recommendations of the prior physicians, and
 - To conduct such examinations, consultations, laboratory tests and discussions with the prior physicians as the third physician deems necessary to resolve the disagreement of the prior physicians;
- The department and the employee or authorized employee representative may jointly designate such a third physician as an alternative;
- The department shall act consistent with the findings, determinations and recommendations of the third physician, unless the employee and their department reach an agreement that is otherwise consistent with the recommendations of at least one of the three physicians; and
- Medical written opinions from the second and/or third physicians must be transferred to the employee's medical file and a copy must be forwarded to Environmental Health & Safety.

Record Keeping

Environmental Health & Safety and each department will establish and maintain an accurate record of the following:

- Measurements taken to monitor employee exposure to formaldehyde. These records will be retained for 30 years;
- Where Environmental Health & Safety has determined that no monitoring is required under this policy, records of the objective data relied upon to support the determination that no employee is exposed to formaldehyde at or above the action level;
- Employee medical surveillance records which will be kept for the duration of employment plus 30 years; and
- Respirator fit test and training records in accordance with the ASU Respiratory Protection Plan.

Upon request, ASU will make available all records maintained as a requirement of this policy for examination and copying to OSHA. In addition, employee exposure and medical records required by this policy shall be provided upon request for examination and copying, to the subject employee or former employee or to anyone having the specific written consent of the subject employee or former employee.

Plan Evaluation

The effectiveness of this plan will be evaluated periodically using the criteria listed below:

- Maintain compliance with applicable institutional, local, State and Federal regulations;
- Maintain 100% participation in mandatory laboratory safety training;
- Processes involving formaldehyde are evaluated at least annually;

- Periodic personal and area air monitoring is conducted in accordance with OSHA and/or NIOSH recommended methods and samples are analyzed by an AIHA accredited laboratory; and
- Maintain exposures below applicable limits or provide appropriate protection.

Related and Supporting Documents

[ASU Chemical Hygiene Plan](#)

ASU Hazard Communications Plan

[ASU Hazardous Waste Management Guidelines](#)

[ASU Respiratory Protection Plan](#)

Appendix A

Definitions

Action Level: A concentration of formaldehyde of 0.5 parts formaldehyde per million parts of air (0.5 ppm) calculated as an 8-hour time-weighted average (TWA) concentration.

Formaldehyde: The chemical substance, HCHO, Chemical Abstracts Service Registry No. 50-00-0. The precise hazards associated with exposure depend both on the form (solid, liquid, or gas) of the material and the concentration present. Solutions of 37-50% formaldehyde used in preserving specimens present a much greater hazard to the skin and eyes due to splashes than solutions containing less than 1%. Formaldehyde is also found in urea-formaldehyde resins (e.g., glues used in plywood and particle board) and can generate formaldehyde-bearing dust when cut, sanded, drilled, or broken.

Eczematous Dermatitis (eczema): Inflammation of the dermis and epidermis (the skin) that arises from direct contact with a material. Symptoms include a rash, blisters, sores, lesions, itching or cracked skin.

Initial Monitoring: Identification of all employees who may be exposed at or above the action level or at or above the STEL and accurately determine the formaldehyde exposure of each employee so identified. Initial monitoring shall be repeated each time there is a change in production, equipment, process, personnel, or control measures which may result in new or additional exposures to formaldehyde.

Methods of Compliance: Engineering and work practices implemented to reduce and maintain employee exposures to formaldehyde at or below the TWA and the STEL.

PPM: Parts per million.

Permissible Exposure Limit (PEL): The allowable exposure that an employee can be exposed to over an 8-hour Time-Weighted Average (TWA). For formaldehyde, the limit is 0.75 parts per million (ppm).

Periodic Monitoring: Employees shown by initial monitoring to be at or above the action level or at or above the STEL shall be periodically monitored. If the last monitoring showed the employee exposure at or above the action level, then repeat monitoring of the employee shall be performed at least once a year under worst-case conditions.

Sensitizer: A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

Short Term Exposure Limit (STEL): A limit of 2 ppm of formaldehyde, averaged over a 15-minute period.

Regulated Areas: Areas where the concentration of airborne formaldehyde exceed the PEL or STEL. All entrances and access ways shall be posted with a sign as indicted in this Plan.

Time-weighted average (TWA): The average exposure to formaldehyde an individual receives for a full eight-hour day

Appendix B

Medical Questionnaire

**Arizona State University Environmental Health & Safety
Formaldehyde Medical Questionnaire**

A. Identification

Department: _____

Date: _____

Employee Name: _____

S.S. # or ASU ID Number: _____

Job Title: _____

Birthdate: _____

Age: _____

Sex: _____

Height: _____

Weight: _____

B. Medical History

1. Have you ever been in the hospital as a patient?

Yes__ No__

If yes, what kind of problem were you having? _____

2. Have you ever had any kind of operation?

Yes__ No__

If yes, what kind? _____

3. Do you take any kind of medicine regularly?

Yes__ No__

If yes, what kind? _____

4. Are you allergic to any drugs, foods, or chemicals?

Yes__ No__

If yes, what kind of allergy is it? _____

What causes the allergy? _____

5. Have you ever been told that you have asthma, hayfever, or sinusitis?

Yes__ No__

6. Have you ever been told that you have emphysema, bronchitis, or any other respiratory problems?

Yes__ No__

7. Have you ever been told you had hepatitis?

Yes__ No__

8. Have you ever been told that you had cirrhosis?

Yes__ No__

9. Have you ever been told that you had cancer?

Yes__ No__

10. Have you ever had arthritis or joint pain?

Yes__ No__

11. Have you ever been told that you had high blood pressure?

Yes__ No__

12. Have you ever had a heart attack or heart trouble?

Yes__ No__

B-1. Medical History Update

1. Have you been in the hospital as a patient any time within the past year?

Yes__ No__

If so, for what condition? _____

2. Have you been under the care of a physician during the past year?

Yes__ No__

If so, for what condition? _____

3. Is there any change in your breathing since last year?

Yes__ No__

Better? _____

Worse? _____

No change? _____

If change, do you know why? _____

4. Is your general health different this year from last year?

Yes__ No__

If different, in what way? _____

5. Have you in the past year or are you now taking any medication on a regular basis?

Yes__ No__

Name Rx: _____

Condition being treated: _____

C. Occupational History

1. How long have you worked for your present employer?

2. What jobs have you held with this employer? Include job title and length of time in each job.

3. In each of these jobs, how many hours a day were you exposed to chemicals?

4. What chemicals have you worked with most of the time?

5. Have you ever noticed any type of skin rash you feel was related to your work?

Yes__ No__

6. Have you ever noticed that any kind of chemical makes you cough?

Yes__ No__

Wheeze?

Yes__ No__

Become short of breath or cause your chest to become tight?

Yes__ No__

7. Are you exposed to any dust or chemicals at home?

Yes__ No__

If yes, explain: _____

8. In other jobs, have you ever had exposure to:

Wood dust?

Yes__ No__

Nickel or chromium?

Yes__ No__

Silica (foundry, sand blasting)?

Yes__ No__

Arsenic or asbestos?

Yes__ No__

Organic solvents?

Yes__ No__

Urethane foams?

Yes__ No__

C-1. Occupational History Update

1. Are you working on the same job this year as you were last year?

Yes__ No__

If not, how has your job changed? _____

2. What chemicals are you exposed to on your job?

3. How many hours a day are you exposed to chemicals?

4. Have you noticed any skin rash within the past year you feel was related to your work?

Yes__ No__

If so, explain circumstances: _____

5. Have you noticed that any chemical makes you cough, be short of breath, or wheeze?

Yes__ No__

If so, can you identify it? _____

D. Miscellaneous

1. Do you smoke?

Yes__ No__

If so, how much and for how long? _____

Pipe: _____

Cigars: _____

Cigarettes: _____

2. Do you drink alcohol in any form?

Yes__ No__

If so, how much, how long, and how often? _____

3. Do you wear glasses or contact lenses?

Yes__ No__

4. Do you get any physical exercise other than that required to do your job?

Yes__ No__

If so, explain: _____

5. Do you have any hobbies or "side jobs" that require you to use chemicals, such as furniture stripping, sand blasting, insulation or manufacture of urethane foam, furniture, etc?

Yes__ No__

If so, please describe, giving type of business or hobby, chemicals used and length of exposures.

E. Symptoms Questionnaire

1. Do you ever have any shortness of breath?

Yes__ No__

If yes, do you have to rest after climbing several flights of stairs?

Yes__ No__

If yes, if you walk on the level with people your own age, do you walk slower than they do?

Yes__ No__

If yes, if you walk slower than a normal pace, do you have to limit the distance that you walk?

Yes__ No__

If yes, do you have to stop and rest while bathing or dressing?

Yes__ No__

2. Do you cough as much as three months out of the year?

Yes__ No__

If yes, have you had this cough for more than two years?

Yes__ No__

If yes, do you ever cough anything up from chest?

Yes__ No__

3. Do you ever have a feeling of smothering, unable to take a deep breath, or tightness in your chest?

Yes__ No__

If yes, do you notice that this on any particular day of the week?

Yes__ No__

If yes, what day or the week?

Yes__ No__

If yes, do you notice that this occurs at any particular place?

Yes__ No__

If yes, do you notice that this is worse after you have returned to work after being off for several days?

Yes__ No__

4. Have you ever noticed any wheezing in your chest?

Yes__ No__

If yes, is this only with colds or other infections?

Yes__ No__

Is this caused by exposure to any kind of dust or other material?

Yes__ No__

If yes, what kind? _____

5. Have you noticed any burning, tearing, or redness of your eyes when you are at work?

Yes__ No__

If so, explain circumstances: _____

6. Have you noticed any sore or burning throat or itchy or burning nose when you are at work?

Yes__ No__

If so, explain circumstances: _____

7. Have you noticed any stuffiness or dryness of your nose?

Yes__ No__

8. Do you ever have swelling of the eyelids or face?

Yes__ No__

9. Have you ever been jaundiced?

Yes__ No__

If yes, was this accompanied by any pain?

Yes__ No__

10. Have you ever had a tendency to bruise easily or bleed excessively?

Yes__ No__

11. Do you have frequent headaches that are not relieved by aspirin or tylenol?

Yes__ No__

If yes, do they occur at any particular time of the day or week?

Yes__ No__

If yes, when do they occur? _____

12. Do you have frequent episodes of nervousness or irritability?

Yes__ No__

13. Do you tend to have trouble concentrating or remembering?

Yes__ No__

14. Do you ever feel dizzy, light-headed, excessively drowsy or like you have been drugged?

Yes__ No__

15. Does your vision ever become blurred?

Yes__ No__

16. Do you have numbness or tingling of the hands or feet or other parts of your body?

Yes__ No__

17. Have you ever had chronic weakness or fatigue?

Yes__ No__

18. Have you ever had any swelling of your feet or ankles to the point where you could not wear your shoes?

Yes__ No__

19. Are you bothered by heartburn or indigestion?

Yes__ No__

20. Do you ever have itching, dryness, or peeling and scaling of the hands?

Yes__ No__

21. Do you ever have a burning sensation in the hands, or reddening of the skin?

Yes__ No__

22. Do you ever have cracking or bleeding of the skin on your hands?

Yes__ No__

23. Are you under a physician's care?

Yes__ No__

If yes, for what are you being treated? _____

24. Do you have any physical complaints today?

Yes__ No__

If yes, explain? _____

25. Do you have other health conditions not covered by these questions?

Yes__ No__

If yes, explain: _____

Appendix C

Formaldehyde Use Evaluation Form

Arizona State University Environmental Health & Safety
Formaldehyde Use Evaluation Form

Department:

Room:

Building:

PI:

Use:

Safety Contact:

This laboratory does not use formaldehyde gas, its solutions, or any material such as trioxane, para-formaldehyde, formalin, or resin formulations, or solids or mixtures containing formaldehyde that serve as sources of the substance. I will update the current chemical inventory to reflect this change and submit the updated inventory to Environmental Health & Safety.

This laboratory currently has formaldehyde gas, its solutions, or any material such as trioxane, para-formaldehyde, formalin, or resin formulations, or solids or mixtures containing formaldehyde that serve as sources of the substance; however, it is no longer in use. I will contact the Hazardous Waste Unit (965-0647) to arrange to have all formaldehyde products picked up for proper disposal. I will update the current chemical inventory to reflect this change and submit the updated inventory to Environmental Health & Safety.

This laboratory currently uses formaldehyde:

_____ Times a day for _____ hours. The quantity typically used is _____
The number employees involved in this process is _____
The process in which formaldehyde is used: _____

_____ Times a week for _____ hours. The quantity typically used is _____
The number employees involved in this process is _____
The process in which formaldehyde is used: _____

_____ Times a month for _____ hours. The quantity typically used is _____
The number employees involved in this process is _____
The process in which formaldehyde is used: _____

_____ Times a year for _____ hours. The quantity typically used is _____
The number employees involved in this process is _____
The process in which formaldehyde is used: _____

Additional Comments:

Date: _____ Signature: _____

Please return the completed form to Environmental Health & Safety at mail code 3804 or fax 480-965-0736.