

OSHA Compliance Guidance for Funeral Homes

Occupational Safety and Health Administration (OSHA) Compliance Summary

Introduction

In 1970, Congress passed the Occupational Safety and Health Act "...to assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources."

In general, coverage of the Act extends to all employers and their employees in the 50 states, the District of Columbia, Puerto Rico and all other territories under federal government jurisdiction. Coverage is provided either directly by the federal Occupational Safety and Health Administration (OSHA) or through an OSHA-approved state program.

The 23 states and two territories (shown later) have OSHA-approved safety and health plans which apply to private sector employers. These plans are required to be at least as effective as federal standards. States are given six months to develop plans comparable to new federal mandates. If you are conducting business in one of these states, it is advisable to contact your local OSHA office to determine if additional compliance measures are required.

The Act has a general duty clause which states that each employer "shall furnish...a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees."

Beyond the general duty clause, OSHA is responsible for developing legal and enforceable standards deemed reasonably necessary and appropriate to protect workers on the job. Four such standards are of particular concern to funeral directors. They are:

- Occupational exposure to formaldehyde
- Hazard communication
- Protection against bloodborne pathogens
- Access to employee exposure and medical records

Although this section is designed to remind and/or educate funeral directors as to the requirements of specific OSHA regulations, it should not be relied upon to the exclusion of the actual regulations in effect in your state. Please utilize those regulations to determine if you are in compliance.

Keep in mind one of OSHA's basic requirements; every employer must display for all employees the Job Safety and Health Protection workplace poster (OSHA 2203 or state equivalent).

Funeral homes operating in federal OSHA states are not required to maintain logs of occupational illnesses

and injuries on federal OSHA reporting forms 200 and 101, although some OSHA-approved state plans may require this practice. Funeral homes are required to report within 48 hours to their local or regional OSHA office any employment accident which results in death of an employee or the hospitalization of five or more employees.

Documentation Checklist

Formaldehyde Program Includes:

- Chemical Information List
- Training Program Verification
- Hazard Determination Program
- Hazard Communication Program
- Training Program Procedure/Content
- Personal Protective Equipment Handout(s)
- Workplace Testing Procedures/Policies/Results
- Safe Handling and Usage Policies for Formaldehyde
- Formaldehyde Waste Disposition Programs/Policies
- Medical Surveillance (Follow up/Accidents/Incidents)
- Material Safety Data Sheets
- Medical Disease Questionnaire
- Workplace Visitor Release Form*
- Training Program Presenter Qualifications
- Statement for Independent Contractors*
- Spill/Leak Detection and Response Procedures
- Incident Reporting Forms (Staff and Management)
- Incident Report Follow-up Reporting and Check-off
- Respirator Fit Testing Program Verification (when required)
- Formaldehyde Contaminated Laundry Programs
- Employee Medical Records (Employees With Occupational Exposure, After Incident Occurrence)

Hazard Communication Program Includes:

- Chemical Information List
- Training Program Verification
- Emergency Response Forms/Letters
- Hazard Communication Program
- Training Program Presenter Qualifications
- Training Program Procedure/Content
- Personal Protective Equipment Handout(s)
- Incident Reporting Forms (Staff and Management)
- Hazardous Chemical Waste Disposition Program/ Policies

- Material Safety Data Sheets
- Hazard Determination Program
- Superfund Amendments and Reauthorization Act(SARA)

Verification Forms/Letters:

- Workplace Visitor Release Form*
- Emergency Responder Forms/Letters
- Statement for independent Contractors*
- Spill/Leak Detection and Response Procedures
- Incident Report Follow-up Reporting and Check-off
- Safe Handling and Usage for Workplace Chemicals
- Employee Medical Records (Forms for Employees With Occupational Exposure, After Incident Occurrence)

Occupational Exposure to Bloodborne Pathogens Program Includes:

- Exposure Control Plan
- Exposure Determination Plan
- Workplace Visitor Release Form*
- Universal Precautions Enforcement Procedures/ Policies
- Training Program Content/Procedure
- Personal Protective Equipment Handout(s)
- Incident Reporting Forms (Staff and Management)
- Housekeeping Procedures (Verification Forms)
- Embalming Procedures—Infectious, Contagious, and/or Communicable Disease Procedures*
- HBV Declination Forms
- Training Program Verification
- Embalming Procedures—General*
- Training Program Presenter Qualifications
- Statement for Independent Contractors*
- HBV Verification of Administration Forms
- Instrument and Machine(s) Disinfection Procedures
- Laundry Procedures/Policies
- Employee Medical Records - Employees With Occupational Exposure (After Incident Occurrence)
- Potentially Hazardous Biomedical Waste Disposition Program (If Required by Federal/State/Local Agency)

General Documents Program Includes:

- General Safety Rules*
- OSHA 200 Forms*
- First Call Forms*
- OSHA 101 Forms and/or Alternatives
- Monthly Fire Extinguisher Reporting Form
- General Emergency Procedures

- Maintenance Procedures
- Computer Station/Electrical Preparedness*
- Motor Vehicle Accident Investigation/Reporting Forms
- Embalming Reports*
- Embalming Authorizations
- HIV/HBV Identification/Prevention Program
- TB Identification/Prevention Program
- Emergency Evacuation Procedures
- Emergency Response Questionnaires (Individual)
- Computer Policies*
- Motor Vehicle Driver/Safety Program
- Automotive Maintenance Documentation

*These forms are not specifically required, but are highly recommended.

Note: Some local jurisdictions may have additional requirements for documentation and/or licensing.

States and Territories with OSHA-Approved Program Plans

The following 23 states and two territories have OSHA-approved safety and health plans which apply to private-sector employers:

- Alaska - 907-465-2700
- Arizona - 602-542-5795
- California - 415-972-8835
- Connecticut - 860-566-5123
- Hawaii - 808-586-8844
- Indiana - 317-232-2378
- Iowa - 515-281-3447
- Kentucky - 502-564-3070
- Maryland - 410-767-2215
- Michigan - 517-373-9600
- Minnesota - 612-296-2342
- Nevada - 702-687-3032
- New Mexico - 505-827-2850
- New York - 518-457-2741
- North Carolina - 919-662-4585
- Oregon - 503-378-3272
- Puerto Rico - 787-754-2119
- South Carolina - 803-896-4300
- Tennessee - 615-741-2582
- Utah - 801-530-6898
- Vermont - 802-828-2288
- Virgin Islands - 809-773-1994
- Virginia - 804-786-2377
- Washington - 360-902-4200
- Wyoming - 307-777-7786

Federal OSHA Regional Offices

Alaska, Idaho, Oregon, Washington	206-553-5930
Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee	404-562-2300
Arkansas, Louisiana, New Mexico, Oklahoma, Texas	214-767-4731
American Samoa, Arizona, California, Guam, Hawaii, Nevada	415-975-4310
Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming	303-844-1600
Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont	617-565-9860
District of Columbia, Delaware, Maryland, Pennsylvania, Virginia, West Virginia	215-596-1201
Iowa, Kansas, Missouri, Nebraska	816-426-5861
Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin	312-886-6266
New Jersey, New York, Puerto Rico, Virgin Islands	212-337-2378

Compliance with OSHA Formaldehyde Standard

Hazards of Exposure to Formaldehyde

Repeated and prolonged exposure to formaldehyde has been associated with lung and nasal passage cancers in humans. It is also highly irritating to the upper respiratory tract and eyes. Skin contact with formaldehyde, even at very low levels, can cause allergic contact dermatitis. Symptoms of this include skin redness, swelling and formation of vesicles or hives.

Once an individual is sensitized, they can suffer skin reactions by being in environments where there are very low concentrations of airborne formaldehyde.

Compliance Requirements for Funeral Homes

The Action Item Table in this section lists the requirements for formaldehyde that all funeral homes must meet. A critical element of compliance is to keep the exposures of your employees below the limits allowed by OSHA, and to document these exposures through air monitoring. If your monitoring results indicate that employees are over OSHA's Action

Formaldehyde Exposure Action Items

Hazardous Condition or Requirement	Recommended Corrective Actions
<p>Measure the level of exposure to formaldehyde during embalming.</p> <p>29 CFR 1910.1048(d)(2)</p>	<p>To determine formaldehyde exposure, personal air samples need to be taken from the breathing zone of the embalmer (attach badges to the collar). The time-weighted average (TWA) and the short term exposure level (STEL) need to be taken on the same day and should represent the maximum exposures experienced by your embalmer during normal operation. The TWA should be an 8 hour exposure and the STEL should be a 15 minute exposure taken during the 15 minute period that you anticipate your highest exposure.</p> <p>Formaldehyde monitoring badges can be purchased through a funeral home supply company and analyzed by an AIHA accredited laboratory. Vendors of these sampling badges include the following:</p> <p>Kelco Supply Company (800)328-7720 E-mail: info@kelcosupply.com http://www.kelcosupply.com/trans/page3.html</p> <p>The Dodge Company (617)661-0500 http://dodgeco.com</p>

Exam Question

- 1.) Which of the following can be a potential symptom of contact with formaldehyde?
- Hives
 - Swelling of vesicles
 - Skin redness
 - All of the above

Level, you should immediately make improvements to the ventilation system in your embalming room. Guidelines for improving ventilation are presented in the section of this report titled “Ventilation in Embalming Rooms.”

After improving the ventilation system, resample to assure that the corrective actions taken were effective. Until sampling results confirm that workers are no longer overexposed, a respirator which protects against formaldehyde must be worn. If you cannot reduce

the formaldehyde air levels to below OSHA’s Action Level through improved ventilation, then additional requirements apply, and we recommend that you contact an independent industrial hygiene consultant to assist you in appropriately implementing these compliance requirements.

A summary of the requirements found in the OSHA Formaldehyde standard, as well as the actual OSHA 29 CFR 1910.1048 standard itself, is provided following the Action Items Table.

Formaldehyde Exposure Action Items *(continued)*

Hazardous Condition or Requirement	Recommended Corrective Actions
	<p>Environmental Monitoring Technology, (800)284-2785 http://www.emt-online.com/ProductPages/KitsFOR.htm</p> <p>Pierce Chemicals Royal Bond Representative (800)527-6419 http://www.piercechemicals.com/</p> <p>SKC (800)752-8472 http://www.skcinc.com</p> <p>We recommend that you collect air samples (8-hour and 15-minute) every three months until you have sufficient monitoring results to show conclusively that employees’ exposures are consistently below the Action Level (0.5 ppm).</p>
<p>A medical surveillance program should be available for employees who develop signs and symptoms of possible overexposure to formaldehyde (such as skin or respiratory problems). 29 CFR 1910.1048(l)(1)(ii)</p>	<p>If employees experience possible signs and symptoms of overexposure to formaldehyde, employers must make medical surveillance by a physician available. All medical surveillance described here should be provided to employees at a reasonable time and place, at no cost.</p>
<p>Formaldehyde exposed workers must receive annual formaldehyde safety training. 29 CFR 1910.1048(n)</p>	<p>The training program must include:</p> <ul style="list-style-type: none"> • Discussion of the OSHA formaldehyde standard and contents of MSDS(s) you use that contain formaldehyde • Purpose of formaldehyde medical surveillance • Description of safe work practices to limit formaldehyde exposure • Purpose and proper use of protective equipment and clothing • Clean-up procedures • Importance of engineering and work practice controls to prevent formaldehyde exposure • Review of any emergency procedures, such as a spill
<p>We recommend that the Preparation Room entrance(s) have formaldehyde labels. 29 CFR 1910.1048(e)(1)</p>	<p>All entrances need to be labeled saying: DANGER FORMALDEHYDE IRRITANT AND POTENTIAL CANCER HAZARD AUTHORIZED PERSONNEL ONLY</p>
<p>Embalming machines should have formaldehyde labels. 29 CFR 1920.1048(h)(2)(ii)</p>	<p>Embalming machine needs a label saying: DANGER FORMALDEHYDE-CONTAMINATED EQUIPMENT AVOID INHALATION AND SKIN CONTACT</p>

Summary of the OSHA Formaldehyde Standard

The OSHA formaldehyde standard (29CFR1910.1048), describes the requirements for controlling worker exposures to formaldehyde. Some of the requirements include:

- Engineering and work practice controls
- Protective equipment and clothing
- Use of warning signs and labels
- Air monitoring
- Respiratory protection
- Worker medical surveillance
- Hazard communication
- Training

These requirements are detailed and have many components to them. They also interface with other OSHA safety and health standards. Some parts of the standard have significant application to your industry, while other components may not apply at all. If your employees are routinely overexposed to formaldehyde, and you cannot eliminate these overexposures through ventilation control or other means, then we recommend that you consult with a qualified industrial hygienist to assist you to properly implement the OSHA Formaldehyde Standard in your workplace.

Complete text of OSHA Standard § 1910.1048 Formaldehyde, including appendices

- (a) **Scope and application.** This standard applies to all occupational exposures to formaldehyde, i.e. from formaldehyde gas, its solutions, and materials that release formaldehyde.
- (b) **Definitions.** For purposes of this standard, the following definitions shall apply:

Action level means a concentration of 0.5 part formaldehyde per million parts of air (0.5 ppm) calculated as an eight (8)-hour time-weighted average (TWA) concentration.

Assistant Secretary means the Assistant Secretary of Labor for the Occupational Safety and Health Administration, U.S. Department of Labor, or designee.

Authorized person means any person required by work duties to be present in regulated areas, or authorized to do so by the employer, by this section, or by the OSH Act of 1970.

Director means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

Emergency is any occurrence, such as but not limited to equipment failure, rupture of containers, or failure of control equipment that result in an uncontrolled release of a significant amount of formaldehyde.

Employee exposure means the exposure to airborne formaldehyde which would occur without corrections for protection provided by any respirator that is in use.

Formaldehyde means the chemical substance, HCHO, Chemical Abstracts Service Registry No. 50-00-0.

(c) Permissible Exposure Limit (PEL)

- (1) *TWA*: The employer shall assure that no employee is exposed to an air-borne concentration of formaldehyde which exceeds 0.75 parts formaldehyde per million parts of air (0.75 ppm) as an 8-hour TWA.
- (2) *Short Term Exposure Limit (STEL)*: The employer shall assure that no employee is exposed to an airborne concentration of formaldehyde which exceeds two parts formaldehyde per million parts of air (2 ppm) as a 15-minute STEL.

(d) Exposure monitoring

- (1) *General*. (i) Each employer who has a workplace covered by this standard shall monitor employees to determine their exposure to formaldehyde.
- (ii) *Exception*. Where the employer documents, using objective data, that the presence of formaldehyde or formaldehyde-releasing products in the workplace cannot result in airborne concentrations of formaldehyde that would cause any employee to be exposed at or above the action level or the STEL under foreseeable conditions of use, the employer will not be required to measure employee exposure to formaldehyde.
- (iii) When an employee's exposure is determined from representative sampling, the measurements used shall be representative of the employee's full shift or short-term exposure to formaldehyde, as appropriate.

Exam Question

2.) Permissible Exposure Limit - The employer shall assure that no employee is exposed to air-borne concentration of formaldehyde which exceeds _____ formaldehyde per million parts of air as an 8-hour time weighted average.

- a. 0.25 parts
- b. 0.50 parts
- c. 0.75 parts
- d. 1.00 parts

- (iv) Representative samples for each job classification in each work area shall be taken for each shift unless the employer can document with objective data that exposure levels for a given job classification are equivalent for different work shifts.
- (2) Initial monitoring. The employer shall identify all employees who may be exposed at or above the action level or at or above the STEL and accurately determine the exposure of each employee so identified.
- (i) Unless the employer chooses to measure the exposure of each employee potentially exposed to formaldehyde, the employer shall develop a representative sampling strategy and measure sufficient exposures within each job classification for each work shift to correctly characterize and not under-estimate the exposure of any employee within each exposure group.
 - (ii) The initial monitoring process shall 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.
 - (iii) If the employer receives reports of signs or symptoms of respiratory or dermal conditions associated with formaldehyde exposure, the employer shall promptly monitor the affected employee's exposure.
- (3) Periodic monitoring.
- (i) The employer shall periodically measure and accurately determine exposure to formaldehyde for employees shown by the initial monitoring to be exposed at or above the action level or at or above the STEL.
 - (ii) If the last monitoring results reveal employee exposure at or above the action level, the employer shall repeat monitoring of the employees at least every 6 months.
 - (iii) If the last monitoring results reveal employee exposure at or above the STEL, the employer shall repeat monitoring of the employees at least once a year under worst conditions.
- (4) Termination of monitoring. The employer may discontinue periodic monitoring for employees if results from two consecutive sampling periods taken at least 7 days apart show that employee exposure is below the action level and the STEL. The results must be statistically representative and consistent with the employer's knowledge of the job and work operation.
- (5) Accuracy of monitoring. Monitoring shall be accurate, at the 95 percent confidence level, to within plus-or-minus 25 percent for airborne concentrations of formaldehyde at the TWA and the STEL and to within plus-or-minus 35 percent for airborne concentrations of formaldehyde at the action level.
- (6) Employee notification of monitoring results. Within 15 days of receiving the results of exposure monitoring conducted under this standard, the employer shall notify the affected employees of these results. Notification shall be in writing, either by distributing copies of the results to the employees or by posting the results. If the employee exposure is over either PEL, the employer shall develop and implement a written plan to reduce employee exposure to or below both PELs, and give written notice to employees. The written notice shall contain a description of the corrective action being taken by the employer to decrease exposure.
- (7) Observation of monitoring.
- (i) The employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to formaldehyde required by this standard.
 - (ii) When observation of the monitoring of employee exposure to formaldehyde requires entry into an area where the use of protective clothing or equipment is required, the employer shall provide the clothing and equipment to the observer, require the observer to use such clothing and equipment, and assure that the observer complies with all other applicable safety and health procedures.
- (e) **Regulated areas.**
- (1) The employer shall establish regulated

Exam Question

3.) The employer may discontinue periodic monitoring for employees if results from two consecutive sampling periods taken at least 7 days apart show that employee exposure is below the action level and the short term exposure limit.

- a. True
- b. False

areas where the concentration of airborne formaldehyde exceeds either the TWA or the STEL and post all entrances and accessways with signs bearing the following information:

DANGER
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

- (2) The employer shall limit access to regulated areas to authorized persons who have been trained to recognize the hazards of formaldehyde.
- (3) An employer at a multi-employer worksite who establishes a regulated area shall communicate the access restrictions and locations of these areas to other employers with work operations at that worksite.

(f) Methods of compliance

- (1) Engineering controls and work practices. The employer shall institute engineering and work practice controls to reduce and maintain employee exposures to formaldehyde at or below the TWA and the STEL.
- (2) Exception. Whenever the employer has established that feasible engineering and work practice controls cannot reduce employee exposure to or below either of the PELs, the employer shall apply these controls to reduce employee exposures to the extent feasible and

shall supplement them with respirators which satisfy this standard.

(g) Respiratory protection

- (1) General. For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this paragraph. Respirators must be used during:
 - (i) Periods necessary to install or implement feasible engineering and work-practice controls.
 - (ii) Work operations, such as maintenance and repair activities or vessel cleaning, for which the employer establishes that engineering and work-practice controls are not feasible.
 - (iii) Work operations for which feasible engineering and work-practice controls are not yet sufficient to reduce employee exposure to or below the PELs.
 - (iv) Emergencies.
- (2) Respirator program.
 - (i) The employer must implement a respiratory protection program in accordance with 29 CFR 1910.134 (b) through (d) (except (d)(1)(iii), (d)(3)(iii)(B)(1), and (2)), and (f) through (m).

TABLE 1: Minimum requirements for respiratory protection against formaldehyde

Condition of use or formaldehyde concentration (PPM)	Minimum respirator required ¹
Up to 7.5 ppm. (10 x PEL)	Full facepiece with cartridges or canisters specifically approved for protection against formaldehyde. ²
Up to 75 ppm. (100 x PEL)	Full-face mask with chin style or chest or back mounted type, with industrial size canister specifically approved for protection against formaldehyde. Type C supplied air respirator, demand type, or continuous flow type, with full facepiece, hood, or helmet.
Above 75 ppm or unknown.	Self-contained breathing apparatus (SCBA) with (emergencies), (100 x PEL). positive pressure full facepiece. Combination supplied-air, full facepiece positive pressure respirator with auxiliary self-contained air supply.
Firefighting	SCBA with positive pressure in full face-piece.
Escape	SCBA in demand or pressure demand mode. Full- face mask with chin style or front. or back mounted type industrial size canister specifically approved for protection against formaldehyde.

¹ Respirators specified for use at higher concentrations may be used at lower concentrations.

² A half-mask respirator with cartridges specifically approved for protection against formaldehyde can be substituted for the full facepiece respirator providing that effective gas-proof goggles are provided and used in combination with the half-mask respirator.

- (ii) If air-purifying chemical-cartridge respirators are used, the employer must:
 - (A) Replace the cartridge after three (3) hours of use or at the end of the work shift, whichever occurs first, unless the cartridge contains a NIOSH-approved end-of-service-life indicator (ESLI) to show when breakthrough occurs.
 - (B) Unless the canister contains a NIOSH-approved ESLI to show when breakthrough occurs, replace canisters used in atmospheres up to 7.5 ppm (10xPEL) every four (4) hours and industrial-sized canisters used in atmospheres up to 75 ppm (100xPEL) every two (2) hours, or at the end of the work shift, whichever occurs first.

(3) *Respirator selection.*

- (i) The employer must select appropriate respirators from Table 1.
- (ii) The employer must provide a powered air-purifying respirator adequate to protect against formaldehyde exposure to any employee who has difficulty using a negative-pressure respirator.

(h) **Protective equipment and clothing.** Employers shall comply with the provisions of 29 CFR 1910.132 and 29 CFR 1910.133. When protective equipment or clothing is provided under these provisions, the employer shall provide these protective devices at no cost to the employee and assure that the employee wears them.

(1) *Selection.* The employer shall select protective clothing and equipment based upon the form of formaldehyde to be encountered, the conditions of use, and the hazard to be prevented.

- (i) All contact of the eyes and skin with liquids containing 1 percent or more formaldehyde shall 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 goggles and face shields, as appropriate to the operation.
- (ii) Contact with irritating or sensitizing materials shall be prevented to the extent necessary to eliminate the hazard.

- (iii) Where a face shield is worn, chemical safety goggles are also required if there is a danger of formaldehyde reaching the area of the eye.
- (iv) Full body protection shall be worn for entry into areas where concentrations exceed 100 ppm and for emergency reentry into areas of unknown concentration.

(2) *Maintenance of protective equipment and clothing.*

- (i) The employer shall assure that protective equipment and clothing that has become contaminated with formaldehyde is cleaned or laundered before its reuse.
- (ii) When ventilating formaldehyde-contaminated clothing and equipment, the employer shall establish a storage area so that employee exposure is minimized. Containers for contaminated clothing and equipment and storage areas shall have labels and signs containing the following information:
DANGER
FORMALDEHYDE-CONTAMINATED
[CLOTHING] EQUIPMENT
AVOID INHALATION AND SKIN CONTACT
- (iii) The employer shall assure that only persons trained to recognize the hazards of formaldehyde remove the contaminated material from the storage area for purposes of cleaning, laundering, or disposal.
- (iv) The employer shall assure that no employee takes home equipment or clothing that is contaminated with formaldehyde.
- (v) The employer shall repair or replace all required protective clothing and equipment for each affected employee as necessary to assure its effectiveness.
- (vi) The employer shall inform any person who launders, cleans, or repairs such clothing or equipment of formaldehyde's potentially harmful effects and of procedures to safely handle the clothing and equipment.

(i) **Hygiene protection.**

- (1) The employer shall provide change rooms, as described in 29 CFR 1910.141 for employees who are required to change from work clothing

Exam Question

4.) Full body protection shall be worn for entry into areas where concentrations exceed _____ ppm and for emergency reentry into areas of unknown concentration.

- a. 10
- b. 25
- c. 50
- d. 100

into protective clothing to prevent skin contact with formaldehyde.

- (2) If employees' skin may become splashed with solutions containing 1 percent or greater formaldehyde, for example, because of equipment failure or improper work practices, the employer shall provide conveniently located quick drench showers and assure that affected employees use these facilities immediately.
 - (3) If there is any possibility that an employee's eyes may be splashed with solutions containing 0.1 percent or greater formaldehyde, the employer shall provide acceptable eyewash facilities within the immediate work area for emergency use.
- (j) **Housekeeping.** For operations involving formaldehyde liquids or gas, the employer shall conduct a program to detect leaks and spills, including regular visual inspections.
- (1) Preventative maintenance of equipment, including surveys for leaks, shall be undertaken at regular intervals.
 - (2) In work areas where spillage may occur, the employer shall make provisions to contain the spill, to decontaminate the work area, and to dispose of the waste.
 - (3) The employer shall assure that all leaks are repaired and spills are cleaned promptly by employees wearing suitable protective equipment and trained in proper methods for cleanup and decontamination.
 - (4) Formaldehyde-contaminated waste and debris resulting from leaks or spills shall be placed for disposal in sealed containers bearing a label warning of formaldehyde's presence and of the hazards associated with formaldehyde.
- (k) **Emergencies.** For each workplace where there is the possibility of emergency involving formaldehyde, the employer shall assure appropriate procedures

are adopted to minimize injury and loss of life. Appropriate procedures shall be implemented in the event of an emergency.

(l) **Medical surveillance**

- (1) Employees covered.
 - (i) The employer shall institute medical surveillance programs for all employees exposed to formaldehyde at concentrations at or exceeding the action level or exceeding the STEL.
 - (ii) The employer shall 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 employer may rely on the evidence that signs and symptoms associated with formaldehyde exposure will occur only in exceptional circumstances when air-borne exposure is less than 0.1 ppm and when formaldehyde is present in material in concentrations less than 0.1 percent.
- (2) Examination by a physician. All medical procedures, including administration of medical disease questionnaires, shall be performed by or under the supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.
- (3) Medical disease questionnaire. The employer shall 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 employer shall also make the following medical surveillance available promptly upon determining that an employee

Exam Question

- 5.) If there is any possibility that an employee's eyes may be splashed with solutions containing _____ or greater formaldehyde, the employer shall provide acceptable eyewash facilities within the immediate work area for emergency use.
- a. 0.1 percent
 - b. 1 percent
 - c. 10 percent
 - d. None of the above

Exam Question

- 6.) All medical procedures, including administration of medical disease questionnaires, shall be performed by or under the supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.
- a. True
 - b. False

is experiencing signs and symptoms indicative of possible overexposure to formaldehyde.

- (i) Administration of a medical disease questionnaire, such as in appendix D, which is designed to elicit information on work history, smoking history, any evidence of eye, nose, or throat irritation; chronic airway problems or hyperreactive airway disease; allergic skin conditions or dermatitis; and upper or lower respiratory problems.
 - (ii) 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.
- (4) *Medical examinations.* Medical examinations shall be given to any employee who the physician feels, 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 shall include:
- (i) 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.
 - (ii) Laboratory examinations for respirator wearers consisting of baseline and annual pulmonary function tests. As a minimum, these tests shall consist of forced vital capacity (FVC), forced expiratory volume in one second (FEV1), and forced expiratory flow (FEF).
 - (iii) Any other test which the examining physician deems necessary to complete the written opinion.
 - (iv) Counseling of employees having medical conditions that would be directly or indirectly aggravated by exposure to formaldehyde on the increased risk of impairment of their health.
- (5) *Examinations for employees exposed in an emergency.* The employer shall make medical examinations available as soon as possible to all employees who have been exposed to formaldehyde in an emergency.
- (i) The examination shall 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.

- (ii) Other examinations shall consist of those elements considered appropriate by the examining physician.
- (6) *Information provided to the physician.* The employer shall provide the following information to the examining physician:
- (i) A copy of this standard and appendix A, C, D, and E;
 - (ii) A description of the affected employee's job duties as they relate to the employee's exposure to formaldehyde;
 - (iii) The representative exposure level for the employee's job assignment;
 - (iv) Information concerning any personal protective equipment and respiratory protection used or to be used by the employee; and
 - (v) Information from previous medical examinations of the affected employee within the control of the employer.
 - (vi) In the event of a non-routine examination because of an emergency, the employer shall provide to the physician as soon as possible: a description of how the emergency occurred and the exposure the victim may have received.
- (7) *Physician's written opinion.*
- (i) For each examination required under this standard, the employer shall obtain a written opinion from the examining physician. This written opinion shall contain the results of the medical examination except that it shall not reveal specific findings or diagnoses unrelated to occupational exposure to formaldehyde. The written opinion shall include:
 - (A) 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;
 - (B) Any recommended limitations on the employee's exposure or changes in the use of personal protective equipment, including respirators;
 - (C) 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.

- (ii) The employer shall provide for retention of the results of the medical examination and tests conducted by the physician.
- (iii) The employer shall provide a copy of the physician's written opinion to the affected employee within 15 days of its receipt.

(8) Medical removal.

- (i) The provisions of paragraph (l)(8) apply 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 in the case of dermal irritation or dermal sensitization when the product suspected of causing the dermal condition contains less than 0.05% formaldehyde.
- (ii) An employee's report of signs or symptoms of possible overexposure to formaldehyde shall be evaluated by a physician selected by the employer pursuant to paragraph (l)(3). If the physician determines that a medical examination is not necessary under paragraph (l)(3)(ii), there shall be a two-week evaluation and remediation period to permit the employer to ascertain whether the signs or symptoms subside untreated or with the use of creams, gloves, first aid treatment or personal protective equipment. Industrial hygiene measures that limit the employee's exposure to formaldehyde may also be implemented during this period. The employee shall be referred immediately to a physician prior to 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.
- (iii) If the signs or 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 employer. The physician shall presume, absent contrary evidence, that observed dermal irritation or dermal sensitization are not attributable to formaldehyde when products to which the affected employee is exposed contain less than 0.1% formaldehyde.

- (iv) Medical examinations shall be conducted in compliance with the requirements of paragraph (l) (5) (i) and (ii). Additional guidelines for conducting medical exams are contained in appendix C.
- (v) If the physician finds that significant irritation of the mucosa of the eyes or of the upper airways, respiratory sensitization, dermal irritation, or dermal sensitization result from workplace formaldehyde exposure and recommends restrictions or removal, the employer shall promptly comply with the restrictions or recommendation of removal. In the event of a recommendation of removal, the employer shall 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.
- (vi) When an employee is removed pursuant to paragraph (l)(8)(v), the employer shall 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 employer shall maintain the employee's current earnings, seniority, and other benefits. If there is no such work available, the employer 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 six months, whichever comes first.
- (vii) The employer shall arrange for a follow-up medical examination to take place

Exam Question

7.) The employer shall provide a copy of the physician's written opinion to the affected employee within ____ days of its receipt.

- a. 7
- b. 15
- c. 21
- d. 30

within six months after the employee is removed pursuant to this paragraph. This examination shall determine if the employee can return to the original job status, or if the removal is to be permanent. The physician shall make a decision within six months of the date the employee was removed as to whether the employee can be returned to the original job status, or if the removal is to be permanent.

- (viii) An employer's obligation to provide earnings, seniority and other benefits to a removed employee may be reduced to the extent that the employee receives compensation for earnings lost during the period of removal either from a publicly or employer-funded compensation program or from employment with another employer made possible by virtue of the employee's removal.
- (ix) In making determinations of the formaldehyde content of materials under this paragraph the employer may rely on objective data.

(9) Multiple physician review.

- (i) After the employer selects the initial physician who conducts any medical examination or consultation to determine whether medical removal or restriction is appropriate, the employee may designate a second physician to review any findings, determinations or recommendations of the initial physician and to conduct such examinations, consultations, and laboratory tests as the second physician deems necessary and appropriate to evaluate the effects of formaldehyde exposure and to facilitate this review.
- (ii) The employer shall promptly notify an employee of the right to seek a second medical opinion after each occasion that an initial physician conducts a medical examination or consultation for the purpose of medical removal or restriction.
- (iii) The employer may condition its participation in, and payment for, the multiple physician review mechanism upon the employee doing the following within fifteen (15) days after receipt of the notification of the right to seek a second medical opinion, or receipt of the initial physician's written opinion, whichever is later:
 - (A) The employee informs the employer of the intention to seek a second medical opinion, and

- (B) The employee initiates steps to make an appointment with a second physician.

- (iv) If the findings, determinations or recommendations of the second physician differ from those of the initial physician, then the employer and the employee shall assure that efforts are made for the two physicians to resolve the disagreement. If the two physicians are unable to quickly resolve their disagreement, then the employer and the employee through their respective physicians shall designate a third physician who shall be a specialist in the field at issue:
 - (A) To review the findings, determinations or recommendations of the prior physicians; and
 - (B) 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.
- (v) In the alternative, the employer and the employee or authorized employee representative may jointly designate such third physician.
- (vi) The employer shall act consistent with the findings, determinations and recommendations of the third physician, unless the employer and the employee reach an agreement which is otherwise consistent with the recommendations of at least one of the three physicians.

(m) **Hazard communication**

- (1) General. Communication of the hazards associated with formaldehyde in the workplace shall be governed by the requirements of paragraph (m). The definitions of 29 CFR 1910.1200(c) shall apply under this paragraph.
 - (i) The following shall be subject to the hazard communication requirements of this paragraph: 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.
 - (ii) As a minimum, specific health hazards that the employer shall address are: Cancer, irritation and sensitization of the skin and respiratory system, eye and throat irritation, and acute toxicity.

- (2) Manufacturers and importers who produce or import formaldehyde or formaldehyde-containing products shall provide downstream employers using or handling these products with an objective determination through the required labels and MSDSs if these items may constitute a health hazard within the meaning of 29 CFR 1910.1200(d) under normal conditions of use.
- (3) Labels.
- (i) The employer shall assure that hazard warning labels complying with the requirements of 29 CFR 1910.1200(f) are affixed to all containers of materials listed in paragraph (m)(1)(i), except to the extent that 29 CFR 1910.1200(f) is inconsistent with this paragraph.
 - (ii) Information on labels. As a minimum, for all materials listed in paragraph (m)(1)(i) capable of releasing formaldehyde at levels of 0.1 ppm to 0.5 ppm, labels shall 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.
 - (iii) For materials listed in paragraph (m)(1)(i) capable of releasing formaldehyde at levels above 0.5 ppm, labels shall appropriately address all hazards as defined in 29 CFR 1910.1200(d) and 29 CFR 1910.1200 appendices A and B, including respiratory sensitization, and shall contain the words "Potential Cancer Hazard."
 - (iv) In making the determinations of anticipated levels of formaldehyde release, the employer may rely on objective data indicating the extent of potential formaldehyde release under reasonably foreseeable conditions of use.
 - (v) Substitute warning labels. The employer may use warning labels required by other statutes, regulations, or ordinances which impart the same information as the warning statements required by this paragraph.
- (4) Material safety data sheets.
- (i) Any employer who uses formaldehyde-containing materials listed in paragraph (m)(1)(i) shall comply with the requirements of 29 CFR 1910.1200(g) with regard to the development and updating of material safety data sheets.
 - (ii) Manufacturers, importers, and distributors of formaldehyde-containing materials listed in paragraph (m)(1)(i) shall assure that material safety data sheets and updated information are provided to all employers purchasing such materials at the time of the initial shipment and at the time of the first shipment after a material safety data sheet is updated.
- (5) Written hazard communication program. The employer shall develop, implement, and maintain at the work-place, a written hazard communication program for formaldehyde exposures in the workplace, which at a minimum describes how the requirements specified in this paragraph for labels and other forms of warning and material safety data sheets, and paragraph (n) for employee information and training, will be met. Employers in multi-employer workplaces shall comply with the requirements of 29 CFR 1910.1200 (e) (2).
- (n) **Employee information and training**
- (1) Participation. The employer shall assure that all employees who are assigned to workplaces where there is exposure to formaldehyde participate in a training program, except that where the employer can show, using objective data, that employees are not exposed to formaldehyde at or above 0.1 ppm, the employer is not required to provide training.
 - (2) Frequency. Employers shall provide such information and training to employees at the time of initial assignment, and whenever a new exposure to formaldehyde is introduced into the work area. The training shall be repeated at least annually.
 - (3) Training program. The training program shall be conducted in a manner which the employee is able to understand and shall include:

Exam Question

- 8.) Employers shall provide such information and training to employees at the time of initial assignment, and whenever a new exposure to formaldehyde is introduced into the work area. The training shall be repeated at least _____.
- a. Monthly
 - b. Quarterly
 - c. Annually
 - d. None of the above

- (i) A discussion of the contents of this regulation and the contents of the Material Safety Data Sheet.
- (ii) The purpose for and a description of the medical surveillance program required by this standard, including:
 - (A) A description of the potential health hazards associated with exposure to formaldehyde and a description of the signs and symptoms of exposure to formaldehyde.
 - (B) Instructions to immediately report to the employer the development of any adverse signs or symptoms that the employee suspects are attributable to formaldehyde exposure.
- (iii) 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;
- (iv) The purpose for, proper use of, and limitations of personal protective clothing and equipment;
- (v) Instructions for the handling of spills, emergencies, and clean-up procedures;
- (vi) 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
- (vii) A review of emergency procedures including the specific duties or assignments of each employee in the event of an emergency.

(4) Access to training materials.

- (i) The employer shall inform all affected employees of the location of written training materials and shall make these materials readily available, with-out cost, to the affected employees.
- (ii) The employer shall provide, upon request, all training materials relating to the employee training program to the Assistant Secretary and the Director.

(o) **Recordkeeping**

(1) Exposure measurements. The employer shall establish and maintain an accurate record of all measurements taken to monitor employee exposure to formaldehyde. This record shall include:

- (i) The date of measurement;

- (ii) The operation being monitored; (iii) The methods of sampling and analysis and evidence of their accuracy and precision;
 - (iv) The number, durations, time, and results of samples taken;
 - (v) The types of protective devices worn; and
 - (vi) The names, job classifications, social security numbers, and exposure estimates of the employees whose exposures are represented by the actual monitoring results.
- (2) Exposure determinations. Where the employer has determined that no monitoring is required under this standard, the employer shall maintain a record of the objective data relied upon to support the determination that no employee is exposed to formaldehyde at or above the action level.
- (3) Medical surveillance. The employer shall establish and maintain an accurate record for each employee subject to medical surveillance under this standard. This record shall include:
- (i) The name and social security number of the employee;
 - (ii) The physician's written opinion;
 - (iii) A list of any employee health complaints that may be related to exposure to formaldehyde; and
 - (iv) A copy of the medical examination results, including medical disease questionnaires and results of any medical tests required by the standard or mandated by the examining physician.

(4) Respirator fit testing.

- (i) The employer shall establish and maintain accurate records for employees subject to negative pressure respirator fit testing required by this standard.
- (ii) This record shall include:
 - (A) A copy of the protocol selected for respirator fit testing.
 - (B) A copy of the results of any fit testing performed.
 - (C) The size and manufacturer of the types of respirators available for selection.
 - (D) The date of the most recent fit testing, the name and social security number of each tested employee, and the respirator type and face piece selected.

(5) Record retention. The employer shall retain records required by this standard for at least the following periods:

- (i) Exposure records and determinations shall be kept for at least 30 years. (ii) Medical records shall be kept for the duration of employment plus 30 years.
- (iii) Respirator fit testing records shall be kept until replaced by a more recent record.

(6) Availability of records.

- (i) Upon request, the employer shall make all records maintained as a requirement of this standard available for examination and copying to the Assistant Secretary and the Director.
- (ii) The employer shall make employee exposure records, including estimates made from representative monitoring and available upon request for examination, and copying to the subject employee, or former employee, and employee representatives in accordance with 29 CFR 1910.20 (a)–(e) and (g)–(i).
- (iii) Employee medical records required by this standard 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 in accordance with 29 CFR 1910.20 (a)–(e) and (g)–(i).

(p) **Dates**

(1) Effective dates

- (i) General. This section shall become effective February 2, 1988, except as noted below.
- (ii) Laboratories. This standard shall become effective for anatomy, histology, and pathology laboratories February 2, 1988, except as noted in the start-up date section. For all other laboratories, paragraphs (a) and (c) of this standard shall become effective February 2, 1988, and paragraphs (b) and (d)–(o) of this standard shall become effective on September 1, 1988 except as noted in the start-up date section.

(2) Start-up dates

- (i) Exposure determinations. Initial monitoring or objective determinations that no monitoring is required by the standard shall be completed by 6 months after the effective date of the standard.
- (ii) Medical surveillance. The initial medical surveillance of all eligible employees shall be completed by 6 months after the effective date of the standard.
- (iii) Emergencies. The emergency procedures required by this standard shall be implemented by 6 months after the effective date of the standard.
- (iv) Respiratory protection. Respiratory protection as required in this standard shall be provided as soon as possible and no later than 9 months after the effective date of the standard.
- (v) Engineering and work practice controls. Engineering and work practice controls required by this standard shall be implemented as soon as possible, but no later than one year after the effective date of the standard.
- (vi) Employee training. Written materials for employee training shall be updated as soon as possible, but no later than 2 months after the effective date of the standard.

(3) Start-up dates of amended paragraphs

- (i) Respiratory protection. Respiratory protection required to meet the amended PEL of 0.75 ppm TWA shall be provided as soon as possible but no later than September 24, 1992.
- (ii) Engineering and work practice controls. Engineering and work practice controls required to meet the amended PEL of 0.75 ppm TWA shall be implemented as soon as possible, but no later than June 26, 1993.
- (iii) Medical removal protection. The medical removal protection provisions including the multiple physician review mechanism shall be implemented no later than December 28, 1992.

Exam Question

9.) Medical records shall be kept for the duration of employment plus 10 years.

- a. True
- b. False

- (iv) ***Hazard communication.*** The labeling provisions contained in amended paragraph (m) of this standard shall be implemented no later than December 28, 1992. Labeling of containers of formaldehyde products shall continue to comply with the provisions of 29 CFR 1910.1200 (e)–(j) until that time.
- (v) ***Training.*** The periodic training mandated for all employees exposed to formaldehyde between 0.1 ppm and 0.5 ppm shall begin no later than August 25, 1992.

APPENDIX A TO § 1910.1048—SUBSTANCE TECHNICAL GUIDELINES FOR FORMALIN

The following Substance Technical Guideline for Formalin provides information on uninhibited formalin solution (37% formaldehyde, no methanol stabilizer). It is designed to inform employees at the production level of their rights and duties under the formaldehyde standard whether their job title defines them as workers or supervisors. Much of the information provided is general; however, some information is specific for formalin. When employee exposure to formaldehyde is from resins capable of releasing formaldehyde, the resin itself and other impurities or decomposition products may also be toxic, and employers should include this information as well when informing employees of the hazards associated with the materials they handle. 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. For example, 37–50 percent solutions of formaldehyde present a much greater hazard to the skin and eyes from spills or splashes than solutions containing less than 1 percent formaldehyde. Individual Substance Technical Guidelines used by the employer for training employees should be modified to properly give information on the material actually being used.

Substance Identification

Chemical Name: Formaldehyde

Chemical Family: Aldehyde

Chemical Formula: HCHO Molecular Weight: 30.03

Chemical Abstracts Service Number (CAS Number):
50–00–0

Synonyms: Formalin; Formic Aldehyde; Paraform; Formol; Formalin (Methanol- free); Fyde; Formalith; Methanal; Methyl Aldehyde; Methylene Glycol; Methylene Oxide; Tetraoxymethalene; Oxomethane; Oxymethylene

Components and Contaminants

Percent: 37.0 Formaldehyde

Percent: 63.0 Water

(NOTE— Inhibited solutions contain methanol.)

Other Contaminants: Formic acid (alcohol free)

Exposure Limits:

OSHA TWA—0.75 ppm

OSHA STEL—2 ppm

Physical Data

Description: Colorless liquid, pungent odor

Boiling point: 214° F (101° C)

Specific Gravity: 1.08 (H₂O=1 @ 20° C)

pH: 2.8–4.0

Solubility in Water: Miscible

Solvent Solubility: Soluble in alcohol and acetone

Vapor Density: 1.04 (Air=1 @ 20° C)

Odor Threshold: 0.8–1 ppm 28

Fire and Explosion Hazard

Moderate fire and explosion hazard when exposed to heat or flame.

The flash point of 37% formaldehyde solutions is above normal room temperature, but the explosion range is very wide, from 7 to 73% by volume in air.

Reaction of formaldehyde with nitrogen dioxide, nitromethane, perchloric acid and aniline, or peroxyformic acid yields explosive compounds.

Flash Point: 185° F (85° C) closed cup

Lower Explosion Limit: 7%

Upper Explosion Limit: 73%

Auto-ignition Temperature: 806° F (430° C)

Flammability Class (OSHA): III A

Extinguishing Media: Use dry chemical, “alcohol foam”, carbon dioxide, or water in flooding amounts as fog. Solid streams may not be effective. Cool fire-exposed containers with water from side until well after fire is out.

Use of water spray to flush spills can also dilute the spill to produce nonflammable mixtures. Water runoff, however, should be contained for treatment.

National Fire Protection Association Section 325M Designation

Health: 2—Materials hazardous to health, but areas may be entered with full-faced mask self-contained breathing apparatus which provides eye protection.

Flammability: 2—Materials which must be moderately heated before ignition will occur. Water spray may be used to extinguish the fire because the material can be cooled below its flash point.

Reactivity: D—Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used.

Reactivity

Stability: Formaldehyde solutions may self-polymerize to form paraformaldehyde which precipitates.

Incompatibility (Materials to Avoid): Strong oxidizing agents, caustics, strong alkalis, isocyanates, anhydrides, oxides, and inorganic acids. Formaldehyde reacts with hydrochloric acid to form the potent carcinogen, bis-chloromethyl ether. Formaldehyde reacts with nitrogen dioxide, nitromethane, perchloric acid and aniline, or peroxyformic acid to yield explosive compounds. A violent reaction occurs when formaldehyde is mixed with strong oxidizers.

Hazardous Combustion or Decomposition Products: Oxygen from the air can oxidize formaldehyde to formic acid, especially when heated. Formic acid is corrosive.

Health Hazard Data

Acute Effects of Exposure

Ingestion (Swallowing): Liquids containing 10 to 40% formaldehyde cause severe irritation and inflammation of the mouth, throat, and stomach. Severe stomach pains will follow ingestion with possible loss of consciousness and death. Ingestion of dilute formaldehyde solutions (0.03–0.04%) may cause discomfort in the stomach and pharynx.

Inhalation (Breathing): Formaldehyde is highly irritating to the upper respiratory tract and eyes. Concentrations of 0.5 to 2.0 ppm may irritate the eyes, nose, and throat of some individuals. Concentrations of 3 to 5 ppm also cause tearing of the eyes and are intolerable to some persons. Concentrations of 10 to 20 ppm cause difficulty in breathing, burning of the nose and throat, cough, and heavy tearing of the eyes, and 25 to 30 ppm causes severe respiratory tract injury leading to pulmonary edema and pneumonitis. A concentration of 100 ppm is immediately dangerous to life and health. Deaths from accidental exposure to high concentrations of formaldehyde have been reported.

Skin (Dermal): Formalin is a severe skin irritant and a sensitizer. Contact with formalin causes white discoloration, smarting, drying, cracking, and scaling. Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin. Previously exposed persons may react to future exposure with an allergic eczematous dermatitis or hives.

Eye Contact: Formaldehyde solutions splashed in the eye can cause injuries ranging from transient discomfort to severe, permanent corneal clouding and loss of vision. 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.

NOTE—The perception of formaldehyde by odor and eye irritation becomes less sensitive with time as one adapts to formaldehyde. This can lead to overexposure if a worker is relying on formaldehyde's warning properties to alert him or her to the potential for exposure.

Acute Animal Toxicity:

Oral, rats: LD50 = 800 mg/kg

Oral, mouse: LD50 = 42 mg/kg

Inhalation, rats: LCLo = 250 mg/kg

Inhalation, mouse: LCLo = 900 mg/kg

Inhalation, rats: LC50 = 590 mg/kg

Chronic Effects of Exposure

Carcinogenicity: Formaldehyde has the potential to cause cancer in humans. Repeated and prolonged exposure increases the risk. Various animal experiments have conclusively shown formaldehyde to be a carcinogen in rats. In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages.

Mutagenicity: Formaldehyde is genotoxic in several in vitro test systems showing properties of both an initiator and a promoter.

Toxicity: Prolonged or repeated exposure to formaldehyde may result in respiratory impairment. Rats exposed to formaldehyde at 2 ppm developed benign nasal tumors and changes of the cell structure in the nose as well as inflamed mucous membranes of the nose. Structural changes in the epithelial cells in the human nose have also been observed. Some persons have developed asthma or bronchitis following exposure to formaldehyde, most often as the result of an accidental spill involving a single exposure to a high concentration of formaldehyde.

Emergency and First Aid Procedures

Ingestion (Swallowing): If the victim is conscious, dilute, inactivate, or absorb the ingested formaldehyde

Exam Question

10.) Formaldehyde has the potential to cause cancer in humans.

- a. True
- b. False

by giving milk, activated charcoal, or water. Any organic material will inactivate formaldehyde. Keep affected person warm and at rest. Get medical attention immediately. If vomiting occurs, keep head lower than hips.

Inhalation (Breathing): Remove the victim from the exposure area to fresh air immediately. Where the formaldehyde concentration may be very high, each rescuer must put on a self-contained breathing apparatus before attempting to remove the victim, and medical personnel should be informed of the formaldehyde exposure immediately. If breathing has stopped, give artificial respiration. Keep the affected person warm and at rest. Qualified first-aid or medical personnel should administer oxygen, if available, and maintain the patient's airways and blood pressure until the victim can be transported to a medical facility. If exposure results in a highly irritated upper respiratory tract and coughing continues for more than 10 minutes, the worker should be hospitalized for observation and treatment.

Skin Contact: Remove contaminated clothing (including shoes) immediately. Wash the affected area of your body with soap or mild detergent and large amounts of water until no evidence of the chemical remains (at least 15 to 20 minutes). If there are chemical burns, get first aid to cover the area with sterile, dry dressing, and bandages. Get medical attention if you experience appreciable eye or respiratory irritation.

Eye Contact: Wash the eyes immediately with large amounts of water occasionally lifting lower and upper lids, until no evidence of chemical remains (at least 15 to 20 minutes). In case of burns, apply sterile bandages loosely without medication. Get medical attention immediately. If you have experienced appreciable eye irritation from a splash or excessive exposure, you should be referred promptly to an ophthalmologist for evaluation.

Emergency Procedures

Emergencies: If you work in an area where a large amount of formaldehyde could be released in an accident or from equipment failure, your employer must develop procedures to be followed in event of an emergency. You should be trained in your specific duties in the event of an emergency, and it is important that you clearly understand these duties. Emergency equipment must be accessible and you should be trained to use any equipment that you might need. Formaldehyde contaminated

equipment must be cleaned before reuse.

If a spill of appreciable quantity occurs, leave the area quickly unless you have specific emergency duties. Do not touch spilled material. Designated persons may stop the leak and shut off ignition sources if these procedures can be done without risk. Designated persons should isolate the hazard area and deny entry except for necessary people protected by suitable protective clothing and respirators adequate for the exposure. Use water spray to reduce vapors. Do not smoke, and prohibit all flames or flares in the hazard area.

Special Firefighting Procedures: Learn procedures and responsibilities in the event of a fire in your workplace. Become familiar with the appropriate equipment and supplies and their location. In firefighting, withdraw immediately in case of rising sound from venting safety device or any discoloration of storage tank due to fire.

Spill, Leak, and Disposal Procedures

Occupational Spill: For small containers, place the leaking container in a well ventilated area. Take up small spills with absorbent material and place the waste into properly labeled containers for later disposal. For larger spills, dike the spill to minimize contamination and facilitate salvage or disposal. You may be able to neutralize the spill with sodium hydroxide or sodium sulfite. Your employer must comply with EPA rules regarding the clean-up of toxic waste and notify state and local authorities, if required. If the spill is greater than 1,000 lb/day, it is reportable under EPA's Superfund legislation.

Waste Disposal: Your employer must dispose of waste containing formaldehyde in accordance with applicable local, state, and Federal law and in a manner that minimizes exposure of employees at the site and of the clean-up crew.

Monitoring and Measurement Procedures

Monitoring Requirements: If your exposure to formaldehyde exceeds the 0.5 ppm action level or the 2 ppm STEL, your employer must monitor your exposure. Your employer need not measure every exposure if a "high exposure" employee can be identified. This person usually spends the greatest amount of time nearest the process equipment. If you are a "representative employee", you will be asked to wear a sampling device to collect formaldehyde. This device may be a passive badge, a sorbent tube attached to a pump, or an impinger

Exam Question

11.) If an employee has skin contact with formaldehyde, you should do the following:

- a. Remove contaminated clothing
- b. Wash the affected area of the body with soap
- c. Both A & B above
- d. None of the above

containing liquid. You should perform your work as usual, but inform the person who is conducting the monitoring of any difficulties you are having wearing the device.

Evaluation of 8-hour Exposure: Measurements taken for the purpose of determining time-weighted average (TWA) exposures are best taken with samples covering the full shift. Samples collected must be taken from the employee's breathing zone air.

Short-term Exposure Evaluation: If there are tasks that involve brief but intense exposure to formaldehyde, employee exposure must be measured to assure compliance with the STEL. Sample collections are for brief periods, only 15 minutes, but several samples may be needed to identify the peak exposure.

Monitoring Techniques: OSHA's only requirement for selecting a method for sampling and analysis is that the methods used accurately evaluate the concentration of formaldehyde in employees' breathing zones. Sampling and analysis may be performed by collection of formaldehyde on liquid or solid sorbents with subsequent chemical analysis. Sampling and analysis may also be performed by passive diffusion monitors and short-term exposure may be measured by instruments such as real-time continuous monitoring systems and portable direct reading instruments.

Notification of Results: Your employer must inform you of the results of exposure monitoring representative of your job. You may be informed in writing, but posting the results where you have ready access to them constitutes compliance with the standard.

Protective Equipment and Clothing

[Material impervious to formaldehyde is needed if the employee handles formaldehyde solutions of 1% or more. Other employees may also require protective clothing or equipment to prevent dermatitis.]

Respiratory Protection: Use NIOSH-approved full facepiece negative pressure respirators equipped with approved cartridges or canisters within the use limitations of these devices. (Present restrictions on cartridges and canisters do not permit them to be used for a full work shift.) In all other situations, use positive pressure respirators such as the positive-pressure air purifying respirator or the self-contained breathing apparatus (SCBA). If you use a negative pressure respirator, your employer must provide you with fit testing of the respirator at least once a

year in accordance with the procedures outlined in Appendix E.

Protective Gloves: Wear protective (impervious) gloves provided by your employer, at no cost, to prevent contact with formalin. Your employer should select these gloves based on the results of permeation testing and in accordance with the ACGIH Guidelines for Selection of Chemical Protective Clothing.

Eye Protection: If you might be splashed in the eyes with formalin, it is essential that you wear goggles or some other type of complete protection for the eye. You may also need a face shield if your face is likely to be splashed with formalin, but you must not substitute face shields for eye protection. (This section pertains to formaldehyde solutions of 1% or more.)

Other Protective Equipment: You must wear protective (impervious) clothing and equipment provided by your employer at no cost to prevent repeated or prolonged contact with formaldehyde liquids. If you are required to change into whole-body chemical protective clothing, your employer must provide a change room for your privacy and for storage of your normal clothing.

If you are splashed with formaldehyde, use the emergency showers and eyewash fountains provided by your employer immediately to prevent serious injury. Report the incident to your supervisor and obtain necessary medical support.

Entry Into An IDLH Atmosphere

Enter areas where the formaldehyde concentration might be 100 ppm or more only with complete body protection including a self-contained breathing apparatus with a full facepiece operated in a positive pressure mode or a supplied air respirator with full facepiece and operated in a positive pressure mode. This equipment is essential to protect your life and health under such extreme conditions.

Engineering Controls

Ventilation is the most widely applied engineering control method for reducing the concentration of airborne substances in the breathing zones of workers. There are two distinct types of ventilation.

Local Exhaust: Local exhaust ventilation is designed to capture airborne contaminants as near to the

Exam Question

12.) The following is considered personal protective equipment by OSHA:

- a. Gloves
- b. Eye protection
- c. Respiratory protection
- d. All of the above

point of generation as possible. To protect you, the direction of contaminant flow must always be toward the local exhaust system inlet and away from you.

General (Mechanical): General dilution ventilation involves continuous introduction of fresh air into the workroom to mix with the contaminated air and lower your breathing zone concentration of formaldehyde. Effectiveness depends on the number of air changes per hour. Where devices emitting formaldehyde are spread out over a large area, general dilution ventilation may be the only practical method of control.

Work Practices: Work practices and administrative procedures are an important part of a control system. If you are asked to perform a task in a certain manner to limit your exposure to formaldehyde, it is extremely important that you follow these procedures.

Medical Surveillance

Medical surveillance helps to protect employees' health. You are encouraged strongly to participate in the medical surveillance program.

Your employer must make a medical surveillance program available at no expense to you and at a reasonable time and place if you are exposed to formaldehyde at concentrations above 0.5 ppm as an 8-hour average or 2 ppm over any 15-minute period. You will be offered medical surveillance at the time of your initial assignment and once a year afterward as long as your exposure is at least 0.5 ppm (TWA) or 2 ppm (STEL). Even if your exposure is below these levels, you should inform your employer if you have signs and symptoms that you suspect, through your training, are related to your formaldehyde exposure because you may need medical surveillance to determine if your health is being impaired by your exposure.

The surveillance plan includes:

- (a) A medical disease questionnaire.
- (b) A physical examination if the physician determines this is necessary.

If you are required to wear a respirator, your employer must offer you a physical examination and a pulmonary function test every year. The physician must collect all information needed to determine if you are at increased risk from your exposure to formaldehyde. At the physician's discretion, the medical examination may include other tests, such as a chest x-ray, to make this determination.

After a medical examination the physician will provide your employer with a written opinion which includes any special protective measures recommended and any restrictions on your exposure. The physician must inform you of any medical conditions you have which

would be aggravated by exposure to formaldehyde.

All records from your medical examinations, including disease surveys, must be retained at your employer's expense.

Emergencies

If you are exposed to formaldehyde in an emergency and develop signs or symptoms associated with acute toxicity from formaldehyde exposure, your employer must provide you with a medical examination as soon as possible. This medical examination will include all steps necessary to stabilize your health. You may be kept in the hospital for observation if your symptoms are severe to ensure that any delayed effects are recognized and treated.

APPENDIX B TO § 1910.1048—SAMPLING STRATEGY AND ANALYTICAL METHODS FOR FORMALDEHYDE

To protect the health of employees, exposure measurements must be unbiased and representative of employee exposure. The proper measurement of employee exposure requires more than a token commitment on the part of the employer. OSHA's mandatory requirements establish a baseline; under the best of circumstances all questions regarding employee exposure will be answered. Many employers, however, will wish to conduct more extensive monitoring before undertaking expensive commitments, such as engineering controls, to assure that the modifications are truly necessary. The following sampling strategy, which was developed at NIOSH by Nelson A. Leidel, Kenneth A. Busch, and Jeremiah R. Lynch and described in NIOSH publication No. 77-173 (Occupational Exposure Sampling Strategy Manual) will assist the employer in developing a strategy for determining the exposure of his or her employees.

There is no one correct way to determine employee exposure. Obviously, measuring the exposure of every employee exposed to formaldehyde will provide the most information on any given day. Where few employees are exposed, this may be a practical solution. For most employers, however, use of the following strategy will give just as much information at less cost.

Exposure data collected on a single day will not automatically guarantee the employer that his or her workplace is always in compliance with the formaldehyde standard. This does not imply, however, that it is impossible for an employer to be sure that his or her worksite is in compliance with the standard. Indeed, a properly designed sampling strategy showing that all employees are exposed below the PELs, at least with a 95 percent certainty, is compelling evidence that the exposure limits are being achieved provided that measurements are conducted using valid sampling

strategy and approved analytical methods.

There are two PELs, the TWA concentration and the STEL. Most employers will find that one of these two limits is more critical in the control of their operations, and OSHA expects that the employer will concentrate monitoring efforts on the critical component. If the more difficult exposure is controlled, this information, along with calculations to support the assumptions, should be adequate to show that the other exposure limit is also being achieved.

Sampling Strategy

Determination of the Need for Exposure Measurements

The employer must determine whether employees may be exposed to concentrations in excess of the action level. This determination becomes the first step in an employee exposure monitoring program that minimizes employer sampling burdens while providing adequate employee protection. If employees may be exposed above the action level, the employer must measure exposure. Otherwise, an objective determination that employee exposure is low provides adequate evidence that exposure potential has been examined.

The employer should examine all available relevant information, for example, insurance company and trade association data and information from suppliers or exposure data collected from similar operations. The employer may also use previously-conducted sampling including area monitoring. The employer must make a determination relevant to each operation although this need not be on a separate piece of paper. If the employer can demonstrate conclusively that no employee is exposed above the action level or the STEL through the use of objective data, the employer need proceed no further on employee exposure monitoring until such time that conditions have changed and the determination is no longer valid.

If the employer cannot determine that employee exposure is less than the action level and the STEL, employee exposure monitoring will have to be conducted.

Workplace Material Survey

The primary purpose of a survey of raw material is to determine if formaldehyde is being used in the work environment and if so, the conditions under which formaldehyde is being used.

The first step is to tabulate all situations where formaldehyde is used in a manner such that it may be released into the workplace atmosphere or contaminate the skin. This information should be available through analysis of company records and information on the MSDSs available through provisions of this standard and the Hazard Communication standard.

If there is an indication from materials handling

records and accompanying MSDSs that formaldehyde is being used in the following types of processes or work operations, there may be a potential for releasing formaldehyde into the workplace atmosphere:

- (1) Any operation that involves grinding, sanding, sawing, cutting, crushing, screening, sieving, or any other manipulation of material that generates formaldehyde-bearing dust
- (2) Any processes where there have been employee complaints or symptoms indicative of exposure to formaldehyde
- (3) Any liquid or spray process involving formaldehyde
- (4) Any process that uses formaldehyde in preserved tissue
- (5) Any process that involves the heating of a formaldehyde-bearing resin.

Processes and work operations that use formaldehyde in these manners will probably require further investigation at the worksite to determine the extent of employee monitoring that should be conducted.

Workplace Observations

To this point, the only intention has been to provide an indication as to the existence of potentially exposed employees. With this information, a visit to the workplace is needed to observe work operations, to identify potential health hazards, and to determine whether any employees may be exposed to hazardous concentrations of formaldehyde.

In many circumstances, sources of formaldehyde can be identified through the sense of smell. However, this method of detection should be used with caution because of olfactory fatigue.

Employee location in relation to source of formaldehyde is important in determining if an employee may be significantly exposed to formaldehyde. In most instances, the closer a worker is to the source, the higher the probability that a significant exposure will occur.

Other characteristics should be considered. Certain high temperature operations give rise to higher evaporation rates. Locations of open doors and windows provide natural ventilation that tend to dilute formaldehyde emissions. General room ventilation also provides a measure of control.

Calculation of Potential Exposure Concentrations

By knowing the ventilation rate in a workplace and the quantity of formaldehyde generated, the employer may be able to determine by calculation if the PELs might be exceeded. To account for poor mixing of formaldehyde into the entire room, locations of fans and proximity of employees to the work operation, the employer must include a safety factor. If an employee is relatively close to a source, particularly if he or she

is located downwind, a safety factor of 100 may be necessary. For other situations, a factor of 10 may be acceptable. If the employer can demonstrate through such calculations that employee exposure does not exceed the action level or the STEL, the employer may use this information as objective data to demonstrate compliance with the standard.

Sampling Strategy

Once the employer determines that there is a possibility of substantial employee exposure to formaldehyde, the employer is obligated to measure employee exposure.

The next step is selection of a maximum risk employee. When there are different processes where employees may be exposed to formaldehyde, a maximum risk employee should be selected for each work operation.

Selection of the maximum risk employee requires professional judgment. The best procedure for selecting the maximum risk employee is to observe employees and select the person closest to the source of formaldehyde. Employee mobility may affect this selection; for example, if the closest employee is mobile in his tasks, he may not be the maximum risk employee. Air movement patterns and differences in work habits will also affect selection of the maximum risk employee.

When many employees perform essentially the same task, a maximum risk employee cannot be selected. In this circumstance, it is necessary to resort to random sampling of the group of workers. The objective is to select a subgroup of adequate size so that there is a high probability that the random sample will contain at least one worker with high exposure if one exists. The number of persons in the group influences the number that need to be sampled to ensure that at least one individual from the highest 10 percent exposure group is contained in the sample. For example, to have 90 percent confidence in the results, if the group size is 10, nine should be sampled; for 50, only 18 need to be sampled.

If measurement shows exposure to formaldehyde at or above the action level or the STEL, the employer needs to identify all other employees who may be exposed at or above the action level or STEL and measure or otherwise accurately characterize the exposure of these employees.

Whether representative monitoring or random

sampling are conducted, the purpose remains the same—to determine if the exposure of any employee is above the action level. If the exposure of the most exposed employee is less than the action level and the STEL, regardless of how the employee is identified, then it is reasonable to assume that measurements of exposure of the other employees in that operation would be below the action level and the STEL.

Exposure Measurements

There is no “best” measurement strategy for all situations. Some elements to consider in developing a strategy are:

- (1) Availability and cost of sampling equipment
- (2) Availability and cost of analytic facilities
- (3) Availability and cost of personnel to take samples
- (4) Location of employees and work operations
- (5) Intraday and interday variations in the process
- (6) Precision and accuracy of sampling and analytic methods, and
- (7) Number of samples needed.

Samples taken for determining compliance with the STEL differ from those that measure the TWA concentration in important ways. STEL samples are best taken in a non-random fashion using all available knowledge relating to the area, the individual, and the process to obtain samples during periods of maximum expected concentrations. At least three measurements on a shift are generally needed to spot gross errors or mistakes; however, only the highest value represents the STEL.

If an operation remains constant throughout the work shift, a much greater number of samples would need to be taken over the 32 discrete non-overlapping periods in an 8-hour work shift to verify compliance with a STEL. If employee exposure is truly uniform throughout the work shift, however, an employer in compliance with the 1 ppm TWA would be in compliance with the 2 ppm STEL, and this determination can probably be made using objective data.

Need to Repeat the Monitoring Strategy

Interday and intraday fluctuations in employee exposure are mostly influenced by the physical processes that generate formaldehyde and the work

Exam Question

13.) Once the employer determines that there is a possibility of substantial employee exposure to formaldehyde, the employer is obligated to measure employee exposure.

- a. True
- b. False

habits of the employee. Hence, in-plant process variations influence the employer's determination of whether or not additional controls need to be imposed. Measurements that employee exposure is low on a day that is not representative of worst conditions may not provide sufficient information to determine whether or not additional engineering controls should be installed to achieve the PELs.

The person responsible for conducting sampling must be aware of systematic changes which will negate the validity of the sampling results. Systematic changes in formaldehyde exposure concentration for an employee can occur due to:

- (1) The employee changing patterns of movement in the workplace
- (2) Closing of plant doors and windows
- (3) Changes in ventilation from season to season
- (4) Decreases in ventilation efficiency or abrupt failure of engineering control equipment
- (5) Changes in the production process or work habits of the employee.

Any of these changes, if they may result in additional exposure that reaches the next level of action (i.e. 0.5 or 1.0 ppm as an 8-hr average or 2 ppm over 15 minutes) require the employer to perform additional monitoring to reassess employee exposure.

A number of methods are suitable for measuring employee exposure to formaldehyde or for characterizing emissions within the worksite. The preamble to this standard describes some methods that have been widely used or subjected to validation testing. A detailed analytical procedure derived from the OSHA Method 52 for acrolein and formaldehyde is presented below for informational purposes.

Inclusion of OSHA's method in this appendix in no way implies that it is the only acceptable way to measure employee exposure to formaldehyde. Other methods that are free from significant interferences and that can determine formaldehyde at the permissible exposure limits within 25 percent of the "true" value at the 95 percent confidence level are also acceptable. Where applicable, the method should also be capable of measuring formaldehyde at the action level to 35 percent of the "true" value with a 95 percent confidence level. OSHA encourages employers to choose methods that will be best for their individual needs. The employer must exercise caution, however, in choosing an appropriate method since some techniques suffer from interferences that are likely to be present in workplaces of certain industry sectors where formaldehyde is used.

[OSHA's Analytical Laboratory Method](#)

Method No: 52

Matrix: Air

Target Concentration: 1 ppm (1.2 mg/m³)

Procedures: Air samples are collected by drawing known volumes of air through sampling tubes containing XAD-2 adsorbent which have been coated with 2- (hydroxymethyl) piperidine. The samples are desorbed with toluene and then analyzed by gas chromatography using a nitrogen selective detector.

Recommended Sampling Rate and Air Volumes: 0.1 L/min and 24 L

Reliable Quantitation Limit: 16 ppb (20 µg/m³)

Standard Error of Estimate at the Target Concentration: 7.3%

Status of the Method: A sampling and analytical method that has been subjected to the established evaluation procedures of the Organic Methods Evaluation Branch.

Date: March 1985

1. General Discussion

- 1.1 *Background:* The current OSHA method for collecting acrolein vapor recommends the use of activated 13X molecular sieves. The samples must be stored in an ice bath during and after sampling and also they must be analyzed within 48 hours of collection. The current OSHA method for collecting formaldehyde vapor recommends the use of bubblers containing 10% methanol in water as the trapping solution.

This work was undertaken to resolve the sample stability problems associated with acrolein and also to eliminate the need to use bubblers to sample formaldehyde. A goal of this work was to develop and/or to evaluate a common sampling and analytical procedure for acrolein and formaldehyde.

NIOSH has developed independent methodologies for acrolein and formaldehyde which recommend the use of reagent-coated adsorbent tubes to collect the aldehydes as stable derivatives. The formaldehyde sampling tubes contain Chromosorb 102 adsorbent coated with N-benzylethanolamine (BEA) which reacts with formaldehyde vapor to form a stable oxazolidine compound. The acrolein sampling tubes contain XAD-2 adsorbent coated with 2- (hydroxymethyl) piperidine (2-HMP) which reacts with acrolein vapor to form a different, stable oxazolidine derivative. Acrolein does not appear to react with BEA to give a suitable reaction product. Therefore, the formaldehyde procedure cannot provide a common method for both aldehydes. However, formaldehyde does react with 2-HMP to form a very suitable reaction product. It is the quantitative reaction of acrolein and formaldehyde with 2-HMP that provides the basis for this evaluation.

This sampling and analytical procedure is very similar to the method recommended by NIOSH for acrolein. Some changes in the NIOSH methodology were necessary to permit the simultaneous determination of both aldehydes and also to accommodate OSHA laboratory equipment and analytical techniques.

1.2 **Limit-defining parameters:** The analyte air concentrations reported in this method are based on the recommended air volume for each analyte collected separately and a desorption volume of 1 mL. The amounts are presented as crolein and/or formaldehyde, even though the derivatives are the actual species analyzed.

1.2.1 **Detection limits of the analytical procedure:** The detection limit of the analytical procedure was 386 pg per injection for formaldehyde. This was the amount of analyte which gave a peak whose height was about five times the height of the peak given by the residual formaldehyde derivative in a typical blank front section of the recommended sampling tube.

1.2.2 **Detection limits of the overall procedure:** The detection limits of the overall procedure were 482 ng per sample (16 ppb or 20 µg/m³ for formaldehyde). This was the amount of analyte spiked on the sampling device which allowed recoveries approximately equal to the detection limit of the analytical procedure.

1.2.3 **Reliable quantitation limits:** The reliable quantitation limit was 482 ng per sample (16 ppb or 20 µg/m³) for formaldehyde. These were the smallest amounts of analyte which could be quantitated within the limits of a recovery of at least 75% and a precision (± 1.96 SD) of $\pm 25\%$ or better.

The reliable quantitation limit and detection limits reported in the method are based upon optimization of the instrument for the smallest possible amount of analyte. When the target concentration of an analyte is exceptionally higher than these limits, they may not be attainable at the routine operating parameters.

1.2.4 **Sensitivity:** The sensitivity of the analytical procedure over concentration ranges representing 0.4 to 2 times the target concentration, based on the recommended air volumes, was 7,589 area units per µg/mL for formaldehyde. This value was determined from the slope of the calibration curve. The sensitivity may vary with the particular instrument used in the analysis.

1.2.5 **Recovery:** The recovery of formaldehyde from samples used in an 18-day

storage test remained above 92% when the samples were stored at ambient temperature. These values were determined from regression lines which were calculated from the storage data. The recovery of the analyte from the collection device must be at least 75% following storage.

1.2.6 **Precision (analytical method only):** The pooled coefficient of variation obtained from replicate determinations of analytical standards over the range of 0.4 to 2 times the target concentration was 0.0052 for formaldehyde (Section 4.3).

1.2.7 **Precision (overall procedure):** The precision at the 95% confidence level for the ambient temperature storage tests was $\pm 14.3\%$ for formaldehyde. These values each include an additional $\pm 5\%$ for sampling error. The overall procedure must provide results at the target concentrations that are $\pm 25\%$ at the 95% confidence level.

1.2.8 **Reproducibility:** Samples collected from controlled test atmospheres and a draft copy of this procedure were given to a chemist unassociated with this evaluation. The formaldehyde samples were analyzed following 15 days storage. The average recovery was 96.3% and the standard deviation was 1.7%.

1.3 **Advantages:**

1.3.1 The sampling and analytical procedures permit the simultaneous determination of acrolein and formaldehyde.

1.3.2 Samples are stable following storage at ambient temperature for at least 18 days.

1.4 **Disadvantages:** *None.*

2. Sampling Procedure

2.1 **Apparatus:**

2.1.1 Samples are collected by use of a personal sampling pump that can be calibrated to within $\pm 5\%$ of the recommended 0.1 L/min sampling rate with the sampling tube in line.

2.1.2 Samples are collected with laboratory prepared sampling tubes. The sampling tube is constructed of silane treated glass and is about 8-cm long. The ID is 4 mm and the OD is 6 mm. One end of the tube is tapered so that a glass wool end plug will hold the contents of the tube in place during sampling. The other end of the sampling tube is open to its full 4-mm ID to facilitate packing of the tube. Both ends of the tube are fire-polished

for safety. The tube is packed with a 75-mg backup section, located nearest the tapered end and a 150-mg sampling section of pretreated XAD-2 adsorbent which has been coated with 2-HMP. The two sections of coated adsorbent are separated and retained with small plugs of silanized glass wool. Following packing, the sampling tubes are sealed with two 7/32 inch OD plastic end caps. Instructions for the pretreatment and the coating of XAD-2 adsorbent are presented in Section 4 of this method.

2.1.3 Sampling tubes, similar to those recommended in this method, are marketed by Supelco, Inc. These tubes were not available when this work was initiated; therefore, they were not evaluated.

2.2 Reagents: None required.

2.3 Technique:

2.3.1 Properly label the sampling tube before sampling and then remove the plastic end caps.

2.3.2 Attach the sampling tube to the pump using a section of flexible plastic tubing such that the large, front section of the sampling tube is exposed directly to the atmosphere. Do not place any tubing ahead of the sampling tube. The sampling tube should be attached in the worker's breathing zone in a vertical manner such that it does not impede work performance.

2.3.3 After sampling for the appropriate time, remove the sampling tube from the pump and then seal the tube with plastic end caps.

2.3.4 Include at least one blank for each sampling set. The blank should be handled in the same manner as the samples with the exception that air is not drawn through it.

2.3.5 List any potential interferences on the sample data sheet.

2.4 Breakthrough:

2.4.1 Breakthrough was defined as the relative amount of analyte found on a backup sample in relation to the total amount of analyte collected on the sampling train.

2.4.2 For formaldehyde collected from test atmospheres containing 6 times the PEL, the average 5% breakthrough air volume was 41 L. The sampling rate was 0.1 L/min and the average mass of formaldehyde collected was 250 µg.

2.5 Desorption Efficiency: No desorption efficiency corrections are necessary to compute air sample results because analytical standards are prepared using coated adsorbent. Desorption efficiencies were determined, however, to investigate the recoveries of the analytes from the sampling device. The average recovery over the range of 0.4 to 2 times the target concentration, based on the recommended air volumes, was 96.2% for formaldehyde. Desorption efficiencies were essentially constant over the ranges studied.

2.6 Recommended Air Volume and Sampling Rate:

2.6.1 The recommended air volume for formaldehyde is 24 L.

2.6.2 The recommended sampling rate is 0.1 L/min.

2.7 Interferences:

2.7.1 Any collected substance that is capable of reacting 2-HMP and thereby depleting the derivatizing agent is a potential interference. Chemicals which contain a carbonyl group, such as acetone, may be capable of reacting with 2-HMP.

2.7.2 There are no other known interferences to the sampling method.

2.8 Safety Precautions:

2.8.1 Attach the sampling equipment to the worker in such a manner that it will not interfere with work performance or safety.

2.8.2 Follow all safety practices that apply to the work area being sampled.

3. Analytical Procedure

3.1 Apparatus:

3.1.1 A gas chromatograph (GC), equipped with a nitrogen selective detector. A Hewlett-Packard Model 5840A GC fitted with a nitrogen-phosphorus flame ionization detector (NPD) was used for this evaluation. Injections were performed using a Hewlett-Packard Model 7671A automatic sampler.

3.1.2 A GC column capable of resolving the analytes from any interference. A 6 ft x 1/4 in OD (2mm ID) glass GC column containing 10% UCON 50-HB-5100 + 2% KOH on 80/100 mesh Chromosorb W-AW was used for the evaluation. Injections were performed on-column.

3.1.3 Vials, glass 2-mL with Teflon-lined caps.

3.1.4 Volumetric flasks, pipets, and syringes for preparing standards, making dilutions, and performing injections.

3.2 Reagents:

- 3.2.1 Toluene and dimethylformamide. Burdick and Jackson solvents were used in this evaluation.
- 3.2.2 Helium, hydrogen, and air, GC grade.
- 3.2.3 Formaldehyde, 37%, by weight, in water. Aldrich Chemical, ACS Reagent Grade formaldehyde was used in this evaluation.
- 3.2.4 Amberlite XAD-2 adsorbent coated with 2-(hydroxymethyl—piperidine (2-HMP), 10% by weight (Section 4).
- 3.2.5 Desorbing solution with internal standard. This solution was prepared by adding 20 µL of dimethylformamide to 100 mL of toluene.

3.3 Standard preparation:

- 3.3.1 Formaldehyde: Prepare stock standards by diluting known volumes of 37% formaldehyde solution with methanol. A procedure to determine the formaldehyde content of these standards is presented in Section 4. A standard containing 7.7 mg/mL formaldehyde was prepared by diluting 1 mL of the 37% reagent to 50 mL with methanol.
- 3.3.2 It is recommended that analytical standards be prepared about 16 hours before the air samples are to be analyzed in order to ensure the complete reaction of the analytes with 2-HMP. However, rate studies have shown the reaction to be greater than 95% complete after 4 hours. Therefore, one or two standards can be analyzed after this reduced time if sample results are outside the concentration range of the prepared standards.
- 3.3.3 Place 150-mg portions of coated XAD-2 adsorbent, from the same lot number as used to collect the air samples, into each of several glass 2-mL vials. Seal each vial with a Teflon-lined cap.
- 3.3.4 Prepare fresh analytical standards each day by injecting appropriate amounts of the diluted analyte directly onto 150-mg portions of coated adsorbent. It is permissible to inject both acrolein and formaldehyde on the same adsorbent portion. Allow the standards to stand at room temperature. A standard, approximately the target levels, was prepared by injecting 11 µL of the acrolein and 12 µL of the formaldehyde stock standards onto a single coated XAD-2 adsorbent portion.

- 3.3.5 Prepare a sufficient number of standards to generate the calibration curves. Analytical standard concentrations should bracket sample concentrations. Thus, if samples are not in the concentration range of the prepared standards, additional standards must be prepared to determine detector response.
- 3.3.7 Desorb the standards in the same manner as the samples following the 16-hour reaction time.

3.4 Sample preparation:

- 3.4.1 Transfer the 150-mg section of the sampling tube to a 2-mL vial. Place the 75-mg section in a separate vial. If the glass wool plugs contain a significant number of adsorbent beads, place them with the appropriate sampling tube section. Discard the glass wool plugs if they do not contain a significant number of adsorbent beads.
- 3.4.2 Add 1 mL of desorbing solution to each vial.
- 3.4.3 Seal the vials with Teflon-lined caps and then allow them to desorb for one hour. Shake the vials by hand with vigorous force several times during the desorption time.
- 3.4.4 Save the used sampling tubes to be cleaned and recycled.

3.5 Analysis:

3.5.1 GC Conditions

Column Temperature:

Bi-level temperature program—First level: 100 to 140° C at 4° C/min following completion of the first level.

Second level: 140 to 180° C at 20° C/min following completion of the first level. Isothermal period: Hold column at 180° C until the recorder pen returns to baseline (usually about 25 min after injection).

Injector temperature: 180° C

Helium flow rate: 30 mL/min (detector response will be reduced if nitrogen is substituted for helium carrier gas).

Injection volume: 0.8 L

GC column: Six-ft x 1/4-in OD (2 mm ID) glass GC column containing 10% UCON 50-HB-5100 + 2% KOH on 80/100 Chromosorb W-AW.

NPD conditions:

Hydrogen flow rate: 3 mL/min

Air flow rate: 50 mL/min

Detector temperature: 275° C

- 3.5.2 *Chromatogram*: For an example of a typical chromatogram, see Figure 4.11 in OSHA Method 52.
- 3.5.3 Use a suitable method, such as electronic integration, to measure detector response.
- 3.5.4 Use an internal standard method to prepare the calibration curve with several standard solutions of different concentrations. Prepare the calibration curve daily. Program the integrator to report results in $\mu\text{g}/\text{mL}$.
- 3.5.5 Bracket sample concentrations with standards.

3.6 *Interferences (Analytical)*

- 3.6.1 Any compound with the same general retention time as the analytes and which also gives a detector response is a potential interference. Possible interferences should be reported to the laboratory with submitted samples by the industrial hygienist.
- 3.6.2 GC parameters (temperature, column, etc.) may be changed to circumvent interferences.
- 3.6.3 A useful means of structure designation is GC/MS. It is recommended this procedure be used to confirm samples whenever possible.
- 3.6.4 The coated adsorbent usually contains a very small amount of residual formaldehyde derivative (Section 4.8).

3.7 *Calculations*:

- 3.7.1 Results are obtained by use of calibration curves. Calibration curves are prepared by plotting detector response against concentration for each standard. The best line through the data points is determined by curve fitting.
- 3.7.2 The concentration, in $\mu\text{g}/\text{mL}$, for a particular sample is determined by comparing its detector response to the calibration curve. If either of the analytes is found on the backup section, it is added to the amount found on the front section. Blank corrections should be performed before adding the results together.
- 3.7.3 The acrolein and/or formaldehyde air concentration can be expressed using the following equation:

$$\text{mg}/\text{m}^3 = (A)(B)/C$$
 where A = $\mu\text{g}/\text{mL}$ from 3.7.2, B = desorption volume, and C = L of air sampled.
 No desorption efficiency corrections are required.

- 3.7.4 The following equation can be used to convert results in mg/m^3 to ppm.

$$\text{ppm} = (\text{mg}/\text{m}^3)(24.45)/\text{MW}$$

where mg/m^3 = result from 3.7.3, 24.45 = molar volume of an ideal gas at 760 mm Hg and 25° C, M = molecular weight (30.0).

4. Backup Data

- 4.1 Backup data on detection limits, reliable quantitation limits, sensitivity and precision of the analytical method, break-through, desorption efficiency, storage, reproducibility, and generation of test atmospheres are available in OSHA Method 52, developed by the Organics Methods Evaluation Branch, OSHA Analytical Laboratory, Salt Lake City, Utah.
- 4.2 *Procedure to Coat XAD-2 Adsorbent with 2-HMP*:
- 4.2.1 Apparatus: Soxhlet extraction apparatus, rotary evaporation apparatus, vacuum dessicator, 1-L vacuum flask, 1-L round-bottomed evaporative flask, 1-L Erlenmeyer flask, 250-mL Buchner funnel with a coarse fritted disc, etc.
- 4.2.2 *Reagents*:
- 4.2.2.1 Methanol, isooctane, and toluene.
- 4.2.2.2 2-(Hydroxymethyl) piperidine.
- 4.2.2.3 Amberlite XAD-2 non-ionic polymeric adsorbent, 20 to 60 mesh, Aldrich Chemical XAD-2 was used in this evaluation.
- 4.2.3 *Procedure*: Weigh 125 g of crude XAD-2 adsorbent into a 1-L Erlenmeyer flask. Add about 200 mL of water to the flask and then swirl the mixture to wash the adsorbent. Discard any adsorbent that floats to the top of the water and then filter the mixture using a fritted Buchner funnel. Air dry the adsorbent for 2 minutes. Transfer the adsorbent back to the Erlenmeyer flask and then add about 200 mL of methanol to the flask. Swirl and then filter the mixture as before. Transfer the washed adsorbent back to the Erlenmeyer flask and then add about 200 mL of methanol to the flask. Swirl and then filter the mixture as before. Transfer the washed adsorbent to a 1-L round-bottomed evaporative flask, add 13 g of 2-HMP and then 200 mL of methanol, swirl the mixture and then allow it to stand for one hour. Remove the methanol at about 40° C and reduced pressure using a rotary evaporation apparatus. Transfer the coated adsorbent to a suitable container and store it in a

vacuum desiccator at room temperature overnight. Transfer the coated adsorbent to a Soxhlet extractor and then extract the material with toluene for about 24 hours. Discard the contaminated toluene, add methanol in its place and then continue the Soxhlet extraction for an additional 4 hours. Transfer the adsorbent to a weighted 1-L round-bottom evaporative flask and remove the methanol using the rotary evaporation apparatus. Determine the weight of the adsorbent and then add an amount of 2-HMP, which is 10% by weight of the adsorbent. Add 200 mL of methanol and then swirl the mixture. Allow the mixture to stand for one hour. Remove the methanol by rotary evaporation. Transfer the coated adsorbent to a suitable container and store it in a vacuum desiccator until all traces of solvents are gone. Typically, this will take 2–3 days. The coated adsorbent should be protected from contamination. XAD-2 adsorbent treated in this manner will probably not contain residual acrolein derivative. However, this adsorbent will often contain residual formaldehyde derivative levels of about 0.1 g per 150 mg of adsorbent. If the blank values for a batch of coated adsorbent are too high, then the batch should be returned to the Soxhlet extractor, extracted with toluene again and then recoated. This process can be repeated until the desired blank levels are attained.

The coated adsorbent is now ready to be packed into sampling tubes. The sampling tubes should be stored in a sealed container to prevent contamination. Sampling tubes should be stored in the dark at room temperature. The sampling tubes should be segregated by coated adsorbent lot number. A sufficient amount of each lot number of coated adsorbent should be retained to prepare analytical standards for use with air samples from that lot number.

4.3 A Procedure to Determine Formaldehyde by Acid Titration: Standardize the 0.1 N HCl solution

using sodium carbonate and methyl orange indicator.

Place 50 mL of 0.1 M sodium sulfite and three drops of thymophthalein indicator into a 250-mL Erlenmeyer flask. Titrate the contents of the flask to a colorless endpoint with 0.1 N HCl (usually one or two drops is sufficient). Transfer 10 mL of the formaldehyde/methanol solution (prepared in 3.3.1) into the same flask and titrate the mixture with 0.1 N HCl, again, to a colorless end- point. The formaldehyde concentration of the standard may be calculated by the following equation:

$$\text{Formaldehyde, mg/mL} = \text{acid titer} \times \text{acid normality} \times 30.0 / \text{mL of sample}$$

This method is based on the quantitative liberation of sodium hydroxide when formaldehyde reacts with sodium sulfite to form the formaldehyde-bisulfite addition product. The volume of sample may be varied depending on the formaldehyde content but the solution to be titrated must contain excess sodium sulfite. Formaldehyde solutions containing substantial amounts of acid or base must be neutralized before analysis.

APPENDIX C TO § 1910.1048—MEDICAL SURVEILLANCE—FORMALDEHYDE

I. Health Hazards

The occupational health hazards of formaldehyde are primarily due to its toxic effects after inhalation, after direct contact with the skin or eyes by formaldehyde in liquid or vapor form, and after ingestion.

II. Toxicology

A. Acute Effects of Exposure

1. *Inhalation (breathing)*: Formaldehyde is highly irritating to the upper airways. The concentration of formaldehyde that is immediately dangerous to life and health is 100 ppm. Concentrations above 50 ppm can cause severe pulmonary reactions within minutes. These include pulmonary edema, pneumonia, and bronchial irritation which can result in death. Concentrations above

Exam Question

- 14.) Formaldehyde is highly irritating to the upper airways. The concentration of formaldehyde that is immediately dangerous to life and health is _____ ppm.
- a. 25
 - b. 50
 - c. 75
 - d. 100

5 ppm readily cause lower airway irritation characterized by cough, chest tightness and wheezing. There is some controversy regarding whether formaldehyde gas is a pulmonary sensitizer which can cause occupational asthma in a previously normal individual. Formaldehyde can produce symptoms of bronchial asthma in humans. The mechanism may be either sensitization of the individual by exposure to formaldehyde or direct irritation by formaldehyde in persons with pre-existing asthma. Upper airway irritation is the most common respiratory effect reported by workers and can occur over a wide range of concentrations, most frequently above 1 ppm. However, airway irritation has occurred in some workers with exposures to formaldehyde as low as 0.1 ppm. Symptoms of upper airway irritation include dry or sore throat, itching and burning sensations of the nose, and nasal congestion. Tolerance to this level of exposure may develop within 1–2 hours. This tolerance can permit workers remaining in an environment of gradually increasing formaldehyde concentrations to be unaware of their increasingly hazardous exposure.

2. ***Eye contact:*** Concentrations of formaldehyde between 0.05 ppm and 0.5 ppm produce a sensation of irritation in the eyes with burning, itching, redness, and tearing. Increased rate of blinking and eye closure generally protects the eye from damage at these low levels, but these protective mechanisms may interfere with some workers' work abilities. Tolerance can occur in workers continuously exposed to concentrations of formaldehyde in this range. Accidental splash injuries of human eyes to aqueous solutions of formaldehyde (formalin) have resulted in a wide range of ocular injuries including corneal opacities and blindness. The severity of the reactions has been directly dependent on the concentration of formaldehyde in solution and the amount of time lapsed before emergency and medical intervention.
3. ***Skin contact:*** Exposure to formaldehyde solutions can cause irritation of the skin and allergic contact dermatitis. These skin diseases and disorders can occur at levels well below those encountered by many formaldehyde workers. Symptoms include erythema, edema, and vesiculation or hives. Exposure to liquid formalin or formaldehyde vapor can provoke skin reactions in sensitized individuals even when airborne concentrations of formaldehyde are well below 1 ppm.

4. ***Ingestion:*** Ingestion of as little as 30 ml of a 37 percent solution of formaldehyde (formalin) can result in death. Gastrointestinal toxicity after ingestion is most severe in the stomach and results in symptoms which can include nausea, vomiting, and severe abdominal pain. Diverse damage to other organ systems including the liver, kidney, spleen, pancreas, brain, and central nervous systems can occur from the acute response to ingestion of formaldehyde.

B. Chronic Effects of Exposure

Long term exposure to formaldehyde has been shown to be associated with an increased risk of cancer of the nose and accessory sinuses, nasopharyngeal and oropharyngeal cancer, and lung cancer in humans. Animal experiments provide conclusive evidence of a causal relationship between nasal cancer in rats and formaldehyde exposure. Concordant evidence of carcinogenicity includes DNA binding, genotoxicity in short-term tests, and cytotoxic changes in the cells of the target organ suggesting both preneoplastic changes and a dose-rate effect. Formaldehyde is a complete carcinogen and appears to exert an effect on at least two stages of the carcinogenic process.

III. Surveillance considerations

A. History

1. ***Medical and occupational history:*** Along with its acute irritative effects, formaldehyde can cause allergic sensitization and cancer. One of the goals of the work history should be to elicit information on any prior or additional exposure to formaldehyde in either the occupational or the non-occupational setting.
2. ***Respiratory history:*** As noted above, formaldehyde has recognized properties as an air-way irritant and has been reported by some authors as a cause of occupational asthma. In addition, formaldehyde has been associated with cancer of the entire respiratory system of humans. For these reasons, it is appropriate to include a comprehensive review of the respiratory system in the medical history. Components of this history might include questions regarding dyspnea on exertion, shortness of breath, chronic air-way complaints, hyperreactive airway disease, rhinitis, bronchitis, bronchiolitis, asthma, emphysema, respiratory allergic reaction, or other preexisting pulmonary disease.

In addition, generalized airway hypersensitivity can result from exposures to a single sensitizing agent. The examiner should, therefore, elicit any prior history

of exposure to pulmonary irritants, and any short-term or long-term effects of that exposure.

Smoking is known to decrease mucociliary clearance of materials deposited during respiration in the nose and upper airways. This may increase a worker's exposure to inhaled materials such as formaldehyde vapor. In addition, smoking is a potential confounding factor in the investigation of any chronic respiratory disease, including cancer. For these reasons, a complete smoking history should be obtained.

3. *Skin Disorders:* Because of the dermal irritant and sensitizing effects of formaldehyde, a history of skin disorders should be obtained. Such a history might include the existence of skin irritation, previously documented skin sensitivity, and other dermatologic disorders. Previous exposure to formaldehyde and other dermal sensitizers should be recorded.
4. *History of atopic or allergic diseases:* Since formaldehyde can cause allergic sensitization of the skin and airways, it might be useful to identify individuals with prior allergen sensitization. A history of atopic disease and allergies to formaldehyde or any other substances should also be obtained. It is not definitely known at this time whether atopic diseases and allergies to formaldehyde or any other substances should also be obtained. Also it is not definitely known at this time whether atopic individuals have a greater propensity to develop formaldehyde sensitivity than the general population, but identification of these individuals may be useful for ongoing surveillance.
5. *Use of disease questionnaires:* Comparison of the results from previous years with present results provides the best method for detecting a general deterioration in health when toxic signs and symptoms are measured subjectively. In this way recall bias does not affect the results of the analysis.

Consequently, OSHA has determined that the findings of the medical and work histories should be kept in a standardized form for comparison of the year-to-year results.

B. Physical Examination

1. *Mucosa of eyes and airways:* Because of the irritant effects of formaldehyde, the examining physician should be alert to evidence of this irritation. A speculum examination of the nasal mucosa may be helpful in assessing possible irritation and cytotoxic changes, as may be indirect

inspection of the posterior pharynx by mirror.

2. *Pulmonary system:* A conventional respiratory examination, including inspection of the thorax and auscultation and percussion of the lung fields should be performed as part of the periodic medical examination. Although routine pulmonary function testing is only required by the standard once every year for persons who are exposed over the TWA concentration limit, these tests have an obvious value in investigating possible respiratory dysfunction and should be used wherever deemed appropriate by the physician. In cases of alleged formaldehyde-induced airway disease, other possible causes of pulmonary dysfunction (including exposures to other substances) should be ruled out. A chest radiograph may be useful in these circumstances. In cases of suspected airway hypersensitivity or allergy, it may be appropriate to use bronchial challenge testing with formaldehyde or methacholine to determine the nature of the disorder. Such testing should be performed by or under the supervision of a physician experienced in the procedures involved.
3. *Skin:* The physician should be alert to evidence of dermal irritation or sensitization, including reddening and inflammation, urticaria, blistering, scaling, formation of skin fissures, or other symptoms. Since the integrity of the skin barrier is compromised by other dermal diseases, the presence of such disease should be noted. Skin sensitivity testing carries with it some risk of inducing sensitivity, and therefore, skin testing for formaldehyde sensitivity should not be used as a routine screening test. Sensitivity testing may be indicated in the investigation of a suspected existing sensitivity. Guidelines for such testing have been prepared by the North American Contact Dermatitis Group.

C. Additional Examinations or Tests

The physician may deem it necessary to perform other medical examinations or tests as indicated. The standard provides a mechanism whereby these additional investigations are covered under the standard for occupational exposure to formaldehyde.

D. Emergencies

The examination of workers exposed in an emergency should be directed at the organ systems most likely to be affected. Much of the content of the examination will be similar to the periodic examination unless the patient

has received a severe acute exposure requiring immediate attention to prevent serious consequences. If a severe overexposure requiring medical intervention or hospitalization has occurred, the physician must be alert to the possibility of delayed symptoms. Follow-up non-routine examinations may be necessary to assure the patient's well-being.

E. Employer Obligations

The employer is required to provide the physician with the following information: A copy of this standard and appendices A, C, and D; a description of the affected employee's duties as they relate to his or her exposure concentration; an estimate of the employee's exposure including duration (e.g. 15 hr/wk, three 8-hour shifts, full-time); a description of any personal protective equipment, including respirators, used by the employee; and the results of any previous medical determinations for the affected employee related to formaldehyde exposure to the extent that this information is within the employer's control.

F. Physician's Obligations

The standard requires the employer to obtain a written statement from the physician. This statement must contain the physician's opinion as to whether the employee has any

medical condition which would place him or her at increased risk of impaired health from exposure to formaldehyde or use of respirators, as appropriate. The physician must also state his opinion regarding any restrictions that should be placed on the employee's exposure to formaldehyde or upon the use of protective clothing or equipment such as respirators. If the employee wears a respirator as a result of his or her exposure to formaldehyde, the physician's opinion must also contain a statement regarding the suitability of the employee to wear the type of respirator assigned. Finally, the physician must inform the employer that the employee has been told the results of the medical examination and of any medical conditions which require further explanation or treatment. This written opinion is not to contain any information on specific findings or diagnoses unrelated to occupational exposure to formaldehyde.

The purpose in requiring the examining physician to supply the employer with a written opinion is to provide the employer with a medical basis to assist the employer in placing employees initially, in assuring that their health is not being impaired by formaldehyde, and to assess the employee's ability to use any required protective equipment.

APPENDIX D TO § 1910.1048— NONMANDATORY MEDICAL DISEASE QUESTIONNAIRE

A. Identification

Plant Name _____ Date _____

Employee Name _____ S.S. # _____

Job Title _____

Birth date: _____ 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 furniturestripping, 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 this on any particular day of the week? Yes ___ No ___

If yes, what day of the week? _____

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: _____

[57 FR 22310, May 27, 1992; 57 FR 27161, June 18, 1992; 61 FR 5508, Feb. 13, 1996; 63 FR 1292, Jan. 8, 1998; 63 FR 20099, Apr. 23, 1998]

Ventilation In Embalming Rooms

The best position for supplied air is above the head of the worker, coming down, and exhausting through the floor or near the floor. The next best option is for supplied air to come from the head of the embalming table (adding a fan may increase efficiency) and the exhaust to be at the foot of the table. Ventilation requirements for funeral home preparation rooms are not specifically addressed in current existing guidelines. However, the National Mechanical Code of the Building Officials and Code Administrators (BOCA) and the Heating, Ventilation, and Air-Conditioning Handbook of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) specify ventilation criteria for autopsy rooms. These criteria for autopsy rooms can serve as useful guidelines for effectively ventilating funeral home preparation rooms.

BOCA requires a minimum of 12 air changes per hour for autopsy rooms. The BOCA Code also requires that the air shall be exhausted to the outdoors, at an approved location on the exterior of the building. ASHRAE recommends a minimum of 12 air changes per hour be supplied to autopsy rooms, and that at least two of the air changes per hour be outdoor air. ASHRAE also specifies that the room be negatively pressurized in relation to adjacent areas. The New Jersey Funeral Directors Association recommends, as an accepted industry practice, 10-15 air changes per hour for preparation rooms. A source of makeup air should also be provided in preparation rooms to prevent excessive negative pressurization and to improve air mixing within the room.

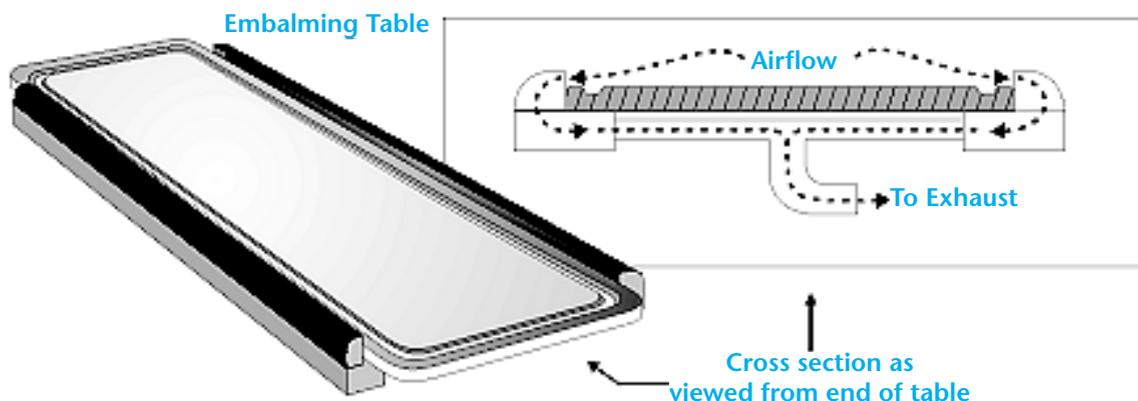
It is likely that a qualified HVAC contractor could correct these ventilation problems without a great deal of expense, and it is recommended that modifications be implemented to keep your exposures to formaldehyde as low as possible. A general notion of the ventilation system recommended is given in the diagram below, taken from a design for embalming tables from the National Institute for Occupational Safety and Health, NIOSH.

Regardless of what specifications you use for your ventilation system, it is very important that the air flow is designed so that any vapors are pulled *away* from the employees' breathing zone. Therefore, having adequate exhaust air capacity below the work surface is critical to reducing exposures to formaldehyde. If modifications are made to the ventilation system within the preparation room, ensure that ventilation testing is conducted to ensure that adequate air velocity and direction is maintained when the system is operating.

Compliance with OSHA Bloodborne Pathogens Standard

Introduction to the OSHA Bloodborne Pathogens Standard

Employees with occupational exposure to blood and other potentially infectious materials (OPIM) face the hazard of becoming infected with bloodborne pathogens (BBP). Because of the severe consequences of contracting diseases from these pathogens,



Exam Question

15.) BOCA requires a minimum of ____ air changes per hour for autopsy rooms.

- a. 6
- b. 12
- c. 18
- d. 24

employees who are occupationally exposed to bloodborne pathogens must be included in an exposure control plan, which is designed to eliminate or minimize employees' exposures through specific procedures, practices, controls, and training. "Universal Precautions" is an approach to infection control in which all human blood and certain human body fluids, such as semen, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids, are treated as if known to be contain bloodborne pathogens.

Compliance Requirements for Funeral Homes

Funeral homes in which embalming is conducted must comply with OSHA's Bloodborne Pathogens standard. The requirements for compliance are listed in the following table. Throughout this section, the following acronyms are used: BBP (bloodborne pathogens); OPIM (other potentially infectious material).

Bloodborne Pathogens Action Items	
Hazardous Condition or Requirement	Recommended Corrective Actions
Each funeral home that conducts embalming must develop an exposure control plan (bloodborne pathogen program) designed to minimize or eliminate employees' exposures to bloodborne pathogens. 29 CFR 1910.1030(c)(1)(iii)	Document the exposure control plan in writing. Employees must be made aware of the written program and know where the program is kept. The written program must be reviewed at least annually. After reviewing the program you must document your review.
Hepatitis B vaccinations must be offered to all employees who are potentially exposed. 29 CFR 1910.1030(f)(1)	All employees who are potentially exposed to blood or OPIM must be offered the hepatitis B vaccination. For employees who already have had the series attempt to obtain a record that the vaccinations were performed. If records cannot be obtained then have employees sign a vaccine declination form. An example of the declination form is in the OSHA Bloodborne Pathogen standard, following this Action Items list. For the new employees who start the hepatitis B vaccination series offer the Hepatitis B vaccination titer for new employees who have not already completed the series within 1 to 2 month after they complete the vaccination series. The titer is required for those new employees who have ongoing blood exposure and have exposure to sharps. Note: Currently the Center for Disease Control does not recommend that you do a titer for those who are already outside of the 1-2 months after there series of vaccinations because the results may or may not be accurate. Also, they are not currently recommending that a booster shot be given. However, always follow your doctor's orders.

Exam Question

- 16.) Funeral homes in which embalming is conducted must comply with OSHA's Bloodborne Pathogens standard.
- a. True
 - b. False

Exam Question

- 17.) Each funeral home that conducts embalming must develop an exposure control plan designed to eliminate/minimize employees' exposure to bloodborne pathogens. At a minimum, how often must this written program be reviewed?
- a. Quarterly
 - b. Monthly
 - c. Annually
 - d. Bi-annual

Bloodborne Pathogens Action Items

Hazardous Condition or Requirement	Recommended Corrective Actions
<p>The company must investigate and/or document the use of engineering controls which reflect the best bloodborne pathogen exposure control technology available (including safer disposable scalpels, blunted suture needles, and safer hypodermic syringes).</p> <p>29 CFR 1910.1030(c)(1)(v) 29 CFR 1910.1030(d)(2)(i)</p>	<ol style="list-style-type: none"> Investigate engineering and work practice controls as the primary means of eliminating or minimizing employee exposure. Preventing exposures requires a comprehensive program, including engineering controls (e.g., safer scalpels) and proper work practices (e.g., no-hands procedures in handling contaminated sharps, eliminating hand-to-hand instrument passing). <i>Non-managerial employees must be involved in this process and their input must be documented.</i> Commercially available products that are designed to eliminate infection from SHARPS injuries must be used, including safety disposable scalpels, blunted suture needles, and safety hypodermic needles. Refer to your products distributor for commercially available products. There are some needles that have to be re-used but should only be used when necessary and when the safety hypodermic syringes cannot be used. Do not remove disposable needles from the syringe with forceps. Dispose of the needle and the syringe to reduce exposure to blood borne pathogens. Implement feasible controls Document the engineering control investigation You must review the safer devices at least annually to determine if newer technology is available.
<p>Protect workers from puncture wounds caused by syringes, scalpels, suturing needles, and other “sharps.”</p> <p>29 CFR 1910.1030(d)(2)(vii)</p>	<p>Use syringes, scalpels, suturing needles, and other “sharps” which are specifically designed to prevent puncture wounds. If a needle must be recapped, placing a needle cap into a stationary cap holder, and sliding the needle into the holder using one hand would eliminate the risks of two handed recapping of needles. Do not leave the exposed needle on the instrument tray.</p> <p>Avoid handing uncapped syringes between personnel. Use a needle disposal containers equipped with devices to secure the needle while the syringe is unscrewed to eliminate handling of the needle during removal from the syringe.</p>
<p>A post-exposure evaluation and follow-up procedure must be in place in the event of an employee’s exposure to blood or OPIM, and specifically in the event of a puncture wound from a suturing needle.</p> <p>29 CFR 1910.1030(f)(3) & 29 CFR 1910.1030(f)(3)(iv)</p>	<p>Following the report of an exposure incident, provide a confidential medical evaluation and follow-up to the affected employee. This should include identification and documentation of the disease status of the source individual (the corpse) if this can be obtained. The employees must be sent to a <u>medical facility</u> that is capable of providing treatment in accordance with the latest CDC guidelines for the post-exposure care of individuals who have been exposed to human blood or other potentially infectious bodily fluids.</p>
<p>Employees must use “Universal Precautions” with all corpses.</p> <p>29 CFR 1910.1030(d)(1)</p>	<p>Ensure that all employees are adequately trained to understand the concept of “universal precautions” and use them in all procedures where there is potential for contact with bloodborne pathogens—specifically, every time an embalming is done.</p>

Bloodborne Pathogens Action Items

Hazardous Condition or Requirement	Recommended Corrective Actions
<p>Drinking (coffee) and eating must not be allowed in work areas (including the embalming room) where there is a reasonable likelihood of exposure to blood or OPIM.</p> <p>29 CFR 1910.1030(d)(2)(ix)</p>	<p>Ensure food and drink is not allowed in the embalming room, as well as, applying cosmetics or lip balm, and handling contact lenses in areas with a likelihood of exposure.</p>
<p>The facility must have a written housekeeping schedule for those areas which may be contaminated with blood or OPIM.</p> <p>29 CFR 1910.1030(d)(4)(i)</p>	<p>Determine and implement an appropriate written schedule for cleaning and decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area. All equipment and environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials.</p>
<p>Only products or chemicals that are listed by the EPA or FDA as registered disinfectants or sterilants may be used to decontaminate surfaces or instruments that have been contaminated with blood or OPIM.</p> <p>29 CFR 1910.1030(d)(4)(ii) 29 CFR 1910.1030(d)(4)(ii)(A)</p>	<p>Check the label to ensure that you are using on products or chemicals that are listed by the EPA or FDA as registered disinfectants or sterilants to decontaminate surfaces or instruments that have been contaminated with blood or OPIM. As is true with all disinfectant products, the effectiveness is governed by strict adherence to the instructions on the label.</p> <p>A mixture of 1 part sodium hypochlorite (household bleach) to 10 to 100 parts water is considered adequate for surfaces (made up daily).</p> <p>All instruments must be disinfected with either EPA or FDA approved cold sterilants after each use.</p> <p>NOTE: <i>Scrubbing Bubbles®, Mr. Clean®, Pinesol and other similar products are not to be used for decontamination of work surfaces because they are not registered disinfectants.</i></p> <p><i>Also, Reusable instruments must be properly disinfected after each use (i.e., in Cidex®); soap and water or Lysol® are not adequate for disinfecting contaminated instruments.</i></p>
<p>Use tongs or forceps to reach into the cleaning containers to pick up sharps.</p> <p>29 CFR 1910.1030(d)(3)(xi)(E)</p>	<p>Reusable sharps that are contaminated with blood or other potentially infectious materials should not be stored or processed in a manner that requires employees to reach by hand into the containers where these sharps have been placed. Provide and require the use of tongs or forceps for this task.</p>
<p>Scrub sponges and other potentially contaminated instrument cleaning tools must be stored properly.</p> <p>29 CFR 1910.1030(d)(4)(ii)(A)</p>	<p>Place the scrub brush and other cleaning tools into a closeable container. The container must be labeled with a biohazard symbol or you can use a red container to identify it as a biohazard.</p>
<p>Attach a biohazard warning label to containers of potentially infectious material.</p> <p>29 CFR 1910.1030(g)(1)(i)</p>	<p>All contaminated articles should be labeled, including the instrument tray, mop and bucket, trash cans used for biohazard storage, and bags used for storing reusable clothing, towels, sheets, refrigerators and freezers containing blood/OPIM; and other containers used to store, transport or ship blood/OPIM. The warning label must be red or orange in color with a biohazard symbol and lettering in black.</p>

Bloodborne Pathogens Action Items

Hazardous Condition or Requirement	Recommended Corrective Actions
<p>Trash cans used for containment of biohazards must be lined with biohazard bags. The regulated waste must be placed in a container that can be closed or covered with a lid.</p> <p>29 CFR1910.1030(d)(4)(iii)(B)(1)(iii)</p>	<p>If the trash is bio-contaminated then you must put a red biohazard bag in the trashcan and a biohazard sticker on the outside.</p> <p>It is recommended that you use trashcans with foot pedal operation for the lid to prevent contaminating the lid with blood or OPIM.</p>
<p>Sharps containers must be easily accessible to personnel and located as close as is feasible to the immediate area where sharps are used.</p> <p>1910.1030(d)(4)(iii)(A)(2)(i)</p>	<p>The sharps container can not be stored in a manner that limits its accessibility. This is to ensure that an employee will not be stuck while trying to place a sharp in the sharps container. Sharps containers should not be placed on the floor, or on countertops where upper cabinets obstruct access.</p>
<p>Employees with occupational exposure to bloodborne pathogens must be trained on the safety procedures related to blood or OPIM.</p> <p>29 CFR 1910.1030(d)(3)(viii)</p>	<p>Provide training identified in the sample bloodborne pathogen sample program(in the appendix) for each exposed employee. Training must be provided before initial exposure, and at least yearly thereafter. This training must provide site specific training as it relates to the exposure control plan and post-exposure evaluation and follow-up.</p> <ol style="list-style-type: none"> 1. Employee training records must include the following: <ol style="list-style-type: none"> a) the dates of the training sessions; b) the contents or a summary of the training sessions; c) the names and qualifications of the persons conducting the training; and d) the names and job titles of all persons attending the training sessions. 2. Training records must be maintained for at least 3 years from the date of the training. Make sure that your training program covers all the elements required by OSHA as specified in the bloodborne pathogens standard.
<p>Although not required by OSHA for <u>funeral homes</u>, a log to document sharps related injuries is recommended.</p>	<p>The sharps injury log must include:</p> <ol style="list-style-type: none"> 1. The type and brand of device involved in the incident 2. The department or work area where the exposure incident occurred 3. An explanation of how the incident occurred

Complete text of OSHA Standard § 1910.1030 Bloodborne Pathogens

(a) **Scope and Application.** This section applies to all occupational exposure to blood or other potentially infectious materials as defined by paragraph (b) of this section.

(b) **Definitions.** For purposes of this section, the following shall apply:

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, or

designated representative.

Blood means human blood, human blood components, and products made from human blood.

Bloodborne Pathogens means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Clinical Laboratory means a workplace where diagnostic or other screening procedures are

performed on blood or other potentially infectious materials.

Contaminated means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Contaminated Laundry means laundry which has been soiled with blood or other potentially infectious materials or may contain sharps.

Contaminated Sharps means any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.

Decontamination means the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

Director means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designated representative.

Engineering controls means controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazard from the workplace.

Exposure Incident means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

Handwashing Facilities means a facility providing an adequate supply of running potable water, soap and single use towels or hot air drying machines.

Licensed Healthcare Professional is a person whose legally permitted scope of practice allows him or her to independently perform the activities required by paragraph (f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.

HBV means hepatitis B virus.

HIV means human immunodeficiency virus.

Needleless systems means a device that does not use needles for:

- (1) The collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established;
- (2) The administration of medication or fluids; or
- (3) Any other procedure involving the potential for occupational exposure to bloodborne pathogens

due to percutaneous injuries from contaminated sharps.

Occupational Exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

Other Potentially Infectious Materials means

- (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids;
- (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and
- (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Parenteral means piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.

Personal Protective Equipment is specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.

Production Facility means a facility engaged in industrial-scale, large-volume or high concentration production of HIV or HBV.

Regulated Waste means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

Research Laboratory means a laboratory producing or using research-laboratory-scale amounts of HIV or HBV. Research laboratories may produce high concentrations of HIV or HBV but not in the volume found in production facilities.

Sharps with engineered sharps injury protections means a nonneedle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery,

or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident.

Source Individual means any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, hospital and clinic patients; clients in institutions for the developmentally disabled; trauma victims; clients of drug and alcohol treatment facilities; residents of hospices and nursing homes; human remains; and individuals who donate or sell blood or blood components.

Sterilize means the use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.

Universal Precautions is an approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

Work Practice Controls means controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

(c) **Exposure control**

(1) *Exposure Control Plan.*

- (i) Each employer having an employee(s) with occupational exposure as defined by paragraph (b) of this section shall establish a written Exposure Control Plan designed to eliminate or minimize employee exposure.
- (ii) The Exposure Control Plan shall contain at least the following elements:
 - (A) The exposure determination required by paragraph (c) (2),
 - (B) The schedule and method of implementation for paragraphs (d) Methods of Compliance, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, (g) Communication of Hazards to Employees, and (h) Recordkeeping, of this standard, and
 - (C) The procedure for the evaluation of circumstances surrounding exposure incidents as required by paragraph (f)(3)(i) of this standard.
- (iii) Each employer shall ensure that a copy of the Exposure Control Plan is accessible to employees in accordance with 29 CFR 1910.20(e).
- (iv) The Exposure Control Plan shall be reviewed

and updated at least annually and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure. The review and update of such plans shall also:

- (A) Reflect changes in technology that eliminate or reduce exposure to bloodborne pathogens; and
 - (B) Document annually consideration and implementation of appropriate commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure.
- (v) An employer, who is required to establish an Exposure Control Plan shall solicit input from non-managerial employees responsible for direct patient care who are potentially exposed to injuries from contaminated sharps in the identification, evaluation, and selection of effective engineering and work practice controls and shall document the solicitation in the Exposure Control Plan.
- (vi) The Exposure Control Plan shall be made available to the Assistant Secretary and the Director upon request for examination and copying.

(2) *Exposure determination.*

- (i) Each employer who has an employee(s) with occupational exposure as defined by paragraph (b) of this section shall prepare an exposure determination. This exposure determination shall contain the following:
 - (A) A list of all job classifications in which all employees in those job classifications have occupational exposure;
 - (B) A list of job classifications in which some employees have occupational exposure, and
 - (C) A list of all tasks and procedures or groups of closely related task and procedures in which occupational exposure occurs and that are performed by employees in job classifications listed in accordance with the provisions of paragraph (c)(2)(i)(B) of this standard. 60
- (ii) This exposure determination shall be made without regard to the use of personal protective equipment.

(d) **Methods of compliance**

- (1) *General.* Universal precautions shall be observed to prevent contact with blood or other potentially

infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

(2) *Engineering and work practice controls.*

- (i) Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.
- (ii) Engineering controls shall be examined and maintained or replaced on a regular schedule to ensure their effectiveness.
- (iii) Employers shall provide handwashing facilities which are readily accessible to employees.
- (iv) When provision of handwashing facilities is not feasible, the employer shall provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.
- (v) Employers shall ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment.
- (vi) Employers shall ensure that employees wash hands and any other skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.
- (vii) Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed except as noted in paragraphs (d)(2)(vii)(A) and (d)(2)(vii)(B) below. Shearing or breaking of contaminated needles is prohibited.
 - (A) Contaminated needles and other contaminated sharps shall not be bent, recapped or removed unless the employer can demonstrate that no alternative is feasible or that such action is required by a specific medical or dental procedure.
 - (B) Such bending, recapping or needle removal must be accomplished through the use of a mechanical device or a one-handed technique.
- (viii) Immediately or as soon as possible after use, contaminated reusable sharps shall be placed in appropriate containers until properly reprocessed. These containers shall be:

(A) Puncture resistant;

- (B) Labeled or color-coded in accordance with this standard;
- (C) Leakproof on the sides and bottom; and
- (D) In accordance with the requirements set forth in paragraph (d)(4)(ii)(E) for reusable sharps.

- (ix) Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure.
- (x) Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.
- (xi) All procedures involving blood or other potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, splattering, and generation of droplets of these substances.
- (xii) Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.
- (xiii) Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.
 - (A) The container for storage, transport, or shipping shall be labeled or color-coded according to paragraph (g)(1)(i) and closed prior to being stored, transported, or shipped. When a facility utilizes Universal Precautions in the handling of all specimens, the labeling/color-coding of specimens is not necessary provided containers are recognizable as containing specimens. This exemption only applies while such specimens/containers remain within the facility. Labeling or color-coding in accordance with paragraph (g)(1)(i) is required when such specimens/containers leave the facility.
 - (B) If outside contamination of the primary container occurs, the primary container shall be placed within a second container which prevents leakage during handling, processing, storage, transport, or shipping and is labeled or color-coded according to the requirements of this standard.
 - (C) If the specimen could puncture the primary container, the primary container shall be placed within a secondary container which is puncture-resistant in addition to the above characteristics.
- (xiv) Equipment which may become contaminated

with blood or other potentially infectious materials shall be examined prior to servicing or shipping and shall be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible.

- (A) A readily observable label in accordance with paragraph (g)(1)(i)(H) shall be attached to the equipment stating which portions remain contaminated.
- (B) The employer shall ensure that this information is conveyed to all affected employees, the servicing representative, and/or the manufacturer, as appropriate, prior to handling, servicing, or shipping so that appropriate precautions will be taken.

(3) Personal protective equipment

- (i) Provision. When there is occupational exposure, the employer shall provide, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices. Personal protective equipment will be considered “appropriate” only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee’s work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used.
- (ii) Use. The employer shall ensure that the employee uses appropriate personal protective equipment unless the employer shows that the employee temporarily and briefly declined to use personal protective equipment when, under rare and extraordinary circumstances, it was the employee’s professional judgment that in the specific instance its use would have prevented the delivery of health care or public safety services or would have posed an increased hazard to the safety of the worker or co-worker. When the employee makes this judgement, the circumstances shall be investigated and documented in order to determine whether changes can be instituted to prevent such occurrences in the future.
- (iii) Accessibility. The employer shall ensure that appropriate personal protective equipment in the appropriate sizes is readily accessible at the work-site or is issued to employees. Hypoallergenic gloves, glove liners, powderless gloves, or other similar alternatives shall be readily accessible to those employees who are

allergic to the gloves normally provided.

- (iv) Cleaning, Laundering, and Disposal. The employer shall clean, launder, and dispose of personal protective equipment required by paragraphs (d) and (e) of this standard, at no cost to the employee.
- (v) Repair and Replacement. The employer shall repair or replace personal protective equipment as needed to maintain its effectiveness, at no cost to the employee.
- (vi) If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible.
- (vii) All personal protective equipment shall be removed prior to leaving the work area.
- (viii) When personal protective equipment is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal.
- (ix) Gloves. Gloves shall be worn when it can be reasonably anticipated that the employee may have hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin; when performing vascular access procedures except as specified in paragraph (d)(3)(ix)(D); and when handling or touching contaminated items or surfaces.
 - (A) Disposable (single use) gloves such as surgical or examination gloves, shall be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised.
 - (B) Disposable (single use) gloves shall not be washed or decontaminated for re-use.
 - (C) Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration or when their ability to function as a barrier is compromised.
 - (D) If an employer in a volunteer blood donation center judges that routine gloving for all phlebotomies is not necessary then the employer shall:
 - (1) Periodically re-evaluate this policy;
 - (2) Make gloves available to all employees who wish to use them for phlebotomy;
 - (3) Not discourage the use of gloves for phlebotomy; and

- (4) Require that gloves be used for phlebotomy in the following circumstances:
 - (i) When the employee has cuts, scratches, or other breaks in his or her skin;
 - (ii) When the employee judges that hand contamination with blood may occur, for example, when performing phlebotomy on an uncooperative source individual; and
 - (iii) When the employee is receiving training in phlebotomy.

- (x) Masks, Eye Protection, and Face Shields. Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, shall be worn whenever splashes, spray, spatter, or drop-lets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated.
- (xi) Gowns, Aprons, and Other Protective Body Clothing. Appropriate protective clothing such as, but not limited to, gowns, aprons, lab coats, clinic jackets, or similar outer garments shall be worn in occupational exposure situations. The type and characteristics will depend upon the task and degree of exposure anticipated.
- (xii) Surgical caps or hoods and/or shoe covers or boots shall be worn in instances when gross contamination can reasonably be anticipated (e.g., autopsies, orthopaedic surgery).

(4) Housekeeping

- (i) General. Employers shall ensure that the worksite is maintained in a clean and sanitary condition. The employer shall determine and implement an appropriate written schedule for cleaning and method of decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area.
- (ii) All equipment and environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials.
 - (A) Contaminated work surfaces shall be decontaminated with an appropriate disinfectant after completion of procedures; immediately or as soon as feasible when surfaces are overtly contaminated or after any spill of blood or other potentially infectious materials; and at the end of the work shift if the surface may have become contaminated since the last cleaning.

- (B) Protective coverings, such as plastic wrap, aluminum foil, or imperviously-backed absorbent paper used to cover equipment and environmental surfaces, shall be removed and replaced as soon as feasible when they become overtly contaminated or at the end of the work shift if they may have become contaminated during the shift.
- (C) All bins, pails, cans, and similar receptacles intended for reuse which have a reasonable likelihood for becoming contaminated with blood or other potentially infectious materials shall be inspected and decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately or as soon as feasible upon visible contamination.
- (D) Broken glassware which may be contaminated shall not be picked up directly with the hands. It shall be cleaned up using mechanical means, such as a brush and dust pan, tongs, or forceps.
- (E) Reusable sharps that are contaminated with blood or other potentially infectious materials shall not be stored or processed in a manner that requires employees to reach by hand into the containers where these sharps have been placed.

(iii) Regulated Waste

- (A) Contaminated Sharps Discarding and Containment
 - (1) Contaminated sharps shall be discarded immediately or as soon as feasible in containers that are:
 - (i) Closable;
 - (ii) Puncture resistant;
 - (iii) Leakproof on sides and bottom; and
 - (iv) Labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard.
 - (2) During use, containers for contaminated sharps shall be:
 - (i) Easily accessible to personnel and located as close as is feasible to the immediate area where sharps are used or can be reasonably anticipated to be found (e.g., laundries);
 - (ii) Maintained upright throughout use; and
 - (iii) Replaced routinely and not be

allowed to overflow.

- (3) When moving containers of contaminated sharps from the area of use, the containers shall be:
- (i) Closed immediately prior to removal or replacement to prevent spillage or protrusion of contents during handling, storage, transport, or shipping;
 - (ii) Placed in a secondary container if leakage is possible. The second container shall be:
 - (A) Closable;
 - (B) Constructed to contain all contents and prevent leakage during handling, storage, transport, or shipping; and
 - (C) Labeled or color-coded according to paragraph (g)(1)(i) of this standard.
- (4) Reusable containers shall not be opened, emptied, or cleaned manually or in any other manner which would expose employees to the risk of percutaneous injury.

(B) Other Regulated Waste Containment

- (1) Regulated waste shall be placed in containers which are:
- (i) Closable;
 - (ii) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;
 - (iii) Labeled or color-coded in accordance with paragraph (g)(1)(i) this standard; and
 - (iv) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.
- (2) If outside contamination of the regulated waste container occurs, it shall be placed in a second container. The second container shall be:
- (i) Closable;
 - (ii) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;
 - (iii) Labeled or color-coded in accordance with paragraph (g)(1)(i)

of this standard; and

- (iv) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.
- (C) Disposal of all regulated waste shall be in accordance with applicable regulations of the United States, States and Territories, and political subdivisions of States and Territories.
- (iv) Laundry.
- (A) Contaminated laundry shall be handled as little as possible with a minimum of agitation.
- (1) Contaminated laundry shall be bagged or containerized at the location where it was used and shall not be sorted or rinsed in the location of use.
 - (2) Contaminated laundry shall be placed and transported in bags or containers labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard. When a facility utilizes Universal Precautions in the handling of all soiled laundry, alternative labeling or color-coding is sufficient if it permits all employees to recognize the containers as requiring compliance with Universal Precautions.
 - (3) Whenever contaminated laundry is wet and presents a reasonable likelihood of soak-through of or leakage from the bag or container, the laundry shall be placed and transported in bags or containers which prevent soak-through and/or leakage of fluids to the exterior.
- (B) The employer shall ensure that employees who have contact with contaminated laundry wear protective gloves and other appropriate personal protective equipment.
- (C) When a facility ships contaminated laundry off-site to a second facility which does not utilize Universal Precautions in the handling of all laundry, the facility generating the contaminated laundry must place such laundry in bags or containers which are labeled or color-coded in accordance with paragraph (g)(1)(i).
- (e) **HIV and HBV Research Laboratories and Production Facilities.**
- (1) This paragraph applies to research laboratories and production facilities engaged in the culture, production, concentration, experimentation, and

manipulation of HIV and HBV. It does not apply to clinical or diagnostic laboratories engaged solely in the analysis of blood, tissues, or organs. These requirements apply in addition to the other requirements of the standard.

(2) Research laboratories and production facilities shall meet the following criteria:

- (i) *Standard microbiological practices.* All regulated waste shall either be incinerated or decontaminated by a method such as autoclaving known to effectively destroy bloodborne pathogens.
- (ii) *Special practices.*
 - (A) Laboratory doors shall be kept closed when work involving HIV or HBV is in progress.
 - (B) Contaminated materials that are to be decontaminated at a site away from the work area shall be placed in a durable, leakproof, labeled or color-coded container that is closed before being removed from the work area.
 - (C) Access to the work area shall be limited to authorized persons. Written policies and procedures shall be established whereby only persons who have been advised of the potential bio-hazard, who meet any specific entry requirements, and who comply with all entry and exit procedures shall be allowed to enter the work areas and animal rooms.
 - (D) When other potentially infectious materials or infected animals are present in the work area or containment module, a hazard warning sign incorporating the universal biohazard symbol shall be posted on all access doors. The hazard warning sign shall comply with paragraph (g)(1)(ii) of this standard.
 - (E) All activities involving other potentially infectious materials shall be conducted in biological safety cabinets or other physical-containment devices within the containment module. No work with these other potentially infectious materials shall be conducted on the open bench.
 - (F) Laboratory coats, gowns, smocks, uniforms, or other appropriate protective clothing shall be used in the work area and animal rooms. Protective clothing shall not be worn outside of the work area and shall be decontaminated before being laundered.
 - (G) Special care shall be taken to avoid skin contact with other potentially infectious materials. Gloves shall be

worn when handling infected animals and when making hand contact with other potentially infectious materials is unavoidable.

- (H) Before disposal all waste from work areas and from animal rooms shall either be incinerated or decontaminated by a method such as autoclaving known to effectively destroy bloodborne pathogens.
 - (I) Vacuum lines shall be protected with liquid disinfectant traps and high-efficiency particulate air (HEPA) filters or filters of equivalent or superior efficiency and which are checked routinely and maintained or replaced as necessary.
 - (J) Hypodermic needles and syringes shall be used only for parenteral injection and aspiration of fluids from laboratory animals and diaphragm bottles. Only needle-locking syringes or disposable syringe-needle units (i.e., the needle is integral to the syringe) shall be used for the injection or aspiration of other potentially infectious materials. Extreme caution shall be used when handling needles and syringes. A needle shall not be bent, sheared, replaced in the sheath or guard, or removed from the syringe following use. The needle and syringe shall be promptly placed in a puncture-resistant container and autoclaved or decontaminated before reuse or disposal.
 - (K) All spills shall be immediately contained and cleaned up by appropriate professional staff or others properly trained and equipped to work with potentially concentrated infectious materials.
 - (L) A spill or accident that results in an exposure incident shall be immediately reported to the laboratory director or other responsible person.
 - (M) A biosafety manual shall be prepared or adopted and periodically reviewed and updated at least annually or more often if necessary. Personnel shall be advised of potential hazards, shall be required to read instructions on practices and procedures, and shall be required to follow them.
- (iii) *Containment equipment.*
- (A) Certified biological safety cabinets (Class I, II, or III) or other appropriate combinations of personal protection or physical containment devices, such as special protective clothing, respirators, centrifuge safety cups, sealed centrifuge rotors, and

containment caging for animals, shall be used for all activities with other potentially infectious materials that pose a threat of exposure to droplets, splashes, spills, or aerosols.

- (B) Biological safety cabinets shall be certified when installed, whenever they are moved and at least annually.
- (3) HIV and HBV research laboratories shall meet the following criteria:
 - (i) Each laboratory shall contain a facility for hand washing and an eye wash facility which is readily available within the work area.
 - (ii) An autoclave for decontamination of regulated waste shall be available.
- (4) HIV and HBV production facilities shall meet the following criteria:
 - (i) The work areas shall be separated from areas that are open to unrestricted traffic flow within the building. Passage through two sets of doors shall be the basic requirement for entry into the work area from access corridors or other contiguous areas. Physical separation of the high-containment work area from access corridors or other areas or activities may also be provided by a double-doored clothes-change room (showers may be included), airlock, or other access facility that requires passing through two sets of doors before entering the work area.
 - (ii) The surfaces of doors, walls, floors and ceilings in the work area shall be water resistant so that they can be easily cleaned. Penetrations in these surfaces shall be sealed or capable of being sealed to facilitate decontamination.
 - (iii) Each work area shall contain a sink for washing hands and a readily available eye wash facility. The sink shall be foot, elbow, or automatically operated and shall be located near the exit door of the work area.
 - (iv) Access doors to the work area or containment module shall be self-closing.
 - (v) An autoclave for decontamination of regulated waste shall be available within or as near as possible to the work area.
 - (vi) A ducted exhaust-air ventilation system shall be provided. This system shall create directional airflow that draws air into the work area through the entry area. The exhaust air shall not be recirculated to any other area of the building, shall be discharged to the outside, and shall be dispersed away from occupied areas and air intakes. The proper direction of the airflow shall be verified (i.e., into the work area).

- (5) Training Requirements. Additional training requirements for employees in HIV and HBV research laboratories and HIV and HBV production facilities are specified in paragraph (g)(2)(ix).
- (f) **Hepatitis B vaccination and post-exposure evaluation and follow-up**
 - (1) General.
 - (i) The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident.
 - (ii) The employer shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are:
 - (A) Made available at no cost to the employee;
 - (B) Made available to the employee at a reasonable time and place;
 - (C) Performed by or under the supervision of a licensed physician or by or under the supervision of another licensed healthcare professional; and
 - (D) Provided according to recommendations of the U.S. Public Health Service current at the time these evaluations and procedures take place, except as specified by this paragraph (f).
 - (iii) The employer shall ensure that all laboratory tests are conducted by an accredited laboratory at no cost to the employee.
 - (2) Hepatitis B Vaccination.
 - (i) Hepatitis B vaccination shall be made available after the employee has received the training required in paragraph (g)(2)(vii)(I) and within 10 working days of initial assignment to all employees who have occupational exposure unless the employee has previously received the complete hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons.
 - (ii) The employer shall not make participation in a prescreening program a prerequisite for receiving hepatitis B vaccination.
 - (iii) If the employee initially declines hepatitis B vaccination but at a later date while still covered under the standard decides to accept the vaccination, the employer shall make available hepatitis B vaccination at that time.

- (iv) The employer shall assure that employees who decline to accept hepatitis B vaccination offered by the employer sign the statement in appendix A.
 - (v) If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) shall be made available in accordance with section (f)(1)(ii).
- (3) Post-exposure Evaluation and Follow-up. Following a report of an exposure incident, the employer shall make immediately available to the exposed employee a confidential medical evaluation and follow-up, including at least the following elements:
- (i) Documentation of the route(s) of exposure, and the circumstances under which the exposure incident occurred;
 - (ii) Identification and documentation of the source individual, unless the employer can establish that identification is infeasible or prohibited by state or local law;
 - (A) The source individual's blood shall be tested as soon as feasible and after consent is obtained in order to determine HBV and HIV infectivity. If consent is not obtained, the employer shall establish that legally required consent cannot be obtained. When the source individual's consent is not required by law, the source individual's blood, if available, shall be tested and the results documented.
 - (B) When the source individual is already known to be infected with HBV or HIV, testing for the source individual's known HBV or HIV status need not be repeated.
 - (C) Results of the source individual's testing shall be made available to the exposed employee, and the employee shall be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual.
 - (iii) Collection and testing of blood for HBV and HIV serological status;
 - (A) The exposed employee's blood shall be collected as soon as feasible and tested after consent is obtained.
 - (B) If the employee consents to base-line blood collection, but does not give consent at that time for HIV serologic testing, the sample shall be preserved for at least 90 days. If, within 90 days of the exposure incident, the employee elects to have the baseline sample tested, such testing shall be done as soon as feasible.
- (iv) Post-exposure prophylaxis, when medically indicated, as recommended by the U.S. Public Health Service;
 - (v) Counseling; and
 - (vi) Evaluation of reported illnesses.
- (4) Information Provided to the Healthcare Professional.
- (i) The employer shall ensure that the healthcare professional responsible for the employee's Hepatitis B vaccination is provided a copy of this regulation.
 - (ii) The employer shall ensure that the healthcare professional evaluating an employee after an exposure incident is provided the following information:
 - (A) A copy of this regulation;
 - (B) A description of the exposed employee's duties as they relate to the exposure incident;
 - (C) Documentation of the route(s) of exposure and circumstances under which exposure occurred;
 - (D) Results of the source individual's blood testing, if available; and
 - (E) All medical records relevant to the appropriate treatment of the employee including vaccination status which are the employer's responsibility to maintain.
- (5) Healthcare Professional's Written Opinion. The employer shall obtain and provide the employee with a copy of the evaluating healthcare professional's written opinion within 15 days of the completion of the evaluation.
- (i) The healthcare professional's written opinion for Hepatitis B vaccination shall be limited to whether Hepatitis B vaccination is indicated for an employee, and if the employee has received such vaccination.
 - (ii) The healthcare professional's written opinion for post-exposure evaluation and follow-up shall be limited to the following information:
 - (A) That the employee has been informed of the results of the evaluation; and
 - (B) That the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials which require further evaluation or treatment.
 - (iii) All other findings or diagnoses shall remain confidential and shall not be included in the written report.
- (6) Medical recordkeeping. Medical records required by

this standard shall be maintained in accordance with paragraph (h)(1) of this section.

(g) **Communication of hazards to employees**

(1) Labels and signs

(i) Labels.

- (A) Warning labels shall be affixed to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious material; and other containers used to store, transport or ship blood or other potentially infectious materials, except as provided in paragraph (g)(1)(i)(E), (F) and (G).
- (B) Labels required by this section shall include the following legend:



BIOHAZARD

- (C) These labels shall be fluorescent orange or orange-red or predominantly so, with lettering and symbols in a contrasting color.
- (D) Labels shall be affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal.
- (E) Red bags or red containers may be substituted for labels.
- (F) Containers of blood, blood components, or blood products that are labeled as to their contents and have been released for transfusion or other clinical use are exempted from the labeling requirements of paragraph (g).
- (G) Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment or disposal are exempted from the labeling requirement.
- (H) Labels required for contaminated equipment shall be in accordance with this paragraph and shall also state which portions of the equipment remain contaminated.
- (I) Regulated waste that has been decontaminated need not be labeled or color-coded.

(ii) Signs.

- (A) The employer shall post signs at the entrance to work areas specified in paragraph (e), HIV and HBV Research Laboratory and Production Facilities, which shall bear the following legend:



BIOHAZARD

- (Name of the Infectious Agent)
- (Special requirements for entering the area)
- (Name, telephone number of the laboratory director or other responsible person.)
- (B) These signs shall be fluorescent orange-red or predominantly so, with lettering and symbols in a contrasting color.

(2) Information and Training.

- (i) The employer shall train each employee with occupational exposure in accordance with the requirements of this section. Such training must be provided at no cost to the employee and during working hours. The employer shall institute a training program and ensure employee participation in the program.
- (ii) Training shall be provided as follows:
 - (A) At the time of initial assignment to tasks where occupational exposure may take place;
 - (B) At least annually thereafter.
- (iii) [Reserved]
- (iv) Annual training for all employees shall be provided within one year of their previous training.
- (v) Employers shall provide additional training when changes such as modification of tasks or procedures or institution of new tasks or procedures affect the employee's occupational exposure. The additional training may be limited to addressing the new exposures created.
- (vi) Material appropriate in content and vocabulary to educational level, literacy, and language of employees shall be used.
- (vii) The training program shall contain at a minimum the following elements:
 - (A) An accessible copy of the regulatory text of this standard and an explanation of its

contents;

- (B) A general explanation of the epidemiology and symptoms of bloodborne diseases;
 - (C) An explanation of the modes of transmission of bloodborne pathogens;
 - (D) An explanation of the employer's exposure control plan and the means by which the employee can obtain a copy of the written plan;
 - (E) An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;
 - (F) An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment;
 - (G) Information on the types, proper use, location, removal, handling, decontamination and disposal of personal protective equipment;
 - (H) An explanation of the basis for selection of personal protective equipment;
 - (I) Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge;
 - (J) Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials;
 - (K) An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available;
 - (L) Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident;
 - (M) An explanation of the signs and labels and/or color coding required by paragraph (g) (1); and
 - (N) An opportunity for interactive questions and answers with the person conducting the training session.
- (viii) The person conducting the training shall be knowledgeable in the subject matter covered by the elements contained in the training program

as it relates to the workplace that the training will address.

- (ix) Additional Initial Training for Employees in HIV and HBV Laboratories and Production Facilities. Employees in HIV or HBV research laboratories and HIV or HBV production facilities shall receive the following initial training in addition to the above training requirements.
 - (A) The employer shall assure that employees demonstrate proficiency in standard microbiological practices and techniques and in the practices and operations specific to the facility before being allowed to work with HIV or HBV.
 - (B) The employer shall assure that employees have prior experience in the handling of human pathogens or tissue cultures before working with HIV or HBV.
 - (C) The employer shall provide a training program to employees who have no prior experience in handling human pathogens. Initial work activities shall not include the handling of infectious agents. A progression of work activities shall be assigned as techniques are learned and proficiency is developed. The employer shall assure that employees participate in work activities involving infectious agents only after proficiency has been demonstrated.
- (h) **Recordkeeping**
 - (1) Medical Records.
 - (i) The employer shall establish and maintain an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.1020.
 - (ii) This record shall include:
 - (A) The name and social security number of the employee;
 - (B) A copy of the employee's hepatitis B vaccination status including the dates of all the hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination as required by paragraph (f)(2);
 - (C) A copy of all results of examinations, medical testing, and follow-up procedures as required by paragraph (f)(3);
 - (D) The employer's copy of the healthcare professional's written opinion as required by paragraph (f)(5); and
 - (E) A copy of the information provided to the healthcare professional as required by

paragraphs (f)(4)(ii)(B)(C) and (D).

(iii) Confidentiality. The employer shall ensure that employee medical records required by paragraph (h)(1) are:

- (A) Kept confidential; and
- (B) Not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.

(iv) The employer shall maintain the records required by paragraph (h) for at least the duration of employment plus 30 years in accordance with 29 CFR 1910.1020.

(2) Training Records.

(i) Training records shall include the following information:

- (A) The dates of the training sessions;
- (B) The contents or a summary of the training sessions;
- (C) The names and qualifications of persons conducting the training; and
- (D) The names and job titles of all persons attending the training sessions.

(ii) Training records shall be maintained for 3 years from the date on which the training occurred.

(3) Availability.

- (i) The employer shall ensure that all records required to be maintained by this section shall be made available upon request to the Assistant Secretary and the Director for examination and copying.
- (ii) Employee training records required by this paragraph shall be provided upon request for examination and copying to employees, to employee representatives, to the Director, and to the Assistant Secretary.
- (iii) Employee medical records required by this paragraph shall be provided upon request for examination and copying to the subject employee, to anyone having written consent of the subject employee, to the Director, and to the Assistant Secretary in accordance with 29 CFR 1910.1020.

(4) Transfer of Records.

- (i) The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h).
- (ii) If the employer ceases to do business and there is no successor employer to receive and

retain the records for the prescribed period, the employer shall notify the Director, at least three months prior to their disposal and transmit them to the Director, if required by the Director to do so, within that three month period.

(i) **Dates**

- (1) Effective Date. The standard shall become effective on March 6, 1992.
- (2) The Exposure Control Plan required by paragraph (c) of this section shall be completed on or before May 5, 1992.
- (3) Paragraph (g)(2) Information and Training and (h) Recordkeeping shall take effect on or before June 4, 1992.
- (4) Paragraphs (d)(2) Engineering and Work Practice Controls, (d)(3) Personal Protective Equipment, (d)(4) Housekeeping, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, and (g) (1) Labels and Signs, shall take effect July 6, 1992.

(5) Sharps injury log.

- (i) The employer shall establish and maintain a sharps injury log for the recording of percutaneous injuries from contaminated sharps. The information in the sharps injury log shall be recorded and maintained in such manner as to protect the confidentiality of the injured employee. The sharps injury log shall contain, at a minimum:
 - (A) The type and brand of device involved in the incident,
 - (B) The department or work area where the exposure incident occurred, and
 - (C) An explanation of how the incident occurred.
- (ii) The requirement to establish and maintain a sharps injury log shall apply to any employer who is required to maintain a log of occupational injuries and illnesses under 29 CFR 1904.
- (iii) The sharps injury log shall be maintained for the period required by 29 CFR 1904.6.

Appendix A To Section 1910.1030— Hepatitis B Vaccine Declination (Mandatory)

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be

vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

[56 FR 64175, Dec. 6, 1991, as amended at 57 FR 12717, Apr. 13, 1992; 57 FR 29206, July 1, 1992; 61 FR 5508, Feb. 13, 1996; 66 FR 5325, Jan. 18, 2001; 71 FR 16672, 16673, Apr. 3, 2006; 73 FR 75586, Dec. 12, 2008]

Compliance with OSHA Hazard Communication Standard

Introduction to the OSHA Hazard Communication Standard

Companies using hazardous chemicals must implement a “Hazard Communication Program” for their facilities. The purpose of the program is to provide employees with information necessary to protect themselves from the physical and health hazards associated with using the chemicals.

Compliance Requirements for Funeral Homes

Funeral homes use hazardous chemicals for embalming, disinfecting surfaces and equipment,

Hazard Communication Action Items	
Hazardous Condition or Requirement	Recommended Corrective Actions
Document the hazard communication program for your facility in writing. 29 CFR 1910.1200(e)(1)	Document a hazard communication program specific to your facility. Address how labeling, MSDSs, and training requirements will be met and include a list of hazardous chemicals used at the facility. To assist you in establishing your program, a model hazard communication program is found on the CD mailed with this report. A paper copy is also available at your request.
In your written hazard communication program, list all of the hazardous chemicals used at your facility. 29 CFR 1910.1200(e)(1)(i)	Develop a list of all hazardous chemicals in the facility and keep it with the written program. Update the list whenever new hazardous chemicals are brought into the facility.
Ensure that all containers of hazardous chemicals are properly labeled. 29 CFR 1910.1200(f)(5)(i) and (ii)	Ensure that all containers of hazardous materials entering the facility are appropriately labeled with the name of the material, a hazard warning, and name and address of the manufacturer or other responsible party. If hazardous materials are transferred to a container other than the original, ensure that the secondary container has a label with identity and hazard warnings.
Obtain an MSDS for each hazardous chemical used at the facility. 29 CFR 1910.1200(g)(8)	Obtain and maintain a file of MSDSs for all hazardous chemicals used at the facility. They can be obtained from the manufacturer, distributor, or supplier.
Train all employees about the hazards of the chemicals with which they worked. 29 CFR 1910.1200(h)(1)	Train employees about the hazardous chemicals present in their work area. Train them at the time of initial assignment to a job using hazardous chemicals and whenever a new hazardous chemical is introduced. NOTE: Formaldehyde hazard training must be repeated annually.

Exam Question

18.) The purpose of which program is to provide employees with information necessary to protect themselves from the physical and health hazards associated with using the chemicals?

- OSHA Hazard Communication Program
- Bloodborne Pathogen Program
- Formaldehyde Program
- Monitoring Program

and for other purposes. The compliance requirements for OSHA's Hazard Communication standard are given in the following table. Please be aware that this OSHA standard refers specifically to CHEMICAL hazards, and is not intended to cover ALL hazards in the workplace. Of the chemicals used in the funeral home business, you should pay particular attention to embalming fluids, and to the chemicals used for disinfecting equipment and surfaces. Products with formaldehyde require special training, which is specified in the section of this report concerning the OSHA Formaldehyde standard.

Complete text of OSHA Standard § 1910.1200 Hazard communication (without Appendices)

(a) Purpose

- (1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Revision 3. The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets and employee training.
- (2) This occupational safety and health standard is intended to address comprehensively the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject. Classifying the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

(b) Scope and application.

- (1) This section requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.)
- (2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.
- (3) This section applies to laboratories only as follows:
 - (i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;
 - (ii) Employers shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;
 - (iii) Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,
 - (iv) Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f) of this section, and that a safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.
- (4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:
 - (i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

- (ii) Employers shall maintain copies of any safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a safety data sheet if an employee requests the safety data sheet, and shall ensure that the safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,
 - (iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.
- (5) This section does not require labeling of the following chemicals:
- (i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;
 - (ii) Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;
 - (iii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;
 - (iv) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for non-industrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, Firearms and Explosives;
 - (v) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,
 - (vi) Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture. 74
- (6) This section does not apply to:
- (i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;
 - (ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with Environmental Protection Agency regulations.
 - (iii) Tobacco or tobacco products;
 - (iv) Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);
 - (v) Articles (as that term is defined in paragraph (c) of this section);
 - (vi) Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;
 - (vii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid

supplies);

- (viii) Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;
- (ix) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;
- (x) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;
- (xi) Ionizing and nonionizing radiation; and, (xii) Biological hazards.

(c) **Definitions.**

“Article” means a manufactured item other than a fluid or particle:

- (i) which is formed to a specific shape or design during manufacture;
- (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and
- (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

“Assistant Secretary” means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee. *“Chemical”* means any substance, or mixture of substances.

“Chemical manufacturer” means an employer with a workplace where chemical(s) are produced for use or distribution.

“Chemical name” means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

“Classification” means to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

“Commercial account” means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

“Common name” means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

“Container” means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

“Designated representative” means any individual or organization to whom an employee gives written authorization to exercise such employee’s rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

“Director” means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

“Distributor” means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

“Employee” means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

“Employer” means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

“Exposure or exposed” means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. *“Subjected”* in terms of health hazards

includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)

“*Foreseeable emergency*” means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

“*Hazard category*” means the division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

“*Hazard class*” means the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

“*Hazard not otherwise classified (HNOC)*” means an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in this section, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA (e.g., acute toxicity Category 5).

“*Hazard statement*” means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

“*Hazardous chemical*” means any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

“*Health hazard*” means a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to §1910.1200—Health Hazard Criteria.

“*Immediate use*” means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

“*Importer*” means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them

to distributors or employers within the United States.

“*Label*” means an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

“*Label elements*” means the specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

“*Mixture*” means a combination or a solution composed of two or more substances in which they do not react.

“*Physical hazard*” means a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. See Appendix B to §1910.1200—Physical Hazard Criteria.

“*Pictogram*” means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.

“*Precautionary statement*” means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

“*Product identifier*” means the name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

“*Produce*” means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.

“*Pyrophoric gas*” means a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

“*Responsible party*” means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

“*Safety data sheet (SDS)*” means written or printed material concerning a hazardous chemical that is

prepared in accordance with paragraph (g) of this section.

“*Signal word*” means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are “danger” and “warning.” “Danger” is used for the more severe hazards, while “warning” is used for the less severe.

“*Simple asphyxiant*” means a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

“*Specific chemical identity*” means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

“*Substance*” means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

“*Trade secret*” means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer’s business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix E to §1910.1200—Definition of Trade Secret, sets out the criteria to be used in evaluating trade secrets.

“*Use*” means to package, handle, react, emit, extract, generate as a byproduct, or transfer.

“*Work area*” means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

“*Workplace*” means an establishment, job site, or project, at one geographical location containing one or more work areas.

(d) Hazard classification.

(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to classify the chemicals in accordance with this section. For each chemical, the chemical manufacturer or importer shall determine the hazard classes, and where appropriate, the category of each class that apply to the chemical being classified. Employers are not required to classify chemicals unless they choose not to rely on the classification performed by the chemical manufacturer or importer for the chemical to

satisfy this requirement.

(2) Chemical manufacturers, importers or employers classifying chemicals shall identify and consider the full range of available scientific literature and other evidence concerning the potential hazards. There is no requirement to test the chemical to determine how to classify its hazards. Appendix A to §1910.1200 shall be consulted for classification of health hazards, and Appendix B to §1910.1200 shall be consulted for the classification of physical hazards.

(3) *Mixtures.*

(i) Chemical manufacturers, importers, or employers evaluating chemicals shall follow the procedures described in Appendices A and B to §1910.1200 to classify the hazards of the chemicals, including determinations regarding when mixtures of the classified chemicals are covered by this section.

(ii) When classifying mixtures they produce or import, chemical manufacturers and importers of mixtures may rely on the information provided on the current safety data sheets of the individual ingredients except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the safety data sheet misstates or omits information required by this section.

(e) Written hazard communication program.

(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, safety data sheets, and employee information and training will be met, and which also includes the following:

(i) A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(2) “*Multi-employer workplaces.*” Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the

hazard communication programs developed and implemented under this paragraph (e) include the following:

- (i) The methods the employer will use to provide the other employer(s) on-site access to safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;
 - (ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,
 - (iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.
- (3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).
- (4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).
- (5) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.
- (f) Labels and other forms of warning.**
- (1) *Labels on shipped containers.* The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag or mark the following shall be provided:
- (i) Product identifier;
 - (ii) Signal word;
 - (iii) Hazard statement(s);
 - (iv) Pictogram(s);
 - (v) Precautionary statement(s); and,
 - (vi) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.
- (2) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(i) through (v) of this section is in accordance with Appendix C, Allocation of Label Elements, for each hazard class and associated hazard category for the hazardous chemical, prominently displayed, and in English (other languages may also be included if appropriate).
- (3) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(ii) through (iv) of this section is located together on the label, tag, or mark.
- (4) *Solid materials*
- (i) For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;
 - (ii) The label may be transmitted with the initial shipment itself, or with the safety data sheet that is to be provided prior to or at the time of the first shipment; and,
 - (iii) This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).
- (5) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

Exam Question

19.) The employer shall make the written hazard communication program available upon request to whom?

- a. Employees
- b. Assistant Secretary of Labor for OSHA
- c. Director of the National Institute for OHSA
- d. All of the above

(6) *Workplace labeling.* Except as provided in paragraphs (f)(7) and (f)(8) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

- (i) The information specified under paragraphs (f)(1)(i) through (v) of this section for labels on shipped containers; or,
 - (ii) Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.
- (7) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(6) of this section to be on a label. The employer shall ensure the written materials are readily accessible to the employees in their work area throughout each work shift.
- (8) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.
- (9) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.
- (10) The employer shall ensure that workplace labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.
- (11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within six months of becoming aware of the new information, and shall ensure that labels on containers of hazardous chemicals shipped after that time contain the new information. If the

chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

(g) **Safety data sheets.**

- (1) Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. Employers shall have a safety data sheet in the workplace for each hazardous chemical which they use.
- (2) The chemical manufacturer or importer preparing the safety data sheet shall ensure that it is in English (although the employer may maintain copies in other languages as well), and includes at least the following section numbers and headings, and associated information under each heading, in the order listed (See Appendix D to §1910.1200--Safety Data Sheets, for the specific content of each section of the safety data sheet):
 - (i) Section 1, Identification;
 - (ii) Section 2, Hazard(s) identification;
 - (iii) Section 3, Composition/information on ingredients;
 - (iv) Section 4, First-aid measures;
 - (v) Section 5, Fire-fighting measures;
 - (vi) Section 6, Accidental release measures;
 - (vii) Section 7, Handling and storage;
 - (viii) Section 8, Exposure controls/personal protection;
 - (ix) Section 9, Physical and chemical properties;
 - (x) Section 10, Stability and reactivity;
 - (xi) Section 11, Toxicological information.
 - (xii) Section 12, Ecological information;
 - (xiii) Section 13, Disposal considerations;
 - (xiv) Section 14, Transport information;
 - (xv) Section 15, Regulatory information; and
 - (xvi) Section 16, Other information, including date of preparation or last revision.

Note 1 to paragraph (g)(2): To be consistent with the GHS, an SDS must also include the headings in paragraphs (g)(2)(xii) through (g)(2)(xv) in order.

Note 2 to paragraph (g)(2): OSHA will not be enforcing information requirements in sections 12 through 15, as these areas are not under its jurisdiction.

- (3) If no relevant information is found for any sub-heading within a section on the safety data sheet, the chemical manufacturer, importer or employer preparing the safety data sheet shall mark it to indicate that no applicable information was found.

- (4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one safety data sheet to apply to all of these similar mixtures.
- (5) The chemical manufacturer, importer or employer preparing the safety data sheet shall ensure that the information provided accurately reflects the scientific evidence used in making the hazard classification. If the chemical manufacturer, importer or employer preparing the safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the safety data sheet before the chemical is introduced into the workplace again.
- (6)
- (i) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate safety data sheet with their initial shipment, and with the first shipment after a safety data sheet is updated;
 - (ii) The chemical manufacturer or importer shall either provide safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;
 - (iii) If the safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,
 - (iv) The chemical manufacturer or importer shall also provide distributors or employers with a safety data sheet upon request.
- (7)
- (i) Distributors shall ensure that safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a safety data sheet is updated;
 - (ii) The distributor shall either provide safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;
 - (iii) Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a safety data sheet is available;
- (iv) Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide safety data sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a safety data sheet is available;
 - (v) If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a safety data sheet can be obtained;
 - (vi) Wholesale distributors shall also provide safety data sheets to employers or other distributors upon request; and,
 - (vii) Chemical manufacturers, importers, and distributors need not provide safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.
- (8) The employer shall maintain in the workplace copies of the required safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access and other alternatives to maintaining paper copies of the safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)
- (9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.
- (10) Safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).

- (11) Safety data sheets shall also be made readily available, upon request, to designated representatives, the Assistant Secretary, and the Director, in accordance with the requirements of 29 CFR 1910.1020(e).

(h) Employee information and training.

- (1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets.
- (2) Information. Employees shall be informed of:
 - (i) The requirements of this section;
 - (ii) Any operations in their work area where hazardous chemicals are present; and,
 - (iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and safety data sheets required by this section.
- (3) Training. Employee training shall include at least:
 - (i) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
 - (ii) The physical, health, simple asphyxiation, combustible dust, and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;
 - (iii) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,
 - (iv) The details of the hazard communication program developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information.

(i) Trade secrets.

- (1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name, other specific identification of a hazardous chemical, or the exact percentage (concentration) of the substance in a mixture, from the safety data sheet, provided that:
 - (i) The claim that the information withheld is a trade secret can be supported;
 - (ii) Information contained in the safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;
 - (iii) The safety data sheet indicates that the specific chemical identity and/or percentage of composition is being withheld as a trade secret; and,
 - (iv) The specific chemical identity and percentage is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph (i)
- (2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity and/or specific percentage of composition of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity or percentage composition of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.
- (3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity or percentage composition, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:
 - (i) The request is in writing;
 - (ii) The request describes with reasonable detail one or more of the following occupational health needs for the information:
 - (A) To assess the hazards of the chemicals to which employees will be exposed;

- (B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;
 - (C) To conduct pre-assignment or periodic medical surveillance of exposed employees;
 - (D) To provide medical treatment to exposed employees;
 - (E) To select or assess appropriate personal protective equipment for exposed employees;
 - (F) To design or assess engineering controls or other protective measures for exposed employees; and,
 - (G) To conduct studies to determine the health effects of exposure.
- (iii) The request explains in detail why the disclosure of the specific chemical identity or percentage composition is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section:
- (A) The properties and effects of the chemical;
 - (B) Measures for controlling workers' exposure to the chemical;
 - (C) Methods of monitoring and analyzing worker exposure to the chemical; and,
 - (D) Methods of diagnosing and treating harmful exposures to the chemical;
- (iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,
- (v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.
- (4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:
- (i) May restrict the use of the information to the health purposes indicated in the written statement of need;
 - (ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,
 - (iii) May not include requirements for the posting of a penalty bond.
- (5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.
- (6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.
- (7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity or percentage composition, the denial must:
- (i) Be provided to the health professional, employee, or designated representative, within thirty days of the request;
 - (ii) Be in writing;
 - (iii) Include evidence to support the claim that the specific chemical identity or percent of composition is a trade secret;
 - (iv) State the specific reasons why the request is being denied; and,
 - (v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the trade secret.
- (8) The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.
- (9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:
- (i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity or percentage composition is a trade secret;
 - (ii) The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,
 - (iii) The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

- (10)
- (i) If OSHA determines that the specific chemical identity or percentage composition requested under paragraph (i)(3) of this section is not a “bona fide” trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.
 - (ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.
- (11) If a citation for a failure to release trade secret information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act’s enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation “in camera” or issue appropriate orders to protect the confidentiality of such matters.
- (12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.
- (13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process information which is a trade secret.
- (j) **Effective dates.**
- (1) Employers shall train employees regarding the new label elements and safety data sheets format by December 1, 2013.
 - (2) Chemical manufacturers, importers, distributors, and employers shall be in compliance with all modified provisions of this section no later than June 1, 2015, except:
 - (i) After December 1, 2015, the distributor shall not ship containers labeled by the chemical manufacturer or importer unless the label has been modified to comply with paragraph (f)(1) of this section.
 - (ii) All employers shall, as necessary, update any alternative workplace labeling used under paragraph (f)(6) of this section, update the hazard communication program required by paragraph (h)(1), and provide any additional employee training in accordance with paragraph (h)(3) for newly identified physical or health hazards no later than June 1, 2016.
 - (3) Chemical manufacturers, importers, distributors, and employers may comply with either §1910.1200 revised as of October 1, 2011, or the current version of this standard, or both during the transition period.

HCS Final Regulatory text 2012

Compliance with OSHA Personal Protective Equipment Standard

Introduction to the OSHA Personal Protective Equipment Standard

All employers are required to make an assessment of the hazards in their workplaces. For any hazards identified, the employer must certify that the PPE which has been selected is that which is most appropriate to the hazard. Additionally, employers must certify that employees have been properly trained to use the PPE.

Compliance Requirements for Funeral Homes

Consult the material safety data sheets (MSDS) to determine proper PPE when handling any given chemical. It is recommended that embalmers using solutions containing formaldehyde wear the following PPE: coveralls, shoe covers, gloves, chemical goggles, face shield, head cover and surgical mask. Coveralls, aprons, or gowns need to have full sleeve coverage and be impervious to blood, formaldehyde, and other chemical agents. If air sampling indicates that exposures to formaldehyde during embalming exceed the limits permitted by OSHA, then a respirator which protects against formaldehyde must be worn.

Personal Protective Action Items

Hazardous Condition or Work Practice	Recommended Corrective Actions
<p>Assess the tasks conducted at the funeral home to determine what PPE is needed.</p> <p>29 CFR 1910.132 (d)(1)</p>	<p>Conduct a PPE hazard assessment of your workplace. You must also document, in writing, that the assessment has been completed.</p>
<p>Where the use of PPE is required, train the employees who must wear the PPE.</p> <p>29 CFR 1910.132 (f)(1)</p>	<p>Provide employees with site-specific training on:</p> <ul style="list-style-type: none"> (i) When PPE is necessary; (ii) What PPE is necessary; (iii) How to properly put on and take off, adjust, and wear PPE; (iv) The limitations of the PPE; and, (v) The proper care, maintenance, useful life and disposal of the PPE. <p>Document that employees have received and understood training on PPE.</p>
<p>Wear gloves that are designed for protection against the hazards found in the embalming room.</p> <p>29 CFR 1910.138(a)</p>	<p>Nitrile or butyl gloves are recommended for exposure to formaldehyde- containing solutions. Other materials (natural latex rubber, PVC, or polyethlyene) may be suitable for short immersion periods, but these gloves may have to be changed more frequently than gloves made of nitrile or butyl, due to material degradation. Consult with glove manufacturers, or the MSDS for the chemical, to ensure that the gloves you select provide proper protection against formaldehyde and blood exposures. Barrier creams are not regarded as effective protection for formaldehyde, since there is no data demonstrating their efficiency.</p> <p>For tasks that have a high risk of cut or puncture injuries, gloves with an interposed layer of cut-proof synthetic mesh should be considered.</p>
<p>Wear eye protection that is appropriate to the hazards in the embalming room.</p> <p>29 CFR 1910.133 (a)(1) & 29 CFR 1910.1048(h)(1)(iii)</p>	<p>Provide eye protection that is appropriate to the tasks being conducted, and to the chemicals in use. The formaldehyde standard specifically requires the use of both a face-shield and goggles for tasks where an employee may be exposed to formaldehyde vapors or splashes. For other chemicals, consult the MSDS for guidance.</p>
<p>Provide an emergency eyewash and shower in the embalming room.</p> <p>29 CFR 1910.151(c)</p>	<p>Install an emergency eyewash or combination eyewash/shower. The location should be no more than 10 seconds travel time from anticipated exposure points. One hundred feet can be traveled in 10 seconds if the workplace has no obstacles. If doors or other obstructions are present, the distance is much less.</p>

Exam Question

- 20.) Nitrile or butyl gloves are recommended for exposure to formaldehyde-containing solutions.
- a. True
 - b. False