OSHA Instruction **CPL 02-02-052/ CPL 2-2.52** (REVISED)
October 7, 1991

Office of Health Compliance Assistance

Subject: Page Changes to OSHA Instruction CPL 2-2.52

****NOTE: Minor changes {{in double brackets}} were made to this directive on May 8, 2017, to update coding instructions. These changes do not impact this directive's enforcement policy.**

****NOTE: As a result of the March 26, 2012, revision to OSHA's Hazard Communication Standard, minor changes {in brackets} were made to this directive on November 1, 2015. These changes do not impact this directive's enforcement policy.**

A. Purpose. This instruction transmits page changes and Appendix G to OSHA Instruction CPL 2-2.52. Subject: Enforcement Procedures for Occupational Exposure to Formaldehyde, dated November 20, 1990.

B. Scope. This instruction applies OSHA-wide.

C. Action. Replace existing pages with the attached CH-1 pages as follows:

Existing Pages	Replacement Pages
11-12	11-12
17-18	17-18
19-20	19-20
None	G-1

D. Background. On July 15, 1991, OSHA issued a proposed revision to the formaldehyde standard, 29 CFR 1910.1048, in a response primarily to a remand by the U.S. Court of Appeals for the D.C. Circuit in UAW v. Pendergrass, 878 F.2d 389 (D.C. Cir. 1989). The page changes address the interim enforcement policy as a result of the proposed amendments. In addition, a summary of the comparison of the current standard with the proposed changes is presented in Appendix G of this instruction. Additional changes to the directive will be made once the revisions to the standard are final.

E. Federal Program Change. This instruction describes a Federal program change which affects State programs. Each Regional Administrator shall:

1. Ensure that a copy of this change is promptly forwarded to each State designee, using a format consistent with the Plan Change Two-way Memorandum in Appendix P, OSHA Instruction STP 2.22A, CH-2.

2. Advise the State designees that in responding to this change they should follow the Federal program change procedures contained in OSHA Instruction CPL 2-2.52, Paragraph E. 2. through 5.

3. Ensure that the State designees submit a plan supplement, in accordance with OSHA Instruction STP 2.22A, Ch-3, as appropriate, following the established schedule that is agreed upon by the State and Regional Administrator to submit non- FOM/OTM Federal program changes.

    a. If a State intends to follow OSHA's policy described in this instruction, the State must submit either a revised version of this instruction, adapted as appropriate to reference State law, regulations and administrative structure, or a cover sheet describing how references in this instruction correspond to the State's structure. The State's acknowledgment of the Plan Change Two- way Memorandum may fulfill the plan supplement requirement if the appropriate documentation is provided.

    b. If the State adopts an alternative to Federal guidelines, the State's submission must identify and provide a rationale for all substantial differences from Federal guidelines in order for OSHA to judge whether a different State procedure is as effective as comparable Federal guidelines.

4. Review policies, instructions and guidelines issued by the State to determine that this change has been communicated to State program personnel.

Gerard F. Scannell Assistant Secretary

Distribution: National, Regional and Area Offices Compliance Officers State Designees NIOSH Regional Program Directors 7(c)(1) Project Managers

U.S. Department of Labor
Occupational Safety & Health Administration

OSHA Instruction CPL 02-02-052 - CPL 2-2.52 November 20, 1990 - Enforcement Procedure for Occupational Exposure to Formaldehyde

A. Purpose. This instruction provides uniform inspection procedures and guidelines to be followed when conducting inspections and issuing citations for workers potentially exposed to formaldehyde.

B. Scope. This instruction applies OSHA-wide.

C. References.

1. OSHA Instruction STP 2.22A, May 14, 1986, the State Plan Policies and Procedures Manual.

2. SHA Instruction CPL 2.45B, June 15, 1989, the Revised Field Operations Manual (FOM).

3. OSHA Instruction CPL 2-2.20B, February 5, 1990, the OSHA Technical Manual (OTM).

4. OSHA Instruction ADM l-l.l2B, December 29, 1989, the Integrated Management Information System (IMIS) Forms Manual.

5. OSHA Instruction CPL 2-2.30, November 14, 1980, 29 CFR 1913.10(b)(6), Authorization of Review of Medical Opinions.

6. OSHA Instruction CPL 2-2.33, February 8, 1982, 29 CFR 1913.10, Rules of Agency Practice and Procedure Concerning OSHA Access to Employee Medical Records--Procedures Governing Enforcement Activities.

D. Action. Regional Administrators and Area Directors shall ensure that the policies and procedures explained in this instruction are implemented.

E. Federal Program Change. This instruction describes a Federal program change which affects State programs. Each Regional Administrator shall:

1. Ensure that a copy of this change is promptly forwarded to each State designee, using a format consistent with the Plan Change Two-way Memorandum in Appendix P, OSHA Instruction STP 2.22A, CH-2.

2. Explain the technical content of this change to the State designee as requested.

3. Ensure that State designees are asked to acknowledge receipt of this Federal program change in writing to the Regional Administrator as soon as the State's intention is known, but not later than 70 calendar days after the date of issuance (10 days for mailing and 60 days for response). This acknowledgment must include the State's intention to follow OSHA's policies and procedures described in this instruction, or a description of the State's alternative policy and/or procedure which is "at least as effective" as the Federal policy, or of the reasons why the change should not apply to that State.

4. Ensure that the State designees submit a plan supplement, in accordance with OSHA Instruction STP 2.22A, Ch-3, as appropriate, following the established schedule that is agreed upon by the State and Regional Administrator to submit non FOM/OTM Federal program changes.

    a. If a State intends to follow OSHA's policy described in this instruction, the State must submit either a revised version of this instruction, adapted as appropriate to reference State law, regulations and administrative structure, or a cover sheet describing how references in this instruction correspond to the State's structure. The State's acknowledgment of the Plan Change Two- way Memorandum may fulfill the plan supplement requirement if the appropriate documentation is provided.

    b. If the State adopts an alternative to Federal guidelines, the State's submission must

identify and provide a rationale for all substantial differences from Federal guidelines in order for OSHA to judge whether a different State procedure is as effective as comparable Federal guidelines.

5. Review policies, instructions and guidelines issued by the State to determine that this change has been communicated to State program personnel.

F. Background. On December 4, 1987, OSHA revised its standard for formaldehyde (29 CFR 1910.1048). This reduced the 8-hour time weighted average (TWA) exposure limit for formaldehyde from 3 parts per million (ppm) to 1 ppm. The peak allowable exposure of 10 ppm was revoked and the 5 ppm ceiling was reduced to 2 ppm TWA measured over a 15 minute period (short-term exposure limit) (STEL). Employers must also conduct exposure monitoring, offer medical surveillance to exposed employees, and supply protective equipment and clothing as needed. The employer may need to establish emergency procedures, provide for clean-up of spills, and install emergency showers and eyewash facilities. Employee training on the hazards of formaldehyde and on the formaldehyde standard must be conducted. Training is reinforced by labels and {material safety data sheets (MSDS)/ safety data sheets (SDSs) required by the Hazard Communication Standard (HCS)(29 CFR 1910.1200). MSDSs are being replaced by SDSs, which have a standardized format. Manufacturers, importers and distributors are required to provide SDSs by June 1, 2015.}

1. On March 2, 1988, OSHA announced in the Federal Register the partial approval by the Office of Management and Budget of information collection requirements under the formaldehyde standard. All parts of the standard were approved except for paragraphs (m)(1)(i) through (m)(4)(ii), concerning hazard communication. In addition, a start-up date for updating the written materials in the training program was added to paragraph (p).

2. On November 8, 1988, OSHA announced in the Federal Register approval of information collection requirements for paragraphs (m)(1)(i) through (m)(4)(ii). A delayed start-up date was specified for these provisions along with a clarification of the labeling provisions. In the interim, OSHA sought

comments on a petition for administrative stay of the warning label requirements.

3. On November 22, 1988, OSHA announced in the Federal Register a further extension of the start-up date for compliance with the newly approved hazard communication provisions.

4. On December 13, 1988, OSHA announced in the Federal Register an administrative stay of paragraphs (m)(1)(i) through (m)(4)(ii) for a period of 9 months. This stay has been extended to December 11, 1990. The effect of the administrative stay will be the continued enforcement of the Hazard Communication Standard with respect to formaldehyde.

5. On July 13, 1989, OSHA published in the Federal Register a corrections and technical amendments notice. Table 1 of paragraph (g), Respiratory Protection, was modified so that the entry for Type C respirators specifies pressure demand or continuous flow type, with full facepiece, hood, or helmet. The notice also clarifies paragraph (g)(2)(ii) by substituting a performance standard, adequate to protect against formaldehyde exposure" (based on protection factors), for an erroneous reference to Table 1. Also, chin style gas masks, approved by NIOSH for formaldehyde exposure, were incorporated into Table 1. Paragraph (o), Recordkeeping, was amended to incorporate a reference to 29 CFR 1910.20, the access to medical records standard.

6. On June 9, 1989, the U.S. Court of Appeals (District of Columbia circuit) handed down its decision regarding the challenge by the United Auto Workers (UAW) and Amalgamated Clothing and Textile Workers Union (ACTWU) to the formaldehyde standard. OSHA was directed to reconsider its finding of insignificant risk at 1 ppm and its failure to include a requirement for medical removal protection (MRP). OSHA petitioned the court to review its decision regarding MRP; this petition was denied on September 22, 1989.

G. Occupational Exposure to Formaldehyde.

1. Formaldehyde Uses. Formaldehyde is a reactive chemical with many uses.

a. The major consumers of formaldehyde are the manufacturers of compressed wood products. Formaldehyde is consumed in resins that are used as glues in the production of particle board, plywood, and fiberboard. These wood products in turn are used in the construction, furniture, and mobile home manufacturing industries.

b. The plastics industry is the second largest use of formaldehyde-based resins. Molding compounds containing melamine, phenolic, or acetyl resins are capable of releasing formaldehyde when subjected to heat and/or pressure in the molding process. The final product, however, contains little free formaldehyde and has little potential for depolymerization, so that potential exposure to formaldehyde from use of the plastic product is minimal. Typical of plastics made from formaldehyde-based resins are lawn and garden equipment, plumbing fixtures, melamine tableware, and electrical insulation parts.

c. Formaldehyde-releasing resins are used to add wrinkle-free and durable press characteristics to synthetic and natural-fiber textiles. These resins leave residual formaldehyde in the product which can result in exposure to formaldehyde in the apparel industry. A dimethylol dihydroxyethyleneurea (DMDHEU)-based resin system is most commonly used.

d. Formaldehyde-bearing resins are used in the coating industry primarily as modifiers in alkyd and acrylic coating systems. Urea-formaldehyde resins are used in clear coating for wood furniture, primer coats for automobiles, baked enamels for appliances, and

can coatings. Melamine-formaldehyde resins are generally used where outdoor exposure or contact with detergents require improved chemical resistance. Melamine-formaldehyde resins also have some application where corrosion resistance is important.

e. Paper products may be treated with formaldehyde derivatives (e.g., melamine- or urea-formaldehyde) to add a desired finish or wet-strength quality. Melamine resins can be inactivated by a high sulfate concentration, and this problem is overcome by addition of excess formaldehyde.

f. Formaldehyde is an important constituent of embalming and preserving fluids because it performs two essential functions--disinfection and preservation. In mortuaries, embalming fluids may be injected in concentrated form to preserve the organs in the visceral and thoracic cavities. Arterial fluids are prepared by diluting the concentrate and are injected into the arterial system through a hose. Formaldehyde's properties as a tissue preservative also account for its use in anatomy, histology, and pathology laboratories.

g. Formaldehyde-based chemicals are used in textile waterproofing, as accelerators in the production of rubber products, and in photographic developing. Foundries use formaldehyde-based resins in molds in the production of ferrous and non-ferrous goods.

h. Formaldehyde is used in the production of industrial chemicals including pentaerythritol, l,4-butanediol, and trimethyl-o-propane.

i. Some detergents, fertilizers, explosives and abrasive products are also manufactured with formaldehyde. Because formaldehyde is an effective bactericide, it is contained in cosmetic products, shampoos, and hair sprays.

It is used in the manufacture of some pharmaceutical products and germicides, and it is used to clean dialysis equipment.

2. Formaldehyde Exposure.

a. Formaldehyde exposure can occur in three ways:

(1) Exposure to liquid or solid formaldehyde (paraformaldehyde) and the accompanying vapors;

(2) Exposure to formaldehyde during primary processing of formaldehyde resins and other chemicals manufactured from formaldehyde; and

(3) Exposure to formaldehyde released from products that contain formaldehyde-based resins.

b. Occupational exposures to formaldehyde occur during heat and/or pressure processing of products made from or including formaldehyde bearing resins. Examples of such exposures include the pressing of wood products, extrusion or injection molding of plastics, heat-setting of pleats on apparel, and casting of molds in foundry processes.

c. Occupational exposures to formaldehyde occur when a finished product contains residual formaldehyde or when hydrolysis--that is, the chemical break-down of formaldehyde-containing materials to produce formaldehyde gas prompted by warm and humid work environments--occurs. The EPA has described this phenomenon as "pseudoconsumptive use" of formaldehyde; i.e., chemical identity is changed but not irreversibly. Examples of "Pseudoconsumptive" uses are: (1) urea-formaldehyde resins in fiberboard, particleboard, plywood, laminates, urea-formaldehyde foams and insulation products, molding compounds, and protective coatings; (2)

urea-formaldehyde concentrates used to produce time-release fertilizers; and (3) hexamethylenetetramine.

3. Operations. Specific operations that cause employee exposure to formaldehyde include:

a. Formaldehyde transfer operations,

b. Reactor or vessel cleaning,

c. Fugitive emissions in chemical plants,

d. Exposure to articles that have been treated with formaldehyde-based resins before curing,

e. Exposure to articles containing cured resins during transit from curing operations to storage or further processing,

f. Exposure to stored articles containing cured resins, and

g. The application of formaldehyde-based resins.

NOTE: Short-term exposures occur during batch operations such as mixing and during periodic cleaning and maintenance activities. Concentrated formaldehyde solutions (37% or greater) are often diluted for sale or use by chemical distributors or end-users, such as hospitals In addition, short-term exposures occur in mortuaries and laboratories (anatomy, histology, pathology, environmental testing, and school biology).

H. Health Effects. Based on the best available evidence in the agency's record on formaldehyde, OSHA determined that formaldehyde is genotoxic, showing properties of both a cancer initiator and promoter. When inhaled, formaldehyde is a carcinogen in rats. In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx, and nasal passages.

1. Formaldehyde is highly irritating to the upper respiratory tract and eyes. Concentrations as low as 0.1 to 2 ppm may irritate the eyes, nose, and throat of some individuals. Concentrations of 3 to 5 ppm cause tearing of the eyes, and the severity of the effects becomes intolerable to some persons. Concentrations of 10 to 20 ppm cause difficulty in breathing, burning of the nose and throat, coughing, and heavy tearing of the eyes. Concentrations over 25 ppm can cause severe respiratory tract injury that can lead to pulmonary edema and pneumonitis. A concentration of 100 ppm is regarded as immediately dangerous to life or health (IDLH) for formaldehyde.

2. Some persons have developed asthma or bronchitis following exposure to formaldehyde; usually a single exposure to high concentrations of formaldehyde as the result of an accidental spill appeared responsible for the onset of symptoms.

3. Formalin (37% formaldehyde) is a skin irritant and sensitizer. Formal in solutions splashed in the eye have resulted in blindness. Less concentrated solutions can also injure the eyes and skin. The severity of the effect depends on the concentration of formaldehyde in solution and whether the affected tissue is flushed with water immediately after the accidental splash. Contact with formalin causes a white discoloration, pain, drying, cracking, and scaling of the skin. Prolonged and repeated contact can cause numbness and a hardening or "tanning" of the skin.

4. Previously exposed persons may react to exposure with an allergic eczematous dermatitis or hives. Employees in industries where there is direct skin contact with formaldehyde-releasing resins (e.g., textiles) tend to have a higher than normal incidence of dermatitis. When patch tested, these persons sometimes show sensitization to formaldehyde.

I. Clarifications of the Formaldehyde Standard (29 CFR 1910.1048).

1. Paragraph (a) Scope and Application.

a. Formaldehyde refers solely to the chemical defined by chemical Abstracts Services Registry Number 50-00-0. This chemical is formaldehyde gas which, per se, is not available commercially. Most exposures are to formaldehyde gas which is emitted at various concentrations from numerous products made from formaldehyde-bearing resins. Various mixtures of formaldehyde, water, and alcohol (sometimes referred to as "formalin") are also included in CAS #50-00-0. Paraformaldehyde, a solid polymeric form of formaldehyde, also serves as a source of formaldehyde gas.

b. The formaldehyde standard applies to all occupational exposures to formaldehyde. This includes general industry, and by cross-reference, maritime and construction. The only exceptions to this coverage occur where the Occupational Safety and Health Act does not give OSHA jurisdiction over employees. Examples include pesticide applicators who are covered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), public employees in States without OSHA-approved occupational safety and health State plans, and unincorporated businesses with no employees. The scope of the formaldehyde standard is not affected in most cases by the laboratory standard. The laboratory standard, 29 CFR 1910.1450, specifically does not apply to formaldehyde use in histology, pathology, and human or animal anatomy laboratories; however, if formaldehyde is used in other types of laboratories which are covered by the laboratory standard the employer needs to comply with 29 CFR 1910.1450

2. Paragraph (c) Permissible Exposure Limit. Where there are measurable concentrations of other regulated

contaminants which affect the same body systems as formaldehyde, citations should be issued per the FOM, Chapter IV, C.6.c. This manual cites paragraph 29 CFR 1910.1000(d)(2) of the Air Contaminants standard for use in cases where there are potential additive and synergistic effects. The Air Contaminants standard, 29 CFR 1910.1000(d)(2)(i), contains a formula which has the effect of proportionally reducing the PEL of each regulated toxic element of the multiple exposure. Paragraph (d)(2)(i) requires employers to meet these adjusted PELs where there is an exposure to a mixture of air contaminants regulated by Subpart Z.

a. When documenting a violation, review the feasibility of abatement methods and identify the shared target organ effects of the contaminants. The body system primarily affected by formaldehyde is the respiratory system (upper and lower). The immune system may also be affected since formaldehyde is a sensitizer which provokes an IgE immunoglobulin mediated response. Appendix F contains guidance for calculating the adjusted PELs and SAEs (sampling and analytical errors). The adjusted PEL should apply only to enforcement of paragraphs (c), Permissible Exposure Limit and (f), Methods of compliance. The STEL and AL should not be adjusted for mixtures for compliance evaluations.

b. The proposed PEL cannot be enforced until the revisions are final. During the interim, it is important to advise the employer of the proposed PEL. Any citations written during the interim for PEL violations should include a notice of the proposed lower PEL in the narrative.

3. Paragraph (d), Exposure Monitoring. Paragraph (d) of the formaldehyde standard requires employers to determine their employees' exposure to formaldehyde if any mixture or solution present in the workplace contains 0.1 percent or more of formaldehyde, or if materials capable of releasing formaldehyde into the workplace air result in employees being exposed to formaldehyde at concentrations reaching or exceeding 0.1 ppm. The CSHO should verify the employee exposure via bulk or air samples.

a. Objective Data. The exposure determination must consist of actual measurements unless the employer can produce objective data to document

that no employee will be exposed to formaldehyde at concentrations exceeding the 0.5 ppm (TWA) action level (AL), or the 2 ppm STEL under foreseeable conditions of use. Industry-wide studies or generic exposure estimates may be a source of objective data; however, the use of such data must accurately characterize actual employee exposures. For exposures less than the AL or STEL, area samples may also be used as the basis for exposure determinations, if they represent those exposures.

b. Medical Complaints. Regardless of employee exposure level, if there are employee health complaints, the employer is required to take action to determine employee exposure.

c. Exception. If mixtures or solutions composed of 0.1 percent or less of formaldehyde are used, employee exposure is below 0.1 ppm, and there are no employee health complaints then an employer should not be cited for not monitoring. (See 29 CFR 1910.1048(d)(1)(ii)(A))

d. Repeat Monitoring. If there is a change in production, equipment, process, personnel, or control measures, which may result in a new or additional exposure to formaldehyde, the initial monitoring shall be repeated. For example, apparel manufacturers and other producers/users of formaldehyde resin finished fabrics may need to repeat initial determinations with different fabric lots.

e. Sampling Methods. As long as the method selected for sampling and analysis meets the criteria for precision and accuracy set out in the formaldehyde standard, the employer is free to choose from many methods available for monitoring exposure to formaldehyde.

(1) Among the methods available are the chromotrophic acid method which relies on use of a midget impinger, gas

chromatographic methods which collect formaldehyde in a specially prepared tube, passive diffusion badges, and handheld monitors.

(2) Appendix A to this instruction summarizes information submitted to the formaldehyde docket on passive and direct reading devices for the measurement of formaldehyde. Limitations, where known, are also given.

4. Paragraph (h), Protective Equipment and Clothing. This section addresses the selection and maintenance of protective equipment and clothing, including aprons, goggles, face shields, and suits. The CSHO should evaluate potential formaldehyde hazards and use professional judgment in enforcing the general requirements of 29 CFR 1910.132 and 29 CFR 1910.133, which are incorporated into the formaldehyde standard by reference. Violations of these general requirements should be cited under 29 CFR 1910.1048(h). Some PPE requirements are specified by the formaldehyde standard, and violations of these requirements should be cited under 29 CFR 1910.1048(h)(1).

a. Solutions containing greater than 1-percent formaldehyde are damaging to the skin and severely damaging to the eyes. Consequently, protective equipment adequate to prevent contact with such solutions must be provided to employees, and the equipment must be kept in good repair and free of formaldehyde contamination.

b. Some solids that release formaldehyde and solutions that contain less than 1-percent formaldehyde can also pose a hazard to employees. Paragraph (h)(1)(iii) requires the employer to provide protective clothing or equipment, as needed, in accordance with the general standards for protective equipment and clothing (29 CFR 1910.132 and 29 CFR 1910.133) to prevent contact

with irritating or sensitizing materials.

c. Formaldehyde gas poses little hazard from dermal contact, although there are a few reports in the literature that indicate sensitization from high airborne concentrations. At the IDLH concentration, the standard requires whole body protection, essentially equivalent to Level A protection, to prevent potential sensitization.

d. Butyl and nitrile glove materials provide the greatest permeation protection. Greater thicknesses of other materials (natural rubber, PVC, polyethylene) may be suitable for shorter immersion periods, but gloves may have to be changed more frequently due to degradation. All these materials are generally suitable for splash protection. Appendix B to this instruction summarizes the permeation data available for formaldehyde. Barrier creams are not regarded as effective protection for formaldehyde, since there is no data demonstrating their efficacy.

5. Paragraph (i), Hygiene Protection.

a. Emergency Showers. Because of the severe dermal effects that can occur when employees have skin contact with concentrated solutions of formaldehyde and because of the relative irreversibility of dermal sensitization to formaldehyde, the employer is required to provide conveniently located quick drench showers for employees who become splashed with solutions of 1 percent or greater formaldehyde as the result of equipment failure, improper work practices, or other emergencies. Whether or not the employee is wearing protective clothing does not affect the need for quick drench showers since the employee must be able to remove PPE splashed with formaldehyde in a safe manner. The availability

of emergency showers should also help to lower any potentially serious inhalation hazard when an employee has been splashed with a formaldehyde solution.

b. Eye Wash Facilities. Liquid formaldehyde can also cause severe damage to the eyes. Thus, the standard requires employers to provide appropriate eye wash facilities within the immediate work area for emergency use by any employee whose eyes are splashed with solutions containing 0.1 percent or more of formaldehyde.

c. The degree of sophistication of the emergency shower and/or eyewash station varies with the size of the potential splash. The use of portable units or hand-held fixtures should be carefully evaluated. Such use should be limited to small spills (generally less than 8 oz.), provided that all possible affected body parts can be flushed continuously for 15 minutes. (For this reason, bottle-type eyewashes are not acceptable.) Appendix C of this instruction contains specific (nonmandatory) evaluation criteria for emergency showers and eyewashes.

6. Paragraph (k), Emergencies. Paragraph (k) ensures that the employer will prepare for any situation where equipment failure, spill or rupture of containers, or failure of control equipment would result in an uncontrolled release of formaldehyde that could result in injury or loss of life. If such circumstances could occur in an accident, the employer must establish procedures for evacuation and access to emergency medical care, obtain needed equipment for evacuation and reentry into the area, and establish procedures for equipment repair, spill cleanup, decontamination, and waste disposal. Paragraph (k) violations should be grouped with any applicable violations under 29 CFR 1910.120. The threshold quantity for formaldehyde for evaluation of catastrophic potential is 500 lbs. (See OSHA Instruction CPL 2-2.45.)

a. There is not a specific exposure level that triggers the emergency provisions. When determining if there is a need to provide for emergencies, the employer should consider whether employees' lives or health could be jeopardized in the worst reasonably predictable accident (i.e., the worst outcome of any possible scenario) unless employees are promptly evacuated from the area.

b. A 30-minute exposure to 100 ppm is potentially fatal, and pulmonary edema has been seen after exposures of 50 ppm. These levels can be generated by relatively small spills (a pint or less), even in ventilated areas.

7. Paragraph (1), Medical Surveillance.

a. The provisions of paragraph (1) establish an approach to medical surveillance based on an employee's exposure potential.

(1) All persons who are required to wear respirators as the result of their formaldehyde exposure must fill out a medical disease questionnaire, such as the optional form contained in Appendix D to the formaldehyde standard, on an annual basis. (Note: The employer is required to administer the questionnaire, a process which is required to be under the supervision of a licensed physician, and involves assisting the employee as necessary to complete the questionnaire.) These persons must then be offered a physical examination and a pulmonary function test.

(2) All persons who are exposed to formaldehyde at concentrations between the action level and the 1 ppm TWA limit (but not over the STEL) must be given the opportunity to participate in a medical surveillance program on an annual basis by filling out a medical disease questionnaire. If an

employee exposed between the action level and the 1 ppm TWA limit is showing signs and symptoms that may be formaldehyde-related, the employer must administer to the employee a medical disease questionnaire without delay. If the physician determines, on the basis of the medical disease questionnaire, that it is necessary to examine the employee, the employee would then be sent to the physician for further examination.

(3) If exposures are less than 0.5 ppm but the employee is showing signs and symptoms that may be formaldehyde-related, the employee must be evaluated via a medical disease questionnaire, and further surveillance would be conducted on the basis of the physician's determination, as it is for concentrations between 0.5 and 1 ppm.

b. Paragraph (l)(3)(ii) requires the physician to make a determination, based on evaluation of the medical disease questionnaire, as to whether additional medical surveillance specified in paragraph (l)(4); i.e., a medical examination, is necessary to ensure the employee is not being placed at increased risk of material impairment of health from exposure to formaldehyde. In some cases, the physician will require additional information from the medical examinations before a final written opinion can be given. When the physician does not require additional information to reach a determination about the employee's health, the determination made in paragraph (l)(3)(ii) must be provided to the employer in writing, and a copy given to the employee within 15 days of its receipt by the employer.

c. Emergencies pose a very different situation from routine surveillance. If the employer has determined that an emergency situation could occur, then there must be a prior arrangement

with a physician or hospital to ensure that any employee acutely exposed to formaldehyde in an emergency receives proper medical intervention, as required by paragraph (k). The plan must also specify what information should be given to emergency care providers, per the requirements of paragraph (1)(6), and how it is to be transmitted.

8. Paragraph (m), Hazard Communication.{ ~~On December 13, 1988, OSHA announced in the Federal Register an administrative stay of paragraphs (m)(l)(i) through (m)(4)(ii) of the formaldehyde standard. OSHA has extended the stay until the revision to the standard is final~~ Revised 29 CFR 1910.1200, Hazard Communication, amended 29 CFR 1910.1048(m)(1) and (m)(2), and mandated that specific hazards be addressed. Paragraphs 29 CFR 1910.1048(h)(2)(ii)(A) and (B), *Signs* and *Labels*, respectively, for contaminated protective clothing and equipment, were also modified by the revised Hazard Communication Standard. Additionally, MSDSs are being replaced by Safety Data Sheets (SDSs), which have a standardized format.

~~a. In the interim, OSHA will continue to enforce the HCS with respect to formaldehyde. For abatement purposes one can meet the proposed hazard communication provisions of the formaldehyde standard.~~

~~b. Paragraph (m)(1) was not stayed. It reemphasizes that hazard communication covers formaldehyde exposures occurring in the manufacture and use of wood products. When applicable, this paragraph shall be cited along with appropriate violations under the HCS.~~ }

9. Paragraph (n), Employee Information and Training.

a. All employees exposed to formaldehyde at concentrations at or above 0.1 ppm or to solutions containing greater than 0.1 percent or more of formaldehyde must receive initial training upon hire.

b. All employees exposed at or above the action level or the STEL must be trained annually.

c. { ~~The administrative stay on paragraph (m), Hazard Communication, does not affect the status of the training requirements under (n).~~

~~(1) Training for formaldehyde conducted after April 4, 1988, must cover all applicable requirements contained in paragraph (n)(3)~~

~~of the new formaldehyde standard. (See March 2, 1988, Federal Register, at 53 FR 6628.)~~

~~(2) Employees previously trained on formaldehyde's hazards under the HCS (29 CFR 1910.1200) must be retrained in order to cover additional information contained in the new formaldehyde standard.~~

~~(3) Retraining and initial training for employees not previously covered by 29 CFR 1910.1200 must be provided as soon as possible once the employer has identified that they are exposed to formaldehyde. A reasonable amount of time should be given the employer to permit identification of affected employees and to obtain training materials. In no case should more than 3 months after completion of monitoring be permitted. (Note that the start-up date for initial monitoring was by August 2, 1988.)~~

~~(4)~~ } The training provisions of paragraph (n) are to be cited rather than the HCS information and training requirements if the employee is covered by (n).

d. Appendix A to the formaldehyde standard provides general information which is appropriate for a training program. This outline would need to be supplemented by plant specific information. In addition, the OSHA hazard recognition training program on formaldehyde may be of assistance to employers who need to train employees. The program includes information on the new standard but it is being revised to more fully reflect the changes. (See OSHA Fact Sheet 89-27.)

10. Paragraph (p), Dates. Since all dates in this section have passed, all paragraphs are in effect for all industries. Appendix D to this instruction gives specific effective dates by paragraph.

11. Supplemental Information. Appendix E to this instruction summarizes the formaldehyde standard triggering events.

J. Hazard Communication Standard (29 CFR 1910.1200). For abatement purposes one can comply with the { ~~proposed~~ } hazard communication provisions of the formaldehyde standard.

K. Inspection Procedures. The following procedures shall be followed in addition to the guidance in the FOM, OTM, and IMIS Forms Manual.

1. Authorization to Review Limited Medical Information. Appropriately qualified compliance personnel are authorized to review medical disease questionnaires and medical opinions mandated by the formaldehyde standard when the limitations and procedures in OSHA Instructions CPL 2-2.30 and CPL 2-2.33 are followed.

a. Qualified compliance personnel are industrial hygienists or professionals with training in medical disciplines.

b. This authorization is pursuant to 29 CFR 1913.10(b)(6).

{{ ~~2.~~ ~~Recording in the IMIS. In addition to current instructions for completing the OSHA-1, as found in the IMIS Manual, the following shall be recorded in Item 42 for all inspections where employee exposure to formaldehyde is investigated for compliance with 29 CFR 1910.1048 and/or 29 CFR 1910.1200.~~

~~Type~~	~~ID~~	~~Value~~
~~N~~	~~16~~	~~Form~~

~~3.~~ 2. }}Contested Cases. For contested cases of 29 CFR 1910.1200 involving formaldehyde which the Regional Administrator supports as strong cases, the Regional Administrator shall expeditiously send a brief memorandum summarizing the facts to the Director, Directorate of Compliance Programs. After the information is reviewed at the National Office, the Regional Administrator will be notified

if the National Office needs applicable portions of the case file before a recommendation on the case can be rendered.

Gerard F. Scannell Assistant Secretary

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Appendix A

Passive and Direct Reading Devices [1]

COMPANY: Air Quality Research (415-644-2097).
PRODUCT NAME: Passive Formaldehyde Kit (PF-20).
METHOD OF COLLECTION: Bisulfite coated glass fiber filter.
DETECTION: Chromotropic acid.
SENSITIVITY: 0.1 ppm for 8 hours; 5 ppm for 15 minutes
INTERFERENCES: Low humidity may cause adverse effects.
COMMENTS: Manufacturer claims the PF-20 monitor will operate in a humidity range of 20 to 90% RH. Face velocities must be greater than 25 cm/s during sampling.

COMPANY: Assay Technology (415-424-9947).
PRODUCT NAME: Chem Chip (TM). DETECTION: Colorimetric (Furpald procedure).
SENSITIVITY: 0.1 ppm for 8 hours; 0.3 ppm for 15 minutes.
INTERFERENCES: Other aldehydes but less interference with higher molecular weights.
COMMENTS: Good for the STEL according to manufacturer's literature. Interferences of other aldehydes would cause a problem in certain industries such as embalming where glutaraldehyde may also be present.

COMPANY: Crystal Diagnostic (617-933-4114).
PRODUCT NAME: AirScan (TM).
METHOD OF COLLECTION: Chemical reaction.
DETECTION: Visible.
SENSITIVITY: 0.1 ppm 8 Hr.; STEL (see comments). INTERFERENCES: Possibly humidity but not definite.
COMMENTS: The company states their monitors are sensitive enough for the STEL if the badge is allowed to develop for several hours. The results on the humidity interference were inconclusive.

[1] This is a summary of information from the formaldehyde docket on passive and direct reading devices. It is not a comprehensive list of all available devices. For further information contact the OSHA Salt Lake City Laboratory (FTS 588-4270).

COMPANY: CEA Instrument, Inc. (201-664-2300).
PRODUCT NAME: Model 555.
METHOD OF COLLECTION: Direct Reading Instrument.
DETECTION: Colorimetric (pararosaniline).
SENSITIVITY: 0.01 ppm continuous reading.
INTERFERENCES: Temperature can cause a problem; other aldehydes.
COMMENTS: A review article states that there is a long equilibration time and calibration must be done often. Interferences of other aldehydes would cause a problem in certain industries such as embalming where glutaraldehyde may also be present.

COMPANY: CEA Instruments, Inc. (201-664-2300).
PRODUCT NAME: TGM 555.
METHOD OF COLLECTION: Direct Reading Instrument.
DETECTION: Colorimetric (pararosaniline).
SENSITIVITY: 0.003 ppm continuous reading.
INTERFERENCES: Temperature can cause a problem; other aldehydes.
COMMENTS: Modification of Model 555. Need to average the continuous readout for STEL. Interferences of other aldehydes would cause a problem in certain industries such as embalming where glutaraldehyde may also be present.

COMPANY: Dosimeter Corporation (513-489-8100).
PRODUCT NAME: Model F-3.
METHOD OF COLLECTION: Cellulose sponge containing a sorbent
DETECTION: Visual with a comparator badge.
SENSITIVITY: 0.03 ppm for 4 hours.
INTERFERENCES: None listed
COMMENTS: Manufacturer's stated sensitivity would make it adequate for STEL.

COMPANY: DuPont.
PRODUCT NAME: Pro-Tek C-60 (TM).
METHOD OF COLLECTION: Modified 1% bisulfite.
DETECTION: Colorimetric (Chromotropic acid).
SENSITIVITY: 0.12 ppm for 8 hours; 1 ppm for 15 minutes.
INTERFERENCES: Phenol, ethanol and other alcohols but in concentrations 8 times and 15 times, respectively.
COMMENTS: Not good for STEL. The interferences of phenol and ethanol may cause problems in certain industries such as plywood manufacturing.

COMPANY: Envirotech Services, Inc. (608-643-4755).
PRODUCT NAME: ETS Dosimeter (TM).
METHOD OF COLLECTION: Organic acid on polycarbonate sponge.
DETECTION: Colorimetric (Purpald procedure).
SENSITIVITY: 0.1 ppm for 8 hours.
INTERFERENCES: Other aldehydes.
COMMENTS: Not good for the STEL. Interferences are other aldehydes which would cause a problem in certain industries such as embalming where glutaraldehyde may also be present.

COMPANY: Foxboro Analytical (203-853-1616)
PRODUCT NAME: Miran-1A.
METHOD OF COLLECTION: Direct Reading Instrument.
DETECTION: Infrared Spectrophotometer.
SENSITIVITY: 1 ppm continuous reading.
INTERFERENCES: Any compound which has an absorbance at 3.58 micrometers (C-Ia stretch). Possibly any aliphatic hydrocarbon may interfere.
COMMENTS: Need to average the continuous readout for STEL or TWA.

COMPANY: MDA Scientific, Inc.
PRODUCT NAME: Lion Formaldemeter.
METHOD OF COLLECTION: Direct Reading Instrument.
DETECTION: Electrochemical.
SENSITIVITY: 0.3 ppm.
INTERFERENCES: Compounds that are easily oxidized such as methanol, phenol, ethanol and formic acid.
COMMENTS: Not useable for STEL due to the short sampling time (approx. 20 seconds) and the time delay for the electrochemical cell to return to zero would prevent rapid sequential measurements.

COMPANY: Sensidyne (813-530-3602).
PRODUCT NAME: 91L.
METHOD OF COLLECTION: Detector tube.
DETECTION: Visible color indication.
SENSITIVITY: 0.2-5 ppm.
INTERFERENCES: Aldehydes, acid gases and ketones.
COMMENTS: The tube has the sensitivity for the STEL but taking a continuous 15-minute sample would be difficult. The number of interferences may lead to a problem.

COMPANY: 3M (612-733-8029).
PRODUCT NAME: 3721 (TM).
METHOD OF COLLECTION: Bisulfite impregnated pad.
DETECTION: Colorimetric (Chromotropic acid).
SENSITIVITY: 0.1 ppm for 8 hours.
INTERFERENCES: Manufacturer claims phenol is not an interference since the monitor has a low collection efficiency for phenol.
COMMENTS: Not good for the STEL. Sampling for longer than 16 hours in low humidity may make it unusable.

COMPANY: Kem Medical (800-553-0330)
PRODUCT NAME: 8510 Vapor-Trak.
METHOD OF COLLECTION: Moistened chemical pad.
DETECTION: Colorimetric (Chromotropic acid).
SENSITIVITY: 0.02 ppm (8 hours); 0.64 ppm (15 min).
INTERFERENCES: None listed but colorimetric methods usually have some interferences.
COMMENTS: Manufacturer's material states that humidity should not be a problem but if it does cause a problem then the exposure would be underestimated. They do state that 20% RH did not cause a problem. That RH is probably at room temperature.

COMPANY: Air Technology Labs, Inc. (209-435-3545).
PRODUCT NAME: Passive Bubbler.
METHOD OF COLLECTION: 3-methyl-2-benzothiazolinone hydrazone hydrochloride (MBTH) solution.
DETECTION: Colorimetric.
SENSITIVITY: 0.2 ppm for 8 hours. 0.8 ppm for 15 minutes.
INTERFERENCES: Other aliphatic aldehydes.
COMMENTS: Device is a passive liquid sampler that is independent of humidity effects.

Appendix B

Summary of Published Permeation Data

THICK-NESS (mm)	GENERIC MATERIAL	BREAK-THROUGH (minutes)	STEADY STATE RATE ($\mu g/cm^2/min$)	COMMENTS
.28-.60	Nitrile	> 360 to > 1260		
.23	Viton	> 960		
	Chemrel	> 480		Suit Material
.08	Silver Shield	> 360		Glove only
.43	Butyl	> 240 to > 960		>240=mixture
	PE/Tyvek	> 360 to > 480		
.07	PE/EVOH/PE	> 240		35C, Swedish
	Teflon	> 180		
.05	CPE	> 180		
.38-.74	Neoprene	120 to > 480	< 90 to < 900	
.16-.46	Natural Rubber	4 to > 480	10 to 900	
.60	Viton/neoprene	> 60		
	Neo + Nat Rub	35	< 600	
	Nitrile-PVC	30	< 9	
.50	PVA	6 to > 240		Degrades, no water breakthrough for mixtures
.15-.51	PVC	4 to > 480	< 10 to < 900	

Appendix C

Nonmandatory Evaluation Criteria for Emergency Showers and Eyewashes

The criteria for acceptable eyewashes and quick drench showers should be taken from ANSI Z358.1-1981, which will be revised in the near future. The National Safety Council Data Sheet 1-686-Rev. 86 contains comparable criteria, but not identical specifications. Generally, the main criteria for judging acceptability are:

(1) Initiation: one hand, one action. Once initiated, flow continues, leaving both hands free.

(2) Location: 15 seconds, 25 feet travel, maximum (for highly concentrated solutions, 10 seconds, 10 feet maximum). Eyewashes positioned 34"-39" high, shower approximately 82" high, with 67" high activation (maximum), positioned 23" (maximum) off center from shower head. Location must be clearly marked, well lighted, and easily accessible; i.e., no obstacles, doorways, or turns.

(3) Water quality: potable, temperature (60-100 degrees F, ideally 90-95 degrees F), pressure (eyewash 30 psi at supply line, shower 30 psi), amount (eyewash 3 gallons/minute for 15 minutes minimum, showers 30 gallons/minute for 15 minutes minimum), maintenance (float-away covers or means to prevent contamination; flush units weekly for a minimum of 3 minutes; bump test eyewashes daily, showers weekly; full flow testing monthly).

(4) Training: Routine drills advisable. As a minimum, employees must know the location and proper use of eyewashes and showers (i.e., initiate, remove contaminated clothing, flush full 15 minutes, etc.).

Appendix D

Start-up Dates

a. The following provisions were triggered as of February 2, 1988, (formaldehyde standard paragraphs):

(a) Scope and application.

(b) Definitions.

(c) Permissible Exposure Limit (PEL). The intent was to have no employees exposed above the PEL by February 2, 1988, (53 FR 46290, December 4, 1988).

(e) Regulated areas. Signs restricting entry to authorized personnel must be placed at the entry to all areas where either PEL is exceeded. An exception is when exposures are over a new PEL but below the old PEL's and the employer did not have adequate sampling data to comply with these requirements. Since the start-up date for monitoring was August 2, 1988, (except for laboratories) no exception should be given after this date.

(g) Respiratory protection. In general, these provisions were not triggered until November 2, 1988. They could be cited in the interim, however, if the employer had knowledge for at least 3 months that employees were exposed above a new PEL.

(h) Protective equipment and clothing.

(i) Hygiene protection.

(j) Housekeeping.

(1) (1)(ii) and (1)(5) Medical surveillance.

emergency or when employees develop signs and symptoms of overexposure to formaldehyde. Because any formaldehyde- bearing products are dermal hazards and because of individual hypersensitivity to formaldehyde, signs or symptoms of overexposure may occasionally occur even though airborne levels are below the PELs.

(k) Recordkeeping.

b. The following provisions are scheduled to be in effect as follows, formaldehyde standard paragraphs:

(d) Exposure monitoring ... August 2, 1988.

(f) Methods of compliance ... February 2, 1989.

(g) Respiratory protection ... As soon as possible but no later than November 2, 1988.

(k) Emergencies ... August 2, 1988.

(l) Medical surveillance (except (1)(l)(ii) and (1)(5) ... August 2, 1988.

(n) Employee information and training ... April 4, 1988.

c. Formaldehyde use in histology, pathology, and human or animal anatomy laboratories (including teaching laboratories) has the same effective dates as described above. All other laboratories had a delayed initial effective date of January 1, 1989, except for 29 CFR l9l0.l048(c)--Permissible exposure limits--which was triggered February 2, 1988. All start-up dates for other laboratories are triggered after the effective date; e.g., exposure determination is to be completed by 6 months after January 1, 1989.

Appendix E

Formaldehyde Standard Triggering Events

Part I. Airborne Levels

A. Below AL and STEL But Above .1 ppm.

1. Exposure Determination.
2. Recordkeeping.
3. Training (initial).
4. Medical Surveillance for Signs and Symptoms.

B. Above AL or STEL.

1. Initial Monitoring.
2. Periodic Monitoring.

    a. At or Above AL ... Every 6 months.
    b. At or Above STEL ... Once a year.

3. Medical Surveillance.
4. Training (annual).
5. Applicable provisions in A. above.

C. Above TWA or STEL.

1. Regulated Areas.
2. Methods of Compliance.
3. Respiratory Protection.
4. Applicable provisions are in A., B. above.

D. Greater than 100 ppm.

1. Full Body protection.
2. Applicable provisions are in A., B., and C. above.

Part II. Eye or Skin Contact.

A. Greater than or Equal to 1% Formaldehyde Solution.

1. PPE.
2. Hygiene protection.

a. Change Rooms.
b. Quick Drench Shower.

B. Greater than or Equal to 1% Formaldehyde Solution.

1. Eye Wash Facilities.
2. PPE.

C. Irritating or Sensitizing Formaldehyde Materials.

1. PPE.
2. Change Rooms.

Part III. Liquid or Gas.

A. Housekeeping.

1. Leak Detection.
2. Preventative Maintenance.
3. Spill Clean-up.

Part IV. Possibility of Emergency.

A. Emergencies.
B. Respiratory Protection.
C. Medical Surveillance.
D. Training.

Appendix F

Considering SAEs for Exposure to Mixtures

Often an employee is simultaneously exposed to a variety of chemical substances in the workplace. Synergistic toxic effects on a target organ are common for such exposures in many construction and manufacturing processes. This type of exposure can also occur when impurities are present in single chemical operations.

New permissible exposure limits (PELs) for mixtures, such as the recent welding fume standard (5 mg/m3), address the complex problem of synergistic exposures and their health effects. In addition, the Code of Federal Regulations (29 CFR 1910.1000) contains a computational approach to assess exposure to a mixture. This calculation should be used when the components in the mixture pose a synergistic threat to worker health.

Whether using a single PEL or the mixture calculation, the sampling and analytical error (SAE) of the individual constituents must be considered before arriving at a final compliance decision. These SAEs can be pooled and weighted to give a control limit for the synergistic mixture. To illustrate this control limit, the following example using the mixture calculation is shown:

The mixture calculation is expressed as:

$$E_m = C_1/L_1 + C_2/L_2) + ... (C_n/L_n) \qquad (1)$$

Where:

E_m = equivalent exposure for the mixture (E_m should be ≤ 1 for compliance)

C = concentration of a particular substance

L = PEL

As an example, an exposure to three different but synergistic substances:

Material	Actual Concentration of 8-hr Exposure (ppm)	8-hr TWA PEL (ppm)	SAE
Substance 1	500	1000	0.089
Substance 2	80	200	0.11
Substance 3	70	200	0.18

Using equation (1) above:

$E_m = 500/1000 + 80/200 + 70/200 = 1.25$

Since E_m is > 1 an overexposure appears to have occurred; however, the SAE for each substance also needs to be considered:

Exposure ratio (for each substance) $Y_n = C_n/L_n$

Ratio to total exposure $R_1 = Y_1/E_m1 \ldots R_n = Y_n/E_m$

The SAEs (95% confidence) of the substances comprising the mixture can be pooled by:

$RS_t = [(R_1)^2 \times (SAE_1)^2 + (R_2)^2 \times (SAE_2)^2 + \ldots (R_n)^2 \times (SAE_n)^2]^{1/2}$

The mixture Control Limit (CL) is equivalent to: $1 + RS_t$

If E_m is < CL then an overexposure has not been established at the 95% confidence level; further sampling may be necessary.

If E_m is >1 and E_m is > CL then overexposure has occurred (95% confidence).

Using the mixture data above:

$Y_1 = 500/1000$, $Y_2 = 80/200$, $Y_3 = 70/200$

$Y_1 = 0.5$, $Y_2 = 0.4$, $Y_3 = 0.35$

$R_1 = Y_1/E_m = 0.4$, $R_2 = 0.32$, $R_3 = 0.28$

$RS_t^2 = (0.4)^2\ (0.089)^2 + (0.32)^2\ (0.11)^2 + (0.28)^2\ (0.18)^2$

$RS_t = (RS_t^2)^{1/2} = 0.071$

$CL = 1 + RS_t = 1.071$

$E_m = 1.25$

Therefore E_m is > CL and an overexposure has occurred within 95% confidence limits.

This calculation is also used when considering a PEL such as the one for total welding fumes. An executable computer program is available which will calculate a control limit for any synergistic mixture. The program will run on any IBM compatible personal computer. For questions contact Rick Cee or Mike Shulsky from the OSHA Salt Lake City Laboratory.

[Replacement page G-1]

Appendix G

COMPARISON OF THE CURRENT PROVISIONS OF THE FORMALDEHYDE STANDARD, 29 CFR 1910.1048, WITH THE PROPOSED AMENDMENTS

CURRENT	PROPOSED
PEL is 1.0 ppm TWA.	PEL is reduced to 0.75 ppm TWA
Action level is 0.5 ppm TWA.	No Change
STEL is 2.0 ppm (15 min.).	No Change
Exposure monitoring is conducted initially over 0.1 ppm, and continued periodically at or above the action level or STEL.	In addition to current provisions, exposure monitoring will be initiated upon report of signs or symptoms of respiratory or dermal conditions.
Medical removal:	Medical removal:
No current provisions.	- Two week evaluation/remediation period. - Wages, seniority, benefits maintained. - Limited to 6 months per determination. - Multiple physician review.
Hazard Communication:	Hazard Communication:
Label identifying "formaldehyde", the name and address of responsible party and containing appropriate hazard warnings including "Potential Cancer Hazard" required at 0.1% or 0.1 ppm.	No changes except the following for solid materials capable of releasing formaldehyde: - Label identifying "formaldehyde" and that physical and health hazard information is available from employer and {MSDS/SDS} required at 0.1 ppm. - Label including {"~~Potential Cancer Hazard~~ May Cause Cancer"} required above 0.5 ppm.
{MSDS/SDS} required at 0.1% or 0.1 ppm	No change
Training required initially at 0.1 ppm or to solutions containing greater than 0.1% or more formaldehyde. Repeated annually at or above action level or STEL.	Training required initially and annually above 0.1 ppm.