

CWRU
WRITTEN PROGRAM
FOR VINYL CHLORIDE
29 CFR 1910.1017

Written 3/1999
Revised 08/2011

CWRU WRITTEN PROGRAM FOR VINYL CHLORIDE

I. Scope and Application

A number of chemicals are regulated by the Occupational Safety and Health Administration (OSHA) under 29 CFR 1910. The standard for vinyl chloride (Cas No. 75-01-4) is listed under 29 CFR 1910.1017. It applies to the “manufacture, reaction, packaging, repackaging, storage, handling or use of vinyl chloride or polyvinyl chloride” and lists the requirements for the proper usage and control of vinyl chloride as it pertains to employee exposure. According to Case Western Reserve University’s (CWRU) safety manual, the Primary Investigator (PI) is ultimately responsible for safety in his/her laboratory. The PI must write and implement a lab-specific Chemical Hygiene Plan unique to the work area. This plan is then reviewed and approved by the Environmental Health and Safety Department (EHS). As part of the implementation of the Chemical Hygiene Plan, the PI shares responsibility in maintaining his/her employees’ training, medical evaluations, and enforcing necessary safety precautions. When new chemicals or procedures are introduced into the lab’s protocol, the Chemical Hygiene Plan needs updated and resubmitted for approval. With the addition of vinyl chloride, changes in the Chemical Hygiene Plan must be in accordance with 29 CFR 1910.1017. Case Western Reserve University will establish a safe work environment in accordance with OSHA’s vinyl chloride standard. Some of the items EHS and Health Services provide include risk assessments, review of engineering controls and personal protective equipment, air monitoring, training, and medical surveillance.

II. Health Effects

Vinyl chloride is rated as a select carcinogen by OSHA, the National Toxicology Program, and the International Agency for Research on Cancer. It is DNA reactive and exhibits dose-related carcinogenic effects. The issue concerning human exposure thresholds to carcinogens is complex; however, DNA reactive agents tend to have a low dose threshold with long-term exposure. Chronic exposure to vinyl chloride could lead to liver cancer (angiosarcoma) as well as carcinogenic effects on the brain, lung, and urinary system. Dermal exposure must be avoided. Skin contact could lead to peripheral circulation problems, numbness, redness, blisters, and eventually Raynaud’s syndrome. It may also lead to skin changes (scleroderma) and lysis of the finger bones. Reproductive effects have been observed in persons exposed to vinyl chloride. It is a known teratogen and mutagen, and exposure must be avoided.

III. Workplace Exposure to Vinyl Chloride

A. Personal exposure to vinyl chloride must be controlled to prevent adverse health effects, especially exposure via inhalation and skin contact. Established procedures and safety controls must be included in the laboratory’s Chemical Hygiene Plan.

- B. The permissible exposure limit (PEL) is 1ppm, and the short-term exposure limit (STEL) is 5ppm. No employee may be exposed to timeweighted average concentrations above 1ppm for an eight hour time period and above 5ppm for a fifteen minute time period.
- C. Skin contact with liquid vinyl chloride is prohibited. According to Fisher Scientific's compatibility chart, silver shield (4mil) is an appropriate glove material.
- D. Engineering controls and personal protective equipment (PPE)
 - 1. Engineering controls must be used first to reduce vinyl chloride exposure to the lowest possible level and then if still warranted personal protective equipment must be used. The type of engineering controls and PPE necessary are determined from risk assessments on an individual basis. Fume hoods are provided in each laboratory.
 - 2. When ordering PPE, chemical protective clothing charts, respirator selection charts, etc. must be reviewed for each supplier and then approved by the EHS before usage.
 - 3. Engineering controls and PPE for each procedure must be included in the Chemical Hygiene Plan.

IV. Respiratory Protection

CWRU has a separate Respirator Program. Please call the EHS Office for information.

- A. EHS maintains a Respirator Program in accordance with 29 CFR 1910.134 and 29 CFR 1910.1017. This includes physicals, training, and fit-testing.
- B. Air purifying respirator cartridges must be replaced prior to the end-of-service life or the end of the workers' shift depending which comes first.
- C. Continuous monitoring and alarm systems must be provided when conditions could exceed maximum use concentrations for respiratory devices.

V. Personal Monitoring

- A. Personal monitoring is conducted whenever vinyl chloride is initially used in a procedure or when a person is exposed to it for the first time. If results are above the action level (0.5ppm), then additional personal monitoring is required.
 - 1. If results exceed 0.5ppm, then monitoring is repeated quarterly.
 - 2. If results exceed 1ppm, then monitoring is repeated at least monthly.

3. Monitoring may be discontinued if 2 consecutive samples collected not less than 5 days apart have results less than 0.5ppm.
- B. Monitoring must take place with procedural changes or with other reasons to suspect the action level is exceeded.
- C. NIOSH Method No. 1007 is used to collect samples.

VI. Regulated Areas, Hazardous Operations, Emergency Situations

- A. Areas where vinyl chloride is “manufactured, reacted, repackaged, stored, handled, or used” and where concentrations are in excess of 1ppm are considered “regulated areas”. Access is limited to authorized persons and entrances must be labeled. See Section X for signage requirements.
- B. If a potential release of vinyl chloride liquid or gas is expected to produce an exposure greater than the designated exposure limit, then the procedure is defined as a “hazardous operation.” Employees performing this work are required to use respiratory and dermal protection.
- C. An “emergency,” as it pertains to this standard, is any large release of vinyl chloride. Written emergency plans must be established for each location using vinyl chloride as a liquid or compressed gas in accordance with 29 CFR 1910.1017 (h)(2)(i). In the event of an emergency, employees must leave the area and contact Security (x3333) or EHS (x2907). If employees have been over-exposed to vinyl chloride, they must go to Health Services (x4539) and contact their supervisors.

VII. Training (Provided by the EHS Department)

- A. Employees subject to the standard are trained annually.
- B. Topics covered in each session include:
 1. Acute & chronic health hazards
 2. Fire hazards
 3. Recognition/Anticipation of operations leading to exposures
 4. Respiratory protection
 5. Monitoring program

- 6. Medical surveillance
- 7. Emergency response

VIII. Records

- A. Any records pertaining to this standard must include employee's name and social security number.
- B. Medical records must be kept on file during the course of employment plus 20 years, or, at least 30 years, whichever is longer.
- C. Monitoring records must be maintained at least 30 years and include the date, concentrations, instruments, and sampling methods used.
- D. Training records should be kept at least 30 years.

IX. Reports

- A. When a regulated area has been established, OSHA must receive within one month a report stating the address, location, and number of employees in the regulated area (including maintenance personnel).
- B. Emergencies must be reported within 24 hours to OSHA. Upon request, the employer may submit information in writing to OSHA.
- C. Employees must be notified in writing within 10 working days of their personal sampling results and the steps taken to reduce exposure.
- D. Upon request, the program, monitoring records, and medical records are provided to OSHA, employees, and other designated representatives (i.e. physicians). OSHA may also request personnel rosters.

X. Signs and Labels

- A. Entrances to Regulated Areas

CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY

- B. Hazardous Operations or Emergencies

CANCER-SUSPECT AGENT IN THIS AREA
PROTECTIVE EQUIPMENT REQUIRED
AUTHORIZED PERSONNEL ONLY

C. Containers of Polyvinyl Chloride Resin Waste

CONTAMINATED WITH VINYL CHLORIDE
CANCER-SUSPECT AGENT

D. Containers of Polyvinyl Chloride

POLYVINYL CHLORIDE
CONTAINS VINYL CHLORIDE
VINYL CHLORIDE IS A CANCER-SUSPECT

E. Containers of Vinyl Chloride

VINYL CHLORIDE
EXTREMELY FLAMMABLE GAS UNDER
PRESSURE

-OR

CANCER-SUSPECT AGENT

F. Signs can be obtained from EHS free of charge.

XI. Medical Surveillance

A. Employees

1. Prior to working with vinyl chloride, each employee potentially exposed to vinyl chloride must be examined by a licensed physician without cost to the employee.
2. Personal monitoring is conducted to evaluate exposure to vinyl chloride.
3. If an employee's health is impaired as a result of vinyl chloride use, the employee will discontinue his exposure to it.

B. Health Services

1. Initial assignment: When beginning work, the employee has a physical with specific focus on the kidneys, liver, spleen, skin, connective tissues, and pulmonary system (see Ap. A).
2. Medical history: The employee's medical history is also examined with reference to his alcohol intake, history of hepatitis, work history and exposure to hepatotoxins including chemicals and drugs, past blood transfusions and hospitalizations.
3. Serum specimen: A serum specimen is obtained from the employee to determine total bilirubin, alkaline phosphatase, serum glutamic oxalacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), and gamma glutamyl transpeptidase.
4. Exams: Exams are performed by a licensed physician every 6 months for employees who have worked with vinyl chloride for at least 10 years, and annually for all other employees potentially exposed. Employees involved in emergency situations are also given medical surveillance.
5. A statement of each employee's ability to work with vinyl chloride, including the use of PPE and respirators, is issued by the physician and another copy given to the employee as well.
6. Any biological specimens collected during medical exams will be analyzed by licensed labs under 42 CFR 74.
7. Alternate medical examinations proposed by the physician may be accepted if the employer receives a statement describing the alternate exam and if the physician explains the purpose of the substitution. This will be available upon request and a copy submitted to OSHA.
8. Appendix A of the standard includes additional tests to be performed by the physician.

VINYL CHLORIDE STANDARD
OSHA 29 CFR 1910.1017

Standard Number: 1910.1017

Standard Title: Vinyl chloride.

SubPart Number: Z

SubPart Title: Toxic and Hazardous Substances

(a) Scope and application.

(a)(1) This section includes requirements for the control of employee exposure to vinyl chloride (chloroethene), Chemical Abstracts Service Registry No. 75014.

(a)(2) This section applies to the manufacture, reaction, packaging, repackaging, storage, handling or use of vinyl chloride or polyvinyl chloride, but does not apply to the handling or use of fabricated products made of polyvinyl chloride.

(a)(3) This section applies to the transportation of vinyl chloride or polyvinyl chloride except to the extent that the Department of Transportation may regulate the hazards covered by this section.

(b) Definitions.

(b)(1) "Action level" means a concentration of vinyl chloride of 0.5 ppm averaged over an 8-hour work day.

(b)(2) "Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or his designee.

(b)(3) "Authorized person" means any person specifically authorized by the employer whose duties require him to enter a regulated area or any person entering such an area as a designated representative of employees for the purpose of exercising an opportunity to observe monitoring and measuring procedures.

(b)(4) "Director" means the Director, National Institute for Occupational Safety and Health, or any person directed by him or the Secretary of Health and Human Services to act for the Director.

(b)(5) "Emergency" means any occurrence such as, but not limited to, equipment failure, or operation of a relief device which is likely to, or does, result in massive release of vinyl chloride.

- (b)(6) "Fabricated product" means a product made wholly or partly from polyvinyl chloride, and which does not require further processing at temperatures, and for times, sufficient to cause mass melting of the polyvinyl chloride resulting in the release of vinyl chloride.
- (b)(7) "Hazardous operation" means any operation, procedure, or activity where a release of either vinyl chloride liquid or gas might be expected as a consequence of the operation or because of an accident in the operation, which would result in an employee exposure in excess of the permissible exposure limit.
- (b)(8) "OSHA Area Director" means the Director for the Occupational Safety and Health Administration Area Office having jurisdiction over the geographic area in which the employer's establishment is located.
- (b)(9) "Polyvinyl chloride" means polyvinyl chloride homopolymer or copolymer before such is converted to a fabricated product.
- (b)(10) "Vinyl chloride" means vinyl chloride monomer.
- (c) Permissible exposure limit.
 - (c)(1) No employee may be exposed to vinyl chloride at concentrations greater than 1 ppm averaged over any 8-hour period, and
 - (c)(2) No employee may be exposed to vinyl chloride at concentrations greater than 5 ppm averaged over any period not exceeding 15 minutes.
 - (c)(3) No employee may be exposed to vinyl chloride by direct contact with liquid vinyl chloride.
- (d) Monitoring.
 - (d)(1) A program of initial monitoring and measurement shall be undertaken in each establishment to determine if there is any employee exposed, without regard to the use of respirators, in excess of the action level.
 - (d)(2) Where a determination conducted under paragraph (d)(1) of this section shows any employee exposures, without regard to the use of respirators, in excess of the action level, a program for determining exposures for each such employee shall be established. Such a program:

- (d)(2)(i) Must be repeated at least quarterly for any employee exposed, without regard to the use of respirators, in excess of the permissible exposure limit.
 - (d)(2)(ii) Must be repeated not less than every 6 months for any employee exposed without regard to the use of respirators, at or above the action level.
 - (d)(2)(iii) May be discontinued for any employee only when at least two consecutive monitoring determinations, made not less than 5 working days apart, show exposures for that employee at or below the action level.
- (d)(3) Whenever there has been a production, process or control change which may result in an increase in the release of vinyl chloride, or the employer has any other reason to suspect that any employee may be exposed in excess of the action level, a determination of employee exposure under paragraph (d)(1) of this section shall be performed.
- (d)(4) The method of monitoring and measurement shall have an accuracy (with a confidence level of 95 percent) of not less than plus or minus 50 percent from 0.25 through 0.5 ppm, plus or minus 35 percent from over 0.5 ppm through 1.0 ppm, and plus or minus 25 percent over 1.0 ppm. (Methods meeting these accuracy requirements are available in the "NIOSH Manual of Analytical Methods").
- (d)(5) Employees or their designated representatives shall be afforded reasonable opportunity to observe the monitoring and measuring required by this paragraph.
- (e) Regulated area.
 - (e)(1) A regulated area shall be established where:
 - (e)(1)(i) Vinyl chloride or polyvinyl chloride is manufactured, reacted, repackaged, stored, handled or used; and
 - (e)(1)(ii) Vinyl chloride concentrations are in excess of the permissible exposure limit.
 - (e)(2) Access to regulated areas shall be limited to authorized persons.

- (f) Methods of compliance. Employee exposures to vinyl chloride shall be controlled at or below the permissible exposure limit provided in paragraph (c) of this section by engineering, work practice, and personal protective controls as follows:
 - (f)(1) Feasible engineering and work practice controls shall immediately be used to reduce exposures to at or below the permissible exposure limit.
 - (f)(2) Wherever feasible engineering and work practice controls which can be instituted immediately are not sufficient to reduce exposures to at or below the permissible exposure limit, they shall nonetheless be used to reduce exposures to the lowest practicable level, and shall be supplemented by respiratory protection in accordance with paragraph (g) of this section. A program shall be established and implemented to reduce exposures to at or below the permissible exposure limit, or to the greatest extent feasible, solely by means of engineering and work practice controls, as soon as feasible.
 - (f)(3) Such plans shall be updated at least annually.

(g) **Respiratory protection.**

- (g)(1) **General.** For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this paragraph.
- (g)(2) **Respirator program.** The employer must implement a respiratory protection program in accordance § 1910.134 (b) through (d) (except (d)(1)(iii), and (d)(3)(iii)(B)(1) and (2)), and (f) through (m) which covers each employee required by this section to use a respirator.
- (g)(3) **Respirator selection.**

(g)(3)(i) Employers must:

- (g)(3)(i)(A) Select, and provide to employees, the appropriate respirators specified in paragraph (d)(3)(i)(A) of 29 CFR 1910.134.
- (g)(3)(i)(B) Provide an organic vapor cartridge that has a service life of at least one hour when using a chemical cartridge respirator at vinyl chloride concentrations up to 10 ppm.
- (g)(3)(i)(C) Select a canister that has a service life of at least four hours when using a powered air-

CWRU has a separate Respirator Program. Please call the EHS Office for information.

purifying respirator having a hood, helmet, or full or half facepiece, or a gas mask with a front-or back-mounted canister, at vinyl chloride concentrations up to 25 ppm.

(g)(3)(ii) When air-purifying respirators are used:

(g)(3)(ii)(A) Air-purifying canisters or cartridges must be replaced prior to the expiration of their service life or the end of the shift in which they are first used, whichever occurs first.

(g)(3)(ii)(B) A continuous-monitoring and alarm system must be provided when concentrations of vinyl chloride could reasonably exceed the allowable concentrations for the devices in use. Such a system must be used to alert employees when vinyl chloride concentrations exceed the allowable concentrations for the devices in use.

(g)(4) Selection of respirators for vinyl chloride shall be as follows:

(g)(5) Where air-purifying respirators are used:

(g)(5)(i) Air-purifying cannisters or cartridges shall be replaced prior to the expiration of their service life or the end of the shift in which they are first used, whichever occurs first, and

(g)(5)(ii) A continuous monitoring and alarm system shall be provided where concentrations of vinyl chloride could reasonably exceed the allowable concentrations for the devices in use. Such system shall be used to alert employees when vinyl chloride concentrations exceed the allowable concentrations for the devices in use.

(g)(6) Apparatus prescribed for higher concentrations may be used for any lower concentration.

(h) Hazardous operations.

(h)(1) Employees engaged in hazardous operations, including entry of vessels to clean polyvinyl chloride residue from vessel walls, shall be provided and required to wear and use;

- (h)(1)(i) Respiratory protection in accordance with paragraphs (c) and (g) of this section; and
 - (h)(1)(ii) Protective garments to prevent skin contact with liquid vinyl chloride or with polyvinyl chloride residue from vessel walls. The protective garments shall be selected for the operation and its possible exposure conditions.
- (h)(2) Protective garments shall be provided clean and dry for each use.
- (i) Emergency situations. A written operational plan for emergency situations shall be developed for each facility storing, handling, or otherwise using vinyl chloride as a liquid or compressed gas. Appropriate portions of the plan shall be implemented in the event of an emergency. The plan shall specifically provide that:
 - (i)(1) Employees engaged in hazardous operations or correcting situations of existing hazardous releases shall be equipped as required in paragraph (h) of this section;
 - (i)(2) Other employees not so equipped shall evacuate the area and not return until conditions are controlled by the methods required in paragraph (f) of this section and the emergency is abated.
- (j) Training. Each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use.
 - (j)(1) The program shall include:
 - (j)(1)(i) The nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard;
 - (j)(1)(ii) The specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps;
 - (j)(1)(iii) The purpose for, proper use, and limitations of respiratory protective devices;
 - (j)(1)(iv) The fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps;

- (j)(1)(v) The purpose for and a description of the monitoring program;
- (j)(1)(vi) The purpose for, and a description of, the medical surveillance program;
- (j)(1)(vii) Emergency procedures;
- (j)(1)(viii) Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride; and
- (j)(1)(ix) A review of this standard at the employee's first training and indoctrination program, and annually thereafter.

(j)(2) All materials relating to the program shall be provided upon request to the Assistant Secretary and the Director.

(k) Medical surveillance. A program of medical surveillance shall be instituted for each employee exposed, without regard to the use of respirators, to vinyl chloride in excess of the action level. The program shall provide each such employee with an opportunity for examinations and tests in accordance with this paragraph. All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee.

(k)(1) At the time of initial assignment, or upon institution of medical surveillance;

(k)(1)(i) A general physical examination shall be performed, with specific attention to detecting enlargement of liver, spleen or kidneys, or dysfunction in these organs, and for abnormalities in skin, connective tissues and the pulmonary system (See Appendix A).

(k)(1)(ii) A medical history shall be taken, including the following topics:

(k)(1)(ii)(A) Alcohol intake;

(k)(1)(ii)(B) Past history of hepatitis;

(k)(1)(ii)(C) Work history and past exposure to potential hepatotoxic agents, including drugs and chemicals;

- (k)(1)(ii)(D) Past history of blood transfusions; and
 - (k)(1)(ii)(E) Past history of hospitalizations.
 - (k)(1)(iii) A serum specimen shall be obtained and determinations made of:
 - (k)(1)(iii)(A) Total bilirubin;
 - (k)(1)(iii)(B) Alkaline phosphatase;
 - (k)(1)(iii)(C) Serum glutamic oxalacetic transaminase (SGOT);
 - (k)(1)(iii)(D) Serum glutamic pyruvic transaminase (SGPT); and
 - (k)(1)(iii)(E) Gamma glutamyl transpeptidase.
- (k)(2) Examinations provided in accordance with this paragraph shall be performed at least:
 - (k)(2)(i) Every 6 months for each employee who has been employed in vinyl chloride or polyvinyl chloride manufacturing for 10 years or longer; and
 - (k)(2)(ii) Annually for all other employees.
- (k)(3) Each employee exposed to an emergency shall be afforded appropriate medical surveillance.
- (k)(4) A statement of each employee's suitability for continued exposure to vinyl chloride including use of protective equipment and respirators, shall be obtained from the examining physician promptly after any examination. A copy of the physician's statement shall be provided each employee.
- (k)(5) If any employee's health would be materially impaired by continued exposure, such employee shall be withdrawn from possible contact with vinyl chloride.
- (k)(6) Laboratory analyses for all biological specimens included in medical examinations shall be performed in laboratories licensed under 42 CFR Part 74.

(k)(7) If the examining physician determines that alternative medical examinations to those required by paragraph (k)(1) of this section will provide at least equal assurance of detecting medical conditions pertinent to the exposure to vinyl chloride, the employer may accept such alternative examinations as meeting the requirements of paragraph (k)(1) of this section, if the employer obtains a statement from the examining physician setting forth the alternative examinations and the rationale for substitution. This statement shall be available upon request for examination and copying to authorized representatives of the Assistant Secretary and the Director.

(l) Signs and labels

(l)(1) Entrances to regulated areas shall be posted with legible signs bearing the legend:

CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY

(l)(2) Areas containing hazardous operations or where an emergency currently exists shall be posted with legible signs bearing the legend:

CANCER-SUSPECT AGENT IN THIS AREA
PROTECTIVE EQUIPMENT REQUIRED
AUTHORIZED PERSONNEL ONLY

(l)(3) Containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride shall be legibly labeled:

CONTAMINATED WITH VINYL CHLORIDE
CANCER-SUSPECT AGENT

(l)(4) Containers of polyvinyl chloride shall be legibly labeled:

POLYVINYL CHLORIDE (OR TRADE NAME)
Contains
VINYL CHLORIDE
VINYL CHLORIDE IS A CANCER-SUSPECT AGENT

(l)(5) Containers of vinyl chloride shall be legibly labeled either:

(l)(5)(i)

VINYL CHLORIDE
EXTREMELY FLAMMABLE GAS UNDER PRESSURE

CANCER SUSPECT AGENT

or,

- (l)(5)(ii) In accordance with 49 CFR Parts 170-189, with the additional legend:

CANCER-SUSPECT AGENT

applied near the label or placard.

- (l)(6) No statement shall appear on or near any required sign, label or instruction which contradicts or detracts from the effect of, any required warning, information or instruction.

(m) Records.

- (m)(1) All records maintained in accordance with this section shall include the name and social security number of each employee where relevant.

- (m)(2) Records of required monitoring and measuring and medical records shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.1020(a)-(e) and (g) through (i). These records shall be provided upon request to the Director. Authorized personnel rosters shall also be provided upon request to the Assistant Secretary and the Director.

(m)(2)(i) Monitoring and measuring records shall:

(m)(2)(i)(A) State the date of such monitoring and measuring and the concentrations determined and identify the instruments and methods used;

(m)(2)(i)(B) Include any additional information necessary to determine individual employee exposures where such exposures are determined by means other than individual monitoring of employees; and

(m)(2)(i)(C) Be maintained for not less than 30 years.

(m)(2)(ii) [Reserved]

(m)(2)(iii) Medical records shall be maintained for the duration of the employment of each employee plus 20 years, or 30 years, whichever is longer.

(n) Employee notification of monitoring results. The employer must, within 15 working days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results and the steps being taken to reduce exposures within the permissible exposure limit either individually in writing or by posting the results in an appropriate location that is accessible to affected employees.

[58 FR 35310, June 30, 1993; 61 FR 5507, Feb. 13, 1996; 63 FR 1152, Jan. 8, 1998; 63 FR 33450, June 18, 1998; 70 FR 1141, Jan. 5, 2005; 71 FR 16672 and 16673, April 3, 2006; 71 FR 50188, August 24, 2006; 73 FR 75585, Dec. 12, 2008; 76 FR 33608, June 8, 2011]

OSHA Regulations (Standards - 29 CFR)
Supplemental medical information - 1910.1017 App A
Standard Number: 1910.1017 App A
Standard Title: Supplemental medical information
SubPart Number: Z
SubPart Title: Toxic and Hazardous Substances

When required tests under paragraph (k)(1) of this section show abnormalities, the tests should be repeated as soon as practicable, preferably within 3 to 4 weeks. If tests remain abnormal, consideration should be given to withdrawal of the employee from contact with vinyl chloride, while a more comprehensive examination is made.

Additional tests which may be useful:

- A. For kidney dysfunction: urine examination for albumin, red blood cells, and exfoliative abnormal cells.
- B. Pulmonary system: Forced vital capacity, Forced expiratory volume at 1 second, and chest roentgenogram (posterior-anterior, 14 X 17 inches).
- C. Additional serum tests: Lactic acid dehydrogenase, lactic acid dehydrogenase isoenzyme, protein determination, and protein electrophoresis.
- D. For a more comprehensive examination on repeated abnormal serum tests: Hepatitis B antigen, and liver scanning.

[39 FR 35896, Oct. 4, 1974; 39 FR 41848, Dec. 3, 1974, as amended at 40 FR 13211, Mar. 25, 1975. Redesignated at 40 FR 23072, May 28, 1975 and amended at 43 FR 49751, Oct. 24, 1978; 45 FR 35282, May 23, 1980; 54 FR 24334, June 7, 1989; 61 FR 5507, Feb. 13, 1996]