

specific completion of similar releases. At no cost shall a program of medical surveillance be established and employees considered to enter regulated areas. (1) Before an employee is to enter a regulated area, a physical examination shall be provided. The examination shall include a history of the employee, occupational background, and environmental

and employees shall be examined more frequently than annually, following assignment examina-

tions, the physician shall consider existing conditions of including reduced competence, those under treatment with steroids or cytotoxicity and cigarette

(1) Employers of employees shall maintain accurate records of medical examinations. Records shall be maintained for the duration of an employee's employment, including retirement or termination. In the event that the employee dies, the records shall be forwarded by the Director.

Required by this paragraph upon request of representatives of the employees or the Director, a physician or other designated person shall be provided to a physician designated by the employee or to a new em-

ployee who conducts a physical examination required by this section shall furnish to the employer a copy of the employee's employment in the spe-

[39 FR 23502, June 27, 1974. Redesignated at 40 FR 23073, May 28, 1975, and amended at 41 FR 35184, Aug. 20, 1976]

§ 1910.1017 Vinyl chloride.

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

(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.

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

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

(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.

(4) "Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health, Education, and Welfare, or his designee.

(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.

(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.

(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.

(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.

(9) "Polyvinyl chloride" means polyvinyl chloride homopolymer or copolymer before such is converted to a fabricated product.

(10) "Vinyl chloride" means vinyl chloride monomer.

(c) *Permissible exposure limit.* (1) No employee may be exposed to vinyl chloride at concentrations greater than 1 ppm averaged over any 8-hour period, and

(2) No employee may be exposed to vinyl chloride at concentrations greater than 5 ppm averaged over any period not exceeding 15 minutes.

(3) No employee may be exposed to vinyl chloride by direct contact with liquid vinyl chloride.

(d) *Monitoring.* (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.

(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:

(i) Shall be repeated at least monthly where any employee is exposed, without regard to the use of respirators, in excess of the permissible exposure limit.

(ii) Shall be repeated not less than quarterly where any employee is exposed, without regard to the use of respirators, in excess of the action level.

(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.

(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.

(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").

(5) Employees or their designated representatives shall be afforded reasonable opportunity to observe the monitoring and measuring required by this paragraph.

(e) *Regulated area.* (1) A regulated area shall be established where:

(i) Vinyl chloride or polyvinyl chloride is manufactured, reacted, repackaged, stored, handled or used; and

(ii) Vinyl chloride concentrations are in excess of the permissible exposure limit.

(2) Access to regulated areas shall be limited to authorized persons.

(f) *Methods of compliance.* Employee exposures to vinyl chloride shall be controlled to at or below the permissible exposure limit provided in paragraph (c) of this section by engineering, work practice, and personal protective controls as follows:

(1) Feasible engineering and work practice controls shall immediately be

used to reduce exposures to at or below the permissible exposure limit.

(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.

(3) Written plans for such a program shall be developed and furnished upon request for examination and copying to authorized representatives of the Assistant Secretary and the Director. Such plans shall be updated at least every six months.

(g) *Respiratory protection.* Where respiratory protection is required under this section:

(1) The employer shall provide a respirator which meets the requirements of this paragraph and shall assure that the employee uses such respirator, except that until April 1, 1976, wearing of respirators shall be at the discretion of each employee for exposures not in excess of 25 ppm, measured over any 15-minute period. Until April 1, 1976, each employee who chooses not to wear an appropriate respirator shall be informed at least quarterly of the hazards of vinyl chloride and the purpose, proper use, and limitations of respiratory devices.

(2) Respirators shall be selected from among those jointly approved by the Mining Enforcement and Safety Administration, Department of the Interior, and the National Institute for Occupational Safety and Health under the provisions of 30 CFR Part 11.

(3) A respiratory protection program meeting the requirements of § 1910.134 shall be established and maintained.

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

Atmosp

(i) Unknown.

(ii) Not over 3

(iii) Not over 2

(iv) Not over 1

(v) Not over 25

(vi) Not over 10

(5)(i) Ent
tions or co
36,000 ppm
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(ii) Entry
than 36.00
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(6) Where
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exposures to at or above the exposure limit. Feasible engineering controls which can immediately reduce exposures to at or below the exposure limit, unless they be used to the lowest practicable level, shall be supplemented by respiratory protection in accordance with (g) of this section. Such protection shall be established to reduce exposures to the maximum permissible exposure level to the greatest extent practicable by means of engineering controls, as soon as feasible.

For such a program, the employer shall furnish upon request and copying of the same to representatives of the employees and the Director. The program shall be updated at least annually.

Protection. Where respiratory protection is required

the employer shall provide a respirator that meets the requirements of this section and shall assure that employees use such respirators until April 1, 1976, after which time they shall be at the employer's expense for exposure to concentrations of 25 ppm, measured over a 10-minute period. Until such time as an employee who is required to wear an appropriate respirator is informed at least 15 days in advance of vinyl chloride, proper use, and maintenance of respiratory devices. Respirators shall be selected and used in accordance with the requirements of the National Institute for Occupational Safety and Health under 29 CFR Part 11. The protection program shall be in accordance with the requirements of § 1910.134 and maintained. Respirators for vinyl chloride shall be as follows:

Atmospheric concentration of vinyl chloride	Required apparatus
(i) Unknown, or above 3,600 p/m	Open-circuit, self-contained breathing apparatus, pressure demand type, with full facepiece.
(ii) Not over 3,600 p/m	(A) Combination type C supplied air respirator, pressure demand type, with full or half facepiece, and auxiliary self-contained air supply; or
(iii) Not over 1,000 p/m	(B) Combination type, supplied air respirator continuous flow type, with full or half facepiece, and auxiliary self-contained air supply.
(iv) Not over 100 p/m	Type C, supplied air respirator, continuous flow type, with full or half facepiece, helmet or hood.
	(A) Combination type C supplied air respirator demand type, with full facepiece, and auxiliary self-contained air supply, or
	(B) Open-circuit self-contained breathing apparatus with full facepiece, in demand mode; or
	(C) Type C supplied air respirator, demand type, with full facepiece.
(v) Not over 25 p/m	(A) A powered air-purifying respirator with hood, helmet, full or half facepiece, and a canister which provides a service life of at least 4 hours for concentrations of vinyl chloride up to 25 p/m, or
	(B) Gas mask, front- or back-mounted canister which provides a service life of at least 4 hours for concentrations of vinyl chloride up to 25 p/m.
(vi) Not over 10 p/m	(A) Combination type C supplied-air respirator, demand type, with half facepiece, and auxiliary self-contained air supply; or
	(B) Type C supplied-air respirator, demand type, with half facepiece; or
	(C) Any chemical cartridge respirator with an organic vapor cartridge which provides a service life of at least 1 hour for concentrations of vinyl chloride up to 10 p/m.

(5)(i) Entry into unknown concentrations or concentrations greater than 36,000 ppm (lower explosive limit) may be made only for purposes of life rescue; and

(ii) Entry into concentrations of less than 36,000 ppm, but greater than 3,600 ppm may be made only for purposes of life rescue, firefighting, or securing equipment so as to prevent a greater hazard from release of vinyl chloride.

(6) Where air-purifying respirators are used:

(i) Air-purifying canisters 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

(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.

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

(h) **Hazardous operations.** (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:

(i) Respiratory protection in accordance with paragraphs (c) and (g) of this section; and

(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.

(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:

(1) Employees engaged in hazardous operations or correcting situations of existing hazardous releases shall be

equipped as required in paragraph (h) of this section;

(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.

(1) The program shall include:

(i) The nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard;

(ii) The specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps;

(iii) The purpose for, proper use, and limitations of respiratory protective devices;

(iv) The fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps;

(v) The purpose for and a description of the monitoring program;

(vi) The purpose for, and a description of, the medical surveillance program;

(vii) Emergency procedures;

(viii) Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride; and

(ix) A review of this standard at the employee's first training and indoctrination program, and annually thereafter.

(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 su-

pervision of a licensed physician, and shall be provided without cost to the employee.

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

(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).

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

(A) Alcohol intake;

(B) Past history of hepatitis;

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

(D) Past history of blood transfusions; and

(E) Past history of hospitalizations.

(iii) A serum specimen shall be obtained and determinations made of:

(A) Total bilirubin;

(B) Alkaline phosphatase;

(C) Serum glutamic oxalacetic transaminase (SGOT);

(D) Serum glutamic pyruvic transaminase (SGPT); and

(E) Gamma glutamyl transpeptidase.

(2) Examinations provided in accordance with this paragraph shall be performed at least:

(i) Every 6 months for each employee who has been employed in vinyl chloride or polyvinyl chloride manufacturing for 10 years or longer; and

(ii) Annually for all other employees.

(3) Each employee exposed to an emergency shall be afforded appropriate medical surveillance.

(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.

(5) If any employee's health would be materially impaired by continued exposure, such employee shall be withdrawn from possible contact with vinyl chloride.

(6) *Logistical specifications.* Laboratories shall be provided in accordance with Part 74.

(7) If the mines that nations to graph (k)(1) vide at leasting medical exposure t employer may amination's of p tion, if the ment from setting fort ions and t tion. This s upon requi copying to of the Assis rector.

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Following topics:

Intake;

History of hepatitis;

History and past exposure

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and chemicals;

History of blood transfu-

History of hospitalizations.

Each specimen shall be ob-

terminations made of:

Bilirubin;

Alkaline phosphatase;

Glutamic oxalacetic tran-

spase (GOT);

Glutamic pyruvic transa-

minase (GPT); and

Glutamyl transpepti-

Aspartate aminotransferase.

Examinations provided in accord-

ance with paragraph shall be per-

formed:

Once a month for each employ-

who has been employed in vinyl

polyvinyl chloride manu-

facturing for 10 years or longer; and

Once a year for all other employ-

who are exposed to an

environment which may be

hazardous to health.

At the time of each employee's

examination, or continued exposure to

the environment, including use of protec-

tive equipment and respirators, shall

be made from the examining physi-

cian after any examination.

The physician's statement

shall be provided each employee.

If an employee's health would

be impaired by continued

exposure, such employee shall be

removed from possible contact with

(6) Laboratory analyses for all bio-
logical specimens included in medical
examinations shall be performed in
laboratories licensed under 42 CFR
Part 74.

(7) If the examining physician deter-
mines that alternative medical exami-
nations to those required by para-
graph (k)(1) of this section will pro-
vide at least equal assurance of detect-
ing medical conditions pertinent to the
exposure to vinyl chloride, the em-
ployer may accept such alternative ex-
aminations as meeting the require-
ments of paragraph (k)(1) of this sec-
tion, if the employer obtains a state-
ment from the examining physician
setting forth the alternative examina-
tions and the rationale for substitu-
tion. This statement shall be available
upon request for examination and
copying to authorized representatives
of the Assistant Secretary and the Di-
rector.

(1) *Signs and labels.* (1) Entrances to
regulated areas shall be posted with
legible signs bearing the legend:

**CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY**

(2) Areas containing hazardous oper-
ations or where an emergency current-
ly exists shall be posted with legible
signs bearing the legend:

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

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

CONTAMINATED WITH VINYL CHLORIDE

CANCER-SUSPECT AGENT

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

POLYVINYL CHLORIDE (OR TRADE NAME)

Contains

VINYL CHLORIDE

VINYL CHLORIDE IS A CANCER-SUSPECT AGENT

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

(i)

VINYL CHLORIDE

EXTREMELY FLAMMABLE GAS UNDER PRESSURE

CANCER SUSPECT AGENT

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

CANCER-SUSPECT AGENT

applied near the label or placard.

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

(m) *Records.* (1) All records main-
tained in accordance with this section
shall include the name and social se-
curity number of each employee
where relevant.

(2) Records of required monitoring
and measuring, medical records, and
authorized personnel rosters, shall be
made and shall be available upon re-
quest for examination and copying to
authorized representatives of the As-
sistant Secretary and the Director.

(i) Monitoring and measuring rec-
ords shall:

(A) State the date of such monitor-
ing and measuring and the concentra-
tions determined and identify the in-
struments and methods used;

(B) Include any additional informa-
tion necessary to determine individual
employee exposures where such expo-
sures are determined by means other
than individual monitoring of employ-
ees; and

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

(ii) Revoked

(iii) Medical records shall be main-
tained for the duration of the employ-
ment of each employee plus 20 years,
or 30 years, whichever is longer.

(3) In the event that the employer
ceases to do business and there is no
successor to receive and retain his rec-
ords for the prescribed period, these
records shall be transmitted by regis-
tered mail to the Director, and each
employee individually notified in writ-
ing of this transfer.

(4) Employees or their designated
representatives shall be provided

access to examine and copy records of required monitoring and measuring.

(5) Former employees shall be provided access to examine and copy required monitoring and measuring records reflecting their own exposures.

(6) Upon written request of any employee, a copy of the medical record of that employee shall be furnished to any physician designated by the employee.

(n) *Reports.* (1) Not later than 1 month after the establishment of a regulated area, the following information shall be reported to the OSHA Area Director. Any changes to such information shall be reported within 15 days.

(i) The address and location of each establishment which has one or more regulated areas; and

(ii) The number of employees in each regulated area during normal operations, including maintenance.

(2) Emergencies, and the facts obtainable at that time, shall be reported within 24 hours to the OSHA Area Director. Upon request of the Area Director, the employer shall submit additional information in writing relevant to the nature and extent of employee exposures and measures taken to prevent future emergencies of similar nature.

(3) Within 10 working days following any monitoring and measuring which discloses that any employee has been exposed, without regard to the use of respirators, in excess of the permissible exposure limit, each such employee shall be notified in writing of the results of the exposure measurement and the steps being taken to reduce the exposure to within the permissible exposure limit.

(o) *Effective dates.* (1) Until April 1, 1975, the provisions currently set forth in § 1910.93q of this Part shall apply.

(2) Effective April 1, 1975, the provisions set forth in § 1910.93q of this Part shall apply.

APPENDIX A—SUPPLEMENTARY MEDICAL INFORMATION

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 × 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.

(Secs. 6 and 8, 84 Stat. 1596, 1599 (29 U.S.C. 655, 657); Secretary of Labor's Order No. 12-71, 36 FR 8754)

[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 23073, May 28, 1975]

§ 1910.1018 Inorganic arsenic.

(a) *Scope and application.* This section applies to all occupational exposures to inorganic arsenic except that this section does not apply to employee exposures in agriculture or resulting from pesticide application, the treatment of wood with preservatives or the utilization of arsenically preserved wood.

(b) *Definitions.* "Action level" means a concentration of inorganic arsenic of 5 micrograms per cubic meter of air (5 µg/m³) averaged over any eight (8) hour period.

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

"Authorized person" means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring and measuring procedures under paragraph (e) of this section.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health, Education and Welfare, or designee.

"Inorganic arsenic" means arsenite, arsenate, and arsine compounds containing arsenic, but not arsine, arsine oxide, or arsine gas.

(c) *Permissible exposure limit.* employer shall not allow any employee to be exposed to concentrations of inorganic arsenic in excess of 10 micrograms per cubic meter (m³), averaged over an 8-hour period.

(d) *Notification.* (1) Not later than January 1, 1978 or within 30 days of the introduction of the workplace, the employer shall be required to establish a program in his workplace for the purpose of complying with the OSHA standard for inorganic arsenic.

(i) The address and location of each establishment which has one or more regulated areas; and

(ii) The number of employees in each regulated area during normal operations, including maintenance.

(iii) A brief statement of the actions which the employer has taken to reduce exposure to inorganic arsenic.

(2) Whenever a significant change in the exposure of an employee to inorganic arsenic occurs, the employer shall notify the OSHA area office of such change.

(e) *Exposure measurement.* (1) Determination of exposure levels shall be based on samples that are representative of each employee's exposure over an 8-hour period.

(ii) For the purpose of this section, an employee exposure which would occur over an 8-hour period and which were not using a respirator shall be considered to be an 8-hour exposure.

(iii) The employer shall monitor each shift (for at least one sample for each classification in each shift).

(2) *Initial monitoring.* The employer who has a workplace covered by this section shall monitor each shift of work operation to determine the airborne concentration of inorganic arsenic to which employees may be exposed.

(3) *Frequency of monitoring.* The employer shall monitor each shift of work operation to determine the airborne concentration of inorganic arsenic to which employees may be exposed.