NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND

SUPPORTING DOCUMENTATION FOR

*** CHLOROPRENE ***

NIOSH/OSHA Draft Technical Standard and Supporting Documentation for CHLOROPRENE

The basic text of this document contains the draft technical standard approved by the Joint Review Committee of the NIOSH/OSHA Standards Completion Program and the supporting documentation for the substance CHLOROPRENE.

The SCP draft technical standards are recommendations to the Department of Labor for its consideration in rulemaking and have no legal status until final rules have been promulgated by that agency. This draft standard is provided for your information only.

The References and Sources, Respirator Table Documentation and Use/Exposure and Control Documentation are the working documents used by the various SCP working groups during the development of the draft technical standard and serve as the technical foundation for the standard. The classification for each substance and the regulatory statements were derived following a decision logic established for the various sections of the standard.

(a) Definitions.

(1) "Permissible exposure" means inhalation of chloroprene in concentrations not in excess of 25 parts per million (ppm) (90 milligrams per cubic meter, mg/cu.m.) averaged over an eight-hour work shift, as stated in $$ 1910.93, Table G-1.

(2) "Action level" means one half of the permissible exposure for chloroprene.

(b) Exposure determination and measurement.

(1) Each employer who has a place of employment in which chloroprene is released into the workplace air shall determine if any employee may be exposed to airborne concentrations of chloroprene at or above the action level. The determination shall be made each time there is a change in production, process, or control measures which could result in an increase in airborne concentrations of chloroprene.

(2) A written record of the determination shall be made and shall contain at least the following information:

(i) Any information, observations, or calculations which may indicate employee exposure to chloroprene;

(ii) Any measurements of chloroprene taken;

(iii) Any employee complaints of symptoms which may be attributable to exposure to chloroprene; and

(iv) Date of determination, work being performed at the time, location within work site, name, and social security number of each employee considered.

(3) If the employer determines that any employee may be exposed to chloroprene at or above the action level, the exposure of the employee in each work operation who is believed to have the greatest exposure shall be measured. The exposure measurement shall be representative of the maximum eight-hour time weighted average exposure of the employee.

(4) If the exposure measurement taken pursuant to paragraph (b) (3) of this section reveals employee exposure to chloroprene at or above the action level, the employer shall:

(i) Identify all employees who may be exposed at or above the action level; and

(ii) Measure the exposure of the employees so identified.

(5) If an employee exposure measurement reveals that an employee is exposed to chloroprene at or above the action level, but not above the permissible exposure, the exposure of that employee shall be measured at least every two months.

(6) If an employee exposure measurement reveals that an employee is exposed to chloroprene above the permissible exposure, the employer shall:

(i) Measure the exposure monthly of the employee so exposed; and

(ii) Institute control measures as required by paragraph (D) of this section; and

(iii) Individually notify, in writing, within five days, every employee who is found to be exposed to chloroprene above the permissible exposure. The employee shall also be notified of the corrective action being taken to reduce the exposure to at or below the permissible exposure.

(7) If two consecutive employee exposure measurements taken at least one week apart reveal that the employee is exposed to chloroprene below the action level, the employer may terminate measurement for the employee.

(8) For purposes of this paragraph, employee exposure is that which would occur if the employee were not using a respirator.

(c) Methods of measurement.

(1) An employee's exposure shall be obtained by any combination of long term or short term samples which represents the employee's actual exposure averaged over an eight-hour work shift (See Appendix B (iv) of this section).

(2) The method of measurement shall have an accuracy, to a confidence level of 95%, of not less than that given in Table 1.

Table 1

Concentration	Required Accuracy
Above permissible exposure	± 25%
At or below permissible exposure and above the action level	± 35%
At or below the action level	± 50%

(d) Compliance. (1) No employee shall be exposed to chloroprene above the permissible exposure as defined in paragraph (a)(1) of this section.

(2) Employee exposures to airborne concentrations of chloroprene shall be controlled to at or below the permissible exposure by engineering and work practice controls:

(i) Engineering and work practice controls shall be instituted to reduce exposures to at or below the permissible exposure, except to the extent that such controls are not technically feasible.

(ii) Wherever engineering and work practice controls are not sufficient to reduce exposures to at or below the permissible exposure, they shall nonetheless be used to reduce exposure to the lowest level feasible and shall be supplemented by respirators in accordance with paragraph (d)(4) of this section.

(3) Engineering controls:

When mechanical ventilation is used to control exposure, measurements which demonstrate system effectiveness, for example, air velocity, static pressure, or air volume, shall be made at least every three months. Measurements of system effectiveness shall also be made within five days of any change in production, process, or control which might result in an increase in airborne concentrations of chloroprene.

(4) Compliance with the permissible exposure shall not be achieved by the use of respirators except:

(i) During the time period necessary to install or implement engineering or work practice controls; or

(ii) In work situations in which engineering and work practice controls are technically not feasible; or

(iii) To supplement engineering and work practice controls when such controls fail to reduce airborne concentrations of chloroprene to at or below the permissible exposure; or

(iv) For operations which require entry into tanks or closed vessels; or

(v) In emergencies.

(5) Where respirators are needed and permitted under this paragraph to reduce employee exposure, the employer shall select and provide the appropriate respirator from Table 2 and shall ensure that the employee uses the respirator provided.

TABLE 2 RESPIRATORY PROTECTION FOR CHLOROPRENE

CONDITION	PERMISSIBLE RESPIRATORY PROTECTION
Vapor Concentration	
400 ppm or less	Any supplied-air respirator with a full facepiece, helmet or hood.
	Any self-contained breathing apparatus with a full facepiece.
Greater than 400 ppm or entry escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand ot other positive pressure mode.
	A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any gas mask providing protection against organic vapors.
	Any escape self-contained breathing apparatus.

(6) Respirators shall be approved by the Mining Enforcement and Safety Administration (formerly Bureau of Mines) or by the National Institute for Occupational Safety and Health under the provisions of 30 CFR Part 11.

(7) The employer shall institute a respiratory protection program in accordance with $ 1910.134(b), (d), (e), and (f).

(e) Fire and safety. (1) The employer shall familiarize himself with the information contained in the Substance Technical Guidelines (Appendix B of this section) for chloroprene.

(2) For the purpose of compliance with § 1910.309, locations classified as hazardous locations due to the presence of chloroprene shall be Class I, Group B. Group D equipment may be used if such equipment is isolated in accordance with § 501-5(a) by sealing all conduits one-half inch size or larger.

(3) For the purpose of compliance with § 1910.157, chloroprene is classified as a Class B fire hazard.

(4) For the purpose of compliance with § 1910.178, locations classified as hazardous locations due to the presence of chloroprene shall be Class I, Group B.

(5) For the purpose of compliance with § 1910.106, liquid chloroprene is classified as a Class IB flammable liquid.

(6) Where a fan is located in ductwork and where chloroprene is present in the ductwork in concentrations greater than 10,000 ppm (25% of the lower flammable limit), the fan rotating element shall be of nonsparking material or the casing shall consist of, or be lined with, nonsparking material. There shall be sufficient clearance between the fan rotating element and the fan casing so as to prevent contact.

(7) Sources of ignition such as smoking or open flames are prohibited where chloroprene presents a fire or explosion hazard.

(8) Chloroprene shall be stored so as not to come in contact with peroxides and other oxidizers. The monomer shall be checked at least weekly to determine inhibitor and polymer content.

(f) Personal protective equipment. (1) Employers shall provide and ensure that employees use impervious clothing, gloves, face shields (eight-inch minimum) and other appropriate protective clothing necessary to prevent any possibility of skin contact with liquid chloroprene. Face shields shall comply with § 1910.133(a)(2), (a)(4), (a)(5), and (a)(6).

(2) Employers shall ensure that clothing contaminated with liquid chloroprene is placed in closed containers for storage until it can be discarded or until the employer provides for the removal of chloroprene from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the chloroprene, the employer shall inform the person performing the operation of the hazardous properties of chloroprene.

(3) Employers shall ensure that clothing which becomes wet with liquid chloroprene be removed immediately and not reworn until the chloroprene is removed from the clothing.

(4) Employers shall provide and ensure that employees use splash-proof safety goggles (cup-cover type dust and splash safety goggles) which comply with § 1910.133(a)(2)-(a)(6) where liquid chloroprene may contact the eyes.

(g) Spills and disposal. (1) In the event that liquid chloroprene is spilled the employer shall immediately eliminate potential sources of ignition, provide available ventilation and then clean up the spill.

(2) Liquid chloroprene shall not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

(h) Sanitation. Employers shall ensure that employees whose skin becomes contaminated with liquid chloroprene promptly wash or shower using soap or mild detergent and water to remove any chloroprene from the skin.

(i) Training and information. (1) Each employer who has a workplace in which chloroprene is present shall keep a copy of this regulation with Appendices A, B and C at the workplace. This material shall be made readily available to affected employees.

(2) Each employer who has employees exposed to chloroprene above the action level, or employees who may have any possibility of skin or eye contact with liquid chloroprene, or employees who work where accidental release, spill, fire, or explosion of chloroprene may occur, shall annually:

(i) Inform affected employees of the information contained in the Substance Safety Data Sheet for chloroprene, (Appendix A of this section);

(ii) Advise affected employees as to the signs and symptoms of exposure to chloroprene;

(iii) Instruct affected employees to advise the employer of the development of signs and symptoms of exposure to chloroprene which are listed in Appendix A of this section; and

(iv) Provide training to ensure that employees understand the precautions of safe use, emergency procedures, and the correct use of protective equipment relative to chloroprene.

(j) Medical surveillance. (1) The employer shall provide medical procedures as required by this paragraph. All medical procedures shall be performed by or under the supervision of a physician at no cost to the employee.

(2) The employer shall make available to each employee who is to be exposed to liquid chloroprene or airborne concentrations of chloroprene at or above the action level, without regard to the use of respirators, a medical examination which shall include as a minimum the following:

(i) A medical history and physical examination with emphasis on the lungs, skin, and eyes.

(ii) 14" x 17" chest roentgenogram.

(3) The employer shall obtain from the physician, as a record of the examination, the following information:

(i) A written opinion which conforms with paragraph (j)(7) of this section.

(ii) 14" x 17" chest roentgenogram or a medically acceptable copy.

(4) The employer shall make available to each employee, exposed to chloroprene in excess of the action level at 12 months from the date of the employee's first exposure, and at every 12 months of exposure in excess of the action level thereafter, a medical examination which must include the following:

(i) A medical history and physical examination (see paragraph (j)(2)(i) of this section).

(ii) 14" x 17" chest roentgenogram (only when indicated by results of pulmonary function testing, FVC and FEV (1 sec)).

(5) The employer shall obtain from the physician, as a record of the periodic examination, the following information:

(i) A written opinion which conforms with paragraph (j)(7) of this section.

(ii) 14" x 17" chest roentgenogram or a medically acceptable copy.

(6) The employer shall provide to the examining physician the following information:

(i) A copy of this regulation with its Appendices A,B, and C;

(ii) A description of the employee's duties as they relate to his exposure to chloroprene;

(iii) A description of any personal protective equipment, including respirators, required to be used;

(iv) The results of any employee's exposure measurement, if available;

(v) The employee's anticipated exposure level; and

(vi) Upon request of the physician, information from previous medical examination of the employee.

(7)(i) The physician's written opinion shall be a signed statement by the examining physician specifically stating: (A) Whether the employee has any detected medical conditions which could be directly or indirectly aggravated by exposure to chloroprene or which could significantly interfere with the ability of the employee to follow recommended or required procedures for protecting himself from unusual or emergency exposure.

(B) Any recommended limitations on the employee's exposure to chloroprene.

(C) That the employee has been informed by the physician of any detected medical conditions which require further medical examination or treatment.

(ii) The written opinion shall not reveal medical information unrelated to exposure to chloroprene.

(8) No employee shall be exposed to chloroprene if such exposure could place the employee at increased risk of material impairment of his health. This determination may be based on the physician's written opinion.

(9) The employer shall provide emergency and follow-up medical examinations and treatment for any employee injured through exposure to chloroprene.

(10) If the examining physician chooses to use alternative medical examinations to those specified in paragraphs (j)(2) and (4) of this section, the employer may accept such alternative medical surveillance examinations as meeting the requirements of this part provided that the employer:

(i) Obtains a statement from the examining physician setting forth the alternative medical examinations and the rationale for substitution and evidence that they will be equally effective.

(ii) Informs each exposed employee of the fact that alternative medical examinations to those required in paragraphs (j)(2) or (4) of this section are to be made available.

(11) If an employee refuses any required medical examination, the employer shall inform the employee of the possible health consequences of such refusal and obtain a signed statement from the employee indicating that the employee understands the risks involved by refusing to be examined.

(12) No medical procedure which would be performed pursuant to this section need be performed if records of a previous such procedure performed within the past six months are acceptable to the examining physician.

(k) Recordkeeping. (1) Exposure determination.

(i) The employer shall keep an accurate record of all determinations required to be made pursuant to paragraph (b)(1) of this section.

(ii) The record shall include the written determination required in paragraph (b)(2) of this section.

(iii) This record shall be maintained until replaced by a more recent record.

(2) Exposure measurements. (i) The employer shall keep an accurate record of all measurements taken to determine employee exposure to chloroprene.

(ii) This record shall include:

(A) The date of measurement;

(B) Operations involving exposure to chloroprene which are being monitored;

(C) Sampling and analytical methods used and evidence of their accuracy, including the method, results and date of calibration of sampling equipment;

(D) Number, duration, and results of samples taken; and

(E) Name, social security number and exposure of the employee monitored.

(iii) This record shall be maintained until replaced by a more recent record but in no event for less than one year.

(3) Mechanical ventilation. (i) When mechanical ventilation is used as an engineering control, the employer shall maintain an accurate record of the measurements demonstrating the effectiveness of such ventilation required by paragraph (d)(3) of this section.

(ii) This record shall include:

(A) Date of measurement;

(B) Type of measurement taken;

(C) Result of measurement.

(iii) These records shall be maintained for at least one year.

(4) Employee training and information. (i) The employer shall keep an accurate record of all employee training and information required by paragraph (i) of this section.

(ii) This record shall include:

(A) Date of training;

(B) Name and social security number of employee trained;

(C) Content or scope of training provided.

(iii) This record shall be maintained until replaced by a more recent record.

(5) Medical surveillance. (i) The employer shall keep an accurate record of employee medical surveillance required by paragraph (j) of this section.

(ii) This record shall include:

(A) Results of tests required by paragraph (j)(2) and (j)(5) of this section;

(B) Any employee medical complaints relative to exposure to chloroprene;

(C) A copy of information provided to the physician pursuant to paragraph (j)(6)(ii), (iii), (iv), (v), and (vi) of this section.

(D) Physician's written opinion; and

(E) A signed statement of any refusal to be examined.

(iii) This record shall be maintained for the duration of the employment of the affected employee.

(6) Access to records. (i) All records required to be maintained by this section shall be made available upon request to authorized representatives of the Assistant Secretary of Labor for Occupational Safety and Health and the Director of the National Institute for Occupational Safety and Health.

(ii) Employee exposure determination and exposure measurement records required to be maintained by this section shall be made available to employees and former employees and their designated representatives.

(iii) Employee medical records required to be maintained by this section shall be made available upon written request to a physician designated by the employee or former employee.

(l) Employee observation of measurement. (1) The employer shall give affected employees or their representatives an opportunity to observe any measurement of employee exposure to chloroprene which is conducted pursuant to this section.

(2) When observation of measurement of employee exposure to chloroprene requires entry into an area where the use of personal protective devices, including respirators, is required, the observer shall be provided with and required to use such equipment and comply with all other applicable safety procedures.

(3) Without interfering with the measurement, observers shall be entitled to:

(i) Receive an explanation of the measurement procedure.

(ii) Visually observe all steps related to the measurement of the airborne concentration of chloroprene that are being performed at the place of exposure; and

(iii) Record the results obtained.

NOTE: The information contained in the following appendixes is advisory in nature and is not intended, by itself, to create any additional obligations not otherwise imposed or detract from any existing obligation.

APPENDIX A

SUBSTANCE SAFETY DATA SHEET FOR CHLOROPRENE

I. SUBSTANCE IDENTIFICATION

A. Substance: Chloroprene (2-chloro-1,3-butadiene)

B. Permissible Exposure: 25 parts of chloroprene per million parts of air (ppm) or 90 milligrams of chloroprene per cubic meter of air (mg/cu m) averaged over an eight-hour work shift.

C. Appearance and Odor: Colorless liquid with an ether-like odor.

II. HEALTH HAZARD DATA

A. Ways in Which the Chemical Affects Your Body:

Chloroprene can affect your body if you inhale it or if it comes in contact with your eyes or skin or if you swallow it. It may be absorbed through the skin.

B. Effects of Overexposure:

1. Exposure to chloroprene may irritate and damage the eyes. It may also irritate the nose and throat and cause a skin rash. In addition, it may cause nervousness, irritability, and temporary loss of hair. Exposure to chloroprene has been reported to cause cancer of the skin or the lung.

2. Reporting Signs and Symptoms: You should inform your employer if you develop any signs or symptoms and suspect they are caused by exposure to chloroprene.

III. EMERGENCY FIRST AID PROCEDURES

A. Eye Exposure: If chloroprene gets into your eyes, wash your eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

B. Skin Exposure: If chloroprene gets on your skin, immediately wash the contaminated skin using soap or mild detergent and water. If chloroprene soaks through your clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. If irritation persists after washing, get medical attention.

C. Breathing: If you or any other person breathes in large amounts of chloroprene, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention immediately.

D. Swallowing: When chloroprene has been swallowed get medical attention immediately. If medical attention is not immediately available get the affected person to vomit by having him touch the back of the throat with his finger or by giving him large amounts (one pint or more) of warm salt water (two tablespoons of salt per pint of water). Do not make an unconscious person vomit.

E. Rescue: Move affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty yourself. Understand your emergency rescue procedures and know the locations of the equipment before the need arises.

IV. RESPIRATORS AND PROTECTIVE CLOTHING

A. Respirators: Respirators are not the best way to control exposure to chloroprene. You can only be required to wear them for routine use if your employer is in the process of installing controls or control measures prove inadequate. You may be required to wear respirators

for non-routine activities or in emergencies. If respirators are worn, they must have a Mining Enforcement and Safety Administration (MESA) or National Institute for Occupational Safety and Health (NIOSH) approval label. (Older respirators may have a Bureau of Mines approval label.) For effective protection, respirators must fit your face and head snugly. Respirators should not be loosened or removed in work situations where there use is required. If you can smell chloroprene while wearing a respirator, the respirator is not working correctly; go immediately to fresh air. If you experience difficulty breathing while wearing a respirator, tell your employer.

B. Protective Clothing: You must wear impervious clothing, gloves, face shield or other appropriate protective clothing to prevent any possibility of skin contact with chloroprene. Replace or repair impervious clothing that has developed leaks.

C. Eye Protection: You must wear splash-proof safety goggles (cup-cover type dust and splash safety goggles) where eye contact to liquid chloroprene may occur.

V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

A. Chloroprene is a flammable liquid and its vapors easily form explosive mixtures with air.

B. Chloroprene must be stored in tightly closed containers in a cool, well ventilated area away from heat, sparks, flames, peroxides and other oxidizers.

C. Sources of ignition such as smoking and open flames are prohibited wherever chloroprene is handled, used or stored in a manner that could create a potential fire or explosion hazard.

D. You must use non-sparking tools when opening or closing metal containers of chloroprene, and containers must be bonded and grounded when pouring or transferring liquid chloroprene.

E. If your skin becomes contaminated with liquid chloroprene, you must promptly wash or shower using soap or mild detergent and water to remove the chloroprene from your skin.

F. Clothing wet from liquid chloroprene can be easily ignited. You must immediately remove this clothing and it must not be reworn until the chloroprene is removed from the clothing.

G. Fire extinguishers, where provided, must be readily available and you should know where they are and how to operate them.

H. Ask your supervisor where chloroprene is used in your work area and for any additional plant safety and health rules.

VI. ACCESS TO INFORMATION

A. Each year your employer is required to inform you of the information contained in this Substance Safety Data Sheet for chloroprene and to instruct you in the safe and correct use of protective equipment.

B. Your employer is required to determine whether you are being overexposed to chloroprene. You or your representative has the right to observe employee exposure measurements and to be informed of the results.

C. Your employer is required to release your exposure determination and medical records to your physician upon written request from your physician.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for CHLOROPRENE

APPENDIX B

SUBSTANCE TECHNICAL GUIDELINES
FOR CHLOROPRENE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: 2-chloro-1,3-butadiene; chlorobutadiene; beta-chloroprene
2. Formula: $CH_2=CClCH=CH_2$
3. Molecular weight: 88.5

B. Physical Data

1. Boiling point (760 mm Hg): 58.9 C (138 F)
2. Specific gravity (Water = 1): 0.96
3. Vapor density (air = 1 at boiling point of chloroprene): 3.0
4. Melting point: -130 C (-202 F)
5. Vapor pressure at 20 C (68 F): 179 mm Hg
6. Solubility in water, % by weight at 20 C (68 F): Insoluble
7. Evaporation rate (butyl acetate = 1): data not available
8. Appearance and odor: Colorless liquid with an ether-like odor.

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Flash point: -20 C (-4 F) (closed cup)
2. Autoignition temperature: data not available
3. Flammable limits in air, % by volume: Lower: 4.0; Upper: 20.0
4. Extinguishing media: Foam, dry chemical, carbon dioxide
5. Special fire-fighting procedures: Do not use a solid stream of water since the stream will scatter and spread the fire. Use water spray to cool containers exposed to a fire.
6. Unusual fire and explosion hazards: Chloroprene is a flammable liquid. Its vapors can easily form explosive mixtures with air. All ignition sources must be controlled where chloroprene is handled, used or stored. Chloroprene vapors are heavier than air and may travel along the ground and be ignited by open flames or sparks at locations remote from the site at which chloroprene is handled.
7. For purposes of conforming with the requirements of 29 CFR 1910.106, chloroprene is classified as a Class IB flammable liquid. At 10,000 ppm, one-fourth of the lower flammable limit, chloroprene is considered to be a potential fire and explosion hazard.
8. For purposes of complying with 29 CFR 1910.309, the classification of hazardous locations as described in Article 500 of the National Electrical Code for chloroprene shall be Class I Group B. Group D equipment may be used if such

equipment is isolated in accordance with Section 501-5(a) by sealing all conduit 1/2 inch or larger in diameter.

B. Reactivity

1. Conditions contributing to instability: Temperatures above -15 C (5 F)
2. Incompatibilities: Contact with peroxides and other oxidizers may cause polymerization with evolution of heat and rupture of container.
3. Hazardous decomposition products: Toxic gases and vapors (such as hydrogen chloride and carbon monoxide) may be released in a fire involving chloroprene.
4. Special precautions: Chloroprene will attack some forms of plastics, rubber and coatings

III. SPILL, LEAK AND DISPOSAL PROCEDURES

A. If chloroprene is spilled or leaked, the following steps should be taken:

1. Remove all ignition sources
2. Ventilate area of spill or leak
3. For small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood). Allow sufficient time for vapors to completely clear hood duct work, then burn the paper. Large quantities can be collected and atomized in a suitable combustion chamber equipped with an appropriate gas cleaning device. Chloroprene may not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

B. Persons not wearing protective equipment should be restricted from areas of spills or leaks until cleanup has been completed.

C. Waste disposal methods: Chloroprene may be disposed of by atomizing in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

IV. MONITORING AND MEASUREMENT PROCEDURES

A. Exposure Above the Action Level: Measurements taken for the purpose of determining employee exposure under this section are best taken such that the average 8-hour exposure may be determined from a single 8-hour sample or two (2) 4-hour samples. Several short term interval samples (up to 30 minutes) may also be used to determine average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). Sampling and analyses may be performed by instruments such as detector tubes certified by NIOSH under 42 CFR Part 84, portable direct-reading instruments, dosimeters, or gas and vapor adsorption tubes with subsequent chemical analyses. The method of measurement must determine the concentration of chloroprene to plus or minus 35%.

B. Exposure Above the Permissible Exposure: The monitoring under this section should be essentially the same as described under paragraph (IV)(A). Laboratories performing chemical analyses should be accredited in Industrial Hygiene Chemistry by the American Industrial Hygiene Association (AIHA). The method of measurement must determine the concentration of chloroprene to plus or minus 25%.

C. Methods meeting these accuracy requirements are available from NIOSH.

D. Since many of the duties relating to employee protection are dependent on the results of monitoring and measuring procedures, employers should assure that the evaluation of employee is performed by a competent industrial hygienist or other technically qualified person.

V. MISCELLANEOUS PRECAUTIONS

A. Store chloroprene in tightly closed containers in a well ventilated area.

B. High exposures to chloroprene can occur when transferring the liquid from one container to another.

C. Non-sparking tools must be used to open and close metal chloroprene containers. These containers must be effectively grounded and bonded prior to pouring.

D. Old samples of chloroprene may contain peroxides that may cause spontaneous polymerization and rupture of containers. Polymer formed from chloroprene may clog pipes and vents.

E. Employers should advise employees of all areas and operations where exposure to chloroprene could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to chloroprene is likely to occur are: during the manufacture and processing of neoprene rubbers and during the production of chloroprene.

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. ROUTE OF ENTRY

Inhalation. Skin absorption.

II. TOXICOLOGY

Chloroprene vapor is an irritant to mucous membranes and skin, and may have teratogenic and carcinogenic properties. Rats died from repeated daily exposure to 1.2 mg/liter (330 ppm), with damage to lungs, liver and kidneys. Higher concentrations caused anesthesia and respiratory paralysis. Daily animal exposures of 0.3 mg/liter (83 ppm) were tolerated for 13 weeks. Chloroprene has been reported to have an effect on embryogenesis in animals; in rats and mice, there was an increase in total embryonal mortality, and a reduction in the fetal weight of offspring of females exposed during pregnancy. Conjunctivitis and focal necrosis of the cornea have been reported in workers. Excessive nervousness and irritability have been observed. Skin exposures cause dermatitis, and occasionally, a peculiar focal alopecia of the scalp which is reversible. Two recent reports suggest that chloroprene exposure is associated with an increase incidence of cancer of the skin and of the lungs.

III. SIGNS AND SYMPTOMS

Irritation of the eyes and respiratory tract; nervousness and irritability; dermatitis; alopecia.

IV. SPECIAL TESTS

None in common usage.

V. TREATMENT

Remove from exposure. Flush eyes and skin with water. If swallowed and the person is conscious, induce vomiting. Give artificial resuscitation if indicated. Recovery is usually rapid and complete.

VI. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. GENERAL

Most reported effects of chloroprene are caused by its irritant properties. Recent reports indicate that chloroprene could be associated with increased incidence of skin and lung cancer. Teratogenicity in animals is reported. It is important that the physician becomes familiar with plant operating conditions in which exposure to chloroprene occurs. Those with skin disease may not tolerate the wearing of protective clothing and those with chronic respiratory disease may not tolerate the wearing of negative pressure respirators.

B. PREPLACEMENT

The following medical procedures must be made available to each employee who is exposed to chloroprene.

1. A complete history and physical examination -- The purpose is to detect preexisting conditions that might place the exposed employee at increased risk, and to establish a baseline for future health monitoring. Examination of respiratory system, skin and eyes should be stressed. The skin should be examined for evidence of chronic disorders and cancer.

2. 14" x 17" chest roentgenogram -- Chloroprene may cause an increased incidence of lung cancer in workers. Surveillance of the lungs is indicated.

C. PERIODIC EXAMINATIONS

The above medical examinations are to be repeated on an annual basis.

References

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for CHLOROPRENE

1. American Conference of Governmental Industrial Hygienists: "Chloroprene," Documentation of the Threshold Limit Values for Substances in Workroom Air (3d ed., 2d printing), Cincinnati, 1974, pp. 54-55.

2. Patty, Frank A.: Industrial Hygiene and Toxicology, Vol. II - Toxicology (2d ed. revised), Interscience Publishing Company, New York, 1963, pp. 1319-1322.

3. von Oettingen, W. F.: The Halogenated Aliphatic, Olefinic, Cyclic, Aromatic, and Aliphatic-Aromatic Hydrocarbons Including the Halogenated Insecticides, Their Toxicity and Potential Dangers, U.S. Public Health Service Publication No. 414, U.S. Government Printing Office, Washington, D.C., 1955, pp. 255-261.

4. International Labour Office: Encyclopaedia of Occupational Health and Safety, Vol. I, A-K, McGraw Hill Book Company, New York, 1974, p. 226.

5. Office of Occupational Health Surveillance and Biometrics, National Institute for Occupational Safety and Health, "Background Information on Chloroprene," Rockville, Md., January 20, 1975, pp. 1-8.

REFERENCES AND SOURCES
CHLOROPRENE
1910.93

(f) Personal Protective Equipment, and, (h) Sanitation

Eye: Grant, "Toxicology of the Eye;" Patty, "Industrial Hygiene and Toxicology;" International Labour Organization, "Encyclopedia of Occupational Safety and Health"

Skin: Patty, "Industrial Hygiene and Toxicology;" Kirk-Othmer, "Encyclopedia of Chemical Technology;" International Labour Organization, "Encyclopedia of Occupational Safety and Health;" Sax, "Dangerous Properties of Industrial Materials"; Lloyd, J.W., "Background in Formation on Chloroprene,", Journal of Occupational Medicine, Vol. 17, No. 4/April 1975.

Ingestion: Patty, "Industrial Hygiene and Toxicology;" "Chemical Abstracts," Vol. 78, 1973, 67807x, p 108; International Labour Organization, "Encyclopedia of Occupational Safety and Health"

COMMENTS

Eye - Classification: 2
Output statement numbers: 10
Exceptions: None

Patty and ILO cite earlier work which determined that chloroprene can cause conjunctivitis and necrosis of the cornea. Grant, however, states that, "Conjunctivitis and and two instances of injury of the corneal epithelium, have been reported from Czechoslovakia. but no ocular symptoms were observed in a study of workers in the chloroprene industry in Sweden or in a related experimental study on animals. It has been suspected that the ocular disturbances were caused by methylvinylketone rather than by chloroprene itself. The workers in Sweden were not appreciably exposed to the ketone, due to differences in manufacturing processes." Based on the information in Grant and no indication in the literature suggesting permanent eye damage, the substance is given a classification of 2.

Skin - Classification: 1
Output statement numbers: 1, 7a, 17i, 21
Exceptions: None

Patty cites work showing "some systemic toxicity from repeated topical applications of chloroprene to the skin of rats." Kirk-Othmer attributes dermatitis, loss of hair and systemic toxicity through skin absorption to exposure of chloroprene. ILO states that "subacute exposure and chronic exposure to low levels may produce damaging effects upon various body organs including the nervous system, liver, kidneys and myocardium." ILO terms chloroprene a primary irritant on contact with skin, causing dermatitis, and the percutaneous absorption results in systemic intoxication. Its flash point is -4 F. Its vapor pressure at 20 C is 179 mm Hg. Documentation of TLV reports work which indicates that loss of hair by workers engaged in neoprene manufacturing "was not due to chloroprene itself, but to

intermediate polymers." Sax lists chloroprene as a moderate local irritant in acute exposures. Patty notes that the loss of hair is completly reversible. In a recent article Lloyd states that, "In the course of a literature search on chloroprene toxicity, Du Pont uncovered two recent Russian articles that suggest an increased incidence of skin and lung cancer in workers exposed to chloroprene. Also, two other articles in the Russian literature were located that described animal experiments in which chloroprene adversely affected embryo development in rats and mice."

Ingestion - Classification: 2
Output statement numbers: None
Exceptions: 20 deleted because of volatility

Patty reports a rat LD100 of 670 mg/kg body weight. Work by Asmangulyan and Badalyan resulted in a rat LD50 of 251 mg/kg; a dose of 15 mg/kg/day to rats for 5 months showed "weak" cumulative effects, as reported in "Chemical Abstracts." ILO states that "subacute exposure and chronic exposure to low levels may produce damaging effects upon various body organs, including the nervous system, liver, kidneys and myocardium."

SUBSTANCE TECHNICAL GUIDELINES

The references cited for this document include:

National Fire Protection Association, "Fire Protection Guide on Hazardous Materials," 5th edition, 1973 (NFPA)

E. C. Leonard (ed), "Vinyl and Diene Monomers," Wiley-Interscience, New York, 1971, p. 1149 (Leo)

Sources of data items used:

I. A. 1. Synonyms: NFPA-325M; Leo
2. Formula: NFPA-325M; Leo
3. Molecular weight: Leo

B. 1. Boiling point: NFPA-325M
2. Specific gravity: Leo
3. Vapor density: NFPA-325M
4. Melting point: Leo
5. Vapor pressure: Leo
6. Solubility in water: NFPA-325M
7. Evaporation rate: not available
8. Appearance and odor: Leo

II. A. 1. Flash point: NFPA-325M
2. Autoignition temperature: not available
3. Flammable limits: NFPA-325M
4. Extinguishing media: NFPA-325M; ADL
5. Special fire fighting procedures: NFPA-325M
6. Unusual fire and explosion hazards: analogy

B. 1. Conditions contributing to instability: Leo
2. Incompatibilities: Leo
3. Hazardous decomposition products: ADL
4. Special precautions: analogy

III. A. Steps if released or spilled: analogy

C. Waste disposal method: analogy

V. Miscellaneous precautions: Leo; analogy

USE/EXPOSURE AND CONTROL DOCUMENT

References used in the preparation of this document include:

"Chemical Abstracts," 78 (1973); 80 (1974) (CA)
Considine, D. M., "Chemical and Process Technology Encyclopedia," McGraw - Hill, 1974 (Considine)
Hurd, J., "Adhesives Guide," British Scientific Instrument Research Assoc., 1959 (Hurd)
International Labour Organization, "Encyclopedia of Occupational Health and Safety," Geneva, 1972 (ILO)
Kirk, R. and Othmer, D., "Encyclopedia of Chemical Technology," Interscience Publishers, Division of John Wiley, 1st edition, 1954 (Chem Tech)
Kirk, R. and Othmer, D., "Encyclopedia of Chemical Technology," Interscience Publishers, Division of John Wiley, 2nd edition, 1972 (K-O)
Lefaux, R., "Practical Toxicology of Plastics," Chemical Rubber Company Press, 1968 (Lefaux)
Mark, H. F., Gaylord, N. G. and Bikales, N. M., "Encyclopedia of Polymer Science and Technology," Interscience, 1964 (Polymer Sci)
McCormick, W. E., Environmental Health Control for the Rubber Industry, "Rubber Chemistry and Technology," 44(2), 512 - 33 (1971) (Environmental Control)
McCormick, W. E., "Industrial Health Problems in the Rubber Industry," Amer. Indust. Hyg. Assoc. Quart., 13(1), 37 - 41 (March 1952) (McCormick)
Morris, G. E., "Synthetic Rubbers, their Chemistry and Dermatological Aspects," Industrial Hygiene and Occupational Medicine (Morris)
Patty, F. A., "Industrial Hygiene and Toxicology," Vol. II, Interscience, 1962 (Patty)
Stanford Research Institute, "Chemical Economics Handbook," Menlo Park, California (SRI)
von Oettingen, W. F., Hueper, W. C., Deichman-Gruebler, W. and Wiley, F. H., "2-Chlorobutadiene (Chloroprene): Its Toxicity and Pathology and the Mechanism of Its Action," Journal of Industrial Hygiene and Toxicology," 18(4), 240 - 270 (1936) (von Oettingen)
Winspear, G., "The Vanderbilt Rubber Handbook," R. T. Vanderbilt Company, Inc., 1968 (Rubber Handbook)

References for Specific Use/Exposure

1. CA, Chem Tech, Considine, Hurd, K-O, Environmental Control, Rubber Handbook, Lefaux, Polymer Sci, SRI
2. Considine, Environmental Control, K-O, Patty, von Oettingen
3. Morris, contact with industry
4. ILO

References for Specific Control Methods

Environmental Control, ILO, K-O, McCormick, Morris, Patty and von Oettingen were the references used in the Specific Control Methods in numbers 1 - 5.

RESPIRATOR TABLE JUSTIFICATION

Patty reports a LC100 of 3 mg/l of air (829.2 ppm) for mice for an 1-hour exposure. No mice died from an 1-hour exposure to 1 mg/l (277 ppm). A LC100 for rabbits, noted by Patty, is 7.5 mg/l (2074 ppm), and for cats is 2.5 mg/l (691 ppm). According to Patty conjunctivitis has been reported.

The Documentation of TLV's report that values of the minimal fatal concentrations of chloroprene for several laboratory animals for 8-hour

exposures range between 160 and 5800 ppm. The Documentation also states that "Concentrations of 80 ppm were said to cause toxic but not highly hazardous symptoms in men." Chloroprene has been reported by the Soviet Union to be a lung carcinogen. Dupont has sent some of their scientific personnel to Russia to evaluate the Russian cancer statistics.

WARNING PROPERTIES; There are no quantitative data available relating the warning properties of chloroprene to air concentrations. Chloroprene, therefore, is treated as a material with poor warning properties.

EYE IRRITATION: Chloroprene is an eye irritant, as noted by Patty.

IDLH: Based upon the acute exposure data summarized by Patty in which it was reported that no mice died from an 1-hour exposure to 277 ppm, but all mice died from an 1-hour exposure to 829.2 ppm, for the purposes of this standard, an IDLH of 400 ppm is assumed.

LFL: The lower flammable limit of chloroprene is 40,000 ppm.

PERMISSIBLE EXPOSURE: 25 ppm.

USE/EXPOSURE AND CONTROL DOCUMENT
CHLOROPRENE

	Use/Exposure	Principal Route of Entry	Currently Used Control Methods
1.	Inhalation of vapor and skin contact with liquid during preparation of the many elastomers (neoprenes) which are used as follows: 17% for molded products 15% hose and tubing (automotive and aircraft) 10% wire and cable 10% belting and sheeting 10% gaskets and pickling 9% adhesives 29% other (cement seals, fiber binders, textile treatment, in herbicides, paints)	A,B,D	Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment (gloves, aprons, goggles, respiratory protective devices)
2.	Inhalation of vapor and skin contact with liquid during manufacture and distribution of chloroprene	A,B,D	Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment (gloves, aprons, goggles, respiratory protective devices)
3.	Inhalation of vapor and skin contact with liquid during processing of neoprene latex which might retain unpolymerized chloroprene. Exposure could take place in the compounding room, at the Banbury mixer, at various rolling operations, in calendering, coating, or molding.	A,B,D	Process enclosure; local exhaust ventilation; general dilution ventilation; personal protective equipment (gloves, aprons, goggles, respiratory protective devices)
4.	Inhalation of vapor and skin contact with liquid during cleaning and maintenance of storage containers	A,B,D	General dilution ventilation; personal protective equipment (gloves, goggles, respiratory protective devices)

A -- Inhalation

B -- Skin contact resulting in localized irritation
C -- Ingestion
D -- Skin contact resulting in absorption and subsequent systemic poisoning