

NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND
SUPPORTING DOCUMENTATION FOR

*** TRICHLORONAPHTHALENE ***

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for TRICHLORONAPHTHALENE

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 TRICHLORONAPHTHALENE.

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.

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(a) Definitions.

(1) "Permissible exposure" means inhalation of trichloronaphthalene in concentrations not in excess of 5 milligrams per cubic meter (mg/m³) averaged over an eight-hour work shift (time weighted average), as stated in § 1910.1000, Table Z-1.

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

(b) Exposure determination and measurement.

(1) Each employer who has a place of employment in which trichloronaphthalene is released into the workplace air shall determine if any employee may be exposed to airborne concentrations of trichloronaphthalene 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 trichloronaphthalene.

(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 trichloronaphthalene;

(ii) Any measurements of trichloronaphthalene taken;

(iii) Any employee complaints of symptoms which may be attributable to exposure to trichloronaphthalene; 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 trichloronaphthalene 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 trichloronaphthalene 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 trichloronaphthalene 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 trichloronaphthalene 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 trichloronaphthalene 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.

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(7) If two consecutive employee exposure measurements taken at least one week apart reveal that the employee is exposed to trichloronaphthalene 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
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Above permissible exposure	$\pm 25\%$
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At or below permissible exposure	
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and above the action level	$\pm 35\%$
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At or below the action level	$\pm 50\%$
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(d) Compliance. (1) No employee shall be exposed to trichloronaphthalene above the permissible exposure as defined in paragraph (a)(1) of this section.

(2) Employee exposures to airborne concentrations of trichloronaphthalene 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. (i) 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 trichloronaphthalene.

(ii) In the design of open surface tank ventilation for the purposes of § 1910.94(d), operations involving trichloronaphthalene shall be classified as C-2 at 200 degrees F.

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(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 trichloronaphthalene 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 TRICHLORONAPHTHALENE

CONDITION	PERMISSIBLE RESPIRATORY PROTECTION
Concentration	
50 mg/M3 or less	Any supplied-air respirator with a full facepiece, helmet or hood.
	Any self-contained breathing apparatus with a full facepiece.
Greater than 50 mg/M3 or entry and escape from unknown concen-	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or 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 and particulates.
	Any escape self-contained breathing apparatus.

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(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 trichloronaphthalene.

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

(3) Dip tank operations shall be performed in accordance with §§ 1910.108 and 1910.94(d).

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

(5) Trichloronaphthalene shall be stored so as not to come in contact with strong oxidizers.

(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 molten trichloronaphthalene. Face shields shall comply with § 1910.133 (a)(2), (a)(4), (a)(5), and (a)(6).

(2) Employers shall provide and ensure that employees use impervious clothing, gloves, face shields (eight-inch minimum) and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with solid trichloronaphthalene or liquids containing trichloronaphthalene. Face shields shall comply with § 1910.133 (a)(2), (a)(4), (a)(5), and (a)(6).

(3) Employers shall provide and ensure that employees use impervious clothing, gloves, and other appropriate protective clothing necessary to prevent skin contact to trichloronaphthalene fumes from the heated material.

(4) Employers shall ensure that non-impervious clothing which becomes contaminated with molten trichloronaphthalene be removed immediately and not reworn until the trichloronaphthalene is removed from the clothing.

(5) Employers shall ensure that non-impervious clothing which becomes contaminated with solid trichloronaphthalene or liquids containing trichloronaphthalene be removed promptly and not reworn until the trichloronaphthalene is removed from the clothing.

(6) Employers shall ensure that employees whose clothing may have become contaminated with solid trichloronaphthalene change into uncontaminated clothing before leaving the work premises.

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

(8) Employers shall provide and ensure that employees use splash-proof safety goggles (cup-cover type dust and splash safety goggles) which comply

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with § 1910.133 (a)(2)-(a)(6) where there is any possibility of molten trichloronaphthalene contacting the eyes.

(9) Employers shall provide and ensure that employees use safety goggles (cup-cover type dust and splash safety goggles) which comply with § 1910.133 (a)(2)-(a)(6), where solid trichloronaphthalene or liquids containing trichloronaphthalene may contact the eyes.

(g) Spills and disposal. In the event that trichloronaphthalene is spilled the employer shall immediately provide available ventilation and then clean up the spill.

(h) Sanitation. (1) Employers shall ensure that all employees subject to skin contact with trichloronaphthalene wash, with soap or mild detergent and water, any areas of the body which may have contacted trichloronaphthalene at the end of each work day.

(2) Employers shall ensure that employees whose skin becomes contaminated with trichloronaphthalene promptly wash or shower with soap or mild detergent and water to remove any trichloronaphthalene from the skin.

(3) Employers shall ensure that employees who handle trichloronaphthalene wash their hands thoroughly with soap or mild detergent and water before eating, smoking or using toilet facilities.

(i) Training and information. (1) Each employer who has a workplace in which trichloronaphthalene is present shall keep a copy of this regulation with Appendixes 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 trichloronaphthalene above the action level or employees who may have skin or eye contact with solid or molten trichloronaphthalene, or liquids containing it, or employees who work where an accidental spill of trichloronaphthalene may occur, shall annually:

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

(ii) Advise affected employees as to the signs and symptoms of exposure to trichloronaphthalene.

(iii) Instruct affected employees to advise the employer of the development of signs and symptoms of exposure to trichloronaphthalene which are listed in Appendix A of the 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 trichloronaphthalene.

(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 airborne concentrations of trichloronaphthalene at or above the action level, without regard to the use of respirators, a medical examination which shall include the following:

(i) A medical history and physical examination with emphasis on the liver and skin.

(ii) A profile of liver function.

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

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

(ii) A record of the results of the liver function tests.

(4) The employer shall make available to each employee, exposed to trichloronaphthalene 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) Tests of liver function (see paragraph (j)(2)(ii) of this section).

(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) A record of the results of the liver function tests.

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

(i) A copy of this regulation with its Appendixes A, B, and C for trichloronaphthalene;

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

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

(iv) The results of any measurement which may indicate the affected employee's exposure;

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

(vi) Upon request of the physician, any available information from previous medical examination of the affected 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 would place the employee at increased risk of material impairment of the employee's health from exposure to trichloronaphthalene or would directly or indirectly aggravate any detected medical condition;

(B) Any recommended limitations upon the employee's exposure to trichloronaphthalene, including limitations upon the use of personal protective equipment and respirators;

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

(ii) The physician's written opinion shall not reveal specific medical findings or diagnoses unrelated to exposure to trichloronaphthalene.

(iii) The employer shall provide the employee with a copy of the physician's written opinion.

(8) No employee shall be exposed to liquid trichloronaphthalene or airborne concentrations of trichloronaphthalene in such a way as would put the employee at increased risk of material impairment of his health from such exposure. 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 trichloronaphthalene.

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(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 trichloronaphthalene.

(ii) This record shall include:

(A) The date of measurement;

(B) Operations involving exposure to trichloronaphthalene 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.

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(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) The 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 trichloronaphthalene;

(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.

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

(2) When observation of measurement of employee exposure to trichloronaphthalene 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 trichloronaphthalene that are being performed at the place of exposure; and

(iii) Record the results obtained.

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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 TRICHLORONAPHTHALENE

- I. SUBSTANCE IDENTIFICATION
 - A. Substance: Trichloronaphthalene
 - B. Permissible Exposure: 5 milligrams of trichloronaphthalene per cubic meter of air (mg/m³) averaged over an eight-hour work shift.
 - C. Appearance and Odor: Colorless to pale yellow solid with an aromatic odor.
- II. HEALTH HAZARD DATA
 - A. Ways in Which the Chemical Affects Your Body: Trichloronaphthalene can affect your body if you inhale it or if it comes in contact with your eyes and skin or if you swallow it. It may be absorbed through the skin. Every effort should be made to prevent skin, eye, oral, or inhalation contact with this material.
 - B. Effects of Overexposure:
 - 1. Exposure to trichloronaphthalene may cause an acne-like skin rash. It may also injure your liver resulting in such effects as fatigue, dark urine and yellow jaundice.
 - 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 trichloronaphthalene.
- III. EMERGENCY FIRST AID PROCEDURES
 - A. Eye Exposure: If solid trichloronaphthalene or liquids containing trichloronaphthalene get into your eyes, wash your eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation persists after washing, get attention. If molten trichloronaphthalene gets into your eyes, immediately flush the eyes with large amounts of water to remove heat. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.
 - B. Skin Exposure: If solid trichloronaphthalene or liquids containing trichloronaphthalene get on your skin, wash the contaminated skin with soap or mild detergent and water promptly. If skin irritation persists after washing, get medical attention. If molten trichloronaphthalene gets on your skin or nonimpervious clothing, immediately flush the

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affected area with large amounts of water to remove heat. Get medical attention immediately.

- C. Breathing: If you or any other person breathes in large amounts of trichloronaphthalene, 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 as soon as possible.
- D. Swallowing: When trichloronaphthalene 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 trichloronaphthalene. You can only be required to wear them for routine use if your employer is in the process of installing controls or other 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 their use is required. If you can smell trichloronaphthalene 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 molten trichloronaphthalene or repeated or prolonged skin contact with solid or liquids containing trichloronaphthalene. You must wear impervious clothing, gloves, face shield or other appropriate protective clothing to prevent skin contact to trichloronaphthalene fumes from the heated material. Repair or replace impervious clothing that has developed leaks.
- C. Eye Protection: You must wear splash-proof safety goggles (cup-cover type dust and splash safety goggles) if there is any possibility of molten trichloronaphthalene contacting your eyes. You must wear safety goggles (cup-cover type dust and splash safety goggles) where eye contact to solid

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trichloro-naphthalene or liquids containing
trichloronaphthalene may occur.

V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

- A. Trichloronaphthalene is a combustible solid.
- B. Trichloronaphthalene must be stored in tightly closed containers in a cool, well ventilated area away from heat, sparks, flames, and strong oxidizers.
- C. Sources of ignition such as smoking and open flames are prohibited wherever trichloronaphthalene is handled, used or stored in a manner that could create a potential fire or explosion hazard.
- D. If your skin becomes contaminated with molten trichloronaphthalene, you must immediately wash or shower using soap or mild detergent and water to remove any trichloronaphthalene from the skin.
- E. If you are subject to skin contact with solid trichloronaphthalene you must wash any areas of your body using soap or mild detergent and water that may have contacted trichloronaphthalene at the end of each work day.
- F. If your skin becomes contaminated with solid trichloronaphthalene, you must promptly wash or shower using soap or mild detergent and water to remove the trichloronaphthalene from your skin.
- G. If your work clothing may have become contaminated with solid trichloronaphthalene, you must change into uncontaminated clothing before leaving the work premises.
- H. You must immediately remove any non-impervious clothing that becomes contaminated with molten trichloronaphthalene and this clothing must not be reworn until the trichloronaphthalene removed from the clothing.
- I. You must promptly remove any non-impervious clothing that becomes contaminated with solid trichloronaphthalene and this clothing must not be reworn until the trichloronaphthalene is removed from the clothing.
- J. You must not eat or smoke in areas where trichloronaphthalene is handled, processed or stored.
- K. If you handle trichloronaphthalene, you must wash your hands thoroughly with soap or mild detergent and water before eating, smoking or using toilet facilities.
- L. Fire extinguishers, eye flushing facilities and quick drenching facilities, where provided, must be readily available and you should know where they are and how to operate them.
- M. Ask your supervisor where trichloronaphthalene 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 trichloronaphthalene. In addition, your employer must instruct you in the safe use of trichloronaphthalene.

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- emergency procedures, and the correct use of protective equipment.
- B. Your employer is required to determine whether you are being exposed to trichloronaphthalene. You or your representative have the right to observe employee exposure measurements and to record the results obtained. If your employer determines that you are being overexposed, he is required to inform you of the exposure and of the actions which are being taken to reduce your exposure.
- C. Your employer is required to keep records of exposure determinations, exposure measurements, and medical surveillance. Your employer is required to make records of exposure determinations and your exposure measurements available to you or your representative upon your request. Your employer is required to release your medical records to your physician upon your written request.

APPENDIX B

SUBSTANCE TECHNICAL GUIDELINES
FOR TRICHLORONAPHTHALENE

- I. PHYSICAL AND CHEMICAL DATA
- A. Substance Identification
1. Synonyms: Halowax; seekay wax; nibren wax
 2. Formula: $C_{10}H_5Cl_3$
 3. Molecular weight: 231.4
- B. Physical Data
1. Boiling point (760 mm Hg): 304 - 354 C (580 - 670 F)
 2. Specific gravity (H₂O = 1): 1.58
 3. Vapor density (air = 1 at boiling point of trichloronaphthalene): 8.0
 4. Melting point: 93 C (199 F)
 5. Vapor pressure at 20 C (68 F): less than 1 mm Hg
 6. Solubility in water, % by weight at 20 C (68 F): Insoluble
 7. Evaporation rate (butyl acetate = 1): much less than 1
 8. Appearance and odor: Colorless to pale yellow solid with an aromatic odor.
- II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA
- A. Fire
1. Flash point: 200 C (392 F) (open cup)
 2. Autoignition temperature: none to boiling point
 3. Flammable limits in air, % by volume: not available
 4. Extinguishing media: Foam, carbon dioxide, dry chemical
 5. Special fire-fighting procedures: Do not use a solid stream of water since a stream will scatter and spread the fire. Use water spray to cool containers exposed to a fire.

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6. Unusual fire and explosion hazards: Liquid trichloronaphthalene is a combustible liquid. At elevated temperatures its vapors can form explosive mixtures with air. All ignition sources must be controlled where trichloronaphthalene is used, handled or stored in a manner so as to create a potential fire or explosion hazard.

B. Reactivity

1. Conditions contributing to instability: Heat.
2. Incompatibilities: Contact with strong oxidizing agents may cause fires and explosions.
3. Hazardous decomposition products: Toxic gases and vapor (such as hydrogen chloride, phosgene and carbon monoxide) may be released in a fire involving trichloronaphthalene.
4. Special precautions: None reported.

III. SPILL AND DISPOSAL PROCEDURES

- A. If trichloronaphthalene is spilled, the following steps should be taken:

1. Remove all ignition sources.
2. Ventilate area of spill.
3. For small quantities, sweep onto paper or other flammable material, place in an appropriate container and burn in a safe place (such as a fume hood). Large quantities may be reclaimed; however, if this is not practical dissolve in a flammable solvent (such as alcohol) and atomize in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

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

- C. Waste disposal methods: Trichloronaphthalene may be disposed of:

1. By making packages of trichloronaphthalene in paper or other flammable material and burning in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.
2. By dissolving in a flammable solvent (such as alcohol) and 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 eight-hour sample or two (2) 4-hour samples. Several short time interval samples (up to 30 minutes) may also be used to determine the 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

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instruments, dosimeters, or gas and vapor adsorption tubes with subsequent chemical analyses, or dosimeters. The method of measurement must determine the concentration of trichloronaphthalene to plus or minus 35%.

B. Exposure above the permissible exposure: The monitoring and measurements 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. The method of measurement must determine the concentration of trichloronaphthalene to plus or minus 25%.

C. Methods: Methods meeting the above accuracy requirements are available from NIOSH.

D. Qualified Persons: 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 exposures is performed by a competent industrial hygienist or other technically qualified person.

V. MISCELLANEOUS PRECAUTIONS

A. Store trichloronaphthalene in tightly closed containers in a cool, well-ventilated area.

C. Employers should advise employees of all areas and operations where exposure to trichloronaphthalene could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to trichloronaphthalene is to occur are: during its use to impregnate paper used in fabrication of electrical capacitors, battery separators, and electrical cable coatings; in the manufacture of polymers to prepare waterproof coatings; as an additive for lubricating and cutting oils; and during its production.

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. ROUTE OF ENTRY

Inhalation; skin absorption.

II. TOXICOLOGY

Trichloronaphthalene vapor and dust are toxic to the liver and the skin. Rats exposed to a mixture of trichloronaphthalene and tetrachloronaphthalene at 11 mg/m³, 16 hours daily for 2 1/2 months showed slightly swollen liver cells with granular cytoplasm. An industrial exposure to unknown concentrations caused a severe acne-form dermatitis termed chloracne in 50 workers (89% of the crew); initially there was pruritis which progressed to an acute eczema and finally a subacute folliculitis of acne type affecting mainly the face, periorbital region, cheeks, and ears. Two workers experienced anorexia, nausea, and vertigo. No fatal cases of liver injury have been reported, but one instance of toxic hepatitis resulted from exposure to 3 mg/m³.

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III. SIGNS AND SYMPTOMS

Acne-form dermatitis; anorexia, nausea; vertigo; jaundice and other signs of liver injury.

IV. SPECIAL TESTS

None in common usage.

V. TREATMENT

Remove from exposure. Flush eyes with water and wash skin thoroughly with soap and water. Treat skin as for acne. If swallowed and the person is conscious, induce vomiting. Give artificial resuscitation if indicated. Destroy contaminated clothing.

VI. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. GENERAL

The anticipated effects of trichloronaphthalene are caused by its capacity to produce an acne-form dermatitis and to affect the liver. Skin absorption occurs. It is important that the physician becomes familiar with plant operating conditions in which exposure to trichloronaphthalene 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 trichloronaphthalene:

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 liver and skin should be stressed.
2. Liver function tests -- Trichloronaphthalene may cause liver damage. A profile of liver function shall be obtained by utilizing a medically acceptable array of biochemical tests.

C. PERIODIC EXAMINATIONS

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

References

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1. American Conference of Governmental Industrial Hygienists: "Trichloronaphthalene," Documentation of the Threshold Limit Values for Substances in Workroom Air (3d ed., 2d printing), Cincinnati, 1974, pp. 265-266.
2. Hygienic Guide Series: "Chloronaphthalenes," American Industrial Hygiene Association Journal, 27:89-91, 1966.
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. 308-310.
4. Patty, Frank A.: Industrial Hygiene and Toxicology, Vol. II -- Toxicology (2d ed. revised), Interscience Publishing Company, New York, 1963, pp. 1343-1345.

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REFERENCES AND SOURCES
TRICHLORONAPHTHALENE
1910.93

- (d) Compliance - Open surface tank classification based on temperature at which tank must operate to have liquid trichloronaphthalene.
(f) Personal Protective Equipment, and, (h) Sanitation

Eye: Kopper Corp. MSDS

Skin: Documentation of TLV's; Hunter, "The Diseases of Occupation"; Patty, "Ind. Hyg. and Tox."; International Labour Office, "Encyclopedia of Occ. Health and Safety"; Koppers Corp. MSDS; and AIHA Hygienic Guide
Ingestion: Sax, "Dangerous Properties of Ind. Materials"; Hunter, Drinker et al, "The Problem of Possible Systemic Effects From Certain Chlorinated Hydrocarbons," Journal of Ind. Hyg. and Tox., Vol. 19, Pg. 283, 1937

COMMENTS

Eye - Classification: 1, 2 and 6

Output statement numbers: 9, 10 and 12 combined

Exceptions: Eye wash fountains not required (Statement 13)

The manufacturers MSDS simply indicates that the dust may be irritating to the eyes and that goggles are recommended. The paucity of data and the recommendation of goggles suggests that eye contact to trichloronaphthalene should be prevented. The classification of 1 is given because this material might be used in the molten state in the workplace and eye contact can be expected to cause thermal burns.

Skin - Classification: 1, 2, 4 and 6

Output statement numbers: 1, 2, 3, 5b, 7a, 14g, 15,

17g, 17i and 20a

Exceptions: 6 not felt necessary for molten material; quick drenching facilities not required (Statement 8); 15 added; 4 modified; 14i not included as 17i is sufficient. The effects of this material are everywhere noted as similar to the effects of pentachloronaphthalene. The comments made for that material, which are as follows, directly apply for this one. "The Documentation of TLV's has the notation "skin" after the chemical name. Hunter notes that "work-people must be taught not to touch the skin with the hands and not to use rags for wiping the nose and face." Patty simply says some authors have indicated that chlorinated naphthalenes may be absorbed through the skin. He reports that the most striking response to contact with these materials is chloracne which usually occurs from long-term contact or from a much shorter contact with hot vapors. It is noted that the reaction is slow to appear and may take months to disappear. Patty suggests (page 2252) that employees keep skin contact to a minimum, that workers be required to take a shower every day before leaving the factory, and that clean work clothing and protective gloves be provided. ILO agrees that fumes can cause a problem and recommends daily clothing changes. The Koppers Corp. MSDS agrees that daily showers and clothing changes are necessary. The classification of 1 is given because the material might be used in the molten state in the workplace and contact could be expected to cause thermal burns. Contact to hot vapors is prevented by the assignment

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of classification 4." Although Patty points out that the degree of toxicity increases with chlorine content, the AIHA Hygienic Guide attributes acneform lesions to exposure to any of the chloronaphthalenes. Also, the manufacturers MSDS calls for the same personal protective measures for skin contact. The documentation of TLV's confirms that this substance can cause chloracne.

Ingestion - Classification: 6

Output Statement numbers: 20a

Exceptions: Statement 19 not considered necessary due to Drinker's data. ILO states that "systemic injury may occur from ingestion." According to Patty, "the systemic injury appears to be exclusively one of liver injury." Sax rates the systemic hazard from chronic or acute ingestion as moderate. Drinker reports that when trichloronaphthalene with traces of the tetra- compound were given to rats in doses of about 0.3 gm/day from May to November of 1936, "Histologic examination showed slight changes in the liver but nothing of great significance." There were no substance related deaths during the experiment.

SUBSTANCE TECHNICAL GUIDELINES

The references cited for this document include:

Koppers Co., Inc., "Hallowax Chlorinated Naphthalene Oils" and Material Safety Data Sheet (Kopp)

Kirk-Othmer, "Encyclopedia of Chemical Technology," 2nd edition, Vol. 5, p. 297 (K-0)

Sources of data items used:

- I.
 - A.
 1. Synonyms: ADL
 2. Formula: Kopp
 3. Molecular weight: Kopp
 - B.
 1. Boiling point: Kopp
 3. Vapor density: calculated
 4. Melting point: Kopp
 5. Vapor pressure: Kopp
 6. Solubility in water: Kopp
 7. Evaporation rate: Kopp
 8. Appearance and odor: Kopp
- II.
 - A.
 1. Flash point: Kopp
 2. Autoignition temperature: Kopp
 3. Flammable limits: not available
 4. Extinguishing media: Kopp
 5. Special fire fighting procedures: Kopp
 6. Unusual fire and explosion hazards: Kopp
 - B.
 1. Conditions contributing to instability: K-0
 2. Incompatibilities: analogy to other chloronaphthalenes
 3. Hazardous decomposition products: Kopp
 4. Special precautions:
- III.
 - A. Steps if released or spilled: Kopp
- C. Waste disposal method: Kopp
- V. Miscellaneous precautions: Kopp

USE/EXPOSURE AND CONTROL DOCUMENT

Sources used in the preparation of this document includes:

"Hallowax," Koppers Chemical and Coatings (Hallowax)

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- Hamilton, A. and Hardy, H., "Industrial Toxicology," Publishing Sciences Group, Inc., 1974 (Hamilton)
- International Labour Organization, "Encyclopedia of Occupational Health and Safety," Geneva, 1972 (ILO)
- Kirk, R. and Othmer, D., "Encyclopedia of Chemical Technology," Interscience Publishers, 2nd edition, 1972 (ILO)
- Kleinfeld, M., Messite, J. and Swencicki, R., "Clinical Effects of Chlorinated Naphthalene Exposure," Journal of Occupational Medicine, 14:377, May 1972 (Kleinfeld)
- Schwartz, L., Tulipan, L. and Birmingham, D. J., "Occupational Diseases of the Skin," 3rd edition, Lea and Febiger, 1957 (Schwartz)
- "Tetrachloronaphthalene," Material Safety Data Sheet, U. S. Department of Labor (MSDS)
- Worth, A. H., "The Chemistry and Technology of Waxes," 2nd edition, Reinhold Publishing Co., 1965 (Worth)

References for Use/Exposure

1. Schwartz, Worth, Kleinfeld
2. Schwartz, Kleinfeld
3. K-O, Hamilton, Worth
4. Hallowax, K-O
5. Worth, Hamilton
6. ILO, Worth
7. ADL estimate, MSDS
8. Hallowax, Worth

References for Specific Control Methods

1. K-O, MSDS, Schwartz
2. K-O, MSDS, Schwartz
3. K-O, Schwartz
4. K-O, MSDS
5. MSDS, Schwartz
6. K-O, Schwartz
7. K-O, MSDS, Schwartz
8. K-O, MSDS, Schwartz

RESPIRATOR TABLE DOCUMENTATION

PERMISSIBLE EXPOSURE: 2 mg/M3.

WARNING PROPERTIES: Since there are no quantitative data relating warning properties to air concentrations of trichloronaphthalene, this substance is treated as a material with poor warning properties. The concentration of trichloronaphthalene in saturated air at 20° C could result in a significant exposure relative to the permissible exposure.

EYE IRRITATION: Even though the AIHA Hygienic Guides state that "eye injury has not proved to be troublesome with the chloronaphthalenes," trichloronaphthalene is treated as an eye irritant for the purposes of this standard, as a Koppers Company Material Safety Data Sheet states that the vapors or dust may irritate the eyes.

LFL: The fire hazard of the chloronaphthalenes is "minimal or nonexistent" according to the AIHA Hygienic Guides. Therefore, there is no lower flammable limit for trichloronaphthalene.

IDLH: 20 mg/M3.

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****IDLH BASIS:** Since there are no toxicological data available concerning the effects of acute exposures to trichloronaphthalene, the IDLH concentration of this substance has been determined on the basis of a comparison to related compounds. The IDLH concentrations of octachloronaphthalene, pentachloronaphthalene, and hexachloronaphthalene, for the purposes of this standard, have been determined to be 10 times greater than their respective threshold limit values. Therefore, since the permissible exposure limit of trichloronaphthalene is 2 mg/M3, an IDLH concentration of 20 mg/M3 is assumed.

SUMMARY OF TOXICOLOGY:

Patty reports that the chlorinated naphthalenes "do not occur in industry as individual compounds," and that "any one product is a mixture but will have a specific range of chlorine substitution." The toxicity of these compounds increases with increasing chlorine content.

Skin lesions may occur from contact with the dust, fume, or vapor of the chloronaphthalenes. The AIHA Hygienic Guides report that "systemic effects have been caused chiefly by the inhalation of fume and vapor from the molten chloronaphthalene wax, and less frequently by the dust." The systemic damage which occurs consists almost exclusively of liver injury.

There is very little quantitative information available concerning the toxicological effects produced by the inhalation of trichloronaphthalene. Patty reports that slight liver injury was observed in animals exposed to a mixture of trichloronaphthalene and trichloronaphthalene at a concentration of 10.97 mg/M3. The exposures were repeated daily for a period of 4 1/2 months. At a concentration of 1.31 mg/M3 for the same exposure period, the animals showed no effects "other than a possible slight enlargement of the liver."

Patty indicates that the chlorinated naphthalenes may be absorbed through the skin but no quantitative data are available on skin absorption LD50's.

VAPOR PRESSURE AT 20 C: less than 1 mm.

SATURATED AIR CONCENTRATION: less than 1300 ppm.

Saturated air at 20 C contains less than 1316 ppm trichloronaphthalene (less than 14,300 mg/M3).

****Note:** The Respirator Review Committee recommends that this substance be set aside until an IDLH can be established based on adequate toxicological information.

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USE/EXPOSURE AND CONTROL DOCUMENT
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	Use/Exposure	Principal Route of Entry	Currently Used Control Methods
1.	Inhalation of vapor or dust and skin contact with vapor, solid or dust during the manufacture of electric equipment using trichloronapthalene as an insulating material: a. Pouring molten solvent dissolved or finely ground solid materials (transformers, condensers, battery separators) b. Dipping electric cable, wires, coils, condensers into molten material c. Peeling and covering of the insulated cable with fabric.	A,B,D	Local exhaust ventilation; general dilution ventilation with intake and exhaust fans; personal protective equipment (gloves and overshoes, clean coveralls, goggles, respiratory protective device for dust)
2.	Inhalation of vapor and skin contact with solid or vapor during use of electric equipment insulated with trichloronapthalene (Electricians stripping wires, handling wires or condensers, soldering wires or condensers)	A,B,D	Local exhaust ventilation; general dilution ventilation; personal protective equipment (gloves, clean coveralls, respiratory protective devices, goggles for soldering)
3.	Inhalation of vapor and skin contact with solid or vapor during use as an inert component of resins or polymers for coating or impregnating textiles, wood and paper (to impart flame resistance, water proofness, fungicidal and insecticidal properties)	A,B,D	Process enclosure, local exhaust ventilation; general dilution ventilation with intake and exhaust fans, personal protective equipment (rubber gloves, goggles, respirator for dust, clean coveralls)
4.	Inhalation of vapor and dust and skin contact with vapor solid and dust during the	A,B,D	Process enclosure, local exhaust ventilation; general dilution ventilation;

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manufacture of trichloronaphthalene (catalytic chlorination of naphthalene) and preparation of material for industrial use (cutting, grinding, pulverizing and packing)

personal protective equipment (rubber gloves, clean coveralls, rubber overshoes, respiratory protective devices, goggles)

- | | | | |
|----|---|-------|---|
| 5. | Inhalation of mist and skin contact with mist during use as an additive for cutting oil (used in various operations performed on metals - cutting, drilling, grinding) | A,B,D | Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles, respiratory protective devices, clean coveralls, rubber overshoes) |
| 6. | Inhalation of vapor and skin contact with vapor, liquid or solid during use as an additive to special lubricants (crankcase oil, lubricants for farm machinery, extreme pressure lubricants) | A,B,D | General dilution ventilation |
| 7. | Inhalation of vapor and dust and skin contact with vapor, solid or dust during cleaning and maintenance of storage vessels and during clean up of accidental spills | A,B,D | Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles, clean coveralls, rubber overshoes, rubber gloves, respiratory protective devices) |
| 8. | Inhalation of vapor, solid or dust and skin contact with vapor, solid or dust during manufacture of polymers using trichloronaphthalene as fillers (to impart flame resistance and improve electrical properties of polymers) and during the manufacture of special lubricants (chassis lubricants, crankcase oil, extreme pressure lubricants) | A,B,D | Process enclosure, local exhaust ventilation; general dilution ventilation; personal protective equipment (rubber gloves, goggles, respiratory protective devices, clean coveralls, rubber overshoes) |

- A -- Inhalation
B -- Skin contact resulting in localized irritation
C -- Ingestion

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D -- Skin contact resulting in
absorption and subsequent
systemic poisoning

----- JES2 JOB STATISTICS -----

1,297 CARDS READ

0 SYSOUT PRINT RECORDS

0 SYSOUT PUNCH RECORDS

0.00 MINUTES EXECUTION TIME

