NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND

SUPPORTING DOCUMENTATION FOR

*** PENTACHLORONAPTHALENE ***

NIOSH/OSHA Draft Technical Standard and Supporting Documentation for PENTACHLORONAPTHALENE

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 PENTACHLORONAPTHALENE.

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.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for PENTACHLORONAPTHALENE

(a) DEFINITIONS

(1) PERMISSIBLE EXPOSURE - "Permissible Exposure" means inhalation of pentachloronaphthalene in concentrations not in excess of 0.5 milligrams per cubic meter, mg/cu.m.) averaged over an eight hour work shift, as stated in section 1910.93, Table G-1.

(2) ACTION LEVEL - "Action Level" means one half (1/2) of the permissible exposure for pentachloronaphthalene.

(b) EMPLOYEE INFORMATION - Each employer who has a workplace in which pentachloronaphthalene is present shall:

(1) STANDARD AVAILABILITY - Keep a copy of this section with its appendices A, B and C, at the workplace. This material shall be made readily available to affected employees; and

(2) PRESENCE OF PENTACHLORONAPTHALENE - Inform affected employees of the quantity, location, and manner of use or storage of pentachloronaphthalene.

(c) EXPOSURE MEASUREMENT

(1) INITIAL DETERMINATION - Each employer who has a place of employment in which pentachloronaphthalene is released into the workplace air shall determine if any employee may be exposed to airborne concentrations of pentachloronaphthalene 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 pentachloronaphthalene. A written determination shall be made and it shall contain at least the following information:

(i) Any information, observations, or calculations which would indicate employee exposure to pentachloronaphthalene;

(ii) Any measurements of airborne concentrations of pentachloronaphtha taken;

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

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

(2) INITIAL EXPOSURE MEASUREMENT - If the employer determines that any employee may be exposed to airborne concentrations of pentachloronaphthalene at or above the action level, the exposure of the employee believed to have the greatest exposure shall be measured. The exposure measurement shall be representative of the maximum exposure of the employee.

(3) IDENTIFICATION OF EXPOSED EMPLOYEES - If the exposure measurement taken under paragraph (c)(2) of this section reveals employee exposure to airborne concentrations of pentachloronaphthalene 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.

(4) EXPOSURE ABOVE THE ACTION LEVEL - If an employee exposure measurement reveals that an employee is exposed to airborne concentrations of pentachloronaphthalene 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.

(5) EXPOSURE ABOVE THE PERMISSIBLE EXPOSURE - If an employee exposure measurement reveals that an employee is exposed to airborne concentrations of pentachloronaphthalene above the permissible exposure, the employer shall:

(i) Inform the employee of the exposure as required by paragraph (N)(1) of this section; and

(ii) Measure the exposure of the employee at least monthly; and

(iii) Institute control measures as required by paragraph (E) of this section.

(6) TERMINATION OF EXPOSURE MEASUREMENT - If two consecutive employee exposure measurements taken at least one week apart reveal that the employee is exposed to airborne concentrations of pentachloronaphthalene below the action level, the employer may terminate measurement for the employee. For purposes of this subparagraph, use of respirators shall not constitute reduction of employee exposure below the action level.

(d) METHODS OF MEASUREMENT - 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 (Appendix B (iv)). The method of measurement shall have an accuracy, to a confidence level of 95%, of not less than that given in Table 1 below.

Table 1

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

(e) Methods of Compliance

(1) Engineering controls - No employee shall be exposed to pentachloronaphthalene above the permissible limit as defined in paragraph (a)(1) of this section. Engineering and work practice controls shall be used to reduce exposure to pentachloronaphthalene to at or below the permissible exposure.

(i) When mechanical ventilation is used to control exposure, measurements which demonstrate system efficiency (for example: air velocity, static pressure, or air volume) shall be made at least every three months. Measurements of system efficiency shall also be made within five work days of any change in production, process or control which might result in a reduction in control.

(ii) In the design of open surface tank ventilation for the purposes of section 1910.94 (d), operations involving molten pentachloronaphthalene shall be classified as B-1 at 248 F.

(2) Respirators

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

a. During the time period necessary to install engineering controls; or

b. In work situations in which engineering controls are technically not feasible; or

c. In work situations in which feasible engineering and work practice controls are insufficient to reduce

employees exposure to at or below the permissible exposure. Where technically feasible engineering and work practice controls are not sufficient to reduce exposure to at or below permissible exposure, they shall be used to reduce exposure to the lowest level feasible; or

d. For operations not exceeding 40 hours per year; or

e. In emergencies.

(ii) Respirators shall be jointly approved by the mining enforcement and safety administration (formerly Bureau of Mines) and by the National Institute for Occupational Safety and Health under the provisions of 30 CFR Part 11.

(iii) Employers shall select and provide the appropriate respirator from Table 2 and shall ensure that the employee uses the respirator provided.

(iv) Employers shall institute a respiratory protection program in accordance with sections 1910.134(b), (d), (e), and (f).

TABLE 2 RESPIRATORY PROTECTION FOR PENTACHLORONAPHTHALENE

CONDITION	PERMISSIBLE RESPIRATORY PROTECTION
Vapor or Particulate Concentration	
Equal to or less than 5.0 mg/M3	Any supplied-air respirator. Any self-contained breathing apparatus.
Greater than 5 mg/M3 or escape and entry from unknown concentrations	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 positive pressure mode.
Escape	Any gas mask providing protection against organic vapors and particulates. Any escape self-contained breathing apparatus.

(f) Fire and Safety

Employers shall familiarize themselves with the information contained in the Substance Technical Guidelines for pentachloronaphthalene which is

contained in Appendix B in order to ensure the safe handling and use of pentachloronaphthalene.

(1) Storage - Pentachloronaphthalene shall be stored so as not to come in contact with strong oxidizers.

(g) Personal Protective Equipment

(1) Skin Contact

(i) Employers shall provide, and require employees to use, impervious clothing, gloves, face shields (8-inch minimum) and other appropriate protective clothing necessary to prevent any possibility of skin contact to molten pentachloronaphthalene. Face shields shall comply with section 1910.133 (a)(6).

(ii) Employers shall provide, and require employees to use, impervious clothing, gloves, face shields (8-inch minimum) and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact to solid pentachloronaphthalene or to liquids containing pentachloronaphthalene. Face shields shall comply with section 1910.133(a)(6).

(iii) Employers shall provide, and require employees to use, impervious clothing, gloves, and other appropriate protective clothing necessary to prevent skin contact to pentachloronaphthalene vapors from the heated material.

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

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

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

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

(2) Eye Contact

(i) Employers shall provide, and require employees to use, splash-proof safety goggles (cup-cover type dust and splash safety goggles), which comply with section 1910.133 (a)(6), where there is any possibility of molten pentachloronaphthalene contacting the eye.

(ii) Employers shall provide, and require employees to use, dust-resistant safety goggles (cup-cover type dust and splash safety goggles), which comply with section 1910.133(a)(6), where eye contact to solid pentachloronaphthalene may occur.

(iii) Employers shall provide, and require employees to use, splash-proof safety goggles (cup-cover type dust and splash safety goggles), which comply with section 1910.133(a)(6), where eye contact to liquids containing pentachloronaphthalene may occur.

(h) Spills

(1) Spills of pentachloronaphthalene shall be cleaned up immediately after utilizing available ventilation.

(i) Sanitation

(1) Employers shall ensure that employees whose skin becomes contaminated with molten pentachloronaphthalene immediately wash or shower to remove any pentachloronaphthalene from the skin.

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

(3) Employers shall ensure that employees whose skin becomes contaminated with pentachloronaphthalene promptly wash or shower to remove any pentachloronaphthalene from the skin.

(4) Employers shall ensure that employees do not eat or smoke in areas where pentachloronaphthalene is handled, processed or stored.

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

(j) Training and Information - Each employer who has employees exposed to pentachloronaphthalene in excess of the action level, or employees who may have skin or eye contact with solid or molten pentachloronaphthalene, or with liquids containing pentachloronaphthalene or employees who work where accidental release, spill, fire, or explosion of pentachloronaphthalene may occur, shall annually:

(1) Substance Safety Data Sheet - Inform each employee of the information contained in the Substance Safety Data Sheet for pentachloronaphthalene, which is contained in Appendix A; and

(2) Medical -

(I) Advise employees as to the signs and symptoms of exposure to pentachloronaphthalene.

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

(3) Procedures -

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

(II) The procedures required by (j)(1), (2), and (3)(I) shall be provided to employees at the expense of the employer during the employee's normal working hours.

(k) Medical Surveillance

(1) The employer shall provide medical procedures as required by paragraph (k). These procedures shall be provided at no cost to the employee.

(2) Preplacement Examination - The employer shall make available to each employee who is to be exposed to pentachloronaphthalene or airborne concentrations of pentachloronaphthalene at or above the action level or is at risk to skin exposure, a medical examination which shall include as a minimum the following:

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

(ii) A profile of liver function.

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

(i) The physician's written opinion stating whether or not the employee has any detected medical conditions which would place him at increased risk from exposure to pentachloronaphthalene.

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

(4) Periodic Examinations - The employer shall make available to each employee, exposed to pentachloronaphthalene 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 (k)(2)(i) of this section).

(ii) Liver function tests (see (k)(2)(II) of this section).

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

(i) The physician's written opinion stating whether or not the employee has any detected medical conditions which would place him at increased risk to further exposure to pentachloronaphthalene.

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

(6) Exclusion or Removal from Exposure - No employee shall be exposed to pentachloronaphthalene if such exposure could place the employee at increased risk of material impairment of his health.

(7) Emergency Procedures - The employer shall provide emergency and follow-up medical examinations and treatment for any employee injured through exposure to pentachloronaphthalene.

(8) Informing the Physician - The employer shall provide to the examining physician the following information:

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

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

(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.

(9) Physician's Written Opinion

(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 pentachloronaphthalene 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 pentachloronaphthalene.

(C) 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 pentachloronaphthalene.

(10) Alternative Medical Examinations - If the examining physician chooses to use alternative medical examinations to those specified in sections (2) and (4), 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 section (2) or (4) above are to be made available.

(11) Refusal to be Medically Examined - 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.

(l) Recordkeeping.

(1) Initial determination.

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

(ii) The record shall include the written determination and any supporting documentation as required in paragraph (c)(1) 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 pentachloronaphthalene.

(ii) This record shall include:

(a) The date of measurement;

(b) A reference to the subparagraph of this regulation which required the measurement, if any;
(c) Operations involving exposure to pentachloronaphthalene which is being monitored;
(d) Sampling and analytical methods used and evidence of their accuracy;
(e) Number, duration, and results of samples taken;
(f) 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 a record of measurements demonstrating the effectiveness of such ventilation as required by paragraph (e)(1)(i) of this section.

(ii) This record shall include:
(a) Date of measurement;
(b) Type of measurement taken;
(c) Result of measurement.

(iii) This record shall be maintained for at least one year.

(4) Annual training.

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

(ii) The record shall include:
(a) Date of training;
(b) Name and Social Security number of employee trained;
(c) Substance of training provided.

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

(5) Medical records.

(i) The employer shall keep an accurate medical record for each employee.

(ii) The record shall include:
(a) Results of tests required in Section (k)(3) and (k)(5) of th
(b) Physician's written opinion;
(c) Any employee medical complaints relative to exposure to pent
(d) A signed statement of any refusal to be examined;
(e) A copy of information provided to the physician pursuant to paragraph (k)(8) (ii) through (vi) of this section

(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 and the Director.

(ii) Employee exposure measurement records required to be maintained by this section shall be made available to employee 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.

(m) Observation of monitoring.

(1) Duty.

The employer shall give affected employees or their representatives an opportunity to observe any monitoring of employee exposure to pentachloronaphthalene which is conducted pursuant to this section.

(2) Exercise of opportunity to observe monitoring.

(i) When observation of the monitoring of employee exposure to pentachloronaphthalene requires entry into an area where the use of personal protective devices is required, the observer shall use such equipment and comply with all other applicable safety procedures.

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

(a) Receive an explanation of the measurement procedures;

(b) Visually observe all steps related to the measurement of exposure to pentachloronaphthalene that are being performed at the place of exposure.

(c) Record the results obtained.

(n) Employee notification.

(1) The employer shall notify in writing, within five work days, every employee who is found to be exposed to pentachloronaphthalene above the permissible exposure. The employee shall also be notified of the level of his exposure and corrective action being taken to reduce the exposure to at or below the permissible exposure.

(2) Pursuant to paragraph (K) of this Section, when an employee is medically examined the employer shall provide the employee with a copy of the physician's written opinion.

APPENDIX A

SUBSTANCE SAFETY DATA SHEET
PENTACHLORONAPHTHALENE

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for PENTACHLORONAPTHALENE

I. SUBSTANCE IDENTIFICATION

SUBSTANCE: Pentachloronaphthalene

PERMISSIBLE EXPOSURE: 0.5 milligrams of pentachloronaphthalene per cubic meter of air (mg/cu m)

APPEARANCE AND ODOR: Pale yellow solid with an aromatic odor.

II. HEALTH HAZARD DATA

A. Ways in Which the Chemical Affects Your Body: Pentachloronaphthalene can affect your body if you inhale it or if it comes in contact with your skin or eyes or if you swallow it. Every effort should be made to prevent, skin, eye, oral, or inhalation contact with this material.

B. Effects of Overexposure:

1. Overexposure: Overexposure to pentachloronaphthalene causes headache and dizziness. Prolonged overexposure to pentachloronaphthalene may cause an acne-like skin rash. It may also injure your liver resulting in such affects as fatigue, dark urine, yellow jaundice and possibly death.

2. Reporting Signs and Symptoms: You should inform your employer if you develop any signs or symptoms associated with pentachloronaphthalene exposure.

III. EMERGENCY FIRST AID PROCEDURES

A. Eye Exposure: If solid pentachloronaphthalene or liquids containing pentachloronaphthalene get into your eyes, wash the eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation persists after washing, get medical attention. If molten pentachloronaphthalene 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 nonimpervious clothing becomes contaminated with pentachloronaphthalene, remove and clean the clothing before wearing again. If nonimpervious clothing becomes heavily contaminated, it should be destroyed. If solid pentachloronaphthalene or liquids containing pentachloronaphthalene get on your skin, wash the contaminated skin with soap and water promptly. If skin irritation persists after washing, get medical attention. If molten pentachloronaphthalene gets on your skin or nonimpervious clothing, immediately flush the 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 pentachloronaphthalene remove 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 pentachloronaphthalene 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 pentachloronaphthalene. You can only be required to wear them for routine use if your employer is in the process of installing controls or if 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)/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 pentachloronaphthalene 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 pentachloronaphthalene and to prevent repeated or prolonged skin contact with solid pentachloronaphthalene or liquids containing pentachloronaphthalene. You must wear impervious clothing, gloves, face shield or other appropriate protective clothing to prevent repeated or prolonged skin contact to hot pentachloronaphthalene vapors from the heated material.

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 pentachloronaphthalene contacting your eyes. You must wear safety goggles (cup-cover type dust and splash safety goggles) where eye contact with solid pentachloronaphthalene or with liquids containing pentachloronaphthalene may occur.

V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

A. Store pentachloronaphthalene away from strong oxidizers.

B. If your skin becomes contaminated with molten pentachloronaphthalene, you must immediately wash or shower to remove any pentachloronaphthalene from the skin.

C. If your skin becomes contaminated with solid pentachloronaphthalene, you must promptly wash or shower to remove the pentachloronaphthalene from your skin.

D. You must immediately remove any non-impervious clothing that becomes contaminated with molten pentachloronaphthalene and this clothing must not be reworn until the pentachloronaphthalene is removed from the clothing.

E. You must promptly remove any non-impervious clothing that becomes contaminated with solid pentachloronaphthalene or liquids containing pentachloronaphthalene and this clothing must not be reworn until the pentachloronaphthalene is removed from the clothing.

F. If you are subject to skin contact with pentachloronaphthalene, you must wash any areas of your body that may have contacted pentachloronaphthalene at the end of each work day.

G. If your work clothing may have become contaminated with solid pentachloronaphthalene, you must change into uncontaminated clothing before leaving the work premises.

H. You must not eat or smoke in areas where pentachloronaphthalene is handled, processed or stored.

I. If you handle pentachloronaphthalene, you must wash your hands throughly with soap or mild detergent and water before eating, smoking or using toilet facilities.

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

APPENDIX B

SUBSTANCE TECHNICAL GUIDELINES
PENTACHLORONAPHTHALENE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: Halowax 1013
2. Formula: $C_{10}H_3Cl_5$
3. Molecular weight: 300.5

B. Physical Data

1. Boiling point (760 mm Hg): 327 - 371 C (620 - 700 F)
2. Specific gravity water=1): 1.67
3. Vapor density (air=1 at boiling point of pentachloronaphthalene): 10.4

4. Melting point: 120 C (248 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): not applicable
8. Appearance and odor: Pale yellow solid with an aromatic odor

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Not combustible

B. Reactivity

1. Conditions contributing to instability: Heat
2. Incompatibilities: Contact with strong oxidizing agents may cause fire and explosions.
3. Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide and toxic chloride fumes) may be released in a fire involving pentachloronaphthalene.
4. Special precautions: None

III. SPILL, LEAK AND DISPOSAL PROCEDURES

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

1. Ventilate area of spill
2. Collect spilled material in the most convenient and safe manner for reclamation, or for disposal in a sanitary landfill. Liquids containing pentachloronaphthalene should be absorbed in vermiculite, dry sand, earth or similar material.

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

C. Waste disposal methods:
Pentachloronaphthalene may be disposed of in a sanitary landfill.

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 eight-hour exposure may be determined from a single eight-hour sample or two (2) 4-hour samples. Short term interval samples (up to 30 minutes) may also be used to determine average exposure level if a minimum of five (5) measurements are taken in a random manner over the eight-hour work shift. Random sampling means that any portion of the work shift has the same chance of being sampled as any other. The arithmetic average of all such random equal duration samples taken on one (1) work shift is an estimate of an employee's average level of exposure for that work shift. 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, gas and vapor adsorption tubes with subsequent chemical analyses or dosimeters. The method of measurement must determine the concentration of pentachloronaphthalene 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 pentachloronaphthalene to plus or minus 25%. Methods meeting these accuracy requirements are available from NIOSH.

V. MISCELLANEOUS PRECAUTIONS

A. Laundering or other cleaning of clothing contaminated with pentachloronaphthalene must be performed in a manner that will not result in contamination of cleaning equipment and fluids which could subsequently contaminate other clothing, etc. being cleaned by the same process.

B. Employers must advise employees of all plant areas and operations where exposure to pentachloronaphthalene could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to pentachloronaphthalene is likely to occur are: during its production and during the formulation of electrical insulating compounds, lubricants, cutting oil, resins and polymers.

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. ROUTE OF ENTRY

Inhalation; skin absorption.

II. TOXICOLOGY

Pentachloronaphthalene is a severe hepatic toxin, with marked effects upon the skin. While a solid at room temperature, the heated liquid produces a hazardous vapor. Rats exposed to the vapor of a mixture of hexa- and pentachloronaphthalene at average concentrations of 1.16 mg/m3 for 16 hours daily up to 4 1/2 months showed definite liver injury, while 8.8 mg/m3 produced some mortality and severe liver injury. The most striking human response to prolonged skin contact with the solid, or to shorter term inhalation of hot vapors, is chloracne. This is an acne-form skin eruption characterized by papules, large comedones and pustules, chiefly affecting the face, neck, arms and legs. Pruritic erythematous and vasculoerythematous reactions have also been reported. Skin lesions are often accompanied by symptoms of systemic effects including headache, vertigo and anorexia. Liver damage characterized by toxic jaundice, which may progress to fatal hepatic necrosis, results

from the inhalation of higher concentrations of the hot fumes of the molten substance. Skin absorption has been demonstrated in animals and is suspected in man.

III. SIGNS AND SYMPTOMS

Headache, fatigue, vertigo and anorexia; pruritis and acne-form eruption of the skin; jaundice and death from liver necrosis from massive overexposure is possible.

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.

VI. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. GENERAL

Most reported effects of pentachloronaphthalene are caused by its severely toxic action on the liver, and by its action on the skin. It is important that the physician becomes familiar with plant operating conditions in which exposure to pentachloronaphthalene 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 pentachloronaphthalene.

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 should be stressed. The skin should be examined for evidence of acute or chronic disorders, especially acne.

2. Liver function tests -- Pentachloronaphthalene 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

1. American Conference of Governmental Industrial Hygienists: "Pentachloronaphthalene," (3d ed., 2d printing), Documentation of the Threshold Limit Values for Substances in Workroom Air, Cincinnati, 1974, p. 198.

2. Patty, Frank A.: Industrial Hygiene and Toxicology, Vol. II - Toxicology (2d ed. revised), Interscience Publishing Company, New York, 1963, pp. 2251-2252, 1343-1345.

3. Kleinfeld Morris, et al: "Clinical Effects of Chlorinated Naphthalene Exposure," Journal of Occupational Medicine, 14:377-379, 1972.

4. Greenburg, Leonard, et al: "The Systemic Effects Resulting from Exposure to Certain Chlorinated Hydrocarbons," Journal of Industrial Hygiene and Toxicology, 21:29-38, 1939.

5. Hygienic Guide Series: "Chloronaphthalene", American Industrial Hygiene Association Journal, 27:89-92, 1966.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for PENTACHLORONAPTHALENE

REFERENCES AND SOURCES
PENTACHLORONAPHTHALENE
1910.93

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

Eye: Koppers Corp. MSDS

Skin: Documentation of TLV's; Hunter, "Disease of Occupation;" Patty, "Ind. Hyg. and Tox.;" International Labour Office, "Encyclopedia of Occ. Health and Safety;" Koppers Corp. MSDS

Ingestion: Sax, "Dangerous Properties of Ind. Materials;" Hunter, "The Disease of Occupation;" Patty, "Ind. Hyg. and Tox."

COMMENTS

Eye - Classification: 1, 2, and 6
Output statement numbers: 9, 20, and 12 combined
Exceptions: Eye wash fountains not required (Statement 13)

There are no specifics in the literature as to the effects o eye contact with this material. The manufacturer's MSDS only ind that goggles are recommended. The absence of data and the recomm of goggles suggests that eye contact to pentachloronaphthalene sh prevented. The classification of 1 is given because this materia might be used in the molten state in the workplace and eye contac be expected to cause thermal burns. The classifications of 6 and are given for the solid substance and liquids containing it respe

Skin - Classification: 1, 2, 4, and 6
Output statement numbers: 1, 2, 4, 5b, 7a, 14g, 15i, 17g, 17i, a
Exceptions: See below

The Documentation of TLV's has the notation "skin" after the chemical name. Hunter notes that "work-people must be taught not touch the skin with the hands and not use rags for wiping the nos face." Patty simply says some authors have indicated that chlori naphthalenes may be absorbed through the skin. He reports that t most striking response to contact with these materials in chlorac which usually occurs from long-term contact or from a much shorte contact with hot vapors. It is noted that the reaction is slow t and may take months to disappear. Patty suggests (page 2252) tha keep skin contact to a minimum, that workers be required to take every day before leaving the factory, and that clean work clothin protective gloves be provided. ILO agrees that fumes can cause a problem and recommends daily clothing changes. The Koppers Cor agrees that daily showers and clothing changes are necessary.

The vapor pressure of pentachloronaphthalene is less than 1 mm Hg at 20 degrees C. It is insoluble in water, has a melting point of 248 degrees F, and is not combustible.

The classification of 1 is given because the material might in the molten state in the workplace and contact could be expecte cause thermal burns. Classifications of 2 and 6 are concluded to necessary to prevent repeated or prolonged contact which results the cited local effects. For similar reasons, contact with hot v is prevented by the assignment of classification 4. As exception statements 6 and 8a are not felt necessary for the molten materia is 14i. Because of the data given, statement 15 is added.

Ingestion - Classification: 2 and 6
Output statement numbers: 19, 20a

Exceptions: None

Sax considers its acute and chronic systemic effects by inge to be of high toxic hazard. Hunter notes that employees "must wa before meals and take food only in special rooms set aside for th purpose." Patty cites work which indicates that rats fed a mixtu of tetra- and pentachloronaphthalene at the dose of o.5 g/day for exhibited some sickness, some mortality, and definitive liver inj

Classifications of 2 and 6 are concluded to be adequate, not because of the systemic effects of ingestion but also because of possible local effects.

SUBSTANCE TECHNICAL GUIDELINES
PENTACHLORONAPHTHALENE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: Halowax 1013
2. Formula: C10H3Cl5
3. Molecular weight: 300.5

B. Physical Data

1. Boiling point (760 mm Hg): 327 - 371 C (620 - 700 F)
2. Specific gravity (water=1): 1.67
3. Vapor density (air=1 at boiling point of pentachloronaphthalene): 10.4
4. Melting point: 120 C (248 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): Not applicable
8. Appearance and odor: Pale yellow solid with an aromatic odor

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Not combustible

B. Reactivity

1. Conditions contributing to instability: Heat.
2. Incompatibilities: Contact with strong oxidizing agents may cause fire and explosions.
3. Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide and toxic chloride fumes) may be released in a fire involving pentachloronaphthalene.
4. Special precautions: None.

III. SPILL, LEAK AND DISPOSAL PROCEDURES

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

1. Ventilate area of spill
2. Collect spilled material in the most convenient and safe manner for reclamation, or for disposal in a sanitary landfill. Liquids containing pentachloronaphthalene should be absorbed in vermiculite, dry sand, earth or similar material.

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

C. Waste disposal methods: Pentachloronaphthalene may be disposed of in a secured sanitary landfill.

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 eight-hour exposure may be determined from a single eight-hour sample or two (2) 4-hour samples. Short term interval samples (up to 30 minutes) may also be used to determine average exposure level if a minimum of five (5) measurements are taken in a random manner over the eight-hour work shift. Random sampling means that any portion of the work shift has the same chance of being sampled as any other. The arithmetic average of all such random equal duration samples taken on one (1) work shift is an estimate of an employee's average level of exposure for that work shift. 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, gas and vapor adsorption tubes with subsequent chemical analyses or dosimeters. The method of measurement must determine the concentration of pentachloronapthalene 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 pentachloronapthalene to plus or minus 25%. Methods meeting these accuracy requirements are available from NIOSH.

V. MISCELLANEOUS PRECAUTIONS

A. Laundering or other cleaning of clothing contaminated with pentachloronaphthalene must be performed in a manner that will not result in contamination of cleaning equipment and fluids which could subsequently contaminate other clothing, etc. being cleaned by the same process.

B. Employers should advise employees of all plant areas and operations where exposure to pentachloronaphthalene could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to pentachloronaphthalene is likely to occur are: During its production and during the formulation of electrical insulating compounds, lubricants, cutting oil, resins and polymers.

RESPIRATOR TABLE DOCUMENTATION

SUBSTANCE: Pentachloronaphthalene

D. O. L. STANDARD: 0.5 mg/M3

WARNING PROPERTIES:

Odor Threshold: No quantitative information is available concerning the odor threshold of pentachloronaphthalene.

Eye Irritation Level: The AIHA Hygienic Guides state that "eye injury has no to be troublesome with the chloronaphthalenes." For the purposes of thi standard, half facepiece respirators are permitted although the Hygienic Guides specifically state that "if respirators are used, they should be full facepiece type approved by the U. S. Bureau of Mines for disperoids

organic vapors."

Evaluation of Warning Properties: There are no quantitative data relating wa properties to air concentrations of pentachloronaphthalene, and therefor substance is treated as a material with poor warning properties. The co tration of pentachloronaphthalene in saturated air at 20 C could present exposure relative to the permissible exposure. Gas sorbent respiratory equipment is not permitted.

IDLH: The AIHA Hygienic GUides state that for the chloronaphthalenes, the "atm concentration immediately hazardous to life (is) probably unattainable with t possible exception of monochloronaphthalene." For the purposes of this stand therefore, respirators have been selected on the basis of the protection fact afforded by each device.

Other Toxicological Information: The AIHA Hygienic Guides state that "severa deaths due to acute atrophy of the liver, and a number of nonfatal cases liver disease have been reported in workers repeatedly exposed to fumes chlorinated naphthalene. In every case but one, penta- or hexachloronap were involved.

"Animal experiments have confirmed the greater toxicity of the mo highly chlorinated members of the series up to and including hexachloro- napthalene . . ."

Patty reports that daily exposures of rats to the vapors of a mix penta- and hexachloronaphthalene at an average concentration of 1.16 mg/ for periods up to 4! months produced definite liver injury. "At a conce of 8.88 mg/cu meter, there was some mortality, poor growth, and severe l injury."

The Documentation of TLV's state that "chlorinated naphthalenes c pentachloronaphthalenes as major components have been responsible for nu outbreaks of dermatitis (chloracne) and a number of cases of liver damag several of them fatal. Thus, von Oettingen cited nine reports of toxic hepatitis as a result of exposure to chlorinated naphthalenes, and one o specified pentachlorinated napthalenes as the agents responsible for sev two of them fatal." According to the Documentation, "the TLV of 0.5 mg/ believed low enough to minimize the incidence of chloracne and prevent s injury to the liver."

VAPOR PRESSURE AT 20 C: Less than 1 mm Hg

SATURATED CONCENTRATION AT 20 C: Less than 1316 ppm (16,100 mg/M3)

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for PENTACHLORONAPHTHALENE

USE/EXPOSURE AND CONTROL DOCUMENT
PENTACHLORONAPHTHALENE

	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 pentachloronaphthalene 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	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 pentachloronaphthalene (Electricians stripping wires, handling wires or condensers, soldering wires or condensers)	A,B	Local exhaust ventilation general dilution ventilation; personal protective equipment (gloves, clean coveralls, respiratory protective devices, gogg 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	Process enclosure, local exhaust ventilation; gene ral dilution ventilation with intake and exhaust f personal protective equip ment (rubber gloves, gogg respirator for dust, clea coveralls)
4.	Inhalation of vapor and dust and skin contact with vapor	A,B	Process enclosure, local exhaust ventilation; gene

	solid and dust during the manufacture of pentachloronaphthalene (catalylic chlorination of naphthalene) and preparation of material for industrial use (cutting, grinding, pulverizing and packing)		ral dilution ventilation; personal protective equip ment (rubber gloves, cle coveralls, rubber oversho 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	Local exhaust ventilation general dilution ventilation; personal protective equipment (goggles, respi tory 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	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	Local exhaust ventilation general dilution ventilation; personal protective equipment (goggles, clean coveralls, rubber oversho rubber gloves, respirator protective devices)
8.	Inhalation of vapor, solid or dust and skin contact with vapor, solid or dust during manufacture of polymers using pentachloronaphthalene 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	Process enclosure; local exhaust ventilation; gene dilution ventilation; per sonal protective equipmen (rubber gloves, goggles, respiratory protective devices, clean coveralls, rubber overshoes)

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

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

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

1,262 CARDS READ

0 SYSOUT PRINT RECORDS

0 SYSOUT PUNCH RECORDS

0.00 MINUTES EXECUTION TIME

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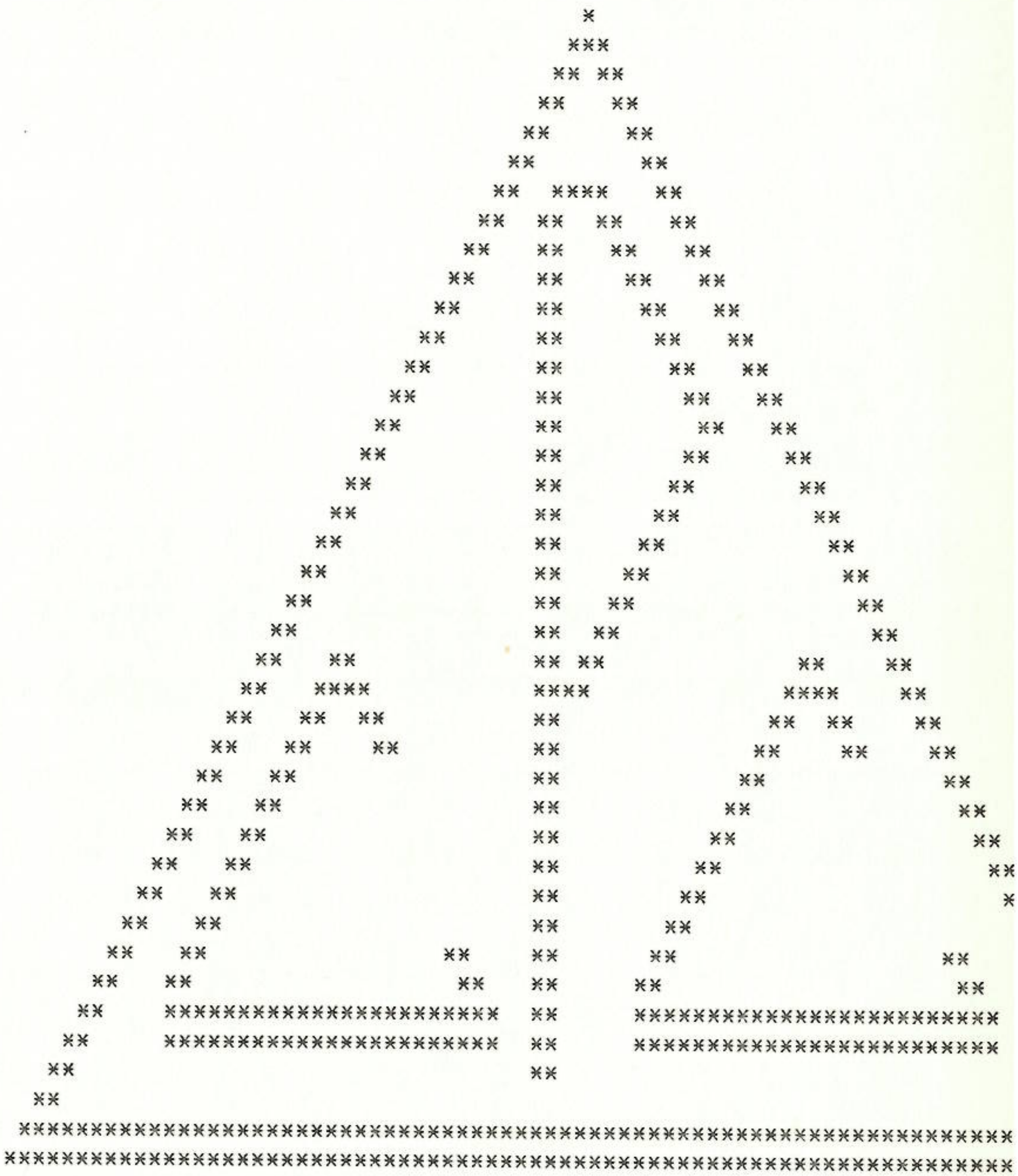

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