NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND

SUPPORTING DOCUMENTATION FOR

*** CLORINATED DIPHENYL OXIDE ***

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for CLORINATED DIPHENYL OXIDE

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 CLORINATED DIPHENYL OXIDE.

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 CLORINATED DIPHENYL OXIDE

(a) Definitions.

(1) "Permissible exposure" means inhalation of chlorinated diphenyl oxide in concentrations not in excess of 0.5 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 chlorinated diphenyl oxide.

(b) Exposure determination and measurement.

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

(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 chlorinated diphenyl oxide;

(ii) Any measurements of chlorinated diphenyl oxide taken;

(iii) Any employee complaints of symptoms which may be attributable to exposure to chlorinated diphenyl oxide; 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 chlorinated diphenyl oxide 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 chlorinated diphenyl oxide 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 chlorinated diphenyl oxide 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 chlorinated diphenyl oxide 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 chlorinated diphenyl oxide above the permissible exposure. The employee shall also be notified of the corrective action being taken to reduce the exposure to at or below the permissible exposure.

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

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

(c) Methods of measurement.

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

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

Table 1

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

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

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

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

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

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

(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 chlorinated diphenyl oxide 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 CHLORINATED DIPHENYL OXIDE

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

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

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

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

(2) For the purpose of compliance with $ 1910.309, locations classified as hazardous locations due to the presence of chlorinated diphenyl oxide shall be Class II, Group G.

(3) For the purpose of compliance with $1910.178, locations classified as hazardous locations due to the presence of chlorinated diphenyl ocide shall be Class II, Group G.

(4) Chlorinated diphenyl oxide 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 repeated or prolonged skin contact with chlorinated diphenyl oxide. Face shields shall comply with $ 1910.133(a)(2), (a)(4), (a)(5), and (a)(6).

(2) Employers shall ensure that employees whose clothing may have become contaminated with chlorinated diphenyl oxide change into uncontaminated clothing before leaving the work premises.

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

(4) Employers shall ensure that non-impervious clothing which becomes contaminated with chlorinated diphenyl oxide be removed promptly and not reworn until the chlorinated diphenyl oxide is removed from the clothing.

(5) 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)-(6) where chlorinated diphenyl oxide may contact the eyes.

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

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

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

(3) Employers shall ensure that employees do not eat or smoke in areas where chlorinated diphenyl oxide is handled, processed or stored.

(4) Employers shall ensure that employees who handle chlorinated diphenyl oxide 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 chlorinated diphenyl oxide 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 chlorinated diphenyl oxide above the action level or employees who may have skin or eye contact with chlorinated diphenyl oxide, or employees who work where an accidental spill of chlorinated diphenyl oxide may occur, shall annually:

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

(ii) Advise affected employees as to the signs and symptoms of exposure to chlorinated diphenyl oxide.

(iii) Instruct affected employees to advise the employer of the development of signs and symptoms of exposure to chlorinated diphenyl oxide 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 chlorinated diphenyl oxide.

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

(2) The employer shall make available to each employee who is to be exposed to liquid chlorinated diphenyl oxide or airborne concentrations of chlorinated diphenyl oxide 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:

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

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

(4) The employer shall make available to each employee, exposed to chlorinated diphenyl oxide 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 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 chlorinated diphenyl oxide;

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

(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 chlorinated diphenyl oxide or would directly or indirectly aggravate any detected medical condition;

(B) Any recommended limitatons upon the employee's exposure to chlorinated diphenyl oxide, 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 chlorinated diphenyl oxide.

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

(8) No employee shall be exposed to liquid chlorinated diphenyl oxide or airborne concentrations of chlorinated diphenyl oxide 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 chlorinated diphenyl oxide.

(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 chlorinated diphenyl oxide.

(ii) This record shall include:

(A) The date of measurement;

(B) Operations involving exposure to chlorinated diphenyl oxide which are being monitored;

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

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

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

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

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

(ii) This record shall include:

(A) Date of measurement;

(B) Type of measurement taken;

(C) Result of measurement.

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

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

(ii) This record shall include:

(A) Date of training;

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

(C) Content or scope of training provided.

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

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

(ii) 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 chlorinated diphenyl oxide;

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

(D) Physician's written opinion; and
(E) A signed statement of any refusal to be examined.
(iii) This record shall be maintained for the duration of the employment of the affected employee.
(6) Access to records. (i) All records required to be maintained by this section shall be made available upon request to authorized representatives of the Assistant Secretary of Labor for Occupational Safety and Health and the Director of the National Institute for Occupational Safety and Health.
(ii) Employee exposure determination and exposure measurement records required to be maintained by this section shall be made available to employees and former employees and their designated representatives.
(iii) Employee medical records required to be maintained by this section shall be made available upon written request to a physician designated by the employee or former employee.
(l) Employee observation of measurement. (1) The employer shall give affected employees or their representatives an opportunity to observe any measurement of employee exposure to chlorinated diphenyl oxide which is conducted pursuant to this section.
(2) When observation of measurement of employee exposure to chlorinated diphenyl oxide 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 chlorinated diphenyl oxide that are being performed at the place of exposure; and
(iii) Record the results obtained.

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

APPENDIX A

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for CLORINATED DIPHENYL OXIDE

SUBSTANCE SAFETY DATA SHEET
FOR CHLORINATED DIPHENYL OXIDE

I. SUBSTANCE IDENTIFICATION

A. Substance: Chlorinated diphenyl oxide

B. Permissible Exposure: 0.5 milligrams of chlorinated diphenyl oxide per cubic meter of air (mg/cu m) averaged over an eight-hour work shift.

C. Appearance: Waxy solid or liquid

II. HEALTH HAZARD DATA

A. Ways in Which the Chemical Affects Your Body: Chlorinated diphenyl oxide can affect your body if you inhale it or if it comes in contact with your eyes or skin. It may also affect your body 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. Exposure to chlorinated diphenyl oxide may cause an acne-like skin eruption or irritation. 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 chlorinated diphenyl oxide. Every effort should be made to prevent skin or eye contact.

III. EMERGENCY FIRST AID PROCEDURES

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

B. Skin Exposure: If chlorinated diphenyl oxide gets on your skin, wash the contaminated skin with soap or mild detergent and water promptly. If liquid chlorinated diphenyl oxide or liquids containing chlorinated diphenyl oxide soaks through your clothing, remove the clothing immediately and wash the skin with soap or mild detergent and water. If irritation persists after washing, get medical attention.

C. Breathing: If you or any other person breathes in large amounts of chlorinated diphenyl oxide, 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 chlorinated diphenyl oxide has been swallowed get medical attention immediately. If medical attention is not immediately available get the 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 chlorinated diphenyl oxide. You can only be required to wear them for routine use if your employer is in the process of installing controls or control measures prove inadequate. You may be required to wear respirators for non-routine activities or in emergencies. If respirators are worn, they must have a Mining Enforcement and Safety Administration (MESA) or National Institute for Occupational Safety and Health (NIOSH) approval label. (Older respirators may have a Bureau of Mines approval label.) For effective protection, respirators must fit your face and head snugly. Respirators should not be loosened or removed in work situations where there use is required. If you can smell chlorinated diphenyl oxide 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 repeated or prolonged skin contact with liquid or solid chlorinated diphenyl oxide. Replace or repair impervious protective clothing that has developed leaks.

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

V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

A. Chlorinated diphenyl oxide is a combustible solid.

B. Chlorinated diphenyl oxide 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 where chlorinated diphenyl oxide is handled used or stored in a manner that could create a potential fire hazard.

D. If your work clothing may have become contaminated with chlorinated diphenyl oxide, you must change into uncontaminated clothing before leaving the work premises.

E. You must promptly remove any non-impervious clothing that becomes contaminated with chlorinated diphenyl oxide and this clothing must not be reworn until the chlorinated diphenyl oxide is removed from the clothing.

F. If you are subject to skin contact with chlorinated diphenyl oxide, you must wash any areas of your body that may have contacted chlorinated diphenyl oxide with soap or mild detergent and water at the end of each work day.

G. If your skin becomes contaminated with chlorinated diphenyl oxide, you must promptly wash or shower using soap or mild detergent and water to remove the chlorinated diphenyl oxide from your skin.

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

I. If you handle chlorinated diphenyl oxide, you must wash your hands thoroughly with soap or mild detergent and water before eating, smoking or using toilet facilities.

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

K. Ask your supervisor where chlorinated diphenyl oxide 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 chlorinated diphenyl oxide. In addition, your employer must instruct you in the safe use of chlorinated diphenyl oxide, emergency procedures, and the correct use of protective equipment.

B. Your employer is required to determine whether you are being exposed to chlorinated diphenyl oxide. 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.

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SUBSTANCE TECHNICAL GUIDELINES
FOR CHLORINATED DIPHENYL OXIDE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: Hexachlorodiphenyl oxide
2. Formula: C12H4Cl60
3. Molecular weight: 377

B. Physical Data

1. Boiling point (760 mm Hg): 230-260 C (446-500 F)
2. Specific gravity (Water = 1): 1.60
3. Vapor density (air = 1 at boiling point of chlorinated diphenyl oxide): 13
4. Melting point: data not available
5. Vapor pressure at 20 C (68 F): less than 0.00006 mm Hg
6. Solubility in water, % by weight at 20 C (68 F): 0.1
7. Evaporation rate (butyl acetate = 1): not available
8. Appearance: Waxy solid or liquid

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Flash point: None
2. Autoignition temperature: 627 C (1163 F)
3. Flammable limits in air, % by volume: not available
4. Extinguishing media: 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.
6. Unusual fire and explosion hazards: As a fire and explosion hazard, chlorinated diphenyl oxide is considered a combustible solid. All ignition sources must be controlled where chlorinated diphenyl oxide is used, handled, or stored so as to create a potential fire or explosion hazard.
7. For purposes of complying with 29 CFR 1910.309, classification of hazardous locations as described in Article 500 of the National Electrical Code should be Class II Group G.

B. Reactivity

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

III. SPILL, LEAK, AND DISPOSAL PROCEDURES

A. If chlorinated diphenyl oxide is spilled or leaked, the following steps should be taken:

1. Remove all ignition sources.
2. Ventilate area of spill or leak.

3. If in solid form, small quantities may be swept onto paper or other suitable material, placed in an appropriate container and burned in a safe place (such as a fume hood). Larger 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.
4. If in the liquid form, small quantities may be absorbed on paper towels, removed to a safe location, (such as a fume hood), and burned. Large quantites can be collected and atomized in a combustion chamber equipped with an appropriate effluent gas cleaning device.

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

C. Waste disposal methods:
Chlorinated diphenyl oxide may be disposed of:
1. If in the solid form, by making packages of chlorinated diphenyl oxide in paper or other flammable material and burning in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device, or by dissolving in a flammable solvent (such as alcohol and atomizing in a suitable combustion chamber equipped with an appropriate gas cleaning device.
2. If in the liquid form, by absorbing in vermiculite, dry sand, earth, or similar material and disposing in a secured sanitary landfill or by atomizing in a suitable combustion chamber equipped with an appropriate effuent 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 instruments, dosimeters, or gas and vapor adsorption tubes with subsequent chemical analyses. The method of measurement must determine the concentration of chlorinated diphenyl oxide 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 chlorinated diphenyl oxide 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 chlorinated diphenyl oxide in tightly closed containers in a cool, well ventilated area.

B. Employers should advise employees of all areas and operations where exposure to chlorinated diphenyl oxide could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to chlorinated diphenyl oxide is likely to occur are: once considered as electrical transformer fluids; as constituents of high-pressure greases, insectides, herbicides, and wood perservatives.

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. ROUTE OF ENTRY

Inhalation.

II. TOXICOLOGY

Chlorinated diphenyl oxide vapor causes an acne-form dermatitis (chloracne). In laboratory animals, cumulative liver damage has resulted from repeated bodily intake and in general the toxicity increases with the degree of chlorination; in guinea pigs a single oral dose of .05 to 0.1 g/kg of material containing 4 or more equivalents of chlorine resulted in death 30 days after administration. Limited experience with humans has shown that exposure to even small amounts of the higher chlorinated derivatives may result in appreciable acne-form dermatitis.

III. SIGNS AND SYMPTOMS

Acne-form dermatitis; may cause liver damage.

IV. SPECIAL TESTS

None in common usage.

V. TREATMENT

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

VI. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. GENERAL

The anticipated effects of chlorinated diphenyl oxide are caused by its capacity to produce an acne-form dermatitis and to affect the liver. It is important that the physician becomes familiar with plant operating conditions in which exposure to chlorinated diphenyl oxide 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 hexachloronaphthalene.

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

2. Liver function tests -- Chlorinated diphenyl oxide 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: "Chlorinated Diphenyl Oxide," Documentation of the Threshold Limit Values for Substances in Workroom Air (3d ed., 2d printing), Cincinnati, 1974, pp. 45-46.

2. Patty, Frank A.: Industrial Hygiene and Toxicology, Vol. II - Toxicology (2d ed. revised), Interscience Publishing Company, New York, 1963, pp. 1706-1709.

REFERENCES AND SOURCES
CHLORINATED DIPHENYL OXIDE
1910.93

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

Eye: Patty, "Industrial Hygiene and Toxicology"

Skin : Patty, "Industrial Hygiene and Toxicology;" Sax, "Dangerous Properties of Industrial Materials;" International Labour Office, "Occupational Health and Safety"

Ingestion: Patty, "Industrial Hygiene and Toxicology;" Sax, "Dangerous Properties of Industrial Materials"

COMMENTS

Eye - Classification: 2 and 6
Output statement numbers: 10, 12
Exceptions: 10 and 12 combined into one general statement
According to Patty, the chlorinated phenyl ethers "vary from water-clear oily liquids of varying viscosities to white to yellow waxy semisolids as the equivalents of chlorine they contain increase from 1 to 6." There is no specific information in the literature as to the effects of eye contact with these materials. It is assumed, based on their properties, that there is some effect but not a severe one.

Skin - Classification: 2 and 6
Output statement numbers: 2, 5b, 7a, 15, 17i, 17g, 20a
Exceptions: 5b and 15 used for both liquids and solids
Patty states that a "common manifestation of excessive exposure to these materials is the skin condition which develops at the site of exposure, resembles common acne in appearance and may be accompanied by intensive itching; this condition generally is caused by prolonged or repeated skin contact." Patty notes that there is some evidence of skin absorption, although the thoroughness of the work is questioned. Severe exposures to rabbit skin were found to produce necrosis and sloughing, while lesser, more chronic exposures produced a hyperplastic reaction in the epithelium, according to Patty. ILO notes that exposure to "very small amounts" of the hexa-compound has resulted in chloracne. Also noted is that "the toxic effect of these substances increases with the degree of chlorination and it is also cumulative." A classification of 2 is concluded to be adequate to prevent harmful exposures. The only exceptions are that statements 5b and 15 are applied not only to solids but also to liquids since the vapor pressures of the various compounds are extremely low. Sax rates the local hazard of acute exposure as moderate and chronic exposure as high; the systemic effect of chronic exposure through skin absorption is assessed as moderate.

Ingestion - Classification: 5
Output statement numbers: 19, 20a
Exceptions: None
Work reported in Patty showed a 30 day survival single -

oral dose of 0.1 to 0.005 g/kg for guinea pigs, as the degree of chlorination increased; the corresponding LD values ranged from 0.6 to 0.05 g/kg. The work showed that effects are delayed and increase in severity with increasing chlorination. Also according to Patty, experimental animals show liver injury following chronic ingestion. Sax attributes a high systemic hazard to acute ingestion of this compound. The chronic toxicity of the substance neccessitates prohibitive measures to eliminate accidental ingestion in the workplace.

SUBSTANCE TECHNICAL GUIDELINES

The references cited for this document include:

Patty, F. A., editor, "Industrial Hygiene and Toxicology," Interscience, New York, 1963, Second Edition, Vol. II, p. 1706 (Patty)

Sources of data items used:

I. A. 1. Synonyms: Patty
2. Formula: Patty
3. Molecular weight: Patty
B. 1. Boiling point: Patty
2. Specific gravity: Patty
3. Vapor density: calculated
4. Melting point: data not available
5. Vapor pressure: Patty
6. Solubility in water: Patty
7. Evaporation rate: not applicable
8. Appearance and odor: Patty

II. A. 1. Flash point: Patty
2. Autoignition temperature: Patty
3. Flammable limits: not applicable
4. Extinguishing media: ADL
5. Special fire fighting procedures: ADL
6. Unusual fire and explosion hazards:
B. 1. Conditions contributing to instability:
2. Incompatibilities: ADL
3. Hazardous decomposition products: ADL
4. Special precautions:

III. A. Steps if released or spilled: ADL
C. Waste disposal method: ADL

V. Miscellaneous prcautions: ADL

USE/EXPOSURE AND CONTROL DOCUMENT

References used in the preparation of this document includes:

"Chemical Abstracts," 66 - 75 (1967 - 71); 78 - 79 (1973); 80 (1974) (CA)
Dow Chemical Corp., "Diphenyl Oxide" (Dow)
International Labour Organization, "Encyclopedia of Occupational Health and Safety," Geneva, 1972 (ILO)
Kirk, R. and Othmer, D., "Encyclopedia of Chemical Technology," Interscience, 2nd edition, 1972 (K-O)
Patty, F. A., "Industrial Hygiene and Toxicology," Interscience, 1962 (Patty)

References for Specific Use/Exposure

1. CA, Dow, K-O, Patty
2. CA, Dow

3. ADL estimate
4. CA, Dow, K-O
5. CA, ILO

References for Specific Control Methods
ILO and Patty were the references used for numbers 1 - 5.

RESPIRATOR TABLE DOCUMENTATION

PERMISSIBLE EXPOSURE: 0.5 mg/M3.

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

EYE IRRITATION: There is no available information which indicates that chlorinated diphenyl oxides produce eye irritation.

LFL: There is no information available on the flammability of the

IDLH: 5 mg/M3.

****IDLH BASIS: No quantitative information is available concerning the toxic effects produced by the inhalation of the chlorinated diphenyl oxides. For the purposes of this standard, therefore, an IDLH concentration is assumed on the basis of comparison to the chloronaphthalenes, for which IDLH concentrations have been assumed to be 10 times the permissible exposures.

SUMMARY OF TOXICOLOGY:

According to Patty, the toxicity of the chlorinated diphenyl oxides increases with increasing chlorine substitution. The repeated inhalation of the more highly chlorinated substances may cause cumulative liver injury. Another toxic effect which may be produced by skin contact to the higher chlorinated derivatives is "acneform" dermatitis. No quantitative data are available concerning systemic toxicity caused by inhalation of these compounds.

Saturated air at 20] C contains less than 9.2 ppm = 141.6 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.

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for CLORINATED DIPHENYL OXIDE

USE/EXPOSURE AND CONTROL DOCUMENT
CHLORINATED DIPHENYL OXIDE

	Use/Exposure	Principal Route of Entry	Currently Used Control Methods
1.	Inhalation of vapor and skin contact with liquid or solid during use in organic synthesis. (Dichloro- derivatives as well as highly chlorinated diphenyl ethers are used to produce flame inhibiting polymers, compounds useful as corrosion inhibitors, drycleaning detergents, thermally stable lubricants, additives for soaps and lotions.)	A,B	Local exhaust ventilation; personal protective equipment (goggles, gloves, respiratory protective devices)
2.	Inhalation of vapor and skin contact with liquid or solid during use in manufacture of hydraulic fluids (produces fire resistance)	A,B	Local exhaust ventilation; general dilution ventilation; personal protective equipment (gloves, goggles)
3.	Inhalation of vapor and skin contact with liquid or solid during preparation and distribution of chlorinated diphenyl oxides	A,B	Local exhaust ventilation; personal protective equipment (goggles, gloves, respiratory protective devices)
4.	Inhalation of vapor and skin contact with liquid or solid during use in manufacture of insecticides, herbicides and wood preservatives	A,B	Local exhaust ventilation; general dilution ventilation; personal protective equipment (gloves, goggles)
5.	Inhalation of vapor and skin contact with solid during use in manufacture of electric insulators.	A,B	Local exhaust ventilation; general dilution ventilation; personal protective equipment (gloves, goggles)

A -- Inhalation
B -- Skin contact resulting in localized irritation
C -- Ingestion
D -- Skin contact resulting in absorption and subsequent

systemic poisoning

Note - A review of the literature and contact with potential manufacturers indicate that chlorinated diphenyl oxide is of little or no industrial significance.