

NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND
SUPPORTING DOCUMENTATION FOR

*** ALDRIN ***

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for ALDRIN

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 ALDRIN.

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

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

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(a) Definitions. (1) "Permissible exposure" means exposure of employees to airborne concentrations of aldrin not in excess of 0.25 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 aldrin averaged over an eight-hour work shift.

(b) Initial determination and exposure measurement. (1) Each employer who has a place of employment in which aldrin is released into the workplace air shall determine if there is any possibility that any employee may be exposed to airborne concentrations of aldrin above the permissible level. The initial determination shall be made each time there is a change in production, process, or control measures which may result in an increase in airborne concentrations of aldrin.

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

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

(ii) Any measurements of aldrin taken;

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

(iv) Date of initial determination, work being performed at the time, location within work site, and employees considered.

(3) If the employer determines that any employee may be exposed to aldrin above the permissible exposure, 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 aldrin above the action level, the employer shall:

(i) Identify all employees who may be exposed above the permissible level; and

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

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

(6) If an employee exposure measurement reveals that an employee is exposed to aldrin 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 aldrin above the permissible exposure. The employee shall also be notified of the results of the exposure measurements and of the corrective action being taken to reduce the exposure to below the permissible exposure.

(7) If two consecutive employee exposure measurements taken at least one week apart reveal that the employee is exposed to aldrin 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.

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(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 percent, of not less than that given in Table 1.

Table 1

Concentration	Required Accuracy
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Above permissible exposure	$\pm 25\%$
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At or below permissible exposure	
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and above the action level	$\pm 35\%$
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At or below the action level	$\pm 50\%$
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(d) Compliance. (1) No employee shall be exposed to aldrin above the permissible exposure as defined in paragraph (a)(1) of this section.

(2) Employee exposures to airborne concentrations of aldrin 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 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 local exhaust is used to control exposure, measurements which demonstrate system effectiveness, for example, air velocity or static pressure, 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 aldrin.

(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 not feasible; or

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

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

(v) In emergencies.

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(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 ALDRIN

CONDITION	PERMISSIBLE RESPIRATORY PROTECTION*
Particulate Concentration	
2.5 mg/M3 or less	Any chemical cartridge respirator with an organic vapor cartridge and dust and mist filter(s).** Any supplied-air respirator. Any self-contained breathing apparatus.
12.5 mg/M3 or less	Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) and dust and mist filter(s).** A gas mask with a chin-style or front- or back-mounted organic vapor canister and dust and mist filter.** Any supplied-air respirator with a full facepiece, helmet or hood. Any self-contained breathing apparatus with a full facepiece.
100 mg/M3 or less	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode. A powered chemical cartridge respirator with an organic vapor cartridge and a high efficiency filter.**
Greater than 100 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.

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Escape Any gas mask providing protection against organic vapors and particulates.**

Any escape self-contained breathing apparatus.

*Use of supplied-air suits may be necessary to prevent skin contact and respiratory exposure from airborne concentrations of aldrin. Supplied-air suits should be selected, used, and maintained under the immediate supervision of persons knowledgeable in the limitation and potential life endangering characteristics of supplied-air suits. Where supplied-air suits are used above a concentration which may be immediately dangerous to life and health (100 mg/M3), an auxiliary positive-pressure self-contained breathing apparatus must also be worn.

**Including pesticide respirators which meet the requirements of this class.

(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. The employer shall familiarize himself with the information contained in the Substance Technical Guidelines (Appendix B of this section) for aldrin.

(f) Personal protective equipment. (1) Employers shall provide and ensure that employees use appropriate protective clothing and equipment necessary to prevent any possibility of skin contact with aldrin or liquids containing aldrin. Face shields shall comply with § 1910.133 (a)(2), (a)(4), (a)(5), and (a)(6).

(2) Employers shall ensure that employees whose clothing has had any possibility of being contaminated with aldrin or liquids containing aldrin change into uncontaminated clothing before leaving the work premises.

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

(4) Where there is any possibility of exposure of an employee's body to aldrin or liquids containing aldrin, employers shall provide facilities for quick drenching of the body within the immediate work area for emergency use.

(5) Employers shall ensure that non-impervious clothing which becomes contaminated with aldrin be removed immediately and not re-worn until the aldrin is removed from the clothing.

(6) Employers shall provide and ensure that employees use safety goggles which comply with § 1910.133(a)(2)-(a)(6) where aldrin or liquids containing aldrin may contact the eyes.

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

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(h) Sanitation. (1) Employers shall ensure that employees whose skin becomes contaminated with aldrin immediately wash or shower with soap or mild detergent and water to remove any aldrin from the skin.

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

(3) Employers shall ensure that employees do not eat or smoke in areas where aldrin or liquids containing aldrin are handled, processed or stored.

(4) Employers shall ensure that employees who handle aldrin or liquids containing aldrin 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 aldrin 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 aldrin above the action level without regard to the use of respirators, or employees who may have any possibility of skin contact or who may have eye contact with aldrin or liquids containing aldrin, or employees who work where a spill of aldrin may occur, shall annually:

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

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

(iii) Instruct affected employees to advise the employer of the development of signs and symptoms of overexposure to aldrin 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 aldrin.

(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) Preplacement medical examination. The employer shall make available to each employee who is exposed, or will be exposed, to airborne concentrations of aldrin above the action level, without regard to the use of respirators, or employees who may have any possibility of skin contact or who may have eye contact with aldrin or liquids containing aldrin, a preplacement medical examination which must include the following:

(i) A medical history and physical examination with emphasis on the nervous system, liver, kidneys and skin;

(ii) Urinalysis to include specific gravity, albumin, glucose and a microscopic on centrifuged sediment.

(3) Periodic medical examination. The employer shall make available to each employee exposed to airborne concentrations of aldrin above the action level, without regard to the use of respirators, or employees who may have any possibility of skin contact or who may have eye contact with aldrin or liquids containing aldrin, twelve months from the date of the employee's first exposure, and every twelve months thereafter, a periodic medical examination which must include the following:

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(i) A medical history and physical examination with emphasis on the nervous system, liver, kidneys and skin;

(ii) Urinalysis to include specific gravity, albumin, glucose and a microscopic on centrifuged sediment.

(4) Alternative medical procedures. If the examining physician chooses to use alternative medical procedures to those specified in paragraphs (j)(2) and (j)(3) of this section, the employer may accept such alternative medical procedures as meeting the requirements of this section provided that the employer:

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

(ii) Informs each exposed worker of the fact that alternative medical procedures to those required in paragraphs (j)(2) and (j)(3) of this section are to be made available.

(5) Interim medical examination. The employer shall provide an interim medical examination for the employee if the employee informs the employer of any of the signs or symptoms of exposure to aldrin which are listed in Appendix A which the employee suspects are caused by exposure to aldrin.

(6) Informing the physician. The employer shall provide to the physician performing any medical examination required by this section the following information:

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

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

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

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

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

(vi) Upon request of the physician, any available information from previous medical examinations of the affected employee.

(7) Where a medical examination is required by paragraphs (j)(2), (j)(3), or (j)(5) of this section, following such examination the employer shall obtain from the examining physician a written opinion which conforms with paragraph (j)(8) of this section.

(8) Physician's written opinion. (i) The physician's written opinion by the examining physician shall specifically state:

(A) Whether the employee has any detected medical condition which would place the employee at increased risk of material impairment of the employee's health from exposure to aldrin;

(B) Any recommended limitations upon the employee's exposure to aldrin, 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 the employee's employment.

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

(9) Results of tests. Where a preplacement or periodic medical examination is required by paragraphs (j)(2) or (j)(3) of this section,

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following such examination the employer shall obtain from the examining physician for inclusion in the employee's medical record:

- (i) A recording of the results of the urinalysis;
- (ii) Where alternative medical procedures have been performed in accordance with paragraph (j)(4) of this section, a recording of such alternative procedures.

(10) No employee shall be exposed to aldrin in such a way as would put the employee at increased risk of material impairment of his health from such exposure. The employer shall base this decision on any information available including the physician's written opinion.

(11) No medical procedure which would be performed pursuant to paragraphs (j)(2) or (j)(3) of this section need be performed if records of a previous such procedure performed within the past six months are acceptable to the examining physician.

(12) 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 risk involved by refusal to be examined.

(13) The employer shall provide emergency medical treatment for any employee injured through exposure to aldrin.

(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) This 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 aldrin.

(ii) This record shall include:

- (A) The date of measurement;
- (B) Operations involving exposure to aldrin which are being monitored;
- (C) Sampling and analytical method used and evidence of their accuracy;
- (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;

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(C) Content or scope of training provided.

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

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

(ii) This record shall include:

(A) The name and social security number of the employee;

(B) Results of tests required by paragraph (j)(2) and (j)(3) of this section and results of any tests conducted pursuant to paragraphs (j)(4) of this section;

(C) Any employee medical complaints relative to exposure to aldrin;

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

(E) Physician's written opinion; and

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

(iii) This record shall be maintained for the duration of and for thirty years after termination 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) Each employee or former employee shall have access to the exposure determination and exposure measurement records required to be maintained by this section which indicate his own exposure to aldrin.

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

(1) Employee observation of measurement. (1) The employer shall give each employee or his representative an opportunity to observe any measurement of his exposure to aldrin which is conducted pursuant to this section.

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

(iii) Record the results obtained.

—NOTE: The information contained in the following appendix for aldrin is neither intended, by itself, to create any additional obligations not otherwise imposed, nor detract from any existing obligation. To the extent the information supplements this regulation for aldrin, it is advisory in nature.

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APPENDIX A

SUBSTANCE SAFETY DATA SHEET
FOR ALDRIN

I. SUBSTANCE IDENTIFICATION

- A. Substance: Aldrin
- B. Permissible Exposure: 0.25 milligram of aldrin per cubic meter of air (mg/M3) averaged over an eight-hour work shift.
- C. Appearance and Odor: Tan to dark brown solid with a mild chemical odor

II. HEALTH HAZARD DATA

- A. Ways in which the chemical affects your body: Aldrin can affect your body if you inhale it or if it comes in contact with your eyes or skin or if you swallow it. It may enter your body through your skin.
- B. Effects of Overexposure:
 - 1. Exposure to aldrin may cause headache, dizziness, nausea, vomiting, trembling, convulsions and death. Liver and kidney damage with bloody urine may occur. Skin contact with aldrin may cause skin irritation. This chemical has caused liver cancer in mice. Aldrin when given to pregnant hamsters has caused defects in their offsprings.
 - 2. Reporting Symptoms: You should inform your employer if you develop any signs or symptoms and suspect that they are caused by exposure to aldrin.

III. EMERGENCY FIRST AID PROCEDURES

- A. Eye Exposure: If aldrin or liquids containing aldrin get into your eyes, wash your eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention immediately. Contact lenses should not be worn when working with this chemical.
- B. Skin Exposure: If aldrin or liquids containing aldrin get on your skin, immediately wash the contaminated skin using soap or mild detergent and water. If aldrin or liquids containing aldrin penetrate through your clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Get medical attention immediately.
- C. Breathing: If you or any other person breathes in large amounts of aldrin 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 aldrin or liquids containing aldrin have been swallowed and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him

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- touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.
- 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 emergency rescue equipment before the need arises.

IV. RESPIRATORS AND PROTECTIVE CLOTHING

- A. Respirators: Respirators are not the best way to control exposure to aldrin. 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 their use is required. If you can smell aldrin 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 Suits: In some work situations the wearing of supplied-air suits or other impervious coverings such as acid suits may be necessary. Your employer should instruct you in their proper use and operation.
- C. Protective Clothing: You must wear appropriate protective clothing and equipment to prevent any possibility of skin contact with aldrin or liquids containing aldrin. Replace or repair impervious clothing that has developed leaks.
- D. Eye Protection: You must wear splash-proof safety goggles where liquids containing aldrin may contact your eyes. You must wear dust-resistant safety goggles where aldrin may contact your eyes.

V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

- A. Aldrin must be stored in tightly closed containers in a well ventilated area.
- B. If your work clothing has had any possibility of being contaminated with aldrin or liquids containing aldrin, you must change into uncontaminated clothing before leaving the work premises.
- C. You must immediately remove any non-impervious clothing that becomes contaminated with aldrin and this clothing must not be reworn until the aldrin is removed from the clothing.
- D. If your skin becomes contaminated with aldrin, you must immediately wash or shower with soap or mild detergent and water to remove the aldrin from your skin.
- E. If you are subject to skin contact with aldrin or liquids containing aldrin, at the end of each work day you must wash

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with soap or mild detergent and water any areas of your body that may have contacted aldrin.

- F. You must not eat or smoke in areas where aldrin or liquids containing aldrin are handled, processed or stored.
- G. If you handle aldrin or liquids containing aldrin, you must wash your hands thoroughly with soap or mild detergent and water before eating, smoking or using toilet facilities.
- H. Quick drenching facilities, where provided, must be readily available and you should know where they are and how to operate them.
- I. Ask your supervisor where aldrin is used in your work area and for any additional 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 aldrin. In addition, your employer must instruct you in the safe use of aldrin, emergency procedures, and the correct use of protective equipment.
- B. Your employer is required to determine whether you are being exposed to aldrin. 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 the actions which are being taken to reduce your exposure.
- C. Your employer is required to keep records of your exposure and medical examinations. Your employer is required to keep exposure data for at least one year and to keep medical data during your employment, and for a period of thirty years following your termination of employment. Your employer is required to make the exposure data available to you upon your request. Your employer is also required to release your medical records to your physician upon your written request.
- D. Your employer must give you a copy of the physicians written opinion for any physical examination required by this standard.

NOTE: The information contained in the following appendix for aldrin is neither intended, by itself, to create any additional obligations not otherwise imposed, nor detract from any existing obligation. To the extent the information supplements this regulation for aldrin, it is advisory in nature.

APPENDIX B

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SUBSTANCE TECHNICAL GUIDELINES
FOR ALDRIN

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a - hexahydro-endo,exo-1,4:5,8-dimethanonaphthalene; hexachlorohexahydro-endo, exo-dimethanonaphthalene; octalene
2. Formula: $C_{12}H_8Cl_6$
3. Molecular weight: 364.9

B. Physical Data

1. Boiling point (760 mm Hg): Decomposes
2. Specific gravity (water = 1): 1.6
3. Vapor density (air = 1 at boiling point of aldrin): Not applicable
4. Melting point: 104 C (220 F)
5. Vapor pressure at 20 C (68 F): 0.000006 mm Hg
6. Solubility in water, % by weight at 20 C (68 F): Essentially insoluble (11 ppb)
7. Evaporation rate (butyl acetate = 1): Not applicable
8. Appearance and odor: Tan to dark brown solid with a mild chemical odor

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Not combustible, but may be dissolved in a flammable solvent

B. Reactivity

1. Conditions contributing to instability: None
2. Incompatibilities: None
3. Hazardous decomposition products: Toxic gases and vapors (such as hydrogen chloride, chlorinated compounds and carbon monoxide) may be released when aldrin decomposes.
4. Special precautions: None.

III. SPILL AND DISPOSAL PROCEDURES

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

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

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

C. Waste disposal methods: Aldrin may be disposed of:

1. By making packages of aldrin in paper or other flammable material and burning in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

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2. By dissolving aldrin in a flammable solvent (such as alcohol) and atomizing in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

IV. MONITORING AND MEASUREMENT PROCEDURES

- A. EXPOSURE ABOVE THE ACTION LEVEL: Measurements taken for the purpose of determining employee exposure under this section are best taken such that the eight-hour exposure may be determined from a single eight-hour sample or two four-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 by collection of particulates using a high efficiency membrane filter with subsequent chemical analysis. The method of measurement must determine the concentration of aldrin 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 aldrin to plus or minus 25%.
- C. METHODS: Methods meeting these accuracy requirements are available from the National Technical Information Service, U. S. Department of Commerce, Springfield, Virginia 22161 under the title "NIOSH Analytical Methods for Set S" (Order number XXXXXXXXXX).
- 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 aldrin in tightly closed containers in a well ventilated area.
- B. Use of supplied-air suits or other impervious coverings (such as acid suits) may be necessary to prevent skin absorption from aldrin. Supplied-air suits should be selected, used, and maintained under the immediate supervision of persons knowledgeable in the limitations and potential life endangering characteristics of supplied-air suits.
- C. Employers should advise employees of all areas and operations where their exposure to aldrin could occur.

VI. COMMON OPERATIONS

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Common operations in which exposure to aldrin is likely to occur are: During its production and during its use as an insecticide and for the production of dieldrin.

NOTE: The information contained in the following appendix for aldrin is neither intended, by itself, to create any additional obligations not otherwise imposed, nor detract from any existing obligations. To the extent the information supplements this regulation for aldrin, it is advisory in nature.

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. ROUTE OF ENTRY

Inhalation; skin absorption; ingestion.

II. TOXICOLOGY

Aldrin as the dust or in solution is a convulsant; its metabolite, dieldrin, causes cancer in animals. The hepatocarcinogenicity of dieldrin in mice has been confirmed in several experiments; some of these liver-cell tumors metastasized. Single doses of aldrin of 50 mg/kg administered orally to pregnant golden hamsters during the period of organogenesis caused a high incidence of fetal deaths, congenital anomalies, and growth retardation. The oral LD50 in animals ranged from 44 to 99 mg/kg; effects were renal tubular degeneration and hepatic necrosis. In dogs, daily doses in the food of 0.02 and 0.06 mg/kg body weight for 1 year resulted in parenchymatous degeneration of the liver and kidneys. In humans, early symptoms of intoxication may include headache, dizziness; nausea, vomiting, malaise, and myoclonic jerks of the limbs; clonic and tonic convulsions and sometimes coma follow and may occur without the premonitory symptoms. A suicidal person who ingested 25.6 mg/kg developed convulsions within 20 minutes which persisted recurrently until large amounts of barbiturates had been administered; hematuria and azotemia occurred the day after ingestion and continued for 18 days; liver function studies were within normal limits except for an elevated icterus index; an electroencephalogram revealed generalized cerebral dysrhythmia, which returned to normal after 5 months. Once aldrin is absorbed, it is rapidly metabolized to dieldrin. In a study of 5 workers exposed to concentrations of aldrin up to 8.5 mg/M3 who had suffered 1 or more convulsive seizures and/or myoclonic limb movements, the probable concentration of dieldrin in the blood during intoxication ranged from 16 to 62 ug/100 g of blood; in asymptomatic workers the concentration of dieldrin ranged up to 22 ug/100 g of blood. Aldrin is reported to have caused erythema-bullous dermatitis in a single case; minor erythema may be observed from skin contact.

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III. SIGNS AND SYMPTOMS

Headache, dizziness; nausea, vomiting, malaise; myoclonic jerks of the limbs, clonic and tonic convulsions; coma; hematuria, azotemia; by analogy to effects caused in animals, it may cause liver damage.

IV. SPECIAL TESTS

Analysis of the blood for concentration of the metabolite of aldrin, dieldrin, is helpful in determining the extent of absorption of aldrin.

V. TREATMENT

Remove from exposure. Immediately flush eyes with water and wash skin with soap or mild detergent and water. If swallowed and the person is conscious, induce vomiting. Do not give oily laxatives. Give artificial resuscitation if indicated. Observe for convulsions and initiate appropriate treatment.

VI. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. GENERAL

Most reported effects of aldrin are caused by its capability to produce convulsions. They may be preceded by premonitory signs and symptoms such as myoclonic jerks of the limbs. Since it is teratogenic in mammalian animals, the advisability of exposure of women of child-bearing age should be considered. The metabolite, dieldrin, causes liver cancer in mice. Skin absorption is known to occur. It is important that the physician become familiar with plant operating conditions in which exposure to aldrin 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 aldrin:

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. Persons with a history of convulsive disorders would be expected to be at increased risk from exposure. Examination of the nervous system, liver, and kidneys should be stressed. The skin should be examined for evidence of chronic disorders.
2. Urinalysis -- Since kidney damage has been observed in humans exposed to aldrin, a urinalysis shall be obtained to include

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at a minimum specific gravity, albumin, glucose and a microscopic on centrifuged sediment.

C. PERIODIC EXAMINATIONS

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

VII. REFERENCES

1. American Conference of Governmental Industrial Hygienists: "Aldrin," Documentation of the Threshold Limit Values for Substances in Workroom Air (3d ed., 2d printing), Cincinnati, 1974, p. 7.
2. Patty, Frank A.: Industrial Hygiene and Toxicology, Vol. II - Toxicology (2d ed. revised), Interscience Publishing Company, New York, 1963, pp. 1356-1358.
3. International Agency for Research on Cancer: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Vol. 5, Some Organochlorine Pesticides, Lyon, France, 1974, pp. 25-38, 125-156.
4. Hayes, W.J., Jr.: Clinical Handbook on Economic Poisons, Emergency Information for Treating Poisoning, U.S. Public Health Service Publication No. 476, U.S. Government Printing Office, Washington, D.C., 1963, pp. 47-50, 62-67.
5. Gleason, M.N., et al: Clinical Toxicology of Commercial Products (3d ed.), Williams and Wilkins Company, Baltimore, 1969, Section III, pp. 85-87.
6. Spiotta, E.J.: "Aldrin Poisoning in Man," A.M.A. Archives of Industrial Hygiene and Occupational Medicine, 4:560-566, 1951.
7. Brown, V.K.H., et al: "A Blood Test Diagnostic of Exposure to Aldrin and Dieldrin," British Journal of Industrial Medicine, 21:283-286, 1964.
8. Kazantzis, G., et al: "Poisoning in Industrial Workers by the Insecticide Aldrin," British Journal of Industrial Medicine, 21:46-51, 1964.
9. Hoogendam, I., et al: "Nine Years' Toxicity Control in Insecticide Plants," Archives of Environmental Health, 10:441-448, 1965.
10. Ottolenghi, A.D., et al: "Teratogenic Effects of Aldrin, Dieldrin, and Endrin in Hamsters and Mice," Teratology, 11-16, 1974.

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REFERENCES AND SOURCES

ALDRIN

1910.1000

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

Eye: None

Skin: Spector, "Handbook of Toxicology;" Stauden, "Kirk-Othmer Encyclopedia of Chemical Technology;" Stolman, "Progress in Chemical Toxicology;" Patty, "Industrial Hygiene and Toxicology"

Ingestion: Stolman, "Progress in Chemical Toxicology;" Patty, "Industrial Hygiene and Toxicology;" Deichmann and Gerarde, "Toxicology of Drugs and Chemicals;" Stecher, "The Merck Index," eighth edition; Sax, "Dangerous Properties of Industrial Materials;" American Conference of Governmental Industrial Hygienists, "Documentation of the Threshold Limit Values for Substances in Workroom Air;" Thienes and Haley, "Clinical Toxicology;" Shell Chemical Company MSDS

COMMENTS

Eye - Classification: 2 and 6

Output statement numbers: 10 and 12 combined

Exceptions: None

Specific information concerning the effects of direct contact with this substance could not be found in the literature. Since aldrin is an insecticide of the cyclodiene group, a family of highly chlorinated cyclic hydrocarbons which are unreactive with water, it can be inferred that the local effects of contact would not be severe. However, since the substance is readily absorbable through the skin, and the eye cavity can also potentially be the site of excessive absorption, the compound is assigned classifications of 2 and 6.

Skin - Classification: 1 and 5

Output statement numbers: 1, 5a, 6, 8a, 14g, 14i, 15, 20a

Exceptions: See below

Spector reports that the acute toxicity of aldrin is relatively high and that skin absorption constitutes the greatest occupational hazard. He lists the acute symptoms for man as "hyper-irritability, depression, vomiting and nausea, headache, convulsions (onset in 1 - 4 hours), and coma. Death within 24 hours." Its chronic toxicity is noted as being unknown for man, but consisting of "loss of appetite and weight, nervousness and irritability" for animals. A two-minute immersion of rabbits in a wetting powder formulation, at a dosage of 15 - 25 mg/kg, is said to cause "anorexia, nervousness, wild activity, spasms lasting 3 - 10 minutes."

Stauden gives the LD50 by dermal application to male rats as 98 mg/kg. He also notes that "the greatest occupational hazard is absorption through the skin."

Stolman states "the compound is absorbed through the skin and causes a chronic intoxication attended by hepatic necrosis, degeneration of the kidneys and brain, pulmonary congestion, and edema."

Patty says that "only minor erythema is observed from

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skin contact with aldrin. Treon and Cleveland applied aldrin as a crystalline powder maintained under a rubber sleeve for 24 hours. The minimum lethal dose was 0.6 to 1.25 g/kg. When the material was applied 2 hours/day, 5 days/week for 10 weeks, the minimum lethal dose in mg/kg/day for the dry powder was 35 to 123. In vegetable oil, it was 10 to 26 mg/kg. In ultrasene, it was less than 4.8 mg/kg. Lehman reported that a 4 per cent aldrin solution in dimethylphthalate had an approximate LD50 of less than 150 mg/kg body weight. It produced no skin irritation but the animals showed severe convulsions and death."

Aldrin has a melting point range of 130 - 150 degrees F. It is insoluble in water.

The rapidity with which this compound is absorbed through the skin and the severity of its effects lead to the conclusion that classifications of 1 and 5 are warranted. Since the substance is often dispersed in solvents before application, and Patty's statements indicate that such solvents may accelerate the rate of absorption, statements 5a and 15 are not only applied to the solid form of the substance but also to liquids containing it.

Ingestion - Classification: 1 and 5

Output statement numbers: 5a, 19, 20a

Exceptions: None

According to Stolman, "for rats, the LD50 is 40 - 50 mg/kg. The insecticide causes gastrointestinal irritation, diarrhea, incoordination, hyperirritability, convulsions, and death. These symptoms occur 1 - 4 hours after ingestion of a fatal dose, and death follows within 24 hours."

Patty reports that "Lehman gave the approximate LD50 for rats from aldrin as 67 mg/kg body weight. Characteristic responses to a toxic dose were tremors and convulsions. Death may be delayed for several days. Treon and Cleveland reported an LD50 for rats of a solution of aldrin in peanut oil to be 45.9 mg/kg of body weight. The toxic dose will vary with the solvent in which it is given." Ball has given an LD50 of 10.6 mg/kg to 59.6 mg/kg for different preparations, reports Patty. When discussing chronic oral toxicity, Patty notes that "Treon and Cleveland fed rats for a period of 2 years" with no "increase in mortality or decrease in growth at any levels fed." At doses above 12.5 ppm, "some animals showed increased liver weights and some degenerative hepatic cell changes. Dogs fed 3 ppm in the diet for extended periods of time showed an increase in liver weight and minor histopathological changes in the liver. Kitselman fed dogs doses of 0.2, 0.07, and 2 mg/kg of body weight/day for a period up to a year. Histopathological studies on the animals fed 0.02 and 0.06 mg/kg of body weight showed parenchymatous degeneration of the liver and kidneys."

Deichmann and Gerarde have noted that after ingestion of "less than 1 gm in an adult," aldrin may cause "temporary reversible kidney and liver injury." Deaths in children have

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resulted by ingestion of 25 mg.

Stecher gives the LD50 orally in rats as 67 mg/kg and lists symptoms as "renal damage, tremors, ataxia, convulsions followed by CNS depression, respiratory failure, death." Chronic toxicity after "prolonged exposure" may result in hepatic damage.

Sax reports that, "ingestion . . . of this material into the body causes irritability, convulsions and depression in from 1 to 4 hours. Continued exposure to it causes liver damage." Sax rates the substance as being of highly toxic hazard by this mode of entry.

The ACGIH gives the acute oral LD50 of aldrin as 60 mg/kg, while the Shell Chemical Company MSDS gives the oral LD50 for the mouse, rat, guinea pig, rabbit and dog as 44 - 95 mg/kg, 39 - 67 mg/kg, 33 mg/kg, 50 mg/kg and 65 - 95 mg/kg respectively.

Thienes and Haley state that the "officially permitted concentration in food" for this substance is 0.1 ppm.

The high acute and chronic toxicity of the substance leads to the conclusion that classifications of 1 and 5 are warranted.

SUBSTANCE TECHNICAL GUIDELINES

The references cited for this document include:

National Fire Protection Association, "Fire Protection Guide on Hazardous Materials," 5th edition, 1975 (NFPA)

Shell Chemical Co., Technical Data Bulletin ACD:67-104, REV:6-72 (Shell)

"Merck Index," 8th edition, 1968 (Merck)

Kirk, R. and Othmer, D., "Encyclopedia of Chemical Technology," Interscience, 2nd edition, 1972 (K-O)

Sources of data items used:

- I. A. 1. Synonyms: Shell, Merck
2. Formula: NFPA-49
3. Molecular weight: Shell
- B. 1. Boiling point: Shell
2. Specific gravity: Shell
3. Vapor density: Not applicable
4. Melting point: K-O
5. Vapor pressure: Shell
6. Solubility in water: Shell
7. Evaporation rate: Not applicable
8. Appearance and odor: Shell
- II. A. 1. Flammability: NFPA-49
- B. 1. Conditions contributing to instability: ADL
2. Incompatibilities: None
3. Hazardous decomposition products: NFPA-49
4. Special precautions: None
- III. A. Steps if released or spilled: NFPA-49, ADL
- C. Waste disposal method: Shell
- V. Miscellaneous precautions: NFPA-49, Shell

USE/EXPOSURE AND CONTROL DOCUMENT

References used in the preparation of this document include:

"Aldrin," Shell Chemical Co., Technical Data Bulletin (Shell)

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- "Aldrin," Shell Chemical Co., "Aldrin 20G Granules Insecticide" (Shell Aldrin 2)
- "Aldrin," Shell Chemical Co., "Aldrite 4 Emulsible Concentrate Insecticide" (Shell Aldrite 4)
- "Aldrin," Shell Chemical Co., Material Safety Data Sheet (Shell MSDS)
- "Aldrin," Hazard Process Index, Hazard Entry No. 9, NIOSH-HSM-99-73-62 (HPI)
- "Aldrin," Commonwealth of Pennsylvania, Department of Environmental Resources, Occupational Health, Hygienic Information Guide No. 66 (Penna #66)
- Avar, P. and Czegledi-Janko, G., "Occupational Exposure to Aldrin," Brit. J. Med. 27, 279 - 82, 1970 (Avar)
- EPA Compendium of Registered Pesticides, Vol. III (EPA)
- International Labour Office, "Encyclopedia of Occupational Health and Safety," Geneva, 1972 (ILO)
- Kazantzis, G., McLaughlin, A. I. G. and Prior, P. F., "Poisoning In Industrial Workers by the Insecticide Aldrin," Brit. J. Indust. Med. 21, 46 - 51, 1964 (Kazantzis)
- Kirk, R. and Othmer, D., "Encyclopedia of Chemical Technology," Interscience, 2nd edition, 1972 (K-O)
- Mick, D. L., Long, K. R. and Bonderman, D. B., "Aldrin and Dieldrin in the Blood of Pesticide Formulators," AIHAJ 33(2), 94 - 9, 1972 (Mick)
- Spencer, E. Y., "Guide to the Chemicals Used in Crop Protection," 6th edition, Publication 1093, Research Branch Agriculture, Canada, 1973 (Spencer)

References for Specific Use/Exposure

1. Shell Aldrin 20G, EPA, HPI
2. Shell Aldrite 4, HPI
3. Shell, HPI
5. Mick, Spencer, K-O, Kazantzis, HPI, Shell, Avar
6. HPI, K-O

References for Specific Control Methods

Shell MSDS, Penna #66, ILO, HPI

RESPIRATOR TABLE DOCUMENTATION

SUBSTANCE: Aldrin

D. O. L. STANDARD: 0.25 mg/M3

WARNING PROPERTIES: Since aldrin has such a low vapor pressure, warning properties are not considered.

Eye Irritation Level: Aldrin is not known to be an eye irritant.

IDLH: 100 mg/M3

Basis for IDLH Value: There are no useful acute inhalation toxicity data available upon which to base the IDLH for aldrin. The chosen IDLH, therefore, has been estimated from information given by Baskin. Baskin states that "severe symptoms follow swallowing or skin contamination with 15 to 50 mg aldrin/kg body weight (average adult)." Aldrin vapor gave no effect in man at 18 mg/M3 during a days exposure according to Deichmann.

- Other Toxicological Information: According to Spector, the "Acute toxicity (of aldrin) is relatively high. Aldrin is absorbable via the intestinal canal, by inhalation, and through the skin, the last constituting the greatest occupational hazard." The acute symptoms for man are "hyper-irritability, depression, vomiting and nausea, headache, convulsions (onset in 1 - 4 hours), coma. Death within

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24 hours."

Patty states that "no quantitative investigative work has been done with air dispersions of aldrin. Some clinical studies have been made on people packaging or handling this material. Princi and Spurbeck studied workers who were exposed to the material in packaging. Any absorption would be by breathing as a dust or possibly through skin contact. The exposure was to a mixture of chlordane, aldrin, and dieldrin. Analysis of the air varied from 5 to 57 mg/cu meter determined as chlorine and calculated as aldrin. By special absorption technique, the actual aldrin was determined to be between 1 and 2.6 mg/cu meter. No evidence of physiological response from the exposure was found.

"Nelson studied a group of workers exposed to dusts of aldrin. He recorded complaints of headache, dizziness, nausea, and vomiting. He found no evidence of liver injury in these individuals.

"It is evident that aldrin can be absorbed when it is breathed as a dust. When considering the toxicity by mouth, it will be recognized that proper protection from air-borne dust in industrial operations is necessary."

The Documentation of TLV's states that "the inhalation toxicities of DDT and lindane have been well documented. Because the mode of action and effect of aldrin is similar to these chlorinated hydrocarbons, it is acceptable procedure to develop a threshold limit by analogy in the absence of specific information on the latter. McGee stated that aldrin and lindane have similar actions in man.

"The acute oral LD50 of DDT is 250 mg/kg, that of lindane 125, and that of aldrin 60 mg/kg. The threshold limit value of the first two would seem to be reasonably set at 1 and 0.5 mg/M3 respectively. Aldrin on this basis would be 0.25 mg/M3. Princi and Spurbeck found no ill effects in workmen exposed to an average of 5 mg/M3 of aldrin and chlordane for three years. . . .

"The limit is believed sufficiently low to prevent systemic injury."

Concerning the percutaneous absorption of aldrin, Patty states that "Treon and Cleveland applied aldrin as a crystalline powder maintained under a rubber sleeve for 24 hours. The minimum lethal dose was 0.6 to 1.25 g/kg."

Reference: Deichmann, William B: Pesticides and the Environment, Vol. II.

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USE/EXPOSURE AND CONTROL DOCUMENT
ALDRIN

Principal Route
of Entry
A,D

Currently Used
Control Methods

- | Use/Exposure | Principal Route
of Entry
A,D | Currently Used
Control Methods |
|---|------------------------------------|--|
| 1. Inhalation of dust and skin contact with solid during use in granular form as an insecticide. Application with granular applicator, spreader, or by airplane for control of soil inhabiting insects in soil or on seeds prior to planting. Used for field crops, fruits, vegetables, and ornamentals. | A,D | Personal protective equipment (respiratory protective devices, protective clothing, gloves, goggles); good personal hygiene practice |
| 2. Inhalation of dust or mist and skin contact with solid or liquid during use as emulsible concentrate insecticide applied with hydraulic sprayers or low volume ground applicators in private and commercial buildings for control of termites on ornamental turf, home lawns, nursery and greenhouse soils | A,D | Personal protective equipment (respiratory protective devices, protective clothing, gloves, goggles); good personal hygiene practice |
| 3. Inhalation of dust or mist and skin contact with solid or liquid during use as insecticide applied as wettable powder | A,D | Personal protective equipment (respiratory protective devices, protective clothing, gloves, goggles); good personal hygiene practice |
| 4. Inhalation of dust and skin contact with solid during use as insecticide applied as dust | A,D | Personal protective equipment (respiratory protective devices, protective clothing, gloves, goggles); good personal hygiene practice |
| 5. Inhalation of dust and skin contact with solid during manufacture, packaging, distribution, and maintenance of equipment and storage containers | A,D | Personal protective equipment (respiratory protective devices, protective clothing, gloves, goggles); good personal hygiene practice; local exhaust ventilation; general dilu- |

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tion ventilation

- | | | | |
|----|--|-----|---|
| 6. | Inhalation of dust and skin contact with solid or liquid during use for production of dieldrin | A,D | Personal protective equipment (respiratory protective devices, protective clothing, gloves, goggles); good personal hygiene practice; local exhaust ventilation; general dilution ventilation |
|----|--|-----|---|

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

Use suspended by EPA 9/26/75. Only underground applications allowed for termite control. Manufacture has been sharply curtailed.

Pesticide Chem. News 9/26/75
ADL expert 2/19/76

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

1,332 CARDS READ

0 SYSOUT PRINT RECORDS

0 SYSOUT PUNCH RECORDS

0.00 MINUTES EXECUTION TIME

[illegible]