

NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND
SUPPORTING DOCUMENTATION FOR

*** OIL MIST, MINERAL ***

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for OIL MIST, MINERAL

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 OIL MIST, MINERAL.

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 mineral oil mist not in excess of 5 milligrams per cubic meter (mg/M3) averaged over an eight-hour work shift (time weighted average), as stated in § 1910.1000, Table Z-1.

(2) "Action level" means one-half of the permissible exposure for mineral oil mist averaged over an eight-hour work shift.

(3) Mineral oil means petroleum base or white mineral petroleum oil.

(b) Initial determination and exposure measurement. (1) Each employer who has a place of employment in which mineral oil mist is released into the workplace air shall determine if there is any possibility that any employee may be exposed to airborne concentrations of mineral oil mist 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 mineral oil mist.

(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 mineral oil mist;

(ii) Any measurements of mineral oil mist taken;

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

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(7) If two consecutive employee exposure measurements taken at least one week apart reveal that the employee is exposed to mineral oil mist 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 percent, 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 mineral oil mist above the permissible exposure as defined in paragraph (a)(1) of this section.

(2) Employee exposures to airborne concentrations of mineral oil mist 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 mineral oil mist.

(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

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- (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 mineral oil mist 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 MINERAL OIL MIST

CONDITION	PERMISSIBLE RESPIRATORY PROTECTION
Particulate Concentration	
25 mg/M3 or less	Any mist respirator, except single-use.
50 mg/M3 or less	Any mist respirator, except single-use or quarter-mask respirator.
	Any fume respirator or high efficiency particulate filter respirator.
	Any supplied-air respirator.
	Any self-contained breathing apparatus.
250 mg/M3 or less	A high efficiency particulate filter respirator with a full facepiece.
	Any supplied-air respirator with a full facepiece, helmet or hood.
	A Type C supplied-air respirator operated in pressure - demand or other positive pressure or continuous-flow mode.
	Any self-contained breathing apparatus with a full facepiece.
2,500 mg/M3 or less	A powered air-purifying respirator with a high efficiency particulate filter.
	A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 2,500 mg/M3 or entry and escape from	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

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unknown concentrations	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.

(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 mineral oil mist.

(2) For the purposes of compliance with § 1910.309, locations classified as hazardous locations due to the presence of mineral oil mist shall be Class I, Group D.

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

(4) For the purposes of compliance with § 1910.178, locations classified as hazardous locations due to the presence of mineral oil mist shall be Class I, Group D.

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

(f) Personal protective equipment. (1) Employers shall provide and ensure that employees use appropriate protective clothing and equipment necessary to prevent repeated or prolonged skin contact with liquid mineral oil. Face shields shall comply with § 1910.133(a)(2), (a)(4), (a)(5), and (a)(6).

(2) Employers shall ensure that non-impervious clothing which becomes wet with liquid mineral oil be removed promptly and not reworn until the mineral oil is removed from the clothing.

(g) Spills and disposal. (Reserved).

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

(i) Training and information. (1) Each employer who has a workplace in which mineral oil mist 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 mineral oil mist above the action level without regard to the use of respirators, or employees whose skin may become wet with liquid mineral oil, shall annually:

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

(ii) Advise affected employees as to the signs and symptoms of exposure to mineral oil mist.

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(iii) Instruct affected employees to advise the employer of the development of signs and symptoms of overexposure to mineral oil mist which are listed in Appendix A of the section;

(iv) Instruct affected employees to inform the employer if they develop any of the medical conditions listed in paragraph (j)(2) of this section; and

(v) Provide training to ensure that employees understand the precautions of safe use, emergency procedures, and the correct use of protective equipment relative to mineral oil mist.

(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) Each employer who has employees exposed to airborne concentrations of mineral oil mist above the action level, without regard to the use of respirators, or employees whose skin may become wet with liquid mineral oil shall obtain information as to whether such employee has a history of any of the following medical conditions:

(i) Chronic lung disease

(ii) Skin disease

(3) The employer shall provide a medical examination for the employee if:

(i) The employee provides a history of any of the medical conditions listed in paragraph (j)(2) of this section; or

(ii) The employee informs the employer of the development of any of the medical conditions listed in paragraph (j)(2) of this section or any of the signs or symptoms of exposure to mineral oil mist which are listed in Appendix A which the employee suspects are caused by exposure to mineral oil mist.

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

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

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

(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; and

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

(5) Where a medical examination is required by paragraph (j)(3) of this section, following such examination the employer shall obtain a written opinion from the examining physician which conforms with paragraph (j)(6) of this section.

(6)(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 mineral oil mist;

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

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(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.

(7) No employee shall be exposed to mineral oil mist 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.

(8) The employer shall provide emergency medical treatment for any employee injured through exposure to mineral oil mist.

(9) 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.

(10) 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) 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 mineral oil mist.

(ii) This record shall include:

(A) The date of measurement;

(B) Operations involving exposure to mineral oil mist 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 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;

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(B) Name of employee trained;

(C) Content or scope of training provided.

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

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

(ii) This record shall include:

(A) The name of the employee;

(B) Information concerning medical conditions obtained from the employee pursuant to paragraph (j)(2) of this section;

(C) Any employee medical complaints relative to exposure to mineral oil mist;

(D) A copy of information provided to the physician pursuant to paragraph (j)(4)(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 one year 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 mineral oil mist.

(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 mineral oil mist which is conducted pursuant to this section.

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

(iii) Record the results obtained.

NOTE: The information contained in the following appendix for mineral oil mist is neither intended, by itself, to create any additional obligations not otherwise imposed, nor detract from any existing obligation. To the

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extent the information supplements this regulation for mineral oil mist, it is advisory in nature.

APPENDIX A

SUBSTANCE SAFETY DATA SHEET
FOR MINERAL OIL MIST

I. SUBSTANCE IDENTIFICATION

- A. Substance: Mineral oil mist
- B. Permissible Exposure: 5 milligrams of mineral oil mist per cubic meter of air (mg/M3) averaged over an eight-hour work shift.
- C. Appearance and Odor: Mist with an odor like burned lube oil generated from petroleum base or white mineral petroleum oil

II. HEALTH HAZARD DATA

- A. Ways in which the chemical affects your body: Mineral oil mist can affect your body if you inhale it.
- B. Effects of Overexposure:
 - 1. Inhalation of mineral oil mist may cause adverse respiratory effects.
 - 2. Reporting Symptoms: You should inform your employer if you develop any signs or symptoms and suspect that they are caused by exposure to mineral oil mist.

III. EMERGENCY FIRST AID PROCEDURES

- A. Skin Exposure: If your skin becomes wet with mineral oil wash the contaminated skin using soap or mild detergent and water. If mineral oil penetrates through your clothing, remove the clothing and wash the skin using soap or mild detergent and water.
- B. Breathing: If you or any other person breathes in large amounts of mineral oil mist move the exposed person to fresh air at once.

IV. RESPIRATORS AND PROTECTIVE CLOTHING

- A. Respirators: Respirators are not the best way to control exposure to mineral oil mist. 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 mineral oil mist

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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 appropriate protective clothing and equipment to prevent repeated or prolonged skin contact with liquid mineral oil. Replace or repair impervious clothing that has developed leaks.
- C. Eye Protection: None required.

V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

- A. Mineral oil is a combustible liquid and its vapors can form explosive mixtures with air at elevated temperatures.
- B. Mineral oil must be stored in tightly closed containers in a cool, well ventilated area away.
- C. Sources of ignition such as smoking and open flames are prohibited wherever mineral oil is handled, used or stored in a manner that could create a potential fire or explosion hazard.
- D. You must promptly remove any non-impervious clothing that becomes wet with liquid mineral oil and this clothing must not be reworn until the mineral oil is removed from the clothing.
- E. If your skin becomes wet with liquid mineral oil, you must promptly wash or shower with soap or mild detergent and water to remove the mineral oil from your skin.
- F. Fire extinguishers, where provided, must be readily available and you should know where they are and how to operate them.
- G. Ask your supervisor where mineral oil is used or mineral oil mist is released 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 mineral oil mist. In addition, your employer must instruct you in the safe use of mineral oil mist, emergency procedures, and the correct use of protective equipment.
- B. Your employer is required to determine whether you are being exposed to mineral oil mist. 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 one year 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.

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- 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 mineral oil mist 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 mineral oil mist, it is advisory in nature.

APPENDIX B

SUBSTANCE TECHNICAL GUIDELINES
FOR MINERAL OIL MIST

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: The mist of petroleum-based: white mineral oil; cutting oils; heat treating oils; hydraulic oils; cable oil; transformer oil; lubricating oils; drawing oils
2. Formula: C_nH_{2n+2} $n = 16$ and up
3. Molecular weight: Not pertinent

B. Physical Data

1. Boiling point (760 mm Hg): 360 C (680 F)
2. Specific gravity (water = 1): 0.8 - 0.9
3. Vapor density (air = 1 at boiling point of mineral oil mist): Not applicable
4. Melting point: Very low
5. Vapor pressure at 20 C (68 F): Very low
6. Solubility in water, % by weight at 20 C (68 F): Insoluble
7. Evaporation rate (butyl acetate = 1): Not applicable
8. Appearance and odor: Mist with an odor like burned lube oil generated from petroleum base or white mineral petroleum oil

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Flash point: 135 C (275 F) (closed cup)
2. Autoignition temperature: 260-371 C (500-700 F)
3. Flammable limits in air, % by volume: Not applicable
4. Extinguishing media: Dry chemical, foam, carbon dioxide
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: Mineral oil is a combustible liquid. At elevated temperatures its vapors

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can form explosive mixtures with air. All ignition sources must be controlled where mineral oil is used, handled or stored in a manner that could create a potential fire or explosion hazard.

7. For purposes of complying with the requirements of 29 CFR 1910.106, mineral oil is classified as a Class IIIB combustible liquid.
8. For purposes of complying with 29 CFR 1910.309, the classification of hazardous locations as described in Article 500 of the National Electrical Code for mineral oil mist shall be Class I, Group D.

B. Reactivity

1. Conditions contributing to instability: None
2. Incompatibilities: None.
3. Hazardous decomposition products: None.
4. Special precautions: None.

III. SPILL, LEAK, AND DISPOSAL PROCEDURES

- A. If mineral oil mist is released in hazardous concentrations, ventilate area of release to disperse the mist.
- B. If mineral oil is spilled or leaked, the following steps should be taken:
 1. Ventilate area of spill or leak.
 2. For small quantities, absorb on paper towels. Remove to a safe place (such as a fume hood) and burn the paper. Large quantities can be collected and atomized in a suitable combustion chamber.
- C. Persons not wearing protective equipment should be restricted from areas of spills and releases until cleanup has been completed.
- D. Waste disposal methods: Mineral oil may be disposed of:
 1. By absorbing it in vermiculite, dry sand, earth or a similar material and disposing in a sanitary landfill.
 2. By atomizing in a suitable combustion chamber.

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 mineral oil mist 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

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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 mineral oil mist 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 mineral oil in tightly closed containers in a cool, well ventilated area.

B. Employers should advise employees of all areas and operations where their exposure to mineral oil and mineral oil mist could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to mineral oil mist is likely to occur are: During any operation in which petroleum-base oils are subjected to elevated temperatures, such as use of cutting and drawing oils, sparking of transformer and cable oils, use of heat-treating oils, or involvement of sealants, etc., and in fires; during the use of petroleum-based oils as coolants or quenching agents in machine shop operations; during steel rolling and pressroom operations; and during the spray application of insecticides.

NOTE: The information contained in the following appendix for mineral oil mist 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 mineral oil mist, it is advisory in nature.

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. ROUTE OF ENTRY

Inhalation.

II. TOXICOLOGY

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Inhalation of mineral oil mist in high concentrations may cause pulmonary effects although this has rarely been reported. A single case of lipoid pneumonitis suspected as caused by exposure to very high concentrations of oil mist was reported in 1950; this occurred in a cash register serviceman whose heavy exposure occurred over 17 years of employment; no other cases have been recorded. Experimental animal exposure studies to white mineral oil mist (untreated, and with no additions) for repeated daily 6 hour exposures for one year at 5 mg/M3 were entirely negative in all criteria used for measuring response. A similar study at 100 mg/M3 resulted in some slight changes in some but not all species exposed; no histologic changes of significance were noted. Exposure to oil mist did not appear to accelerate the production of lung tumors in a lung-tumor susceptible strain of mice. A second parallel study of sulfurized, solvent-extracted naphthenic-base oil to which animals were exposed daily at 50 mg/M3 for 18 months failed to reveal a single animal with any sort of injury or indisposition as a result of the oil mist inhalation. A review of exposures to mineral oil mist averaging 15 mg/M3 (but often higher) in several industries disclosed a striking lack of reported cases of illness related to these exposures. A study of oil mist exposures in machine shops, at mean concentrations of 3.7 mg/M3 and maximum of 110 mg/M3, showed no increase in respiratory symptoms or decrement in respiratory performance attributable to oil mist inhalation among men employed for many years. There is no evidence to suggest any relation between inhalation of oil mist and lung cancer. On the other hand, there are some reported cases of skin cancer from contact with certain oils. Contact with liquid oils may cause dermatitis.

III. SIGNS AND SYMPTOMS

None reported.

IV. SPECIAL TESTS

None in common usage.

V. TREATMENT

None specific.

VI. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. GENERAL

There are few reports of pulmonary complaints occurring from industrial exposure to mineral oil mist. It is important that the physician become familiar with plant operating conditions in which exposure to mineral oil mist 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.

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B. PREPLACEMENT

Routine medical histories and physical examinations are not required. However, the employer must screen employees for history of certain medical conditions (listed below) which might place the employee at increased risk from mineral oil mist exposure. Only those giving a positive history of these conditions must be referred for further medical examinations.

1. Chronic respiratory disease -- In persons with impaired pulmonary function, especially those with obstructive airway diseases, the breathing of mineral oil mist might cause exacerbation of symptoms due to its irritant properties.
2. Skin disease -- Prolonged exposure to mineral oil mist may cause a dermatitis. Persons with preexisting skin disorders may be more susceptible to the effects of this agent.

C. PERIODIC EXAMINATIONS

Routine periodic examinations are not required. However, if the employer becomes aware of an employee with the above-listed conditions, he must refer such employee for further medical examination.

VII. REFERENCES

1. American Conference of Governmental Industrial Hygienists: "Oil Mist (Mineral)," Documentation of the Threshold Limit Values for Substances in Workroom Air (3d ed., 2d printing), Cincinnati, 1974, pp. 191-192.
2. Lippmann, M. and D.H. Goldstein: "Oil-Mist Studies, Environmental Evaluation and Control," Archives of Environmental Health, 21:591-599, 1970.
3. Goldstein, D.H., et al: "An Epidemiologic Study of An Oil Mist Exposure," Archives of Environmental Health, 21:600-603, 1970.
4. Ely, T.S., et al: "A Study of Mortality, Symptoms, and Respiratory Function in Humans Occupationally Exposed to Oil Mist," Journal of Occupational Medicine, 12:253-261, 1970.
5. Hendricks, N.V., et al: "A Review of Exposures to Oil Mist," Archives of Environmental Health, 4:139-145, 1962.
6. Proudfit, J.P., et al: "Chronic Lipid Pneumonia Following Occupational Exposure," A.M.A. Archives of Industrial Hygiene and Occupational Medicine, 1:105-111, 1950.

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REFERENCES AND SOURCES

MINERAL OIL MIST

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

Eye: Grant, "Toxicology of the Eye"

Skin: Deichmann and Gerarde, "Toxicology of Drugs and Chemicals"

Ingestion: Sax, "Dangerous Properties of Industrial Materials;"

Stauden, "Kirk-Othmer Encyclopedia of Chemical Technology"

COMMENTS

Eye - Classification: 0

Output statement numbers: None

Exceptions: None

Grant reports that "the various liquid hydrocarbons of petroleum cause little or no injury on direct external contact with the eye. In particular, kerosene, DeoBase, Stoddard solvent, and petroleum oil on rabbit and human corneas are essentially innocuous. Liquid petrolatum and purified, deodorize kerosene such as used for insecticide solvent can be applied to human eyes without causing discomfort or signs of irritation."

Liquid petrolatum can be considered mineral oil. It is, therefore, concluded that eye contact prevention to mineral oil mist is not warranted.

Skin - Classification: 2

Output statement numbers: 2, 16g, 16i

Exceptions: See below

Of petroleum solvents or distillates in general, Deichmann and Gerarde state "repeated skin contact may produce dermatitis due to removal of fat from the skin."

Mineral oil has a very low vapor pressure at 20 degrees C. It is insoluble in water and has a flash point of 275 degrees F.

A classification of 2 is concluded to be most appropriate. Because of the rather innocuous effects of the substance, neither statements 7a or 7b is used. Additionally, statements 16g and 16i are used instead of 17g and 17i respectively, and statement 20a is deleted.

Ingestion - Classification: 0

Output statement numbers: None

Exceptions: None

Kirk-Othmer notes it is widely used as a laxative, in spite of the facts that it may inhibit digestion, interfere with the absorption of fat-soluble vitamins, interfere with healing of anorectal wounds, is capable of producing a lipid pneumonia if accidentally aspirated into the lungs on swallowing, and has been found to be one cause of anorectal pathology.

Since this substance is used in laxative formulations, it is concluded that ingestion, in the context of this standard, would not present a hazard in the industrial environment.

SUBSTANCE TECHNICAL GUIDELINES

The references cited for this document include:

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

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Kirk-Othmer, "Encyclopedia of Chemical Technology," 2nd edition, Vol. 15,
p. 82; Vol. 11, p. 789 (K-O)

Sources of data items used:

- I. A. 1. Synonyms: K-O
2. Formula: ADL
3. Molecular weight: ADL
- B. 1. Boiling point: NFPA-325M
2. Specific gravity: NFPA-325M
3. Vapor density: Not applicable
4. Melting point: ADL
5. Vapor pressure: ADL
6. Solubility in water: NFPA-325M
7. Evaporation rate: Not applicable
8. Appearance and odor: ADL
- II. A. 1. Flash point: K-O
2. Autoignition temperature: Data not available
3. Flammable limits: Not applicable
4. Extinguishing media: NFPA-49
5. Special fire fighting procedures: NFPA-49
6. Unusual fire and explosion hazards: NFPA-325M
- B. 1. Conditions contributing to instability: ADL
2. Incompatibilities: None
3. Hazardous decomposition products: None
4. Special precautions: None
- III. A. Steps if released or spilled: NFPA-49
C. Waste disposal method: None
- V. Miscellaneous precautions: ADL

USE/EXPOSURE AND CONTROL DOCUMENT

References used in the preparation of this document include:

- "EPA Compendium of Registered Pesticides," Vol. III, "Insecticides, Acaricides, Molluscicides, and Antifouling Compounds," U.S. E.P.A., Office of Pesticide Programs, U.S. Government Printing Office, Washington, 1972 (EPA)
- Goldstein, D. H., Benoit, J. N. and Tyroler, H. A., "An Epidemiologic Study of An Oil Mist Exposure," Archives of Environmental Health, 21:600 - 603, 1970 (Goldstein)
- "Health Risks in the Foundry," Michigan's Occupational Health, 13:2 - 5, 1968 (Michigan)
- Hendricks, N. V., Collings, G. H., Dooley, A. E., Garrett, J. T. and Rather, Jr., J. B., "A Review of Exposures to Oil Mist," Archives of Environmental Health, 4:139 - 145, 1962 (Hendricks)
- Jones, J. G., "An Investigation into the Effects of Exposure to An Oil Mist on Workers in a Mill for the Cold Reduction of Steel Strip," Annals of Occupational Hygiene, 3:264 - 271, 1960 (Jones)
- Larsen, L. B. and Shmunis, E., "Health Hazard Evaluation/Toxicity Determination," Willard Bronze Company, Cincinnati, Ohio, NIOSH-TR-010-74, HHE-72-7-10 (Larsen)
- Lippmann, M., and Goldstein, D. H., "Oil-Mist Studies - Environmental Evaluation and Control," Archives of Environmental Health, 21:591 - 599, 1970 (Lippmann)
- Ohman, H., "Air-borne Oil Mist in Workshops and Mines," Proceedings of the 15th International Congress of Occupational Health, Vienna, 1966,

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p. 133 - 135 (Ohman)

"Oil Mist," Hygienic Information Guide No. 74, Commonwealth of Pennsylvania, Department of Environmental Resources, Occupational Health, 12/71 (Penn)

Pasternack, B. and Ehrlich, L., "Occupational Exposure to an Oil-Mist Atmosphere," Archives of Environmental Health, 25:286 - 294, 1972 (Pasternack)

Proudfit, J. P., van Ordstrand, H. S. and Miller, C. W., "Chronic Lipid Pneumonia Following Occupational Exposure," Industrial Hygiene and Occupational Medicine, 1:105 - 111, 1950 (Proudfit)

References for Specific Use/Exposure

1. Penn, Hendriks, Ohman
2. Proudfit, Penn
3. Jones, Hendriks
4. Goldstein, Lippman, Pasternack
5. Larsen, Michigan
6. Hendriks, Ohman
7. EPA, ADL estimate

References for Specific Control Methods

1. Penn
2. Penn
3. Penn
4. Lippman, Penn
5. Penn
6. Penn
7. ADL estimate

RESPIRATOR TABLE DOCUMENTATION

SUBSTANCE: Mineral oil mist

D. O. L. STANDARD: 5 mg/M3

Eye Irritation Level: Mineral oil mist is not known to be an eye irritant.

IDLH: There is no evidence in the available toxicological information that an acute exposure to mineral oil mist would impede escape or cause any irreversible health effects within one-half hour. Respirators have been assigned on the basis of the protection factor afforded by each device. It is recognized, however, that for some substances for which there does not appear to exist a concentration immediately dangerous to life and health, the determination of allowable respiratory protection based on protection factors may result in the selection of a concentration which is not likely to be encountered in the occupational environment. Therefore, for all such particulate substances it has been arbitrarily determined that only those respirators allowed for use above IDLH concentrations are permitted for use in concentrations exceeding 500 times the permissible exposure.

Other Toxicological Information: The Documentation of TLV's states that "oil mist (mineral) refers to air-borne mist of petroleum-base cutting oils or white mineral petroleum oil.

"A review, published in 1962 by Hendricks et al. of OILS OF ALL TYPES used in industry found a striking lack of reported cases of illness related to 'oil' mist inhalation. Available data indicated that the AVERAGE exposure concentrations were below 15 mg/M3; some exposures exceeded this limit by a considerable factor.

"A number of operating limits are now used in work-places and by control agencies. The Detroit Bureau of Industrial Hygiene employs 5 mg/M3; some industrial plants find 10 mg/M3 is adequate

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to reduce complaints; other industrial observations suggest that complaints arise at concentrations of 15 mg/M3 and above.

"Experimental animal exposure studies to white mineral oil mist (untreated, and with no additions) for repeated daily six-hour exposures for one year at 5 mg/M3 were entirely negative in all criteria used for measuring response. A similar study at 100 mg/M3 resulted in some slight changes in some but not all species exposed; no histologic changes of significance were noted; respiratory function was normal in the one species (rabbit) tested, but the monkey, which was reported to show changes upon repeated exposures, WAS NOT exposed to the oil mist. Exposure to oil mist did not appear to accelerate the production of lung tumors in a lung-tumor susceptible strain of mice.

"A second parallel study of sulfurized, solvent-extracted naphthenic-base oil to which animals were exposed daily at 50 mg/M3 for 18 months failed to reveal a single animal with any sort of injury or indisposition as a result of the oil mist inhalation . . .

"The 5 mg/M3 limit would appear to contain a factor of safety of at least ten against even relatively minor changes in the lungs, and is recommended as an index of good industrial practice rather than prevention of injury."

Deichmann and Gerarde state that "mineral oil nose drops or sprays may spill into the trachea and trickle into the lungs (aspiration of debilitated individuals causing a low-grade foreign-body reaction 'lipoid pneumonia.' This is also caused by aspiration of vegetable and animal oils, such as olive oil, cotton seed oil, corn oil, lard, oil, peanut oil, etc. Endogenous lipoid pneumonia is due to the hematogenous deposition of cholesterol in the lungs.

"Possible ill effects from the repeated inhalation of an oil-contaminated atmosphere (mineral oil mists) are lipoid pneumonia, bronchitis, pulmonary fibrosis, hyperplastic gastritis, rhinitis, sinusitis, pharyngitis, dermatitis, and oil acne.

"Mineral oil is removed from the lung with great difficulty by the macrophages. Lipoid pneumonia is entirely different from the fulminating chemical pneumonitis resulting from the aspiration of kerosene, mineral spirits, furniture polish, etc."

VAPOR PRESSURE AT 20 C: Very low

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USE/EXPOSURE AND CONTROL DOCUMENT

MINERAL OIL MIST

Principal Route
of Entry

Currently Used
Control Methods

Use/Exposure	Principal Route of Entry	Currently Used Control Methods
1. Inhalation of mist during use as a coolant or quenching agent in machine shop operations (including machinery such as lathes, drills, grinders, metal cutters, and shapers) in metal fabrication (including automobile manufacture and fabrication of items such as screws and bolts)	A	Process enclosure; local exhaust ventilation; general mechanical ventilation
2. Inhalation of mist during spray application for lubrication and cleaning of machinery	A	Process enclosure; local exhaust ventilation; general mechanical ventilation
3. Inhalation of mist during steel rolling operations (including cold rolling)	A	Process enclosure; local exhaust ventilation; general mechanical ventilation
4. Inhalation of mist during pressroom operations in printing	A	Mist suppression; local exhaust ventilation; general mechanical ventilation
5. Inhalation of mist during casting and cleaning in foundry operations	A	Process enclosure; local exhaust ventilation; general mechanical ventilation
6. Inhalation of mist during mine drilling operations	A	Process enclosure; local exhaust ventilation; general mechanical ventilation
7. Inhalation of mist during spray application of insecticides	A	General mechanical ventilation

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

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

1,117 CARDS READ

0 SYSOUT PRINT RECORDS

0 SYSOUT PUNCH RECORDS

0.00 MINUTES EXECUTION TIME

[illegible]