NIOSH/OSHA STANDARDS COMPLETION PROGRAM

DRAFT TECHNICAL STANDARD AND SUPPORTING DOCUMENTATION FOR

*** METHYL CELLOSOLVE ACETATE ***

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for METHYL CELLOSOLVE ACETATE

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 METHYL CELLOSOLVE ACETATE.

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

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

NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for METHYL CELLOSOLVE ACETATE

(a) DEFINITIONS

(1) PERMISSIBLE EXPOSURE - "Permissible Exposure" means inhalation of methyl cellosolve acetate in concentrations not in excess of 25 parts per million (ppm) (120 milligrams per cubic meter, mg/cu.m.) averaged over an eight hour work shift, as stated in section 1910.93, Table G-1.

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

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

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

(2) PRESENCE OF METHYL CELLOSOLVE ACETATE - Inform affected employees of the quantity, location, and manner of use or storage of methyl cellosolve acetate.

(c) EXPOSURE MEASUREMENT

(1) INITIAL DETERMINATION - Each employer who has a place of employment in which methyl cellosolve acetate is released into the workplace air shall determine if any employee may be exposed to airborne concentrations of methyl cellosolve acetate at or above the action level. The determination shall be made each time there is a change in production, process, or control measures which could result in an increase in airborne concentrations of methyl cellosolve acetate. A written determination shall be made and it shall contain at least the following information:

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

(ii) Any measurements of airborne concentrations of methyl cellosolve taken;

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

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

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

(3) INDENTIFICATION OF EXPOSED EMPLOYEES - If the exposure measurement taken under paragraph (c)(2) of this section reveals employee exposure to airborne concentrations of methyl cellosolve acetate at or above the action level, the employer shall:

(i) Identify all employees who may be exposed at or above the action level; and

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

(4) EXPOSURE ABOVE THE ACTION LEVEL - If an employee exposure measurement reveals that an employee is exposed to airborne concentrations of methyl cellosolve acetate at or above the action

level, but not above the permissible exposure, the exposure of that employee shall be measured at least every two months.

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

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

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

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

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

(d) METHODS OF MEASUREMENT - An employee's exposure shall be obtained by any combination of long term or short term samples which represents the employee's actual exposure averaged over an eight hour work shift (Appendix B (iv)). The method of measurement shall have an accuracy, to a confidence level of 95%, of not less than that given in Table 1 below.

Table 1

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

(e) Methods of Compliance

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

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

(ii) In the design of open surface tank ventilation for the purposes of compliance with section 1910.94 (d), operations involving methyl cellosolve acetate shall be classified as B-3 at 70 F.

(iii) Where a fan is located in duct work and where methyl cellosolve acetate is present in concentrations greater than 4250 ppm, one fourth of the lower flammable limit, the fan rotating element shall consist of, or be lined with nonsparking material. There shall be sufficient clearance

between the fan rotating element and the fan casing so as to prevent contact.

(2) Respirators

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

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

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

(c) In work situations in which feasible engineering and work practice controls are insufficient to reduce employees exposure to at or below the permissible exposure. Where technically feasible engineering and work practice controls are not sufficient to reduce exposure to at or below permissible exposure, they shall be used to reduce exposure to the lowest level feasible; or

(d) For operations not exceeding 40 hours per year; or

(e) In emergencies.

TABLE 2. RESPIRATORY PROTECTION FOR METHYL CELLOSOLVE ACETATE

Condition	Permissible Respiratory Protection
Vapor Concentration	
Equal to or Less than 250 ppm	cartridge(s). Any supplied-air respirator.
Equal to or Less than 1000 ppm	organic vapor cartridge(s). A gas mask with a chin-style or front- or back-mounted organic vapor canister. Any supplied-air respirator with a full facepiece, helmet or hood. Any self-contained breathing apparatus with a full facepiece.
Equal to or Less than 4000 ppm	operated in pressure-demand (positive pressure) mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.
Greater than 4000 ppm or, Entry and Escape	Self-contained breathing apparatus with a full facepiece

	air respirator with a full facepiece operated in pressure-demand (positive pressure) or continuous flow mode and an auxiliary self-contained air supply operated in pressure-demand mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand (positive pressure) mode.
Escape	Any gas mask providing protection against organic vapors. Any escape self-contained breathing apparatus.

(f) Fire and Safety - Employers shall familiarize themselves with the information contained in the Substance Technical Guidelines for methyl cellosolve acetate which is contained in Appendix B in order to ensure the safe handling and use of methyl cellosolve acetate.

(1) Electrical - For the purposes of compliance with section 1910.309, locations classified as hazardous locations due to the presence of methyl cellosolve acetate shall be Class I Group C.

(2) Portable fire extinguishers - For the purposes of compliance with section 1910.157, methyl cellosolve acetate is classified as a Class B fire hazard.

(3) Powered industrial trucks - For the purposes of compliance with section 1910.178, locations classified as hazardous locations due to the presence of methyl cellosolve acetate shall be Class I Group C.

(4) Combustible liquids - For the purposes of compliance with section 1910.106, liquid methyl cellosolve acetate is classified as a Class II combustible liquid. Spray finishing operations shall be performed in accordance with sections 1910.107 and 1910.94(c). Dip tank operations shall be performed in accordance with sections 1910.108 and 1910.94(d).

(5) Sources of ignition - Sources of ignition such as smoking or open flames are prohibited where methyl cellosolve acetate is used, handled or stored in a manner so as to create a potential fire or explosion hazard.

(6) Storage - Methyl cellosolve acetate shall be stored so as not to come in contact with nitrates, strong oxidizers, strong acids or strong alkalies.

(g) Personal Protective Equipment

(1) Skin Contact

(i) Employers shall provide, and require employees to use, impervious clothing, gloves, face shields (8 inch minimum) and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact to liquid methyl cellosolve acetate. Face shields shall comply with section 1910.133(a)(6).

(ii) Employers shall ensure that non-impervious clothing which becomes wet with liquid methyl cellosolve acetate be removed

promptly and not reworn until the methyl cellosolve acetate is removed from the clothing.

(2) Eye Contact

(i) Employers shall provide, and require employees to use, splash-proof safety goggles (cup-cover type dust and splash safety goggles), which comply with section 1910.133(a)(6), where eye contact to liquid methyl cellosolve acetate may occur.

(h) Spills

(1) Spills of methyl cellosolve acetate shall be cleaned up immediately after eliminating potential sources of ignition and utilizing available ventilation.

(2) Methyl cellosolve acetate liquid may not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

(i) Sanitation

(1) Employers shall ensure that employees whose skin becomes wet with liquid methyl cellosolve acetate promptly wash or shower as necessary to remove any methyl cellosolve acetate from the skin.

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

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

(2) Medical -

(I) Advise employees as to the signs and symptoms of exposure to methyl cellosolve acetate.

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

(III) Instruct the employees to inform the employer if they develop any of the medical conditions listed in (k)(2) of this section; and

(3) Procedures -

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

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

(k) Medical Surveillance

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

(2) Preplacement Questionnaire - The employer shall obtain from each employee who will be exposed to liquid methyl cellosolve acetate, or

airborne concentrations of methyl cellosolve acetate at or above the action level, a written statement as to whether such employee has a history of any of the following:

(I) Chronic lung disease
(II) Skin disease
(III) Kidney disease
(IV) Liver disease

(3) Preplacement Medical Examination - The employer shall provide a medical examination for an employee if the employee provides a history of any of the conditions named in paragraph (k)(2).

(4) Results of Preplacement Examination - The employer shall obtain a physician's written opinion based on the medical examination pursuant to paragraph (k)(3).

(5) Periodic Medical Examinations - The employer shall provide a medical examination for an employee if the employee advises the employer of the development of (i) any of the medical conditions listed in (k)(2), (ii) signs and symptoms listed in Appendix A which the employee suspects may be caused by exposure to methyl cellosolve acetate.

(6) Results of Periodic Examinations - The employer shall obtain a physician's written opinion based on the medical examination pursuant to paragraph (k)(6).

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

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

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

(I) A copy of this action with its Appendices A,B and C for methyl ce
(II) A description of the employee's duties as they relate to his exposure to methyl cellosolve acetate;
(III) A description of any personal protective equipment required to be used;
(IV) The results of any employee's exposure measurement, if available;
(V) The employee's anticipated exposure level; and
(VI) Upon request of the physician, information from previous medical examination of the employee.

(10) Physician's Written Opinion

(I) The physician's written opinion shall be a signed statement by the examining physician specifically stating:

(A) Whether the employee has any detected medical conditions which could be directly or indirectly aggravated by exposure to methyl cellosolve acetate or which could significantly interfere with the ability of the employee to follow recommended or required procedures for protecting himself from unusual or emergency exposure.

(B) Any recommended limitations upon the employee's exposure to methyl cellosolve acetate.

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

(II) The written opinion shall not reveal medical information unrelated to exposure to methyl cellosolve acetate.

(11) Refusal to be Medically Examined - If an employee refuses any required medical examination, the employer shall inform the employee of the possible health consequences of such refusal and obtain a signed statement from the employee indicating that the employee understands the risks involved by refusing to be examined.

(l) Recordkeeping.

(1) Initial determination.

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

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

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

(2) Exposure measurements.

(i) The employer shall keep an accurate record of all measurements taken to determine employee exposure to methyl cellosolve acetate.

(ii) This record shall include:

(a) The date of measurement;

(b) A reference to the subparagraph of this regulation which required the measurement, if any;

(c) Operations involving exposure to methyl cellosolve acetate which are being monitored;

(d) Sampling and analytical methods used and evidence of their accuracy;

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

(f) Name, Social Security number, and exposure of the employee monitored.

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

(3) Mechanical ventilation.

(i) When mechanical ventilation is used as an engineering control, the employer shall maintain a record of measurements demonstrating the effectiveness of such ventilation as required by paragraph (e)(1)(i) of this section.

(ii) This record shall include:

(a) Date of measurement;

(b) Type of measurement taken;

(c) Result of measurement.

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

(4) Training and information.

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

(ii) The record shall include:

(a) Date of training;

(b) Name and Social Security number of employees trained;

(c) Substance of training provided.

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

(5) Medical records.

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

(ii) The record shall include:

(a) Physician's written opinion;

(b) Preplacement questionnaire;

(c) Any employee medical complaints relative to exposure to meth

(d) A signed statement of any refusal to be examined;

(e) A copy of information provided to the physician pursuant to paragraph (k)(9)(ii) through (vi) of this section.

(iii) This record shall be maintained for the duration of the employment of the affected employee.

(6) Access to records.

(i) All records required to be maintained by this section shall be made available upon request to authorized representatives of the Assistant Secretary and the Director.

(ii) Employee exposure measurement records required to be maintained by this section shall be made available to employees and former employees and their designated representatives.

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

(m) Observation of monitoring.

(1) Duty.

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

(2) Exercise of opportunity to observe monitoring.

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

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

(a) Receive an explanation of the measurement procedures;

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

(c) Record the results obtained.

(n) Employee notification.

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

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

Cellosolve Acetate

APPENDIX A

SUBSTANCE SAFETY DATA SHEET

I. SUBSTANCE IDENTIFICATION

SUBSTANCE: Methyl cellosolve acetate

PERMISSIBLE EXPOSURE: 25 parts of methyl cellosolve acetate vapor per million parts of air (ppm) or 120 milligrams of methyl cellosolve acetate vapor per cubic meter of air (mg/cu m)

APPEARANCE AND ODOR: Colorless liquid with a mild ether-like odor.

II. HEALTH HAZARD DATA

A. Ways in Which the Chemical Affects Your Body: Methyl cellosolve acetate might affect your body if you inhale it or if it comes in contact with your skin or eyes or if you swallow it.

B. Effects of Overexposure:

1. Signs and Symptoms:

a. Swallowing a large single dose of methyl cellosolve acetate might be fatal.

b. Swallowing repeated smaller doses of methyl cellosolve acetate or repeated breathing of high air levels of methyl cellosolve acetate might cause kidney damage, brain damage and death. It is unlikely that air levels of methyl cellosolve acetate will be dangerous unless the liquid is heated.

c. Methyl cellosolve acetate might cause eye irritation if splashed in the eye.

d. Methyl cellosolve acetate can be absorbed through intact skin. If a large amount is absorbed death might result.

2. Reporting Signs and Symptoms: You should inform your employer if you develop any of the above possible signs or symptoms associated with methyl cellosolve acetate exposure.

III. EMERGENCY FIRST AID PROCEDURES

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

B. Skin Exposure: If nonimpervious clothing becomes wet with methyl cellosolve acetate, remove and clean the clothing before wearing again. If methyl cellosolve acetate gets on your skin, flush the contaminated skin with water promptly. If there is skin irritation, get medical attention.

C. Breathing: If you or any other person breathes in large amounts of methyl cellosolve acetate remove the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

D. Swallowing: When methyl cellosolve acetate has been swallowed get medical attention immediately. If medical attention is not immediately available get the affected person to vomit by having him touch the back of his throat with his finger or by giving him large amounts (one pint or more) of warm salt water (two tablespoons of salt per pint of water). Do not make an unconscious person vomit.

E. Rescue: Move affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty yourself. Understand your emergency rescue procedures and know the locations of the equipment before the need arises.

IV. RESPIRATORS AND PROTECTIVE CLOTHING

A. RESPIRATORS: Respirators are not the best way to control exposure to methyl cellosolve acetate. You can only be required to wear them for routine use if your employer is in the process of installing controls or other control measures prove inadequate. You may be required to wear respirators for non-routine activities or in emergencies. If respirators are worn, they must have a Mining Enforcement and Safety Administration (MESA)/National Institute for Occupational Safety and Health (NIOSH) approval label. (Older respirators may have a Bureau of Mines approval label.) If you can smell methyl cellosolve acetate while wearing a respirator, the respirator is not working correctly; go immediately to fresh air. If you experience difficulty breathing while wearing a respirator, tell your employer.

B. PROTECTIVE CLOTHING: You must wear impervious clothing, gloves, face shield, and other protective clothing to prevent repeated or prolonged skin contact with liquid methyl cellosolve acetate.

C. EYE PROTECTION: You must wear splash-proof safety goggles (cup-cover type dust and splash safety goggles) where eye contact to liquid methyl cellosolve acetate may occur.

V. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

Methyl cellosolve acetate is a combustible liquid and its vapors can form explosive mixtures with air at elevated temperatures. It must be stored in tightly closed containers in a cool, well-ventilated area away from heat, sparks and flames. Store methyl cellosolve acetate away from nitrates, strong oxidizers, strong alkalies, and strong acids. Sources of ignition such as smoking and open flames are prohibited wherever methyl cellosolve acetate is handled, used or stored in a manner that

could create a potential fire or explosion hazard. You must use non-sparking tools when opening or closing metal containers of methyl cellosolve acetate, and containers must be bonded and grounded when pouring or transferring liquid methyl cellosolve acetate. If your skin becomes wet with liquid methyl cellosolve acetate, you must promptly wash or shower as necessary to remove any methyl cellosolve acetate from the skin. You must promptly remove any non-impervious clothing that becomes wet with liquid methyl cellosolve acetate and this clothing must not be reworn until the methyl cellosolve acetate is removed from the clothing. Fire extinguishers, where provided, must be readily available and you should know where they are and how to operate them. Ask your supervisor where methyl cellosolve acetate is used in your work area and for any additional plant safety rules.

APPENDIX B

SUBSTANCE TECHNICAL GUIDELINES
METHYL CELLOSOLVE ACETATE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: 2-methoxyethyl acetate; gylcol monomethyl ether acetate; ethylene glycol monomethyl ether acetate
2. Formula: $CH_3COOCH_2CH_2OCH_3$
3. Molecular weight: 118

B. Physical Data

1. Boiling point (760 mm Hg): 145 C (293 F)
2. Specific gravity (water=1): 1.01
3. Vapor density (air=1 at boiling point of methyl cellosolve acetate): 4.1
4. Melting point: -65 C (-85 F)
5. Vapor pressure at 20 C (68 F): 2 mm Hg
6. Solubility in water, % by weight at 20 C (68 F): completely miscible
7. Evaporation rate (butyl acetate=1): 0.3
8. Appearance and odor: Colorless liquid with a mild ether-like odor

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Flash point: 44 C (111 F) (closed cup)
2. Autoignition temperature: 393 C (740 F)
3. Flammable limits in air, % by volume: Lower: 1.7 Upper: 8.2
4. Extinguishing media: Dry chemical, alcohol foam, carbon dioxide
5. Special fire-fighting procedures: Do not use solid stream of water since stream will scatter and spread fire. Use water spray to cool containers exposed to a fire.
6. Unusual fire and explosion hazards: Methyl cellosolve acetate is a combustible liquid. At elevated temperatures its vapors can form explosive mixtures with air. All ignition sources must be controlled where methyl cellosolve acetate is handled, used or stored. Methyl cellosolve acetate vapors are heavier than air and may travel along the ground and be ignited by sparks or open flames at locations remote from the site at which methyl cellosolve acetate is handled, used or stored.
7. For purposes of conforming to the requirements of 29 CFR 1910.106, methyl cellosolve acetate is classified as a Class II combustible liquid. At 4250 ppm, one-fourth of the lower

flammable limit, methyl cellosolve acetate is considered to be a potential fire and explosion hazard.

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 methyl cellosolve acetate shall be Class I, Group C.

B. Reactivity

1. Conditions contributing to instability: Heat
2. Incompatibilities: Contact with nitrates, strong oxidizers, strong alkalies, and strong acids may cause fire and explosion.
3. Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide) may be released in a fire involving methyl cellosolve acetate.
4. Special precautions: None

III. SPILL, LEAK, AND DISPOSAL PROCEDURES

A. If methyl cellosolve acetate is spilled or leaked, the following steps should be taken:

1. Remove all ignition sources
2. Ventilate area of spill or leak
3. For small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood) and burn the paper. Large quantities can be collected and atomized in a suitable combustion chamber. Liquid methyl cellosolve acetate may not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

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

C. Waste Disposal Methods:

Methyl cellosolve acetate may be disposed of:

1. By absorbing it in vermiculite, dry sand, earth or a similar material and disposing in a sanitary land fill.
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 average 8-hour exposure may be determined from a single sample or two (2) 4-hour samples. Short term interval samples (up to 30 minutes) may also be used to determine average exposure level if a minimum of five (5) measurements are taken in a random manner over the 8-hour work shift. Random sampling means that any portion of the work shift has the same chance of being sampled as any other. The arithmetic average of all such random equal duration samples taken on one (1) work shift is an estimate of an employee's average level of exposure for that work shift. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). Sampling and analyses may be performed by instruments such as detector tubes certified by NIOSH under 42 CFR Part 84, portable direct-reading instruments, gas and vapor adsorption tubes with subsequent chemical analyses or dosimeters. The method of measurement must determine the concentration of methyl cellosolve acetate to plus or minus 35%.

b. EXPOSURE ABOVE THE PERMISSIBLE EXPOSURE: The monitoring under this section should be essentially the same as described under paragraph IV. a. Laboratories performing chemical analyses should be accredited in Industrial Hygiene Chemistry by the American Industrial Hygiene Association (AIHA). The method of measurement must determine the concentration of methyl cellosolve acetate to plus or minus 25%. Methods meeting these accuracy requirements are available in the "NIOSH Monitoring Methods Manual".

V. MISCELLANEOUS PRECAUTIONS

A. Store methyl cellosolve acetate in tightly closed containers in a cool, well-ventilated area.

B. High exposures to methyl cellosolve acetate can occur when transferring the liquid from one container to another.

C. Non-sparking tools must be used to open and close metal methyl cellosolve acetate containers. These containers must be effectively grounded and bonded prior to pouring.

D. Employers must advise employees of all plant areas and operations where exposure to methyl cellosolve acetate could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to methyl cellosolve acetate is likely to occur are: operations involved in its manufacture and in its use as a solvent for many resins in the formulation of coatings and inks and in the formulation of water-based paints.

APPENDIX C - MEDICAL SURVEILLANCE GUIDELINES

I. ROUTE OF ENTRY

Inhalation; skin absorption.

II. TOXICOLOGY

Methyl cellosolve acetate is irritating to the upper respiratory tract, and is only slightly narcotic. Guinea pigs and cats exposed to nearly saturated vapor died after some delay; concentrations of 1500 ppm for seven hours killed cats, while 7000 ppm for four hours was lethal to some rats. On repeated exposures, 500 ppm for eight hours killed some cats. There was irritation of upper respiratory tract, disturbance of equilibrium, drowsiness, and apathy followed by death. These animals had damage to the lung and kidney. There was only slight irritation of the eyes. There was no irritation upon skin contact, but absorption did occur. No chronic systemic effects have been reported in humans.

III. SIGNS AND SYMPTOMS

From experience with animal exposures it may be predicted that exposure to high concentrations of vapor may result in irritation of the eyes, nose and throat. Prolonged heavy exposure might cause narcosis.

IV. SPECIAL TESTS

None in common usage.

V. TREATMENT

None specific. Remove from exposure, give artificial resuscitation if indicated, and wash eyes and contaminated skin. Recovery is fairly rapid and complete.

VI. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. GENERAL

Most reported effects of methyl cellosolve acetate are caused by its irritant properties. It is important that the physician become familiar with plant operating conditions in which exposure to methyl cellosolve acetate 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

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 methyl cellosolve acetate 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 methyl cellosolve acetate might cause exacerbation of symptoms due to its irritant properties.

2. Skin disease - Methyl cellosolve acetate is absorbed through the skin. It also is a defatting agent and may cause dryness and cracking. Persons with preexisting skin disorders may be more susceptible to the effects of this agent.

3. Kidney disease -- Although methyl cellosolve acetate is not known as a kidney toxin in humans, the importance of the organ in the elimination of toxic substances justifies special consideration in those with possible impairment of renal function.

4. Liver disease -- Although methyl cellosolve acetate is not known as a liver toxin in humans, the importance of this organ in the biotransformation and detoxification of foreign substances should be considered before exposing persons with impaired liver function.

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.

References

1. Grant, W. Morton: Toxicology of the Eye (2d ed.), Charles C. Thomas, Illinois, 1974, 685.

2. Browning, Ethel: Toxicity and Metabolism of Industrial Solvents, Elsevier Publishing Company, Amsterdam, 1965, pp. 621-623.

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NIOSH/OSHA Draft Technical Standard
and Supporting Documentation for METHYL CELLOSOLVE ACETATE

SUBSTANCE TECHNICAL GUIDELINES
METHYL CELLOSOLVE ACETATE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: 2-methoxyethyl acetate; gylcol monomethyl ether acetate; ethylene glycol monomethyl ether acetate
2. Formula: $CH_3COOCH_2CH_2OCH_3$
3. Molecular weight: 118

B. Physical Data

1. Boiling point (760 mm Hg): 145 C (293 F)
2. Specific gravity (water=1): 1.01
3. Vapor density (air=1 at boiling point of methyl cellosolve acetate): 4.1
4. Melting point: -65 C (-85 F)
5. Vapor pressure at 20 C (68 F): 2 mm Hg
6. Solubility in water, % by weight at 20 C (68 F): completely miscible
7. Evaporation rate (butyl acetate=1): 0.3
8. Appearance and odor: Colorless liquid with a mild ether-like odor

II. FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

A. Fire

1. Flash point: 44 C (111 F) (closed cup)
2. Autoignition temperature: 393 C (740 F)
3. Flammable limits in air, % by volume: Lower: 1.7 Upper: 8.2
4. Extinguishing media: Dry chemical, alcohol foam, carbon dioxide
5. Special fire-fighting procedures: Do not use solid stream of water since stream will scatter and spread fire. Use water spray to cool containers exposed to a fire.
6. Unusual fire and explosion hazards: Methyl cellosolve acetate is a combustible liquid. At elevated temperatures its vapors can form explosive mixtures with air. All ignition sources must be controlled where methyl cellosolve acetate is handled, used or stored in a manner that could create a potential fire or explosion hazard. Methyl cellosolve acetate vapors are heavier than air and may travel along the ground and be ignited by sparks or open flames at locations remote from the site at which methyl cellosolve acetate is handled, used or stored.
7. For purposes of conforming to the requirements of 29 CFR 1910.106, methyl cellosolve acetate is classified as a Class II combustible liquid. For example, 4300 ppm, approximately one-fourth of the lower flammable limit, is one situation in which methyl cellosolve acetate is considered to be a potential fire and explosion hazard.
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 methyl cellosolve acetate shall be Class I, Group C.

B. Reactivity
1. Conditions contributing to instability: Heat
2. Incompatibilities: Contact with nitrates, strong oxidizers, strong alkalies, and strong acids may cause fire and explosion.
3. Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide) may be released in a fire involving methyl cellosolve acetate.
4. Special precautions: None

III. SPILL, LEAK, AND DISPOSAL PROCEDURES

A. If methyl cellosolve acetate is spilled or leaked, the following steps should be taken:
1. Remove all ignition sources.
2. Ventilate area of spill or leak.
3. 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. Methyl cellosolve acetate may not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

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

C. Waste disposal methods: Methyl cellosolve acetate may be disposed of:
1. By absorbing it in vermiculite, dry sand, earth or a similar material and disposing in a secured 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 average 8-hour exposure may be determined from a single sample or two (2) 4-hour samples. Short term interval samples (up to 30 minutes) may also be used to determine average exposure level if a minimum of five (5) measurements are taken in a random manner over the 8-hour work shift. Random sampling means that any portion of the work shift has the same chance of being sampled as any other. The arithmetic average of all such random equal duration samples taken on one (1) work shift is an estimate of an employee's average level of exposure for that work shift. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). Sampling and analyses may be performed by instruments such as detector tubes certified by NIOSH under 42 CFR Part 84, portable direct-reading instruments, gas and vapor adsorption tubes with subsequent chemical analyses or dosimeters. The method of measurement must determine the concentration of methyl cellosolve acetate to plus or minus 35%.

b. EXPOSURE ABOVE THE PERMISSIBLE EXPOSURE: The monitoring under this section should be essentially the same as described under paragraph IV. a. Laboratories performing chemical analyses should be accredited in Industrial Hygiene Chemistry by the American

Industrial Hygiene Association (AIHA). The method of measurement must determine the concentration of methyl cellosolve acetate to plus or minus 25%. Methods meeting these accuracy requirements are available in the "NIOSH Monitoring Methods Manual".

V. MISCELLANEOUS PRECAUTIONS

A. Store methyl cellosolve acetate in tightly closed containers in a cool, well-ventilated area.

B. High exposures to methyl cellosolve acetate can occur when transferring the liquid from one container to another.

C. Non-sparking tools must be used to open and close metal methyl cellosolve acetate containers. These containers must be effectively grounded and bonded prior to pouring

D. Employers should advise employees of all plant areas and operations where exposure to methyl cellosolve acetate could occur.

VI. COMMON OPERATIONS

Common operations in which exposure to methyl cellosolve acetate is likely to occur are: operations involved in its manufacture and in its use as a solvent for many resins in the formulation of coatings and inks and in the formulation of water-based paints.

RESPIRATOR TABLE DOCUMENTATION

SUBSTANCE: Methyl methacrylate

D. O. L. STANDARD: 100 ppm

WARNING PROPERTIES:

Odor Threshold: Staub reports an odor threshold for methyl methacrylate of 0.21 ppm.

Eye Irritation Level: According to Grant, "on application to rabbit eyes it (methyl methacrylate) has caused irritation requiring several days for recovery. The TLV is recommended "to protect against discomfort from irritation."

Other Information: According to the Documentation of TLV's, some "investigat noted irritation at 170 to 250 ppm, but workers tolerated without complaint levels approximating 200 ppm . . . It was the opinion of men in the field that 100 ppm could be tolerated continuously for eight hours without discomfort."

Evaluation of Warning Properties: Since the odor threshold of methyl methacrylate is below the permissible exposure limit, and since irritation occurs within 3 times of the permissible exposure limit, methyl methacrylate is treated as a material with good warning properties Gas sorbent respiratory equipment is permitted.

IDLH: 4000 ppm

Basis for IDLH Value: This IDLH is based upon the 8-hour rat LC50 of 3750 ppm methyl methacrylate given by Patty.

Other Toxicological Information: The Documentation of TLV's reports that "Deichmann found that single eight-hour exposures to methyl methacrylate vapor in a concentration of 4400 ppm were fatal to rats and rabbits, but not to guinea pigs. Spealman and coworkers reported that exposures to one-half hour to three hours daily for 15 days at 10,000 to 11,000 ppm caused death among mice and dogs, but guinea pigs survived. They found little evidence of a cumulative effect."

Patty gives an 8-hour LC50 of 3750 ppm for rats.

LFL: 17,000 ppm

VAPOR PRESSURE AT 20 C: 35 mm Hg

SATURATED CONCENTRATION AT 20 C: 46,100 ppm

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USE/EXPOSURE AND CONTROL DOCUMENT
METHYL CELLOSOLVE ACETATE

	Use/Exposure	Principal Route of Entry	Currently Used Control Methods
1.	Inhalation of vapor and skin contact with liquid during spray or heat application of surface coatings containing solvent (varnishes, dopes, lacquers, metal lacquers, cellulose lacquers for paper coating, textile printing, leather finishes)	A,D	Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles or face shield)
2.	Inhalation of vapor and skin contact with liquid during spray or heat application of adhesives containing solvent (including polyvinyl formal, polyvinyl butyral, and polyvinyl acetate adhesives)	A,D	Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles or face shield)
3.	Inhalation of vapor and skin contact with liquid during manufacture of photographic film	A,D	Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles or face shield)
4.	Inhalation of vapor and skin contact with liquid during cleaning operations (dry cleaning)	A,D	Local exhaust ventilation; personal protective equipment (goggles or face shield)
5.	Inhalation of vapor and skin contact with liquid during manufacture and packaging of substance	A,D	Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles or face shield)
6.	Inhalation of vapor and skin contact with liquid during manufacture of surface coatings containing solvent (lacquers, dopes, varnishes, nail polish)		Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles or face shield)
7.	Inhalation of vapor and skin contact with liquid during manufacture of adhesives containing	A,D	Local exhaust ventilation; general dilution ventilation; personal protective equipment (goggles or face

solvent shield)

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