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DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS

DIRECTOR'S OFFICE

CONSTRUCTION SAFETY AND HEALTH STANDARD

Filed with the Secretary of State on **December 12, 2018**

These rules become effective immediately upon filing with the secretary of state unless adopted under section 33, 44, or 45a(6) of the administrative procedures act of 1969, 1969 PA 306, MCL 24.233, 24.244, or 24.245a. Rules adopted under these sections become effective 7 days after filing with the secretary of state.

(By authority conferred on the director of the department of licensing and regulatory affairs by sections 14, 16, 19, 21, and 24 of the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1014, 408.1016, 408.1019, 408.1021, and 408.1024, and Executive Reorganization Order Nos. 1996-1, 1996-2, 2003-1, 2008-4, and 2011-4, MCL 330.3101, 445.2001, 445.2011, 445.2025, and 445.2030)

R 325.60501 is added to the Michigan Administrative Code, as follows:

CONSTRUCTION SAFETY AND HEALTH STANDARD
PART 605 METHYLENEDIANILINE (MDA) IN CONSTRUCTION

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R 325.60501 Scope, application, adoption, and availability of standards.

Rule 501. (1) These rules apply to all construction operations as defined in the Michigan occupational safety and health act (MIOSHA), 1974 PA 154, MCL 408.1001 to 408.1094, in which there is exposure to MDA, including but not limited to all of the following:

(a) Construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain MDA.

(b) Installation or the finishing of surfaces with products containing MDA.

(c) MDA spill or emergency cleanup, or both, at construction sites.

(d) Transportation, disposal, storage, or containment of MDA or products containing MDA on the site or location at which construction activities are performed.

(2) Except as provided in subrule (7) of this rule and 29 CFR 1926.60(f)(5), these rules do not apply to the processing, use, and handling of products containing MDA if initial monitoring indicates that the product is not capable of releasing MDA in excess of the action level under the expected conditions of processing, use, and handling that will cause the greatest possible release, and if no "dermal exposure to MDA" can occur.

(3) Except as provided in subrule (7) of this rule, these rules do not apply to the processing, use, and handling of products containing MDA if objective data are reasonably relied upon that demonstrate the product is not capable of releasing MDA under the expected conditions of processing, use, and handling that will cause the greatest possible release, and if no "dermal exposure to MDA" can occur.

(4) Except as provided in subrule (7) of this rule, these rules do not apply to the storage, transportation, distribution or sale of MDA in intact containers sealed in such a manner as to contain the MDA dusts, vapors, or liquids, except for the provisions of Construction Safety Standard Part 42. “Hazard Communication,” and 29 CFR 1926.60(e).

(5) Except as provided in subrule (7) of this rule, these rules do not apply to materials in any form that contain less than 0.1% MDA by weight or volume.

(6) Except as provided in subrule (7) of this rule, these rules do not apply to "finished articles containing MDA."

(7) If products containing MDA are exempted under subrules (2) to (6) of this rule, the employer shall maintain records of the initial monitoring results or objective data supporting that exemption and the basis for the employer's reliance on the data, as provided in the recordkeeping provision of 29 CFR 1926.60(o).

(8) These rules do not apply to general industry. Exposure to MDA in general industry is covered by General Industry Safety and Health Standard Part 303. “Methylenedianiline (MDA) in General Industry.”

(9) The following federal Occupational Safety and Health Administration (OSHA) regulations are adopted by reference in these rules:

(a) 29 CFR 1926.60 “Methylenedianiline,” as amended April 11, 2018.

(b) 29 CFR 1926.60, appendix A “Substance Data Sheet, for 4,4’-Methylenedianiline,” as amended June 20, 1996.

(c) 29 CFR 1926.60, appendix B “Substance Technical Guidelines, MDA,” as amended June 20, 1996.

(d) 29 CFR 1926.60, appendix C “Medical Surveillance Guidelines for MDA,” as amended June 20, 1996.

(e) 29 CFR 1926.60, appendix D “Sampling and Analytical Methods for MDA Monitoring and Measurement Procedures,” as amended June 20, 1996.

(10) A reference to 29 CFR 1910.133 means Construction Safety and Health Standard Part 6. “Personal Protective Equipment.”

(11) A reference to 29 CFR 1910.38 means Construction Safety Standard Part 18. “Fire Protection and Prevention.”

(12) A reference to 29 CFR 1910.1200 means Construction Safety Standard Part 42. “Hazard Communication.”

(13) A reference to 29 CFR 1910.141 means General Industry Safety and Health Standard Part 474. “Sanitation.”

(14) A reference to 29 CFR 1910.1020 and 1926.33 means General Industry and Construction Safety and Health Standard Part 470. “Employee Medical Records and Trade Secrets.”

(15) A reference to 29 CFR 1910.134 means Occupational Health Standard Part 451. “Respiratory Protection.”

(16) The adopted federal regulations have the same force and effect as a rule promulgated under the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1001 to 408.1094.

(17) The OSHA regulations adopted in these rules are available from the United States Department of Labor, Occupational Safety and Health Administration website, www.osha.gov, at no charge, as of the time of adoption of these rules.

(18) The regulations adopted in these rules are available for inspection at the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143.

(19) The regulations adopted in these rules may be obtained from the publisher or the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143, at the cost charged in this rule, plus $20.00 for shipping and handling.

(20) The following Michigan Occupational Safety and Health Administration (MIOSHA) standards are referenced in these rules. Up to 5 copies of these standards may be obtained at no charge from the Michigan Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143 or via the internet at the following website: www.michigan.gov/mioshastandards. For quantities greater then 5, the cost, as of the time of adoption of these rules, is 4 cents per page.

(a) Construction Safety and Health Standard Part 6. "Personal Protective Equipment," R 408.40601 to R 408.40660.

(b) Construction Safety Standard Part 18. "Fire Protection and Prevention," R 408.41801 to R 408.41884.

(c) Construction Safety Standard Part 42. "Hazard Communication," R 408.44201 to R 408.44204.

(d) General Industry Safety and Health Standard Part 303. "Methylenedianiline (MDA) in General Industry," R 325.50051 to R 325.50076.

(e) General Industry Safety and Health Standard Part 474. "Sanitation," R 325.47401 to R 325.47425.

(f) General Industry and Construction Safety and Health Standard Part 470. "Employee Medical Records and Trade Secrets," R 325.3451 to R 325.3476.

(g) Occupational Health Standard Part 451. "Respiratory Protection," R 325.60051 to R 325.60052.

1926.60 – METHYLENEDIANILINE

1926.60(a) Scope and application.

1926.60(a)(1) This section applies to all construction work as defined in 29 CFR 1910.12(b), in which there is exposure to MDA, including but not limited to the following:

1926.60(a)(1)(i) Construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain MDA;

1926.60(a)(1)(ii) Installation or the finishing of surfaces with products containing MDA;

1926.60(a)(1)(iii) MDA spill/emergency cleanup at construction sites; and

1926.60(a)(1)(iv) Transportation, disposal, storage, or containment of MDA or products containing MDA on the site or location at which construction activities are performed.

1926.60(a)(2) Except as provided in paragraphs (a)(7) and (f)(5) of this section, this section does not apply to the processing, use, and handling of products containing MDA where initial monitoring indicates that the product is not capable of releasing MDA in excess of the action level under the expected conditions of processing, use, and handling which will cause the greatest possible release; and where no dermal exposure to MDA can occur.

1926.60(a)(3) Except as provided in paragraph (a)(7) of this section, this section does not apply to the processing, use, and handling of products containing MDA where objective data are reasonably relied upon which demonstrate the product is not capable of releasing MDA under the expected conditions of processing, use, and handling which will cause the greatest possible release; and where no dermal exposure to MDA can occur.

1926.60(a)(4) Except as provided in paragraph (a)(7) of this section, this section does not apply to the storage, transportation, distribution or sale of MDA in intact containers sealed in such a manner as to contain the MDA dusts, vapors, or liquids, except for the provisions of 29 CFR 1910.1200 and paragraph (e) of this section.

1926.60(a)(5) Except as provided in paragraph (a)(7) of this section, this section does not apply to materials in any form which contain less than 0.1% MDA by weight or volume.

1926.60(a)(6) Except as provided in paragraph (a)(7) of this section, this section does not apply to finished articles containing MDA.

1926.60(a)(7) Where products containing MDA are exempted under paragraphs (a)(2) through (a)(6) of this section, the employer shall maintain records of the initial monitoring results or objective data supporting that exemption and the basis for the employer's reliance on the data, as provided in the recordkeeping provision of paragraph (o) of this section.

1926.60(b) Definitions.

For the purpose of this section, the following definitions shall apply:

Action level means a concentration of airborne MDA of 5 ppb as an eight (8)-hour time-weighted average.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Authorized person means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring and measuring procedures under paragraph (p) of this section, or any other person authorized by the Act or regulations issued under the Act.

Container means any barrel, bottle, can, cylinder, drum, reaction vessel, storage tank, commercial packaging or the like, but does not include piping systems.

Decontamination area means an area outside of but as near as practical to the regulated area, consisting of an equipment storage area, wash area, and clean change area, which is used for the decontamination of workers, materials, and equipment contaminated with MDA.

Dermal exposure to MDA occurs where employees are engaged in the handling, application or use of mixtures or materials containing MDA, with any of the following non-airborne forms of MDA:

(i) Liquid, powdered, granular, or flaked mixtures containing MDA in concentrations greater than 0.1% by weight or volume; and

(ii)Materials other than finished articles containing MDA in concentrations greater than 0.1% by weight or volume.

Director means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which results in an unexpected and potentially hazardous release of MDA.

Employee exposure means exposure to MDA which would occur if the employee were not using respirators or protective work clothing and equipment.

Finished article containing MDA is defined as a manufactured item:

(i) Which is formed to a specific shape or design during manufacture;

(ii) Which has end use function(s) dependent in whole or part upon its shape or design during end use; and

(iii) Where applicable, is an item which is fully cured by virtue of having been subjected to the conditions (temperature, time) necessary to complete the desired chemical reaction.

Historical monitoring data means monitoring data for construction jobs that meet the following conditions:

(i) The data upon which judgments are based are scientifically sound and were collected using methods that are sufficiently accurate and precise;

(ii) The processes and work practices that were in use when the historical monitoring data were obtained are essentially the same as those to be used during the job for which initial monitoring will not be performed;

(iii) The characteristics of the MDA-containing material being handled when the historical monitoring data were obtained are the same as those on the job for which initial monitoring will not be performed;

(iv) Environmental conditions prevailing when the historical monitoring data were obtained are the same as those on the job for which initial monitoring will not be performed; and

(v) Other data relevant to the operations, materials, processing, or employee exposures covered by the exception are substantially similar. The data must be scientifically sound, the characteristics of the MDA containing material must be similar and the environmental conditions comparable.

4,4'Methylenedianiline or MDA means the chemical; 4,4'-diaminodiphenylmethane, Chemical Abstract Service Registry number 101-77-9, in the form of a vapor, liquid, or solid. The definition also includes the salts of MDA.

Regulated Areas means areas where airborne concentrations of MDA exceed or can reasonably be expected to exceed, the permissible exposure limits, or where dermal exposure to MDA can occur.

STEL means short term exposure limit as determined by any 15-minute sample period.

1926.60(c) Permissible exposure limits.

The employer shall assure that no employee is exposed to an airborne concentration of MDA in excess of ten parts per billion (10 ppb) as an 8-hour time-weighted average and a STEL of one hundred parts per billion (100 ppb).

1926.60(d) Communication among employers.

On multi-employer worksites, an employer performing work involving the application of MDA or materials containing MDA for which establishment of one or more regulated areas is required shall inform other employers on the site of the nature of the employer's work with MDA and of the existence of, and requirements pertaining to, regulated areas.

1926.60(e) Emergency situations.

1926.60(e)(1) Written plan.

1926.60(e)(1)(i) A written plan for emergency situations shall be developed for each construction operation where there is a possibility of an emergency. The plan shall include procedures where the employer identifies emergency escape routes for his employees at each construction site before the construction operation begins. Appropriate portions of the plan shall be implemented in the event of an emergency.

1926.60(e)(1)(ii) The plan shall specifically provide that employees engaged in correcting emergency conditions shall be equipped with the appropriate personal protective equipment and clothing as required in paragraphs (i) and (j) of this section until the emergency is abated.

1926.60(e)(1)(iii) The plan shall specifically include provisions for alerting and evacuating affected employees as well as the applicable elements prescribed in 29 CFR 1910.38, "Employee emergency plans and fire prevention plans."

1926.60(e)(2) Alerting employees. Where there is the possibility of employee exposure to MDA due to an emergency, means shall be developed to promptly alert employees who have the potential to be directly exposed. Affected employees not engaged in correcting emergency conditions shall be evacuated immediately in the event that an emergency occurs. Means shall also be developed for alerting other employees who may be exposed as a result of the emergency.

1926.60(f) Exposure monitoring.

1926.60(f)(1) General.

1926.60(f)(1)(i) Determinations of employee exposure shall be made from breathing zone air samples that are representative of each employee's exposure to airborne MDA over an eight (8) hour period. Determination of employee exposure to the STEL shall be made from breathing zone air samples collected over a 15 minute sampling period.

1926.60(f)(1)(ii) Representative employee exposure shall be determined on the basis of one or more samples representing full shift exposure for each shift for each job classification in each work area where exposure to MDA may occur.

1926.60(f)(1)(iii) Where the employer can document that exposure levels are equivalent for similar operations in different work shifts, the employer shall only be required to determine representative employee exposure for that operation during one shift.

1926.60(f)(2) Initial monitoring. Each employer who has a workplace or work operation covered by this standard shall perform initial monitoring to determine accurately the airborne concentrations of MDA to which employees may be exposed unless:
1926.60(f)(2)(i) the employer can demonstrate, on the basis of objective data, that the MDA-containing product or material being handled cannot cause exposures above the standard's action level, even under worst-case release conditions; or
1926.60(f)(2)(ii) The employer has historical monitoring or other data demonstrating that exposures on a particular job will be below the action level.

1926.60(f)(3) Periodic monitoring and monitoring frequency.
1926.60(f)(3)(i) If the monitoring required by paragraph (f)(2) of this section reveals employee exposure at or above the action level, but at or below the PELs, the employer shall repeat such monitoring for each such employee at least every six (6) months.
1926.60(f)(3)(ii) If the monitoring required by paragraph (f)(2) of this section reveals employee exposure above the PELs, the employer shall repeat such monitoring for each such employee at least every three (3) months.
1926.60(f)(3)(iii) Employers who are conducting MDA operations within a regulated area can forego periodic monitoring if the employees are all wearing supplied-air respirators while working in the regulated area.
1926.60(f)(3)(iv) The employer may alter the monitoring schedule from every three months to every six months for any employee for whom two consecutive measurements taken at least 7 days apart indicate that the employee exposure has decreased to below the PELs but above the action level.

1926.60(f)(4) Termination of monitoring.
1926.60(f)(4)(i) If the initial monitoring required by paragraph (f)(2) of this section reveals employee exposure to be below the action level, the employer may discontinue the monitoring for that employee, except as otherwise required by paragraph (f)(5) of this section.
1926.60(f)(4)(ii) If the periodic monitoring required by paragraph (f)(3) of this section reveals that employee exposures, as indicated by at least two consecutive measurements taken at least 7 days apart, are below the action level the employer may discontinue the monitoring for that employee, except as otherwise required by paragraph (f)(5) of this section.

1926.60(f)(5) Additional monitoring. The employer shall institute the exposure monitoring required under paragraphs (f)(2) and (f)(3) of this section when there has been a change in production process, chemicals present, control equipment, personnel, or work practices which may result in new or additional exposures to MDA, or when the employer has any reason to suspect a change which may result in new or additional exposures.

1926.60(f)(6) Accuracy of monitoring. Monitoring shall be accurate, to a confidence level of 95 percent, to within plus or minus 25 percent for airborne concentrations of MDA.

1926.60(f)(7) Employee notification of monitoring results.
1926.60(f)(7)(i) The employer must, as soon as possible but no later than 5 working days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results either individually in writing or by posting the results in an appropriate location that is accessible to employees.
1926.60(f)(7)(ii) The written notification required by paragraph (f)(7)(i) of this section shall contain the corrective action being taken by the employer or any other protective measures which have been implemented to reduce the employee exposure to or below the PELs, wherever the PELs are exceeded.

1926.60(f)(8) Visual monitoring. The employer shall make routine inspections of employee hands, face and forearms potentially exposed to MDA. Other potential dermal exposures reported by the employee must be referred to the appropriate medical personnel for observation. If the employer determines that the employee has been exposed to MDA the employer shall:
1926.60(f)(8)(i) Determine the source of exposure;
1926.60(f)(8)(ii) Implement protective measures to correct the hazard; and
1926.60(f)(8)(iii) Maintain records of the corrective actions in accordance with paragraph (o) of this section.

1926.60(g) Regulated areas.
1926.60(g)(1) Establishment.
1926.60(g)(1)(i) Airborne exposures. The employer shall establish regulated areas where airborne concentrations of MDA exceed or can reasonably be expected to exceed, the permissible exposure limits.
1926.60(g)(1)(ii) Dermal exposures. Where employees are subject to "dermal exposure to MDA" the employer shall establish those work areas as regulated areas.

1926.60(g)(2) Demarcation. Regulated areas shall be demarcated from the rest of the workplace in a manner that minimizes the number of persons potentially exposed.

1926.60(g)(3) Access. Access to regulated areas shall be limited to authorized persons.

1926.60(g)(4) Personal protective equipment and clothing. Each person entering a regulated area shall be supplied with, and required to use, the appropriate personal protective clothing and equipment in accordance with paragraphs (i) and (j) of this section.

1926.60(g)(5) Prohibited activities. The employer shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.

1926.60(h) Methods of compliance.
1926.60(h)(1) Engineering controls and work practices and respirators.
1926.60(h)(1)(i) The employer shall use one or any combination of the following control methods to achieve compliance with the permissible exposure limits prescribed by paragraph (c) of this section:
1926.60(h)(1)(i)(A) Local exhaust ventilation equipped with HEPA filter dust collection systems;
1926.60(h)(1)(i)(B) General ventilation systems;
1926.60(h)(1)(i)(C) Use of work practices; or
1926.60(h)(1)(i)(D) Other engineering controls such as isolation and enclosure that the Assistant Secretary can show to be feasible.
1926.60(h)(1)(ii) Wherever the feasible engineering controls and work practices which can be instituted are not sufficient to reduce employee exposure to or below the PELs, the employer shall use them to reduce employee exposure to the lowest levels achievable by these controls and shall supplement them by the use of respiratory protective devices which comply with the requirements of paragraph (i) of this section.

1926.60(h)(2) Special Provisions. For workers engaged in spray application methods, respiratory protection must be used in addition to feasible engineering controls and work practices to reduce employee exposure to or below the PELs.

1926.60(h)(3) Prohibitions. Compressed air shall not be used to remove MDA, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

1926.60(h)(4) Employee rotation. The employer shall not use employee rotation as a means of compliance with the exposure limits prescribed in paragraph (c) of this section.

1926.60(h)(5) Compliance program.
1926.60(h)(5)(i) The employer shall establish and implement a written program to reduce employee exposure to or below the PELs by means of engineering and work practice controls, as required by paragraph (h)(1) of this section, and by use of respiratory protection where permitted under this section.
1926.60(h)(5)(ii) Upon request this written program shall be furnished for examination and copying to the Assistant Secretary, the Director, affected employees and designated employee representatives. The employer shall review and, as necessary, update such plans at least once every 12 months to make certain they reflect the current status of the program.

1926.60(i) Respiratory protection.
1926.60(i)(1) General. For employees who use respirators required by this section, the employer must provide each employee an appropriate respirator that complies with the requirements of this paragraph. Respirators must be used during:
1926.60(i)(1)(i) Periods necessary to install or implement feasible engineering and work-practice controls.
1926.60(i)(1)(ii) Work operations, such as maintenance and repair activities and spray-application processes, for which engineering and work-practice controls are not feasible.
1926.60(i)(1)(iii) Work operations for which feasible engineering and work-practice controls are not yet sufficient to reduce employee exposure to or below the PELs.
1926.60(i)(1)(iv) Emergencies.

1926.60(i)(2) Respirator program. The employer must implement a respiratory protection program in accordance with § 1910.134 (b) through (d) (except (d)(1)(iii)), and (f) through (m), which covers each employee required by this section to use a respirator.

1926.60(i)(3) Respirator selection.
1926.60(i)(3)(i) Employers must:
1926.60(i)(3)(i)(A) Select, and provide to employees, the appropriate respirators specified in paragraph (d)(3)(i)(A) of 29 CFR 1910.134.
1926.60(i)(3)(i)(B) Provide HEPA filters for powered and non-powered air-purifying respirators.
1926.60(i)(3)(i)(C) For escape, provide employees with one of the following respirator options: Any self-contained breathing apparatus with a full facepiece or hood operated in the positive-pressure or continuous-flow mode; or a full facepiece air-purifying respirator.
1926.60(i)(3)(i)(D) Provide a combination HEPA filter and organic vapor canister or cartridge with air-purifying respirators when MDA is in liquid form or used as part of a process requiring heat.
1926.60(i)(3)(ii) An employee who cannot use a negative-pressure respirator must be given the option of using a positive-pressure respirator, or a supplied-air respirator operated in the continuous-flow or pressure-demand mode.

1926.60(j) Protective work clothing and equipment.
1926.60(j)(1) Provision and use. Where employees are subject to dermal exposure to MDA, where liquids containing MDA can be splashed into the eyes, or where airborne concentrations of MDA are in excess of the PEL, the employer shall provide, at no cost to the employee, and ensure that the employee uses, appropriate protective work clothing and equipment which prevent contact with MDA such as, but not limited to:
1926.60(j)(1)(i) Aprons, coveralls or other full-body work clothing;
1926.60(j)(1)(ii) Gloves, head coverings, and foot coverings; and
1926.60(j)(1)(iii) Face shields, chemical goggles; or
1926.60(j)(1)(iv) Other appropriate protective equipment which comply with 1910.133.

1926.60(j)(2) Removal and storage.
1926.60(j)(2)(i) The employer shall ensure that, at the end of their work shift, employees remove MDA-contaminated protective work clothing and equipment that is not routinely removed throughout the day in change areas provided in accordance with the provisions in paragraph (k) of this section.
1926.60(j)(2)(ii) The employer shall ensure that, during their work shift, employees remove all other MDA-contaminated protective work clothing or equipment before leaving a regulated area.
1926.60(j)(2)(iii) The employer shall ensure that no employee takes MDA-contaminated work clothing or equipment out of the decontamination areas, except those employees authorized to do so for the purpose of laundering, maintenance, or disposal.
1926.60(j)(2)(iv) MDA-contaminated work clothing or equipment shall be placed and stored and transported in sealed, impermeable bags, or other closed impermeable containers.
1926.60(j)(2)(v) Containers of MDA-contaminated protective work clothing or equipment which are to be taken out of decontamination areas or the workplace for cleaning, maintenance, or disposal, shall bear labels warning of the hazards of MDA.

1926.60(j)(3) Cleaning and replacement.
1926.60(j)(3)(i) The employer shall provide the employee with clean protective clothing and equipment. The employer shall ensure that protective work clothing or equipment required by this paragraph is cleaned, laundered, repaired, or replaced at intervals appropriate to maintain its effectiveness.
1926.60(j)(3)(ii) The employer shall prohibit the removal of MDA from protective work clothing or equipment by blowing, shaking, or any methods which allow MDA to re-enter the workplace.
1926.60(j)(3)(iii) The employer shall ensure that laundering of MDA-contaminated clothing shall be done so as to prevent the release of MDA in the workplace.
1926.60(j)(3)(iv) Any employer who gives MDA-contaminated clothing to another person for laundering shall inform such person of the requirement to prevent the release of MDA.
1926.60(j)(3)(v) The employer shall inform any person who launders or cleans protective clothing or equipment contaminated with MDA of the potentially harmful effects of exposure.

1926.60(j)(4) Visual Examination.
1926.60(j)(4)(i) The employer shall ensure that employees' work clothing is examined periodically for rips or tears that may occur during performance of work.
1926.60(j)(4)(ii) When rips or tears are detected, the protective equipment or clothing shall be repaired and replaced immediately.

1926.60(k) Hygiene facilities and practices.

1926.60(k)(1) General.

1926.60(k)(1)(i) The employer shall provide decontamination areas for employees required to work in regulated areas or required by paragraph (j)(1) of this section to wear protective clothing. Exception: In lieu of the decontamination area requirement specified in paragraph (k)(1)(i) of this section, the employer may permit employees engaged in small scale, short duration operations, to clean their protective clothing or dispose of the protective clothing before such employees leave the area where the work was performed.

1926.60(k)(1)(ii) Change areas. The employer shall ensure that change areas are equipped with separate storage facilities for protective clothing and street clothing, in accordance with 29 CFR 1910.141(e).

1926.60(k)(1)(iii) Equipment area. The equipment area shall be supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective clothing and equipment.

1926.60(k)(2) Shower area.

1926.60(k)(2)(i) Where feasible, shower facilities shall be provided which comply with 29 CFR 1910.141(d)(3) wherever the possibility of employee exposure to airborne levels of MDA in excess of the permissible exposure limit exists.

1926.60(k)(2)(ii) Where dermal exposure to MDA occurs, the employer shall ensure that materials spilled or deposited on the skin are removed as soon as possible by methods which do not facilitate the dermal absorption of MDA.

1926.60(k)(3) Lunch Areas.

1926.60(k)(3)(i) Whenever food or beverages are consumed at the worksite and employees are exposed to MDA the employer shall provide clean lunch areas were MDA levels are below the action level and where no dermal exposure to MDA can occur.

1926.60(k)(3)(ii) The employer shall ensure that employees wash their hands and faces with soap and water prior to eating, drinking, smoking, or applying cosmetics.

1926.60(k)(3)(iii) The employer shall ensure that employees do not enter lunch facilities with contaminated protective work clothing or equipment.

1926.60(l) Communication of hazards to employees.

1926.60(l)(1) Hazard communication. The employer shall include Methylenedianiline (MDA) in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of MDA and safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (l)(3) of this section. The employer shall ensure that at least the following hazards are addressed: Cancer; liver effects; and skin sensitization.

1926.60(l)(2) Signs and labels

1926.60(l)(2)(i) Signs.

1926.60(l)(2)(i)(A) The employer shall post and maintain legible signs demarcating regulated areas and entrances or access-ways to regulated areas that bear the following legend:

DANGER
MDA
MAY CAUSE CANCER
CAUSES DAMAGE TO THE LIVER
RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING MAY BE REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

1926.60(l)(2)(i)(B) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(i)(A) of this section:

DANGER
MDA
MAY CAUSE CANCER
LIVER TOXIN
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING MAY BE REQUIRED TO BE WORN IN THIS AREA

1926.60(l)(2)(ii) Labels.
1926.60(l)(2)(ii)(A) The employer shall ensure that labels or other appropriate forms of warning are provided for containers of MDA within the workplace. The labels shall comply with the requirements of § 1910.1200(f) and shall include at least the following information for pure MDA and mixtures containing MDA:

DANGER CONTAINS MDA MAY CAUSE CANCER CAUSES DAMAGE TO THE LIVER

1926.60(l)(2)(ii)(B) Prior to June 1, 2015, employers may include the following information workplace labels in lieu of the labeling requirements in paragraph (l)(2)(ii)(A) of this section:
1926.60(l)(2)(ii)(B)(1) For Pure MDA:

DANGER CONTAINS MDA MAY CAUSE CANCER LIVER TOXIN

1926.60(l)(2)(ii)(B)(2) For mixtures containing MDA:

DANGER CONTAINS MDA CONTAINS MATERIALS WHICH MAY CAUSE CANCER LIVER TOXIN

1926.60(l)(3) Information and training.
1926.60(l)(3)(i) The employer shall provide employees with information and training on MDA, in accordance with 29 CFR 1910.1200(h), at the time of initial assignment and at least annually thereafter.
1926.60(l)(3)(ii) In addition to the information required under 29 CFR 1910.1200, the employer shall:
1926.60(l)(3)(ii)(A) Provide an explanation of the contents of this section, including appendices A and B, and indicate to employees where a copy of the standard is available;
1926.60(l)(3)(ii)(B) Describe the medical surveillance program required under paragraph (n) of this section, and explain the information contained in Appendix C of the section; and
1926.60(l)(3)(ii)(C) Describe the medical removal provision required under paragraph (n) of this section.

1926.60(l)(4) Access to training materials.
1926.60(l)(4)(i) The employer shall make readily available to all affected employees, without cost, all written materials relating to the employee training program, including a copy of this regulation.
1926.60(l)(4)(ii) The employer shall provide to the Assistant Secretary and the Director, upon request, all information and training materials relating to the employee information and training program.

1926.60(m) Housekeeping.
1926.60(m)(1) All surfaces shall be maintained as free as practicable of visible accumulations of MDA.
1926.60(m)(2) The employer shall institute a program for detecting MDA leaks, spills, and discharges, including regular visual inspections of operations involving liquid or solid MDA.
1926.60(m)(3) All leaks shall be repaired and liquid or dust spills cleaned up promptly.
1926.60(m)(4) Surfaces contaminated with MDA may not be cleaned by the use of compressed air.
1926.60(m)(5) Shoveling, dry sweeping, and other methods of dry clean-up of MDA may be used where HEPA filtered vacuuming and/or wet cleaning are not feasible or practical.
1926.60(m)(6) Waste, scrap, debris, bags, containers, equipment, and clothing contaminated with MDA shall be collected and disposed of in a manner to prevent the re-entry of MDA into the workplace.

1926.60(n) Medical surveillance.
1926.60(n)(1) General.
1926.60(n)(1)(i) The employer shall make available a medical surveillance program for employees exposed to MDA under the following circumstances:
1926.60(n)(1)(i)(A) Employees exposed at or above the action level for 30 or more days per year;
1926.60(n)(1)(i)(B) Employees who are subject to dermal exposure to MDA for 15 or more days per year;
1926.60(n)(1)(i)(C) Employees who have been exposed in an emergency situation;
1926.60(n)(1)(i)(D) Employees whom the employer, based on results from compliance with paragraph (f)(8), has reason to believe are being dermally exposed; and
1926.60(n)(1)(i)(E) Employees who show signs or symptoms of MDA exposure.
1926.60(n)(1)(ii) The employer shall ensure that all medical examinations and procedures are performed by or under the supervision of a licensed physician at a reasonable time and place, and provided without cost to the employee.

1926.60(n)(2) Initial examinations.
1926.60(n)(2)(i) Within 150 days of the effective date of this standard, or before the time of initial assignment, the employer shall provide each employee covered by paragraph (n)(1)(i) of this section with a medical examination including the following elements:
1926.60(n)(2)(i)(A) A detailed history which includes:
1926.60(n)(2)(i)(A)(1) Past work exposure to MDA or any other toxic substances;
1926.60(n)(2)(i)(A)(2) A history of drugs, alcohol, tobacco, and medication routinely taken (duration and quantity); and
1926.60(n)(2)(i)(A)(3) A history of dermatitis, chemical skin sensitization, or previous hepatic disease.
1926.60(n)(2)(i)(B) A physical examination which includes all routine physical examination parameters, skin examination, and examination for signs of liver disease.
1926.60(n)(2)(i)(C) Laboratory tests including:
1926.60(n)(2)(i)(C)(1) Liver function tests and (2) Urinalysis
1926.60(n)(2)(i)(D) Additional tests as necessary in the opinion of the physician.
1926.60(n)(2)(ii) No initial medical examination is required if adequate records show that the employee has been examined in accordance with the requirements of this section within the previous six months prior to the effective date of this standard or prior to the date of initial assignment.

1926.60(n)(3) Periodic examinations.
1926.60(n)(3)(i) The employer shall provide each employee covered by this section with a medical examination at least annually following the initial examination. These periodic examinations shall include at least the following elements:
1926.60(n)(3)(i)(A) A brief history regarding any new exposure to potential liver toxins, changes in drug, tobacco, and alcohol intake, and the appearance of physical signs relating to the liver, and the skin;
1926.60(n)(3)(i)(B) The appropriate tests and examinations including liver function tests and skin examinations; and
1926.60(n)(3)(i)(C) Appropriate additional tests or examinations as deemed necessary by the physician.
1926.60(n)(3)(ii) If in the physician's opinion the results of liver function tests indicate an abnormality, the employee shall be removed from further MDA exposure in accordance with paragraph (n)(9) of this section. Repeat liver function tests shall be conducted on advice of the physician.

1926.60(n)(4) Emergency examinations. If the employer determines that the employee has been exposed to a potentially hazardous amount of MDA in an emergency situation under paragraph (e) of this section, the employer shall provide medical examinations in accordance with paragraph (n)(3)(i) and (ii) of this section . If the results of liver function testing indicate an abnormality, the employee shall be removed in accordance with paragraph (n)(9) of this section. Repeat liver function tests shall be conducted on the advice of the physician. If the results of the tests are normal, tests must be repeated two to three weeks from the initial testing. If the results of the second set of tests are normal and on the advice of the physician, no additional testing is required.

1926.60(n)(5) Additional examinations. Where the employee develops signs and symptoms associated with exposure to MDA, the employer shall provide the employee with an additional medical examination including liver function tests. Repeat liver function tests shall be conducted on the advice of the physician. If the results of the tests are normal, tests must be repeated two to three weeks from the initial testing. If the results of the second set of tests are normal and on the advice of the physician, no additional testing is required.

1926.60(n)(6) Multiple physician review mechanism.

1926.60(n)(6)(i) If the employer selects the initial physician who conducts any medical examination or consultation provided to an employee under this section, and the employee has signs or symptoms of occupational exposure to MDA (which could include an abnormal liver function test), and the employee disagrees with the opinion of the examining physician, and this opinion could affect the employee's job status, the employee may designate an appropriate and mutually acceptable second physician:

1926.60(n)(6)(i)(A) To review any findings, determinations or recommendations of the initial physician; and

1926.60(n)(6)(i)(B) To conduct such examinations, consultations, and laboratory tests as the second physician deems necessary to facilitate this review.

1926.60(n)(6)(ii) The employer shall promptly notify an employee of the right to seek a second medical opinion after each occasion that an initial physician conducts a medical examination or consultation pursuant to this section. The employer may condition its participation in, and payment for, the multiple physician review mechanism upon the employee doing the following within fifteen (15) days after receipt of the foregoing notification, or receipt of the initial physician's written opinion, whichever is later:

1926.60(n)(6)(ii)(A) The employee informing the employer that he or she intends to seek a second medical opinion, and

1926.60(n)(6)(ii)(B) The employee initiating steps to make an appointment with a second physician.

1926.60(n)(6)(iii) If the findings, determinations, or recommendations of the second physician differ from those of the initial physician, then the employer and the employee shall assure that efforts are made for the two physicians to resolve any disagreement.

1926.60(n)(6)(iv) If the two physicians have been unable to quickly resolve their disagreement, then the employer and the employee through their respective physicians shall designate a third physician:

1926.60(n)(6)(iv)(A) To review any findings, determinations, or recommendations of the prior physicians; and

1926.60(n)(6)(iv)(B) To conduct such examinations, consultations, laboratory tests, and discussions with the prior physicians as the third physician deems necessary to resolve the disagreement of the prior physicians.

1926.60(n)(6)(v) The employer shall act consistent with the findings, determinations, and recommendations of the second physician, unless the employer and the employee reach a mutually acceptable agreement.

1926.60(n)(7) Information provided to the examining physician.

1926.60(n)(7)(i) The employer shall provide the following information to the examining physician:

1926.60(n)(7)(i)(A) A copy of this regulation and its appendices;

1926.60(n)(7)(i)(B) A description of the affected employee's duties as they relate to the employee's potential exposure to MDA;

1926.60(n)(7)(i)(C) The employee's current actual or representative MDA exposure level;

1926.60(n)(7)(i)(D) A description of any personal protective equipment used or to be used; and

1926.60(n)(7)(i)(E) Information from previous employment related medical examinations of the affected employee.

1926.60(n)(7)(ii) The employer shall provide the foregoing information to a second physician under this section upon request either by the second physician, or by the employee.

1926.60(n)(8) Physician's written opinion.

1926.60(n)(8)(i) For each examination under this section, the employer shall obtain, and provide the employee with a copy of, the examining physician's written opinion within 15 days of its receipt. The written opinion shall include the following:

1926.60(n)(8)(i)(A) The occupationally pertinent results of the medical examination and tests;

1926.60(n)(8)(i)(B) The physician's opinion concerning whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of health from exposure to MDA;

1926.60(n)(8)(i)(C) The physician's recommended limitations upon the employee's exposure to MDA or upon the employee's use of protective clothing or equipment and respirators; and

1926.60(n)(8)(i)(D) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions resulting from MDA exposure which require further explanation or treatment.

1926.60(n)(8)(ii) The written opinion obtained by the employer shall not reveal specific findings or diagnoses unrelated to occupational exposures.

1926.60(n)(9) Medical removal.

1926.60(n)(9)(i) Temporary medical removal of an employee.

1926.60(n)(9)(i)(A) Temporary removal resulting from occupational exposure. The employee shall be removed from work environments in which exposure to MDA is at or above the action level or where dermal exposure to MDA may occur, following an initial examination (paragraph (n)(2) of this section), periodic examinations (paragraph (n)(3) of this section), an emergency situation (paragraph (n)(4) of this section), or an additional examination (paragraph (n)(5) of this section) in the following circumstances:

1926.60(n)(9)(i)(A)(1) When the employee exhibits signs and/or symptoms indicative of acute exposure to MDA; or

1926.60(n)(9)(i)(A)(2) When the examining physician determines that an employee's abnormal liver function tests are not associated with MDA exposure but that the abnormalities may be exacerbated as a result of occupational exposure to MDA.

1926.60(n)(9)(i)(B) Temporary removal due to a final medical determination.

1926.60(n)(9)(i)(B)(1) The employer shall remove an employee from work having an exposure to MDA at or above the action level or where the potential for dermal exposure exists on each occasion that a final medical determination results in a medical finding, determination, or opinion that the employee has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to MDA.

1926.60(n)(9)(i)(B)(2) For the purposes of this section, the phrase "final medical determination" shall mean the outcome of the physician review mechanism used pursuant to the medical surveillance provisions of this section.

1926.60(n)(9)(i)(B)(3) Where a final medical determination results in any recommended special protective measures for an employee, or limitations on an employee's exposure to MDA, the employer shall implement and act consistent with the recommendation.

1926.60(n)(9)(ii) Return of the employee to former job status.

1926.60(n)(9)(ii)(A) The employer shall return an employee to his or her former job status:

1926.60(n)(9)(ii)(A)(1) When the employee no longer shows signs or symptoms of exposure to MDA, or upon the advice of the physician.

1926.60(n)(9)(ii)(A)(2) When a subsequent final medical determination results in a medical finding, determination, or opinion that the employee no longer has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to MDA.

1926.60(n)(9)(ii)(B) For the purposes of this section, the requirement that an employer return an employee to his or her former job status is not intended to expand upon or restrict any rights an employee has or would have had, absent temporary medical removal, to a specific job classification or position under the terms of a collective bargaining agreement.

1926.60(n)(9)(iii) Removal of other employee special protective measure or limitations. The employer shall remove any limitations placed on an employee or end any special protective measures provided to an employee pursuant to a final medical determination when a subsequent final medical determination indicates that the limitations or special protective measures are no longer necessary.

1926.60(n)(9)(iv) Employer options pending a final medical determination. Where the physician review mechanism used pursuant to the medical surveillance provisions of this section, has not yet resulted in a final medical determination with respect to an employee, the employer shall act as follows:

1926.60(n)(9)(iv)(A) Removal. The employer may remove the employee from exposure to MDA, provide special protective measures to the employee, or place limitations upon the employee, consistent with the medical findings, determinations, or recommendations of the physician who has reviewed the employee's health status.

1926.60(n)(9)(iv)(B) Return. The employer may return the employee to his or her former job status, and end any special protective measures provided to the employee, consistent with the medical findings, determinations, or recommendations of any of the physicians who have reviewed the employee's health status, with two exceptions:

1926.60(n)(9)(iv)(B)(1) If the initial removal, special protection, or limitation of the employee resulted from a final medical determination which differed from the findings, determinations, or recommendations of the initial physician; or

1926.60(n)(9)(iv)(B)(2) The employee has been on removal status for the preceding six months as a result of exposure to MDA, then the employer shall await a final medical determination.

1926.60(n)(9)(v) Medical removal protection benefits.

1926.60(n)(9)(v)(A) Provisions of medical removal protection benefits. The employer shall provide to an employee up to six (6) months of medical removal protection benefits on each occasion that an employee is removed from exposure to MDA or otherwise limited pursuant to this section.

1926.60(n)(9)(v)(B) Definition of medical removal protection benefits. For the purposes of this section, the requirement that an employer provide medical removal protection benefits means that the employer shall maintain the earnings, seniority, and other employment rights and benefits of an employee as though the employee had not been removed from normal exposure to MDA or otherwise limited.

1926.60(n)(9)(v)(C) Follow-up medical surveillance during the period of employee removal or limitations. During the period of time that an employee is removed from normal exposure to MDA or otherwise limited, the employer may condition the provision of medical removal protection benefits upon the employee's participation in follow-up medical surveillance made available pursuant to this section.

1926.60(n)(9)(v)(D) Workers' compensation claims. If a removed employee files a claim for workers' compensation payments for a MDA-related disability, then the employer shall continue to provide medical removal protection benefits pending disposition of the claim. To the extent that an award is made to the employee for earnings lost during the period of removal, the employer's medical removal protection obligation shall be reduced by such amount. The employer shall receive no credit for workers' compensation payments received by the employee for treatment-related expenses.

1926.60(n)(9)(v)(E) Other credits. The employer's obligation to provide medical removal protection benefits to a removed employee shall be reduced to the extent that the employee receives compensation for earnings lost during the period of removal either from a publicly or employer-funded compensation program, or receives income from employment with any employer made possible by virtue of the employee's removal.

1926.60(n)(9)(v)(F) Employees who do not recover within the 6 months of removal. The employer shall take the following measures with respect to any employee removed from exposure to MDA:
1926.60(n)(9)(v)(F)(1) The employer shall make available to the employee a medical examination pursuant to this section to obtain a final medical determination with respect to the employee;
1926.60(n)(9)(v)(F)(2) The employer shall assure that the final medical determination obtained indicates whether or not the employee may be returned to his or her former job status, and, if not, what steps should be taken to protect the employee's health;
1926.60(n)(9)(v)(F)(3) Where the final medical determination has not yet been obtained, or once obtained indicates that the employee may not yet be returned to his or her former job status, the employer shall continue to provide medical removal protection benefits to the employee until either the employee is returned to former job status, or a final medical determination is made that the employee is incapable of ever safely returning to his or her former job status; and
1926.60(n)(9)(v)(F)(4) Where the employer acts pursuant to a final medical determination which permits the return of the employee to his or her former job status despite what would otherwise be an unacceptable liver function test, later questions concerning removing the employee again shall be decided by a final medical determination. The employer need not automatically remove such an employee pursuant to the MDA removal criteria provided by this section.
1926.60(n)(9)(vi) Voluntary removal or restriction of an employee. Where an employer, although not required by this section to do so, removes an employee from exposure to MDA or otherwise places limitations on an employee due to the effects of MDA exposure on the employee's medical condition, the employer shall provide medical removal protection benefits to the employee equal to that required by paragraph (n)(9)(v) of this section.

1926.60(o) Recordkeeping.
1926.60(o)(1) Objective data for exempted operations.
1926.60(o)(1)(i) Where the employer has relied on objective data that demonstrate that products made from or containing MDA are not capable of releasing MDA or do not present a dermal exposure problem under the expected conditions of processing, use, or handling to exempt such operations from the initial monitoring requirements under paragraph (f)(2) of this section, the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.
1926.60(o)(1)(ii) The record shall include at least the following information:
1926.60(o)(1)(ii)(A) The product qualifying for exemption;
1926.60(o)(1)(ii)(B) The source of the objective data;
1926.60(o)(1)(ii)(C) The testing protocol, results of testing, and/or analysis of the material for the release of MDA;
1926.60(o)(1)(ii)(D) A description of the operation exempted and how the data support the exemption; and
1926.60(o)(1)(ii)(E) Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption.
1926.60(o)(1)(iii) The employer shall maintain this record for the duration of the employer's reliance upon such objective data.

1926.60(o)(2) Historical monitoring data.
1926.60(o)(2)(i) Where the employer has relied on historical monitoring data that demonstrate that exposures on a particular job will be below the action level to exempt such operations from the initial monitoring requirements under paragraph (f)(2) of this section, the employer shall establish and maintain an accurate record of historical monitoring data reasonably relied upon in support of the exception.
1926.60(o)(2)(ii) The record shall include information that reflect the following conditions:
1926.60(o)(2)(ii)(A) The data upon which judgments are based are scientifically sound and were collected using methods that are sufficiently accurate and precise;
1926.60(o)(2)(ii)(B) The processes and work practices that were in use when the historical monitoring data were obtained are essentially the same as those to be used during the job for which initial monitoring will not be performed;
1926.60(o)(2)(ii)(C) The characteristics of the MDA-containing material being handled when the historical monitoring data were obtained are the same as those on the job for which initial monitoring will not be performed;
1926.60(o)(2)(ii)(D) Environmental conditions prevailing when the historical monitoring data were obtained are the same as those on the job for which initial monitoring will not be performed; and
1926.60(o)(2)(ii)(E) Other data relevant to the operations, materials, processing, or employee exposures covered by the exception.
1926.60(o)(2)(iii) The employer shall maintain this record for the duration of the employer's reliance upon such historical monitoring data.

1926.60(o)(3) The employer may utilize the services of competent organizations such as industry trade associations and employee associations to maintain the records required by this section.

1926.60(o)(4) Exposure measurements.
1926.60(o)(4)(i) The employer shall keep an accurate record of all measurements taken to monitor employee exposure to MDA.
1926.60(o)(4)(ii) This record shall include at least the following information:
1926.60(o)(4)(ii)(A) The date of measurement;
1926.60(o)(4)(ii)(B) The operation involving exposure to MDA;
1926.60(o)(4)(ii)(C) Sampling and analytical methods used and evidence of their accuracy;
1926.60(o)(4)(ii)(D) Number, duration, and results of samples taken;
1926.60(o)(4)(ii)(E) Type of protective devices worn, if any; and
1926.60(o)(4)(ii)(F) Name, social security number, and exposure of the employees whose exposures are represented.
1926.60(o)(4)(iii) The employer shall maintain this record for at least thirty (30) years, in accordance with 29 CFR 1926.33.

1926.60(o)(5) Medical surveillance.
1926.60(o)(5)(i) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance by paragraph (n) of this section, in accordance with 29 CFR 1926.33.
1926.60(o)(5)(ii) The record shall include at least the following information:
1926.60(o)(5)(ii)(A) The name and social security number of the employee;
1926.60(o)(5)(ii)(B) A copy of the employee's medical examination results, including the medical history, questionnaire responses, results of any tests, and physician's recommendations.
1926.60(o)(5)(ii)(C) Physician's written opinions;
1926.60(o)(5)(ii)(D) Any employee medical complaints related to exposure to MDA; and
1926.60(o)(5)(ii)(E) A copy of the information provided to the physician as required by paragraph (n) of this section.
1926.60(o)(5)(iii) The employer shall ensure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with 29 CFR 1926.33.
1926.60(o)(5)(iv) A copy of the employee's medical removal and return to work status.

1926.60(o)(6) Training records. The employer shall maintain all employee training records for one (1) year beyond the last date of employment.

1926.60(o)(7) Availability.
1926.60(o)(7)(i) The employer, upon written request, shall make all records required to be maintained by this section available to the Assistant Secretary and the Director for examination and copying.
1926.60(o)(7)(ii) The employer, upon request, shall make any exposure records required by paragraphs (f) and (n) of this section available for examination and copying to affected employees, former employees, designated representatives, and the Assistant Secretary, in accordance with 29 CFR 1926.33(a)-(e) and (g)-(i).
1926.60(o)(7)(iii) The employer, upon request, shall make employee medical records required by paragraphs (n) and (o) of this section available for examination and copying to the subject employee, anyone having the specific written consent of the subject employee, and the Assistant Secretary, in accordance with 29 CFR 1926.33.

1926.60(o)(8) Transfer of records. The employer shall comply with the requirements concerning transfer of records set forth in 29 CFR 1910.1020(h).

1926.60(p) Observation of monitoring.
1926.60(p)(1) Employee observation. The employer shall provide affected employees, or their designated representatives, an opportunity to observe the measuring or monitoring of employee exposure to MDA conducted pursuant to paragraph (f) of this section.

1926.60(p)(2) Observation procedures. When observation of the measuring or monitoring of employee exposure to MDA requires entry into areas where the use of protective clothing and equipment or respirators is required, the employer shall provide the observer with personal protective clothing and equipment or respirators required to be worn by employees working in the area, assure the use of such clothing and equipment or respirators, and require the observer to comply with all other applicable safety and health procedures.

1926.60(q) Appendices.
The information contained in appendices A, B, C, and D of this section is not intended, by itself, to create any additional obligations not otherwise imposed by this standard nor detract from any existing obligation.

[61 FR 5507, Feb. 13, 1996; 63 FR 1152, Jan. 8, 1998; 70 FR 1143, Jan. 5, 2005; 70 FR 16674, April 3, 2006; 71 FR 50191, August 24, 2006; 73 FR 75588, Dec. 12, 2008; 76 FR 33611, June 8, 2011; 77 FR 17889, March 26, 2012; 83 FR 15499, April 11, 2018]

1926.60 APPENDIX A
SUBSTANCE DATA SHEET, FOR 4-4'-METHYLENEDIANILINE

Note: The requirements applicable to construction work under this Appendix A are identical to those set forth in Appendix A to 1910.1050 of this chapter.

[61 FR 31427, June 20, 1996]

1910.1050 APPENDIX A
SUBSTANCE DATA SHEET, FOR 4,4'-METHYLENEDIANILINE

I. SUBSTANCE IDENTIFICATION

A. Substance: Methylenedianiline (MDA)

B. Permissible Exposure:

1. Airborne: Ten parts per billion parts of air (10 ppb), time-weighted average (TWA) for an 8-hour workday and an action level of five parts per billion parts of air (5 ppb).
2. Dermal: Eye contact and skin contact with MDA are not permitted.

C. Appearance and odor: White to tan solid; amine odor.

II. HEALTH HAZARD DATA

A. Ways in which MDA affects your health. MDA can affect your health if you inhale it, or if it comes in contact with your skin or eyes. MDA is also harmful if you happen to swallow it. Do not get MDA in eyes, on skin, or on clothing.

B. Effects of overexposure.

1. Short-term (acute) overexposure: Overexposure to MDA may produce fever, chills, loss of appetite, vomiting, jaundice. Contact may irritate skin, eyes and mucous membranes. Sensitization may occur.
2. Long-term (chronic) exposure. Repeated or prolonged exposure to MDA, even at relatively low concentrations, may cause cancer. In addition, damage to the liver, kidneys, blood, and spleen may occur with long-term exposure.
3. Reporting signs and symptoms: You should inform your employer if you develop any signs or symptoms which you suspect are caused by exposure to MDA including yellow staining of the skin.

III. PROTECTIVE CLOTHING AND EQUIPMENT

A. Respirators.

Respirators are required for those operations in which engineering controls or work practice controls are not adequate or feasible to reduce exposure to the permissible limit.

If respirators are worn, they must have a label issued by the National Institute for Occupational Safety and Health under the provisions of 42 CFR part 84 stating that the respirators have been approved for this purpose, and cartridges and canisters must be replaced in accordance with the requirements of 29 CFR 1910.134.

If you experience difficulty breathing while wearing a respirator, you may request a positive pressure respirator from your employer. You must be thoroughly trained to use the assigned respirator, and the training will be provided by your employer.

MDA does not have a detectable odor except at levels well above the permissible exposure limits. Do not depend on odor to warn you when a respirator canister is exhausted. If you can smell MDA while wearing a respirator, proceed immediately to fresh air.

If you experience difficulty breathing while wearing a respirator, tell your employer.

B. Protective Clothing.

You may be required to wear coveralls, aprons, gloves, face shields, or other appropriate protective clothing to prevent skin contact with MDA.

Where protective clothing is required, your employer is required to provide clean garments to you, as necessary, to assure that the clothing protects you adequately. Replace or repair impervious clothing that has developed leaks.

MDA should never be allowed to remain on the skin.

Clothing and shoes which are not impervious to MDA should not be allowed to become contaminated with MDA, and if they do, the clothing and shoes should be promptly removed and decontaminated.

The clothing should be laundered to remove MDA or discarded.

Once MDA penetrates shoes or other leather articles, they should not be worn again.

C. Eye protection.

You must wear splashproof safety goggles in areas where liquid MDA may contact your eyes.

Contact lenses should not be worn in areas where eye contact with MDA can occur.

In addition, you must wear a face shield if your face could be splashed with MDA liquid.

IV. EMERGENCY AND FIRST AID PROCEDURES.

A. Eye and face exposure.

If MDA is splashed into the eyes, wash the eyes for at least 15 minutes. See a doctor as soon as possible.

B. Skin exposure.

If MDA is spilled on your clothing or skin, remove the contaminated clothing and wash the exposed skin with large amounts of soap and water immediately. Wash contaminated clothing before you wear it again.

C. Breathing.

If you or any other person breathes in large amounts of MDA, get the exposed person to fresh air at once. Apply artificial respiration if breathing has stopped. Call for medical assistance or a doctor as soon as possible. Never enter any vessel or confined space where the MDA concentration might be high without proper safety equipment and at least one other person present who will stay outside. A life line should be used.

D. Swallowing.

If MDA has been swallowed and the patient is conscious, do not induce vomiting. Call for medical assistance or a doctor immediately.

V. MEDICAL REQUIREMENTS

If you are exposed to MDA at a concentration at or above the action level for more than 30 days per year, or exposed to liquid mixtures more than 15 days per year, your employer is required to provide a medical examination, including a medical history and laboratory tests, within 60 days of the effective date of this standard and annually thereafter.

These tests shall be provided without cost to you. In addition, if you are accidentally exposed to MDA (either by ingestion, inhalation, or skin/eye contact) under conditions known or suspected to constitute toxic exposure to MDA, your employer is required to make special examinations and tests available to you.

VI. OBSERVATION OF MONITORING

Your employer is required to perform measurements that are representative of your exposure to MDA and you or your designated representative are entitled to observe the monitoring procedure.

You are entitled to observe the steps taken in the measurement procedure and to record the results obtained.

When the monitoring procedure is taking place in an area where respirators or personal protective clothing and equipment are required to be worn, you and your representative must also be provided with, and must wear, the protective clothing and equipment.

VII. ACCESS TO RECORDS

You or your representative are entitled to see the records of measurements of your exposure to MDA upon written request to your employer. Your medical examination records representative upon request by you to your employer.

VIII. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

A. Material is combustible.

Avoid strong acids and their anhydrides. Avoid strong oxidants. Consult supervisor for disposal requirements.

B. Emergency clean up.

Wear self-contained breathing apparatus and fully clothe the body in the appropriate personal protective clothing and equipment.

[63 FR 1152, Jan. 8, 1998; 63 FR 20099, April 23, 1998]

1926.60 APPENDIX B
SUBSTANCE TECHNICAL GUIDELINES, MDA

Note: The requirements applicable to construction work under this Appendix B are identical to those set forth in Appendix B to 1910.1050 of this chapter.

[61 FR 31427, June 20, 1996]

1910.1050 APPENDIX B
SUBSTANCE TECHNICAL GUIDELINES, MDA

I. IDENTIFICATION

A. Substance identification.

1. Synonyms: CAS No. 101-77-9. 4,4'- methylenedianiline; 4,4'-methylenebisaniline; methylenedianiline; dianilinomethane.
2. Formula: $C_{13}H_{14N2}$

II. PHYSICAL DATA

1	Appearance and Odor:	White to tan solid; amine odor
2	Molecular Weight:	198.26
3	Boiling Point:	398-399 degrees C at 760 mm Hg
4	Melting Point:	88-93 degrees C (190-100 degrees F)
5	Vapor Pressure:	9 mmHg at 232 degrees C
6	Evaporation Rate (n-butyl acetate = 1):	Negligible
7	Vapor Density (Air=1):	Not Applicable
8	Volatile Fraction by Weight:	Negligible
9	Specific Gravity (Water=1):	Slight
10	Heat of Combustion:	-8.40 kcal/g
11	Solubility in Water:	Slightly soluble in cold water, very soluble in alcohol, benzene, ether, and many organic solvents.

III. FIRE, EXPLOSION, AND REACTIVITY HAZARD DATA

1	Flash Point:	190 degrees C (374 degrees F) Setaflash closed cup
2	Flash Point	226 degrees C (439 degrees F) Cleveland open cup
3	Extinguishing Media:	Water spray; Dry Chemical; Carbon dioxide.
4	Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
5	Unusual Fire and Explosion Hazards:	Fire or excessive heat may cause production of hazardous decomposition products.

IV. REACTIVITY DATA

1	Stability:	Stable
2	Incompatibility:	Strong oxidizers
3	Hazardous Decomposition Products:	As with any other organic material, combustion may produce carbon monoxide. Oxides of nitrogen may also be present.
4	Hazardous Polymerization:	Will not occur.

V. SPILL AND LEAK PROCEDURES

1. Sweep material onto paper and place in fiber carton.
2. Package appropriately for safe feed to an incinerator or dissolve in compatible waste solvents prior to incineration.
3. Dispose of in an approved incinerator equipped with afterburner and scrubber or contract with licensed chemical waste disposal service.
4. Discharge treatment or disposal may be subject to federal, state, or local laws.
5. Wear appropriate personal protective equipment.

VI. SPECIAL STORAGE AND HANDLING PRECAUTIONS

A. High exposure to MDA can occur when transferring the substance from one container to another. Such operations should be well ventilated and good work practices must be established to avoid spills.
B. Pure MDA is a solid with a low vapor pressure. Grinding or heating operations increase the potential for exposure.
C. Store away from oxidizing materials.
D. Employers shall advise employees of all areas and operations where exposure to MDA could occur.

VII. HOUSEKEEPING AND HYGIENE FACILITIES

A. The workplace should be kept clean, orderly, and in a sanitary condition. The employer should institute a leak and spill detection program for operations involving MDA in order to detect sources of fugitive MDA emissions.
B. Adequate washing facilities with hot and cold water are to be provided and maintained in a sanitary condition. Suitable cleansing agents should also be provided to assure the effective removal of MDA from the skin.

VIII. COMMON OPERATIONS

Common operations in which exposure to MDA is likely to occur include the following: Manufacture of MDA; Manufacture of Methylene diisocyanate; Curing agent for epoxy resin structures; Wire coating operations; and filament winding.

1926.60 APPENDIX C
MEDICAL SURVEILLANCE GUIDELINES FOR MDA

Note: The requirements applicable to construction work under this Appendix C are identical to those set forth in Appendix C to 1910.1050 of this chapter.

[61 FR 31427, June 20, 1996]

1910.1050 APPENDIX C
MEDICAL SURVEILLANCE GUIDELINES FOR MDA

I. ROUTE OF ENTRY

Inhalation; skin absorption; ingestion. MDA can be inhaled, absorbed through the skin, or ingested.

II. TOXICOLOGY

MDA is a suspect carcinogen in humans. There are several reports of liver disease in humans and animals resulting from acute exposure to MDA.

A well-documented case of an acute cardiomyopathy secondary to exposure to MDA is on record.

Numerous human cases of hepatitis secondary to MDA are known.

Upon direct contact MDA may also cause damage to the eyes.

Dermatitis and skin sensitization have been observed. Almost all forms of acute environmental hepatic injury in humans involve the hepatic parenchyma and produce hepatocellular jaundice.

This agent produces intrahepatic cholestasis. The clinical picture consists of cholestatic jaundice, preceded or accompanied by abdominal pain, fever, and chills.

Onset in about 60 percent of all observed cases is abrupt with severe abdominal pain. In about 30 percent of observed cases, the illness presented and evolved more slowly and less dramatically, with only slight abdominal pain. In about 10 percent of the cases only jaundice was evident.

The cholestatic nature of the jaundice is evident in the prominence of itching, the histologic predominance of bile stasis, and portal inflammatory infiltration, accompanied by only slight parenchymal injury in most cases, and by the moderately elevated transaminase values.

Acute, high doses, however, have been known to cause hepatocellular damage resulting in elevated SGPT, SGOT, alkaline phosphatase and bilirubin.

Absorption through the skin is rapid. MDA is metabolized and excreted over a 48-hour period. Direct contact may be irritating to the skin, causing dermatitis. Also MDA which is deposited on the skin is not thoroughly removed through washing.

MDA may cause bladder cancer in humans. Animal data supporting this assumption is not available nor is conclusive human data. However, human data collected on workers at a helicopter manufacturing facility where MDA is used suggests a higher incidence of bladder cancer among exposed workers.

III. SIGNS AND SYMPTOMS

Skin may become yellow from contact with MDA.

Repeated or prolonged contact with MDA may result in recurring dermatitis (red-itchy, cracked skin) and eye irritation.

Inhalation, ingestion or absorption through the skin at high concentrations may result in hepatitis, causing symptoms such as fever and chills, nausea and vomiting, dark urine, anorexia, rash, right upper quadrant pain and jaundice. Corneal burns may occur when MDA is splashed in the eyes.

IV. TREATMENT OF ACUTE TOXIC EFFECTS/ EMERGENCY SITUATION

If MDA gets into the eyes, immediately wash eyes with large amounts of water.

If MDA is splashed on the skin, immediately wash contaminated skin with mild soap or detergent.

Employee should be removed from exposure and given proper medical treatment. Medical tests required under the emergency section of the medical surveillance section (m)(4) must be conducted.

If the chemical is swallowed, do not induce vomiting but remove by gastric lavage.

1926.60 APPENDIX D
SAMPLING AND ANALYTICAL METHODS FOR MDA MONITORING AND MEASUREMENT PROCEDURES

Note: The requirements applicable to construction work under this Appendix D are identical to those set forth in Appendix D to 1910.1050 of this chapter.

[61 FR 31427, June 20, 1996]

1910.1050 APPENDIX D
SAMPLING AND ANALYTICAL METHODS FOR MDA MONITORING AND MEASUREMENT PROCEDURES

Measurements taken for the purpose of determining employee exposure to MDA are best taken so that the representative average 8-hour exposure may be determined from a single 8-hour sample or two (2) 4-hour samples.

Short-time interval samples (or grab samples) may also be used to determine average exposure level if a minimum of five 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 samples taken on one 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).

There are a number of methods available for monitoring employee exposures to MDA. The method OSHA currently uses is included below.

The employer however has the obligation of selecting any monitoring method which meets the accuracy and precision requirements of the standard under his unique field conditions.

The standard requires that the method of monitoring must have an accuracy, to a 95 percent confidence level, of not less than plus or minus 25 percent for the select PEL.

OSHA METHODOLOGY

Sampling Procedure

Apparatus

Samples are collected by use of a personal sampling pump that can be calibrated within + or – 5 percent of the recommended flow rate with the sampling filter in line.

Samples are collected on 37 mm Gelman type A/E glass fiber filters treated with sulfuric acid. The filters are prepared by soaking each filter with 0.5 mL of 0.26N H_2S0_4. (0.26 N H_2S0_4 can be prepared by diluting 1.5 mL of 36N H_2S0_4 to 200 mL with deionized water.) The filters are dried in an oven at 100 degrees C for one hour and then assembled into two-piece 37 mm polystyrene cassettes with backup pads. The cassettes are sealed with shrink bands and the ends are plugged with plastic plugs.

After sampling, the filters are carefully removed from the cassettes and individually transferred to small vials containing approximately 2 mL deionized water. The vials must be tightly sealed. The water can be added before or after the filters are transferred. The vials must be sealable and capable of holding at least 7 mL of liquid. Small glass scintillation vials with caps containing Teflon liners are recommended.

Reagents

Deionized water is needed for addition to the vials.

Sampling technique

Immediately before sampling, remove the plastic plugs from the filter cassettes.

Attach the cassette to the sampling pump with flexible tubing and place the cassette in the employee's breathing zone.

After sampling, seal the cassettes with plastic plugs until the filters are transferred to the vials containing deionized water.

At some convenient time within 10 hours of sampling, transfer the sample filters to vials.

Seal the small vials lengthwise.

Submit at least one blank filter with each sample set.

Blanks should be handled in the same manner as samples, but no air is drawn through them.

Record sample volumes (in L of air) for each sample, along with any potential interferences.

Retention efficiency

A retention efficiency study was performed by drawing 100 L of air (80 percent relative humidity) at 1 L/min through sample filters that had been spiked with 0.814 µg MDA.

Instead of using backup pads, blank acid-treated filters were used as backups in each cassette.

Upon analysis, the top filters were found to have an average of 91.8 percent of the spiked amount.

There was no MDA found on the bottom filters, so the amount lost was probably due to the slight instability of the MDA salt.

Extraction efficiency

The average extraction efficiency for six filters spiked at the target concentration is 99.6 percent.

The stability of extracted and derivatized samples was verified by reanalyzing the above six samples the next day using fresh standards. The average extraction efficiency for the reanalyzed samples is 98.7 percent.

Recommended air volume and sampling rate

The recommended air volume is 100 L.

The recommended sampling rate is 1 L/min.

Interferences (sampling)

MDI appears to be a positive interference. It was found that when MDI was spiked onto an acid-treated filter, the MDI converted to MDA after air was drawn through it.

Suspected interferences should be reported to the laboratory with submitted samples.

Safety precautions (sampling)

Attach the sampling equipment to the employees so that it will not interfere with work performance or safety.

Follow all safety procedures that apply to the work area being sampled.

Analytical Procedure

Apparatus: The following are required for analysis.

A GC equipped with an electron capture detector.

For this evaluation a Tracor 222 Gas Chromatograph equipped with a Nickel 63 High Temperature Electron Capture Detector and a Linearizer was used.

A GC column capable of separating the MDA derivative from the solvent and interferences.

A 6 ft X 2 mm ID glass column packed with 3 percent OV-101 coated on 100/120 Gas Chrom Q was used in this evaluation.

An electronic integrator or some other suitable means of measuring peak areas or heights.

Small resealable vials with Teflon-lined caps capable of holding 4 mL.

A dispenser or pipet for toluene capable of delivering 2.0 mL.

Pipets (or repipets with plastic or Teflon tips) capable of delivering 1 mL for the sodium hydroxide and buffer solutions.

A repipet capable of delivering 25 uL HFAA.

Syringes for preparation of standards and injection of standards and samples into a GC.

Volumetric flasks and pipets to dilute the pure MDA in preparation of standards.

Disposable pipets to transfer the toluene layers after the samples are extracted.

Reagents

0.5 NaOH prepared from reagent grade NaOH.

Toluene, pesticide grade. Burdick and Jackson distilled in glass toluene was used.

Heptafluorobutyric acid anhydride (HFAA). HFAA from Pierce Chemical Company was used.

pH 7.0 phosphate buffer, prepared from 136 g potassium dihydrogen phosphate and 1 L deionized water. The pH is adjusted to 7.0 with saturated sodium hydroxide solution.

4,4'-Methylenedianiline (MDA), reagent grade.

Standard Preparation

Concentrated stock standards are prepared by diluting pure MDA with toluene. Analytical standards are prepared by injecting uL amounts of diluted stock standards into vials that contain 2.0 mL toluene.

25 uL HFAA are added to each vial and the vials are capped and shaken for 10 seconds.

After 10 min, 1 mL of buffer is added to each vial.

The vials are recapped and shaken for 10 seconds.

After allowing the layers to separate, aliquots of the toluene (upper) layers are removed with a syringe and analyzed by GC.

Analytical standard concentrations should bracket sample concentrations. Thus, if samples fall out of the range of prepared standards, additional standards must be prepared to ascertain detector response.

Sample preparation

The sample filters are received in vials containing deionized water.
1 mL of 0.5N NaOH and 2.0 mL toluene are added to each vial.
The vials are recapped and shaken for 10 min.
After allowing the layers to separate, approximately 1 mL aliquots of the toluene (upper) layers are transferred to separate vials with clean disposable pipets.
The toluene layers are treated and analyzed.

Analysis

GC conditions	
Zone temperatures:	Column - 220 degrees C
	Injector - 235 degrees C
	Detector - 335 degrees C
Gas flows Ar/CH_4	Column - 28 mL/min(95/5)
	Purge - 40 mL/min
Injection volume:	5.0 uL
Column:	6 ft X 1/8 in ID glass, 3 percent OV-101 on 100/ 120 Gas Chrom Q
Retention time of MDA derivative:	3.5 min

Chromatogram:

Peak areas or heights are measured by an integrator or other suitable means.
A calibration curve is constructed by plotting response (peak areas or heights) of standard injections versus μg of MDA per sample. Sample concentrations must be bracketed by standards.

Interferences (analytical)

Any compound that gives an electron capture detector response and has the same general retention time as the HFAA derivative of MDA is a potential interference. Suspected interferences reported to the laboratory with submitted samples by the industrial hygienist must be considered before samples are derivatized.
GC parameters may be changed to possibly circumvent interferences.
Retention time on a single column is not considered proof of chemical identity. Analyte identity should be confirmed by GC/MS if possible.

Calculations

The analyte concentration for samples is obtained from the calibration curve in terms of μg MDA per sample. The extraction efficiency is 100 percent. If any MDA is found on the blank, that amount is subtracted from the sample amounts. The air concentrations are calculated using the following formulae.

$$\mu g/m^3 = (\mu g \text{ MDA per sample})\ (1000)/(\text{L of air sampled})$$

$$ppb = (\mu g/m^3)(24.46)/(198.3) = (\mu g/m^3)(0.1233)$$

where 24.46 is the molar volume at 25 degrees C and 760 mm Hg

Safety Precautions (analytical)

Avoid skin contact and inhalation of all chemicals.
Restrict the use of all chemicals to a fume hood if possible.
Wear safety glasses and a lab coat at all times while in the lab area.

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