

WRITTEN SAFETY PROGRAMS

10.1 CONFINED SPACE ENTRY PROGRAM

10.1.1 PURPOSE

The purpose of this program is to ensure the protection of State of Michigan employees and contractors from the hazards associated with confined space entry. Examples of confined spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, fan housings, ventilation or exhaust ducts, sewers, pipe chases, underground utility vaults, tunnels, and pipelines. This document contains requirements for practices and procedures to protect employees from those hazards of entry into and work within permit required confined spaces.

10.1.2 SCOPE

It shall be the policy of the Infrastructure Services and/or Tenant and Land Services to reduce the need for confined space entry. It shall also be the policy to eliminate, whenever possible, all confined space hazards in order to reclassify permit-required confined spaces to non-permit required confined spaces. When confined space entry is necessary, all provisions of this document are to be followed.

10.1.3 DEFINITIONS

Acceptable Entry Conditions means those conditions that will protect the employee and ensure that they can safely enter and work in a confined space.

Attendant means an individual stationed outside the confined space who monitors, communicates and performs specific tasks identified within this program.

Authorized Entrant means the employee who is authorized to enter the confined space.

Blanking or Blinding means the absolute closure of a pipe, line, or duct by the fastening of a solid plate, which completely covers the bore and is capable of withstanding the maximum pressure without leakage.

Confined Space means a piece of equipment or process space, which meets the following criteria:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit; and
- Is not designed for continuous human occupancy.

Emergency means any occurrence (including failure of monitoring equipment) or event which could endanger the entrants.

Entry Permit means a written or printed document, which records the controlled entry into a permit space and contains specific information established within this program.

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Entry Supervisor means the trained person who is responsible for determining if the confined space has acceptable entry conditions, and for authorizing, overseeing and terminating the confined space entry.

Hazardous Atmosphere means an atmosphere, which could be harmful to employees (impairment in ability to self-rescue). One or more of the following criteria constitute a hazardous atmosphere:

- 10% of the lower flammable limit (gas, vapor or mist)
- Airborne dust concentrations which meet the lower flammable limit (dust obscuring vision at 5 feet)
- Oxygen concentrations below 19.5% or above 23.5%
- The presence of any substance whose concentration exceeds a recognized permissible exposure limit or dose. For those substances that have no permissible exposure level or dose, refer to other recognized data such as material safety data sheets, manufacturers' data and lab analysis for determining acceptable conditions.
- Any other atmospheric condition which could be immediately dangerous to life or health.

Hot Work Permit means the written authorization to perform operations (cutting, welding, brazing, heating) capable of providing a source of ignition.

Immediately Dangerous to Life and Health (IDLH) means any condition (immediate or delayed) which poses a threat to life and health.

Isolation means the process by which a confined space has been removed from service and completely protected from hazards. Examples of isolating methods are blanking, bleeding, lockout, removal of linkages, disconnecting, etc.

Oxygen Deficient Atmosphere means less than 19.5% oxygen.

Oxygen Enriched Atmosphere means more than 23.5% oxygen.

Permit-Required Confined Space means a confined space that has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere.
2. Contains a material that has the potential for engulfing an entrant.
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor, which slopes downward and tapers to a smaller cross-section.
4. Contains any other recognized serious safety or health hazard.

Permit System means the written procedure for preparing and issuing permits for entry and returning the permit space to service following termination of the entry.

Rescue Service means the personnel designated to rescue an employee from a permit required confined space.

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Retrieval System means the equipment (line, body harness, wristlets, anchored lifting devices and related equipment) used for non-entry rescue of persons from a permitted space.

Note: Appendix A contains the entire list of definitions for the Infrastructure Services and/or Tenant and Land Services Confined Space Program.

10.1.4 RESPONSIBILITIES

10.1.4.1 Management

- Periodically audit work operations and documentation using canceled permits to evaluate the overall effectiveness of the confined space entry program and ensure that employees participating in entry operations are protected from permit space hazards.
- Provide the proper protective equipment when such equipment is necessary to protect the health and safety of the employee.
- Provide guidance for the proper selection and use of appropriate air monitoring equipment, respiratory protection and personal protective equipment to meet the requirements of this program.
- Provide guidance for the proper selection and use of appropriate safety and rescue equipment to meet the requirements of this program.
- Identify evaluate and report job areas and locations that are or may be confined spaces. A list of confined spaces that are identified shall be submitted to the Infrastructure Services or Tenant and Land Services Health and Safety Coordinator.
- Classify confined spaces as "permit required", "alternate entry", or "non-permit required".
- Identify personnel who will enter confined spaces.
- Provide instruction to personnel on the proper use of equipment required for confined space entry.
- Maintain equipment that is used to enter confined spaces.
- Assure that entry permits are issued, canceled, and filed for one year.
- Identify and evaluate the hazards of permit spaces before employees enter them.
- Conduct a pre-entry briefing to inform entrants of possible hazards that may be encountered in a confined space.

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- Take the necessary measures to prevent unauthorized entrance into permit spaces.

10.1.4.2 Employees

- Comply with the confined space entry procedures and with those procedures stipulated by their supervisor.
- Properly maintain in safe operable condition all equipment used for confined space entry.
- Report any deficiencies or malfunction of equipment to a supervisor.
- Understand emergency procedures in case of an accident in a confined space.
- Under no circumstance may an employee enter a confined space that is suspect of having a non-respirable atmosphere, even to rescue a fellow employee.

10.1.5 REQUIREMENTS

10.1.5.1 Confined Space Entry Program Administration

10.1.5.1.1 Written Permit System

A permit system shall be utilized for entry into Permit Spaces (*See Appendix G, Confined Space Entry Procedures, Appendix H, Confined Space Entry Form and Appendix I, Hot Work Permit*).

Each canceled entry permit shall be retained for at least one (1) year to facilitate the review of the permit-required confined space program. Any problems encountered during an entry operation shall be noted on the permit so that appropriate revisions to the permit space program can be made.

10.1.5.1.2 Coordinating Entry Operations

All outside contractors performing work in confined space entry permit area shall be informed of any fire, explosion, health or other safety hazards of that confined space. This information shall be based on current and past history of the confined space and the nature of the contractor's work.

Supervisors shall inform contractors regarding Infrastructure Services and/or Tenant and Land Services safety rules and emergency plans, which may be applicable to the contractor's employees. Contractors and their employees must not be allowed to enter a confined space until the provisions of this program have been satisfied. When Infrastructure Services and/or Tenant and Land Services and contractor personnel are

working in or near permit spaces, their entry operations must be coordinated to avoid endangering any personnel.

At the conclusion of the entry operations, the contractor must be debriefed regarding procedures, which were followed and concerning any hazards confronted or created in permit spaces during entry operations.

It is the responsibility of each contractor who performs permit space entry operations, to obtain any available information regarding permit space hazards and entry operations from Infrastructure Services and/or Tenant and Land Services. They must also coordinate entry operations with Infrastructure Services and/or Tenant and Land Services when Infrastructure Services or Tenant and Land Services and contractor personnel will be working in or near permit spaces. Infrastructure Services and/or Tenant and Land Services must be informed of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operations.

10.1.5.1.3 Concluding Entry

The entry supervisor will determine when the entry operations have been completed. The permit space will be closed and the permit canceled. The lead worker will write the date, time and sign at the bottom of the Infrastructure Services and/or Tenant and Land Services Confined Space Permit.

10.1.5.1.4 Program Review and Revision

Each supervisor will review entry operations and recommend revisions to the procedures correcting any deficiencies before subsequent entries are authorized. Recommended revisions will be provided to the Infrastructure Services and/or Tenant and Land Services Health and Safety Coordinator

10.1.5.1.5 Annual Compliance Review

The Infrastructure Services and/or Tenant and Land Services Health and Safety Coordinator will review the program annually to determine how the program can be improved. This will include an audit of canceled entry permits.

10.1.5.1.6 Alternate Entry

Employees who enter a confined space need not comply with all the procedures set forth in the program provided that:

1. It can be demonstrated that the only hazard posed by the permit space is an actual or potential hazardous atmosphere.

2. It can be demonstrated that continuous forced air ventilation alone is sufficient to maintain the permit space safe for entry.
3. Monitoring and inspection data are developed that support the previous conclusions.
4. If an initial entry of the permit space is necessary to obtain the data required, the entry is performed according to the procedures set forth in this document concerning the entry of a permit required confined space.
5. The determinations and supporting data required are documented and made available to each employee who enters the space.

Procedures are outlined in Appendix F, Confined Space Entry Procedures and Appendix G, Confined Space Entry Form.

10.1.5.1.7 Permit Entry Reclassification to A Non-Permit Confined Space

If a permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed *according to Appendix F, Confined Space Entry Procedures*. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated. *Note: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards.*

The supervisor shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space. Follow the procedures outlined in *Appendix F, Confined Space Entry Procedures* to certify a space as non-permit and *Appendix G, Confined Space Entry Form for Non-Permit Confined Space Certification*.

If hazards arise within a permit space that has been reclassified to a non-permit confined space under this section, each employee in the space shall exit the space. The Supervisor shall then reevaluate the space and determine whether it must be reclassified as a permit space.

10.1.5.1.8 Contractor Notification

For outside contractors performing work on the premises of State property, the following confined space entry procedures are required.

1. The supervisor of the project will inform the contractor that the work place contains confined spaces and that entry is allowed only by compliance with applicable regulations.
2. The person in charge will inform the contractor of the configuration and hazards, which constitute a confined space.
3. The person in charge will inform the contractor of any precautions or procedures, which have been implemented for staff member safety in or near the confined space.
4. If staff members and the contractor will be working in the same confined space, the person in charge and the contractor's supervisor will coordinate entry operations.

10.1.5.2 Hazard Recognition & Control

10.1.5.2.1 Identifying Permit Space Hazards

Each entry supervisor will identify and evaluate the hazards of permit spaces before employees enter. The following hazards shall be identified prior to entry into a confined space:

1. Atmospheric hazards
2. Asphyxiating atmospheres
3. Flammable atmospheres
4. Toxic atmospheres
5. Burn hazards
6. Heat stress hazards
7. Mechanical hazards
8. Engulfment hazards
9. Physical hazards (falls, debris, slipping hazards)
10. Electrocution hazards
11. Danger of unexpected movement of machinery
12. Noise hazards

10.1.5.2.2 General Procedures

It is the policy of Infrastructure Services and/or Tenant and Land Services that all confined spaces be safe prior to entry by authorized personnel. The following methods must be utilized to control hazards associated with confined space entry.

1. Lockout of energy sources
2. Cleaning and purging

3. Ventilation of Confined Spaces, *see Appendix C*,
4. Use of personal protective equipment *see Section 10.7 Respiratory Protection Program*

10.1.5.2.3 Traffic Hazards

The following precautions shall be followed when entering a confined space located along a roadway, parking lot or any areas where traffic flow may cause a potential hazard.

1. Approach the area cautiously and activate flashers upon approach to the confined space.
2. Park any vehicles in such a way that traffic will flow in the most unobstructed manner, and where possible, the vehicle should provide protection for the entry crew.
3. Park the vehicle in such a manner that exhaust fumes are not drawn down into the manhole. If this is not possible, extend the exhaust stack above the vehicle.
4. Before uncovering a manhole, place traffic safety cones around the manhole and vehicle, visible to traffic in all directions. Place cones to protect the crew and to channel traffic flow. The cones should be placed at sufficient distances and intervals to adequately warn oncoming traffic.
5. In areas of high traffic volume or other sites warranting additional highly visible safety equipment, use illuminating traffic arrows, barricades, and "Men Working" signs.
6. When placement of the vehicle creates a situation of having only one open lane of traffic in a congested area, use a flag person to direct traffic flow. When a flag person is necessary, an additional crew member is required to attend the employee in the manhole. Wear traffic safety vests or equivalent at all times when working on the street or easement surface in the field.
7. In the case of opening or obstructions in the street or sidewalk being worked on or left unattended, effectively display danger signals such as warning signs, cones and flags. Under these same conditions at night, prominently display warning lights. Enclose excavations and openings with suitable barricades.

10.1.5.3 Safe Entry Practices

Entry supervisors will implement procedures and practices necessary for safe permit space entry operations. These include, but are not limited to:

1. Acceptable entry conditions *see Appendix B, Atmospheric Testing and Monitoring*.

2. Isolating the permit space.
3. Purging, inerting, flushing or ventilating the permit space as necessary to eliminate or control atmospheric hazards.
4. Pre-entry Briefing. The lead worker will conduct a meeting of all employees who will enter the confined space. Employees will be informed of the hazards and safety conditions of the particular job.

10.1.5.3.1 Equipment Use And Maintenance

The supervisor shall provide, maintain and ensure proper use of equipment used for entry into a permit space. Examples of such equipment are testing, ventilating, lighting, monitoring, communication and personal protective equipment. *See Appendix D, Basic Confined Space Entry and Rescue Equipment.*

10.1.5.3.2 Testing For Acceptable Entry Conditions

Permit space evaluation begins with testing conducted before an entry and continues with testing and monitoring activities throughout the entry. The aim is to ensure acceptable entry conditions are maintained while entrants are in the space. Atmospheric testing should be conducted in accordance with *Appendix B of this Program.*

10.1.5.3.3 Preventing Unauthorized Entry

In order to prevent unauthorized entry into permit-required confined spaces, Supervisors must utilize one or more of the following mechanisms:

1. Train all employees.
2. Provide information to visitors.
3. Post warning signs.
4. Erect barriers.
5. Install locks or covers at entry points.

10.1.5.4 Confined Space Entry Team Responsibilities

In addition to designating at least one authorized entrant to perform work in a confined space, each entry supervisor will provide at least one attendant outside a permit space to be entered for the duration of the entry operations. *See Appendix E, Duties of the Attendant, for specific responsibilities.*

There are three specific members of a confined space entry team:

1. Authorized Entrants
2. Attendants
3. Lead Worker/Entry Supervisor

10.1.5.4.1 Duties of Authorized Entrants

1. Know the hazards that may be faced during entry, including information on signs or symptoms of exposure.
2. Know how to use entry related equipment such as but not limited to :
 - a. Testing and monitoring equipment
 - b. Ventilation equipment
 - c. Communication equipment
 - d. Personal protective equipment
 - e. Lighting
 - f. Barriers
 - g. Ladders and egress equipment
 - h. Rescue equipment (if appropriate).
3. Communicate with the attendant.
4. Alert the attendant of hazards.
5. Exit the permit space quickly when required.

10.1.5.4.2 Duties of Attendants

1. Know the hazards that may be faced during entry, including information indicating signs or symptoms of exposure.
2. Be aware of possible behavioral effects of hazard exposure to authorized entrants.
3. Maintain an accurate count or identification of authorized entrants in the confined space.
4. Remain outside the confined space during entry operations until relieved.
5. Communicate with authorized entrants to monitor status and alert entrants of the need to evacuate.
6. Monitor activities inside and outside the space for:
 - a. Prohibited conditions
 - b. Behavioral effects of hazards on entrants
 - c. Dangerous situation outside space
 - d. Attendant's ability to perform the job
7. Summoning rescue and emergency services
8. Prohibit access to the confined space by personnel who are not authorized entrants
9. Perform non-entry rescues.

10. Do not perform other work, which might interfere with the primary duty to monitor and protect authorized entrants.

10.1.5.4.3 Attendant Emergency Response

To facilitate non-entry rescue, retrieval systems or methods shall be utilized whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.

10.1.5.4.4 Duties of Entry Supervisors

1. Know the hazards that may be faced during entry, including information indicating signs or symptoms of exposure.
2. Verify that all applicable information is documented.
3. Ensure that atmospheric testing has been conducted.
4. Ensure that power supplies have been de-energized.
5. Understand the hazards of the work to be performed and make available the appropriate safety and task related equipment for the entry.
6. Verify that rescue services are available and communication equipment is in place.
7. Coordinate the transfer of responsibilities for permit space entry to ensure that acceptable conditions are being maintained until the entry is terminated.
8. Terminate the entry and cancel the permit when the work is complete or a prohibited condition is encountered.

10.1.5.5 Rescue Provisions

An outside rescue team will be established for each location with permit spaces. No Infrastructure Services and/or Tenant and Land Services employees are authorized as Confined Space Rescuers. The outside rescue team will be made aware of the hazards they may confront when called on to perform rescues. The rescue team is responsible to equip, train and conduct itself appropriately. Infrastructure Services and/or Tenant and Land Services will provide the rescue team with access to all permit spaces from which rescue may be necessary so they can develop appropriate rescue plans and practice rescue operations.

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever feasible.

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If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required, that shall be made available to the medical facility treating the exposed entrant.

Retrieval systems shall meet the following requirements:

1. Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back, near shoulder level, or above the entrant's head.
2. Wristlets may be used in lieu of the chest or full body harness if it can be demonstrated that the use of a chest or full body harness is infeasible or creates a greater hazard and use of wristlets is the safest and most effective alternative.
3. The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than five (5) feet deep.

10.1.6 TRAINING

The supervisor shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the assigned duties.

Training shall be provided to each affected employee:

1. Before the employee is first assigned duties.
2. Before there is a change in assigned duties.
3. Whenever there is a change in permit space operations that presents a hazard about which an employee has not been previously trained.
4. Whenever the department supervisor has reason to believe either that there are deviations from the permit space entry procedures required by *MIOSHA, Michigan Department of Occupational Health, R325.63001-2, "Permit Required Confined Spaces"*, or there are inadequacies in the employee's knowledge or use of these procedures.

The supervisor shall certify that the required training has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

Only trained authorized attendants, authorized entrants, entry supervisors and personnel authorizing or in charge of entry shall work in and around a Permit Space.

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10.1.7 REFERENCES & APPENDICES

For additional information refer to:

MIOSHA, General Industry, Part 90 “Confined Space Entry”

MIOSHA, Department of Occupational Health, R 325.63001-2 “Permit Required Confined Spaces”

Regarding employee proficiency in the duties required refer to OSHA 29 CFR 1910.146 “Permit Required Confined Spaces (Final Rule)”

National Institute of Occupational Safety & Health (NIOSH): Confined Space Entry Practices

Appendices:

- A. Definitions
- B. Atmospheric Testing and Monitoring
- C. Ventilation of Confined Spaces
- D. Basic Confined Space Entry and Rescue Equipment
- E. Entry Team Duties
- F. Confined Space - Entry Procedures
- G. Confined Space - Entry Form
- H. Hot Work Permit
- I. Entry Authorization
- J. Training Objectives
- K. Contractor Checklist
- L. Signs
- M. Identification/Classification

10.1.7.1 Appendix A

DEFINITIONS

Acceptable entry conditions: The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Attendant: An individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized entrant: An employee who is authorized by the employer to enter a permit required confined space.

Blanking or Blinding: The absolute closure of a pipe, line or duct, by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined space: A space that:

Is large enough and so configured that an employee can bodily enter and perform assigned work; and
Has limited or restricted means for entry or exit (for example, tanks vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and is not designed for continuous employee occupancy.

Double block and bleed: The closure of a line, duct or pipe by closing and locking or tagging two inline valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency: Any occurrence (including any failure of hazard control or monitoring equipment) or event(s) internal or external to the confined space that could endanger entrants.

Engulfment: The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry: The action by which a person passes through an opening into a permit required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry permit: The written or printed document that is provided by the employer to allow and control entry into a permit space.

Entry permit system: means the employer's written procedures for preparing and issuing permits for entry and returning the permit space to service following termination of entry and designates by name or title the individuals who may authorize entry.

Entry supervisor: See "Lead Worker". The term "Lead Worker" is utilized by Infrastructure Services and/or Tenant and Land Services wherever 29 CFR 1910.146 refers to the "entry supervisor".

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Hazardous atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
- Airborne combustible dust at a concentration that meets or exceeds its LFL.
- Toxic gases, vapors, or mists

Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, "Occupational Health and Environmental Control", or in Subpart Z, "Toxic and Hazardous Substances", of this part and which could result in employee exposure in excess of its dose or permissible exposure limit.

Note: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

Any other atmospheric condition that is immediately dangerous to life or health.

Note: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard 1910.1200, published information, and internal documents will provide guidance in establishing acceptable atmospheric conditions.

Hot work permit: The employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately Dangerous To Life Or Health (IDLH): Any condition which poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

Note: Some materials - hydrogen fluoride gas and cadmium vapor, for example - may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12 - 72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

Inerting: The displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Note: This procedure produces an IDLH oxygen-deficient atmosphere.

Isolation: The process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout and tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Lead Worker: The person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and

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overseeing entry operations, and for terminating entry as required by this section. The term "Lead Worker" is utilized by Infrastructure Services and/or Tenant and Land Services wherever 29 CFR 1910.146 refers to the "entry supervisor."

Note: A lead worker also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of lead worker may be passed from one individual to another during the course of an entry operation.

Line breaking: The intentional opening of a pipe, line or duct that is or has been carrying flammable, corrosive or toxic material, an inert gas, or any fluid at a volume, pressure or temperature capable of causing injury.

Non-permit confined space: A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Oxygen deficient atmosphere: An atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere: An atmosphere containing more than 23.5 percent oxygen by volume.

Permit required confined space (Permit Space): A confined space that has one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfment of an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section; or,
- Contains any other recognized serious safety or health hazard.

Permit required confined space program: The employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Permit system: The employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Prohibited condition: Any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

Rescue service: The personnel designated to rescue employees from permit spaces.

Retrieval system: The equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing: The process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space. Testing enable employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

10.1.7.2 Appendix B

ATMOSPHERIC TESTING AND MONITORING

Procedure For Atmospheric Testing And Monitoring

Atmospheric testing is necessary for two purposes: evaluation of the hazards of the permit space and verification of acceptable entry conditions.

Evaluation Testing

The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate entry procedures can be developed and acceptable entry conditions stipulated for that space.

A minimum of three tests should be performed to identify atmospheric hazards in confined spaces. These tests must be performed in the following sequence:

1. Oxygen Content
2. Flammability
3. Toxicity

Verification Testing

The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions.

Duration of Testing

Because test instruments may have a delayed response time, the duration required for a valid sample should be determined from manufacturer's specifications.

Testing Stratified Atmospheres

When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet in the direction of travel and to each side. If a sampling probe is use, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

Equipment Calibration

To ensure that the atmospheric testing equipment is functioning properly, any direct reading test device should not be used without performing the following three operations:

- Inspection
- Calibration
- Function Test

All three operations should be performed according to specific manufacturer's instructions.

Air Monitoring Guide

1. Calibrate Instrument
2. Inspect Instrument
 - Check physical condition of instrument (case, meter, attachments, hoses for cracks)
 - Review instructions to insure you know how to use the device and interpret results.

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3. Perform Function Test

- Oxygen sensor: breath into sampling device to reduce the oxygen level below 19.5%. The oxygen alarm should sound.
- Combustible gas sensor: Follow manufacturer's instruction for function test.
- Always perform a function test in the field before use.
- Never perform a function test in the suspected atmosphere.

4. Pre-Test Space

- Zero instrument in known fresh air.
- In vertical space, test entire space, top to bottom, every four feet and in the direction of travel.
- Order of tests:
 1. Oxygen
 2. Flammability
 3. Toxicity

5. Monitor the Space

If continuous monitoring is required, position the instrument near the workers breathing zone.

- If any of the alarms sound, exit the space immediately.
- Always record your readings.
- Contact the Infrastructure Services and/or Tenant and Land Services Health and Safety Coordinator if any atmospheric hazards cannot be reduced below the PEL with ventilation.

10.1.7.3 Appendix C

VENTILATION OF CONFINED SPACES

Ventilation is one of the most effective means of controlling hazardous atmospheres in confined spaces. In this procedure, clean air replaces contaminated air by natural or forced (mechanical) ventilation. When ventilating a confined space, the following factors must be taken into consideration:

Volume of air: This determines the capacity of the blower or ejector.

Type of atmosphere: This will determine the type of blower or ejector used and the length of time needed to ventilate until it is safe for people to enter the space.

Access to space: This determines how to get the ventilating air into and out of the space.

Power requirements and availability: This will influence the power source and fan motor size. A portable generator may be required as a source of power.

Cost, efficiency and maintenance: This may have an effect on the type of device that is selected and what is necessary to keep it working properly.

Shape of space: This will affect the type of directional device needed and the amount of air pressure required to provide sufficient ventilation.

Source of clean air: This is necessary to ensure adequate ventilation.

Length of time ventilation is needed: This is determined by the type of contaminant and the work that is to be done in the space

Type of work to be done: This determines whether local exhaust ventilation or general ventilation is required.

VENTILATION GUIDE

1. Select fan with a capacity to quickly replace the air in the space. Limitations are posted on the fan housing.
2. Use reliable, grounded electrical power.
3. Eliminate any hazardous atmosphere. Exhaust toxic and flammable air; supply fresh air when oxygen-deficient.
4. Provide constant circulation of fresh air while space is occupied.
 - Natural ventilation is allowable only on "non-permit" entry.
 - Direct high-velocity supply ventilation to mix the air throughout the space.
 - Capture contaminants during hot work or cleaning with solvents by using additional local (or point) exhaust.
 - Pure oxygen is not "fresh air". Never use bottled oxygen for ventilation.
5. Arrange ductwork to ensure safety:
 - Locate supply fan intake away from flammable or toxic air.
 - Position exhaust fan outlet to avoid recirculation of bad air or endangering others outside the space.
 - Position exhaust duct inlet next to the source of contaminants.
 - Keep ducts short and straight.
 - Make sure air circulates through entire space and does not short-circuit.
6. Monitor the air to ensure ventilation is keeping the air safe to breathe.

10.1.7.4 Appendix D

BASIC CONFINED SPACE ENTRY AND RESCUE EQUIPMENT

Equipment shall include, but is not be limited to:

Safety Cones

Safety Vest

Barricades (as required)

Men Working Signs (as required)

Safety Flags

Manhole Hook (or pick)

Combustible Gas Detector

Utility Ropes

Safety Harness

Safety Rope

Fire Extinguisher

First Aid Kit

Safety Ladder

Manhole Access Bracket

Self Contained Air Units

Hard Hats

Safety Glasses

Safety Shoes

Rescue Telephone Number

Rescue Device (tri-pod)

10.1.7.5 Appendix E

ENTRY TEAM DUTIES

DUTIES OF AUTHORIZED ENTRANTS:

- Know the hazards that may be faced during entry.
- Recognize the signs and symptoms of hazard exposure.
- Understand the consequences of hazardous exposure.
- Use equipment properly.
- Communicate with the attendant.
- Alert the attendant of hazards.
- Exit the permit space quickly when required.

DUTIES OF THE ATTENDANT:

- Know entry hazards.
- Know behavioral effects of exposure.
- Maintain accurate entrant identification.
- Remain outside the permit space.
- Communicate with entrants.
- Monitor entry activities.
- Summon rescue and emergency services.
- Prevent unauthorized entry.
- Perform non-entry rescue.
- Perform no conflicting duties.

DUTIES OF THE LEAD WORKER:

- Know the potential hazards during entry and work.
- Determine if acceptable entry conditions are present at a permit space where entry is planned.
- Terminate entry as required by the standard.
- Verify that rescue services are readily available and the means for summoning them are operable.
- Remove unauthorized individuals who enter or try to enter the permit space during entry and work.
- Determine that entry and work operations remain consistent with entry permit terms and that acceptable entry conditions are maintained.
- The person authorizing the entry may also serve as the entrant or attendant for the entry.

10.1.7.6 Appendix F

CONFINED SPACE ENTRY PROCEDURES

1. Determine if entry into confined space is necessary to perform work.
2. Minimum required equipment should be on hand: Ventilation, barrier and warning signs, gas monitor capable of measuring concentrations of oxygen, flammable gases, hydrogen sulfide and carbon monoxide.
3. Eliminate any unsafe conditions before the access door or cover is opened.
4. Immediately guard the entry by some barrier and signs to prevent people or objects from accidentally entering the confined space.
5. Conduct hazard assessment:
 - a. Test the real or potential atmospheric hazards.
 - b. Oxygen content less than 19.5% or greater than 23.5%
 - c. Flammable gases and vapors greater than 10% of the LEL (Lower Explosive Limit)
 - d. Hydrogen Sulfide concentrations greater than 10 ppm (Parts per million)
 - e. Carbon Monoxide concentrations greater than 35 ppm
 - f. Other toxic gases or vapors greater than PEL (Permissible Exposure Limit)
 - g. See Air Monitoring Guide for more information (Appendix B).
 - h. Review the space for other observable serious safety and health hazards: mechanical, electrical, burn, heat stress, engulfment or entrapment hazards, etc.
6. If any hazardous atmosphere exists, do the following:
 - a. If possible, determine and eliminate the source of the atmospheric hazards (for example: carbon monoxide from nearby truck or gas-powered generator).
 - b. When the atmosphere contains toxins or flammables, ventilate the space by drawing air out until the air has been changed over several times.
 - c. When oxygen deficient, ventilate by pushing air into the space until the air has been changed over several times.
 - d. Verify the hazardous atmosphere has been eliminated by testing the air as in Step 5.
 - e. See Ventilation Guide for more information (Appendix C).
7. Determine from information gathered above which entry procedure is appropriate:
 - a. **NON-PERMIT SPACE:** If there are neither real nor potential atmospheric hazards and no observable serious safety and health hazards, this should be certified in writing. Certify by signing at lines 1 and 2 on Permit/Certification. After Certification, skip to step 13.
 - b. **ALTERNATE ENTRY PROCEDURES:** If no observable serious safety and health hazards exist and atmospheric hazards are controlled with continuous ventilation, this should be certified in writing. Certify by signing at lines 2 and 3 on Permit/Certification.
 - c. **PERMIT-REQUIRED SPACE:** If there are any observable serious safety/health hazards in addition to potential or real atmospheric hazards, all procedure here must be followed. Authorize Permit by signing on line 3.

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- d. NON-RESPIRABLE ATMOSPHERES: If hazardous atmosphere cannot be eliminated by continuous ventilation, contact Infrastructure Services and/or Tenant and Land Services Health and Safety Coordinator before continuing.
8. Pre-entry precautions:
 - a. Notify affected departments of service interruption.
 - b. Lock-out/tag-out all sources of energy (e.g. steam, electric, mechanical) posing a risk to workers.
 - c. Install blank in affected pipes where valves are not secure or seated.
 - d. Clean and/or purge any chemical storage vessel.
 - e. Wear appropriate personal protective and respiratory protection equipment.
 - f. Have lights and or ladder available.
 - g. If coordination is needed with contractors, *see Appendix K Contractor Checklist*.
 - h. Have appropriate MSDS's (Material Safety Data Sheets).
 - i. Determine how often air monitoring will be conducted.
9. Additional precautions necessary for Permit-Required Spaces:
 - a. Determine start and end times for authorized entry.
 - b. Assign roles and responsibilities as entrant(s), attendant(s), and leadworker(s).
 - c. Set up non-entry rescue equipment (tri-pod, harness).
 - d. Identify rescue service.
 - e. Determine communication method between entrant/attendant.
 - f. Conduct pre-entry briefing: review hazards, procedures and precautions.
10. Sign and post the Permit/Certification at the site.
11. Continually ventilate the space by pushing air so that a positive pressure changes the air over several times every hour. Direct the clean air toward the worker.
12. Test the air periodically while personnel are in the confined space to ensure the ventilation preventing any accumulation of a hazardous atmosphere.
13. Under the following condition, personnel must exit the confined space, re-evaluate hazards and modify entry procedures.
 - a. If any hazardous atmosphere is detected after entry. (Notify Infrastructure Services and/or Tenant and Land Services Health and Safety Coordinator before re-entry.)
 - b. If any health or safety hazard develops which was not anticipated.
 - c. If Attendant (on Permit-Required Confined Space Entry) cannot effectively perform duties.
 - d. If personnel in confined space are experiencing symptoms from heat stress or over-exposure to atmospheric hazards.
14. When work is completed, return the space to original condition.
15. Close out the permit/certification and submit the completed paperwork to the supervisor.

10.1.7.7 Appendix G

CONFINED SPACE ENTRY FORM

GENERAL INFORMATION

SPACE TO BE ENTERED	PURPOSE OF ENTRY
LOCATION/BUILDING	AUTHORIZED DURATION-DATE From _____ To _____ Time From _____ To _____

ENTRY PROCEDURE		
<input type="checkbox"/> Non-Permit Entry Sign at: <div style="text-align: center; font-size: 2em; font-weight: bold;">1 2</div>	<input type="checkbox"/> Alternate Entry Sign at: <div style="text-align: center; font-size: 2em; font-weight: bold;">2 3</div>	<input type="checkbox"/> Permit-Required <div style="text-align: center;"> </div>

EQUIPMENT INVENTORY	
<input type="checkbox"/> Ventilating Fan <input type="checkbox"/> Barrier & Warning Signs <input type="checkbox"/> Gas Monitor: ID# <input type="checkbox"/> Phone/Radio (to contact 911) <input type="checkbox"/> 2-way Communication w/entrant <input type="checkbox"/> Non-entry rescue equipment <input type="checkbox"/> Other	<input type="checkbox"/> Gloves <input type="checkbox"/> Hard Hat <input type="checkbox"/> Respirator <input type="checkbox"/> Safety Glasses <input type="checkbox"/> Ladder <input type="checkbox"/> Lights

PRE-ENTRY PRECAUTIONS	
YES	<input type="checkbox"/> Notify affected departments of service interruption. <input type="checkbox"/> Lock-out/tag-out all sources of energy posing a risk. <input type="checkbox"/> Eliminate unsafe conditions before opening access door. <input type="checkbox"/> Guard entry with barrier and signs. <input type="checkbox"/> Install blank in affected pipes. <input type="checkbox"/> Clean and/or purge any chemical storage vessel. <input type="checkbox"/> Wear personal/respiratory protection. <input type="checkbox"/> Lights and/or ladder available. <input type="checkbox"/> See Contractor Checklist if coordination is needed. <input type="checkbox"/> Appropriate MSDS's on site. <input type="checkbox"/> Non-entry rescue equipment in place. <input type="checkbox"/> Determine how often air monitoring will be conducted <input type="checkbox"/> Determine communication method between entrant and attendant: <input type="checkbox"/> Voice (with sight) <input type="checkbox"/> Radio
NO	<input type="checkbox"/> <input type="checkbox"/>

FOR PERMIT-REQUIERD PROCEDURE		
Assign roles and responsibilities:	Entrant	Attendant
Name _____	<input type="checkbox"/>	<input type="checkbox"/>
Name _____	<input type="checkbox"/>	<input type="checkbox"/>
Name _____	<input type="checkbox"/>	<input type="checkbox"/>
Name _____	<input type="checkbox"/>	<input type="checkbox"/>

EMERGENCY RESCUE SERVICE	
SERVICE	
CONTACT METHOD	PHONE ()

HAZARD ASSESSMENT	
REAL OR POTENTIAL ATMOSPHERIC HAZARDS YES NO <input type="checkbox"/> <input type="checkbox"/> Oxygen deficient (<19.5%) <input type="checkbox"/> <input type="checkbox"/> Oxygen enriched (>23.5%) <input type="checkbox"/> <input type="checkbox"/> Flammable mist. Gas. Vapor or dust <input type="checkbox"/> <input type="checkbox"/> Carbon monoxide <input type="checkbox"/> <input type="checkbox"/> Hydrogen sulfide <input type="checkbox"/> <input type="checkbox"/> Toxic (Specify) _____	OBSERVABLE SERIOUS SAFETY/HEALTH HAZARDS YES NO <input type="checkbox"/> <input type="checkbox"/> Mechanical <input type="checkbox"/> <input type="checkbox"/> Electrical <input type="checkbox"/> <input type="checkbox"/> Engulfment/Entrapment <input type="checkbox"/> <input type="checkbox"/> Burn <input type="checkbox"/> <input type="checkbox"/> Slip, Trip, Fall <input type="checkbox"/> <input type="checkbox"/> Heat stress Other (specify) _____ _____ _____ _____

There are no real or potential atmospheric hazards	
SIGNATURE	DATE
1	/ /

There are no observable serious safety or health hazards	
SIGNATURE	DATE
2	/ /

ENTRY AUTHORIZATION	
I certify that all require precautions have been taken and necessary equipment is provided for safe entry and work in this confined space.	
LEAD WORKER OR ENTRY SUPERVISOR NAME	initials
3	
● Form is available on-site	

ANNUAL REVIEW	
COMPLETED BY	DATE

10.1.7.8 Appendix H

**HOT WORK PERMIT
FOR CUTTING, WELDING, AND BRAZING
WITH PORTABLE GAS OR ARC EQUIPMENT**

(For work outside established welding booths and maintenance shops)

Date _____ Building/Facility _____

Department _____ Location _____

Work to be done _____

Special Precautions _____

Is Fire Watch required due to combustible materials within 35 feet or next to adjacent walls/floors/ceilings? ____

If "YES" see FIRE WATCH checklist below:

I certify that the location where this work is to be done has been examined, necessary precautions taken, and permission granted by my supervisor for this work. If necessary, the Confined Space Entry Permit has also been completed. Post this permit at the job site.

Permit expires ___/___/___ Signed _____

Individual responsible for authorized welding, cutting, and brazing

Time Started _____ Completed ___/___/___

ATTENTION!

Before approving any cutting, welding or brazing permit the supervisor or safety coordinator shall inspect the work area and confirm that precautions have been taken to prevent fire. Check all appropriate blocks.

PRECAUTIONS

- Sprinklers (installed) are in service.
- Cutting, welding, or brazing equipment in good condition.
- Nearby employees advised of the work.
- Shields erected to prevent eye injury due to arc.
- All necessary protective clothing and equipment available, including adequate ventilation.
- Persons performing work fully trained.
- No combustible materials or flammable liquids within 10 feet of the work.

WITHIN 35 FEET OF WORK

- Floors swept clean of combustibles.
- Combustible floors wet down, covered with damp sand, or other shields.
- Combustible materials and flammable liquids protected with covers, guards, or metal shields.
- All wall and floor openings covered.
- Covers suspended beneath work to collect sparks.
- Explosimeter used to check LEL near flammable liquids. (If no explosimeter, move flammables)

WORK ON ENCLOSED EQUIPMENT AND IN CONFINED SPACES

(Tanks, containers, ducts, dust collectors, etc.)

- Equipment cleaned of all combustibles.
- Containers purged of flammable vapors and LEL checked.
- Confined space entry permit completed.

FIRE WATCH, IF REQUIRED

- To be provided during and 30 minutes after operation, if within 35 feet of combustibles.
- Supplied with extinguishers and small hose (when installed).
- Trained in using fire extinguisher/hose and in sounding fire alarm.

FINAL CHECK

- Check for fire in area, adjacent rooms, and floors 45 minutes after completion of hot work, regardless of the location.
- Enable smoke detectors.

Signed _____
Supervisor

10.1.7.10 Appendix J

Confined Space Entry - Training Objectives

Entrants, attendants, and supervisors of confined space entry work must have the right knowledge, skills and attitude to work safely. An effective training program will not only develop these knowledge, skills and attitudes but will certify competency through tests and hands-on exercises. The following objectives will be met in Infrastructure Services and/or Tenant and Land Services Confined Space Entry Training.

OBJECTIVE 1. Hazard Recognition

All confined spaces are considered to be hazardous if they have the potential to harm an employee who will be working within the space.

The employee shall be able to:

1. Identify the 3 factors that the Michigan Occupational Safety and Health Administration (MIOSHA) looks for in defining a confined space.
2. Identify how hazardous chemicals enter the body.
3. Identify acute and chronic health effects and symptoms that may occur after exposure to hazardous chemicals.
4. Describe the types of exposure limits set by MIOSHA to protect the health of employees.
5. Identify hazards that may occur in confined spaces, including hazardous atmospheres, engulfment and entrapment hazards, mechanical and electrical hazards, and physical hazards.
6. Using a Material Safety Data Sheet (MSDS), identify the upper and lower explosive limits for given chemicals.
7. Given the vapor density of a substance, determine where the vapors will most likely collect in a confined space.

OBJECTIVE 2. Confined Space Entry Requirements

In order to protect people from the hazards in confined spaces, MIOSHA has adopted a standard that requires the use of specific procedures.

The employee shall be able to:

1. Identify the difference between a permit-required confined space and a non-permit space.
2. List the duties of attendants, entrants, entry supervisors, and rescue service personnel.
3. List the type of information that must be provided to contractors whose employees will be entering permit spaces.
4. List the key elements of a permit-required confined space program.
5. List the steps that must be followed when working in or around permit spaces.

OBJECTIVE 3. Air Monitoring

Special instruments are used to test the quality of air in confined spaces. Testing the air is the most important step in the confined space entry procedure.

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The employee shall be able to:

1. Identify the procedures required for testing the air in a confined space.
2. Identify the levels at which a monitoring instrument will alarm.
3. Demonstrate the use of monitoring equipment in a classroom exercise.
4. Describe the limitations of the air monitor used in the classroom exercise.

OBJECTIVE 4. Ventilation

Atmospheric hazards must be controlled by mechanical ventilation. Mechanical ventilation replaces contaminated air with air that is clean and breathable.

The employee shall be able to:

1. Identify conditions requiring ventilation.
2. Identify 5 common problems that occur when ventilating confined spaces.
3. Identify the factors to consider when selecting ventilation equipment.
4. Evaluate a confined space and select the proper ventilation equipment.
5. Demonstrate the use of ventilation equipment during a simulated confined space entry.

OBJECTIVE 5. Safety and Protective Equipment

The safety and protective equipment needed for confined space entry will depend on the type of space and the work being done.

The employee shall be able to:

1. Identify the types of respirators that may be used in confined spaces.
2. List the types of safety equipment used for confined space entry.
3. Assemble, inspect, and demonstrate the use of a mechanical lifting device.
4. Inspect, don, and demonstrate the use of a harness.

OBJECTIVE 6. Documenting Entry

A number of important steps must be taken before any employees enter a confined space. These steps are crucial to ensuring employee safety.

The employee shall be able to:

1. Identify the items that must be completed on an entry permit.
2. List the conditions necessary to certify alternate entry procedures for a permit space.
3. Identify how a permit space can be reclassified into a non-permit space.
4. Complete a confined space entry form for a permit space, an alternate entry space, and a non-permit space.

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10.1.7.11 Appendix K

CONTRACTOR CHECKLIST for CONFINED SPACE ENTRY

In order to comply with 29 CFR, Part 1910.146, the following should be communicated to all contractors working in confined spaces on DMB property.

1. The workplace contains permit spaces and entry is allowed only through compliance with a permit space program. Indicate whose confined space entry program will be enforced.
 - State of Michigan, Department of Management & Budget
 - Contractor (copy to DMB project representative)

- 2) The space requires a permit because of DMB's experience with the space and the following hazards:
 - Real or Potential Atmospheric Hazards
 - Oxygen content less than 19.5% or greater than 23.5%.
 - Flammable gases and vapors greater than 10% of the LEL (Lower Explosive Limit).
 - Hydrogen Sulfide concentrations greater than 10 ppm (Parts per million).
 - Carbon Monoxide concentration greater than 35 ppm.
 - Other toxic gases or vapors greater than PEL (Permissible Exposure Limit).
 - Combustible dust.

 - Observable serious safety and health hazards
 - Mechanical
 - Electrical
 - Engulfment/Entrapment
 - Slip, Trip, Fall
 - Burn
 - Heat Stress
 - Other (specify) _____

- 3) Review precautions or procedures that DMB has implemented for the protection of employees in or near permit spaces where contractor personnel will be working. If DMB personnel will be working in or near permit spaces occupied by contractor, coordinate activity to ensure safety of ALL personnel.

- 4) At the conclusion of the entry operations, the contractor should discuss with DMB the procedures followed and any hazards confronted or created during entry operations.

State of Michigan Project Representative

Contractor Supervisor/Manager

Job Number or PO Number: _____

Date: _____

10.1.7.12 Appendix L

CONFINED SPACE SIGNS

MIOSHA General Industry Safety Standards Part 90 states, "If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs or by any equally effective means (c)(2)." Also, the employer shall, "implement the measures necessary to prevent unauthorized entry(d)(1)". DMB shall utilize training and signage as needed to fulfill these requirements.

The following signs or their equivalent shall be used to mark confined spaces whenever feasible.

10.1.7.12.1 Permit-Required Confined Spaces

Confined spaces with a potential or real atmospheric hazard and/or a serious, observable safety or health hazard are considered Permit-Required Spaces. Permit Spaces, included those which may be entered with "Alternate Entry Procedures" will be posted with this sign.

This sign indicates that a Confined Space Permit (including hazard assessment, air monitoring, etc.) is required before each entry.

If a confined space is not posted with a sign, it shall be considered a Permit-Required Confined space until it is reclassified.

10.1.7.12.2 Non-Permit Confined Space

If a permit space has no actual or potential Atmospheric hazards and if all hazards within the space are eliminated without entry in to the space, the permit space may be reclassified as a non-permit confined space.

This sign indicates that the confined space has been reclassified as a Non-Permit Confined space and the records are on file.

If any hazards are created or introduced during the entry, entrants shall leave the space and reevaluate the hazards and necessary safety measures.

10.2 CONTROL OF HAZARDOUS ENERGY SOURCES - (LOCKOUT/TAGOUT)

10.2.1 PURPOSE

The purpose of this procedure is to assure that employees are protected from unintended machine motion or unintended release of energy which could cause injury when they set up, adjust, repair, service, install or perform maintenance work on equipment, machinery or processes.

10.2.2 SCOPE

This program applies to a wide cross section of DMB management and employees. These requirements establish safety procedures for performing lockouts (applying energy control procedures) and communicating to all “affected” employees. The principle of isolating the energy source “zero-energy-state” applies to all forms of energy (electric, hydraulic, pneumatic, steam, kinetic, gravitational, etc.). In addition to traditional electrical lockout hardware (hasps, tags and locks), line blanks, isolating valve covers and related hardware may be needed to isolate steam lines and other distribution systems.

Typical tasks requiring lockout/tagout procedures include:

- Electrical lubrication of moving machine parts
- Routine lubrication of moving machine parts
- Sanitation or cleaning of machinery
- De-jamming
- Maintenance of high pressure, high temperature or hazardous substance pipelines
- Replacement of motors, impellers, and other components

Tasks which require the isolation of high voltage switch-gear and related equipment, are specifically covered in Section 10.3 “Safety Requirements for the Generation, Transmission and Distribution of Electric Power”. Related work practices for specific applications are also included in Section 12.6 “Electrical Safety Related Work Practices”.

10.2.3 DEFINITIONS

Affected Employee means one whose job requires him/her to operate or use a machine on which servicing or maintenance is being performed under lockout or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Authorized Employee means a person who locks out machines or equipment in order to perform servicing or maintenance on that machine. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance.

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Energized means connected to an energy source or containing residual or stored energy.

Energy Control Procedure means a procedure that is developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

Energy Isolating Device means a mechanical device that physically prevents the transmission or release of energy.

Energy Source means any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, kinetic, or other type of energy source.

Lockout means the placement of a lockout device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout means putting a lock on the part of the machine or energy source that controls the energy; for example a circuit breaker, switch, steam valve, etc.

Lockout Device means a device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment.

Power Source means any source of energy, which includes but is not limited to springs, air, hydraulic, steam, gas, fluids, and gravity.

Servicing and/or Maintenance means workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to *unexpected* energization or startup of the equipment or release of hazardous energy.

Tagout means the placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

10.2.4 RESPONSIBILITIES

It is the supervisor's responsibility to ensure that this information is communicated, implemented and enforced without exception. **Machine specific lockout procedures are required to be documented for certain types of equipment and machinery, which are defined herein.** These requirements apply to all activities performed on State property. This also includes provisions for contractors' employees who are working on State property. It will be necessary to re-train annually, but its effectiveness and implementation must be monitored continually.

10.2.4.1 Management Responsibilities

- Assure that the locks and devices required for compliance with the lockout procedure are provided to employees.
- Train new employees and periodically instruct all of their employees regarding provisions and requirements of this lockout procedure. *See Appendix A for Employee Training Certification Form.*
- Provide adequate supervision.
- Effectively enforce compliance of this lockout procedure including the use of corrective disciplinary action where necessary.

10.2.4.2 Employees Responsibility

- Comply with the lockout procedure.
- Consult with supervisor or other appropriate knowledgeable management personnel whenever there are any questions regarding employee protection.
- Utilize and care for the locks and other devices required to comply with the lockout procedure.

10.2.5 REQUIREMENTS

10.2.5.1 General Considerations

The provisions of this rule generally require that the energy sources for equipment be turned off or disconnected and that the switch be locked out (preferable over tagging a circuit) or labeled with a warning tag. Sources of energy, such as springs, air, electric, hydraulic, steam and gravity shall be evaluated in advance to determine whether to retain or relieve the pressure prior to starting the work.

1. Communicate, implement and enforce the energy control program.
2. Use locks when equipment can be locked out.
3. Ensure that new or overhauled equipment has a disconnect means which can accommodate locks.
4. Employ additional means to ensure safety when tags must be used in lieu of locks (devices are available to isolate circuit breakers and corded equipment).
5. Identify and implement machine specific procedures (in writing) for the control of hazardous energy in process or equipment, which are fed by

more than one power source. See *Appendix B*.

6. Institute procedures for release of lockout/tagout including machine inspection, notification and safe positioning of employees and removal of the lockout/tagout device.
7. Obtain standardized locks and tags, which indicate the identity of the employee using them and which are of sufficient quality and durability to ensure their effectiveness.
8. Conduct and document periodic inspections of energy control procedures periodically (at least annually).
9. Train employees in the specific energy control procedures with training reminders as part of the annual inspections of the control procedures at least annually.
10. Adopt procedures to ensure safety when equipment must be tested during servicing, when outside contractors are working at the site, when a multiple lockout is needed for a crew servicing equipment and when shifts or personnel change.
11. Employees shall request assistance from their supervisor if they do not know when or how to obtain lockout equipment. Any questions concerning lockout procedure should be directed to employee's supervisor.

10.2.5.2 Sequence Of Lockout/Tagout Procedures

This procedure may be adapted to fit specific applications:

1. The supervisor or facility manager should be notified before anyone may begin any work.
2. The Authorized Employee should know before beginning lockout procedures the type, magnitude, and hazards of energy that the machine or equipment utilizes.
3. Notify all Affected Employees when, where, and why a lockout system is going to be utilized.
4. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress stop button, open toggle switch, etc.).
5. Isolate all energy control devices so that the equipment is isolated from its energy sources (open the switch, close valves, unplug, quick disconnect, or other energy isolation means).
6. Stored energy such as springs, elevated machine members, rotating flywheels, hydraulic systems, air, gas, steam, or water pressure, etc. must be dissipated or restrained by methods such as reposition, blocking,

bleeding, etc.

7. Lockout the energy isolating devices with the specially assigned red individual locks. Use cylinder boxes to lock out plugs, quick disconnects, or remote switches. Sign, date, and attach Lockout Identification Tag through the lock pin.
8. Recheck the energy sources (verify de-energization) after ensuring that no employees are exposed. Operate the push button or other normal operating controls to make certain that the equipment will not operate. Return operating controls to off or neutral position after test.
9. After switches or valves have been turned off, persons doing the work should place their padlocks through the lock on the control, or through the multiple lockout devices.
10. The disconnect should be tried to verify that it cannot be moved.
11. When the work is completed, maintenance personnel should remove their locks. When the last lock is removed, the tag should also be removed and the affected employees and supervisor notified of the completed work.

10.2.5.3 Hardware

Common hardware used for lockouts consists of multiple lock device (shackle), padlocks and notification tags.

10.2.5.3.1 Multiple Lockout Device

The multiple lockout device is an interlocking hasp with multiple holes. The device is placed on the equipment disconnect switch. Each authorized employee places his or her padlock shackle through the holes and secures their lock. Thus several employees may lock out and work on the same equipment. This equipment cannot be operated until the device and last padlocks have been removed.

10.2.5.3.2 Padlocks

Key operated padlocks should be issued to each employee who will use the lockout procedure. Only one key should be issued to the lock holder. The supervisor or manager will have a duplicate or master key kept in a secured location. If a lock must be removed and the key has been lost or there is an emergency, the lock should be cut. The user's name and department will identify each lock. This information can be marked or engraved on the lock case or an identification tag attached to the lock. Locks should never be loaned. Locks must be durable, standardized and substantial enough so they can not be accidentally removed. Locks can be obtained from Tenant and Land Services lockshop.

10.2.5.3.3 Tags

Notification tags will be made of sturdy paper or plastic signs, which are placed on the machine being maintained or repaired. The tags are a useful adjunct to the lockout procedure, but should be used only in conjunction with lockout hardware. Tags shall be “BRADY” model #165520 (W.W. Grainger 57825). Tags should include the following information: “DANGER; DO NOT OPERATE”; and include employee name and date.

10.2.5.4 Exclusions

Certain types of tasks are excluded from coverage under the requirements of this procedure:

1. Normal production operations including repetitive, routine minor adjustments and maintenance which would be covered under MIOSHA machine guarding standards.
2. Work on cord and plug connected electric equipment when it is unplugged, and the employee working on the equipment has exclusive control over the plug.
3. Hot tap operations involving gas, steam, or water when continuity of service is essential, and documented procedures are followed to provide proven effective protection for employees.

10.2.5.5 Machine Specific Procedures

As a general practice, it is necessary to develop specific procedures for specific equipment or equipment groups. Any piece of equipment, which is fed by more than one-energy source, falls under this requirement. An example of the requirement to develop machine specific procedures would be to provide protection for a series of equipment, which is activated by a control panel (110 V) to activate a motor starter circuit powered by 480V. *See Appendix B for Machine Specific Evaluation Procedure Form.*

The employer need not document the required procedure for a particular machine or piece of equipment, when all of the following elements exist:

1. The machine or equipment has no potential for residual energy or release of stored energy after shut down.
2. The machine or equipment has a single energy source, which can be readily identified and isolated.
3. The isolating and locking out of that energy source will completely de-energize and deactivate the machine or equipment

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4. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
5. A single lockout device will achieve a locked-out condition.
6. The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
7. The servicing or maintenance does not create hazards for other employees.
8. The employer, in utilizing this exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

A lockout procedure is a system, which assures that equipment has been de-energized and cannot operate. Effective lockout procedures will prevent unexpected operation of machines, and thereby, eliminate a prime source of injury to maintenance personnel.

10.2.5.6 Troubleshooting

Power may be turned on when it is required to perform tests, adjustments or diagnostic procedures. All of the rules pertaining to removing locks and restoring power shall be followed. When the troubleshooting activity has identified the problem, power must be turned off while repair activities are completed. The equipment or process must again be locked out if it is necessary to continue work after completing the test or adjustments.

1. Inspect the work area to ensure that nonessential tools and material have been removed and to ensure that the machine/equipment components are operationally intact.
2. Notify and remove employees from the machine/equipment area.
3. Remove the lockout devices by the Authorized Employee who applied the device.
4. Energize and proceed with testing/positioning.
5. De-energize all systems and reapply energy control measures *as outlined in Sequence of Lockout/Tagout Procedures 10.2.5.2.*

10.2.5.7 Procedures Involving More Than One Person:

1. In the preceding steps, if more than one individual is required to lockout equipment, each individual will place their own personal lockout device on the energy isolating devices. (One lock for each person.)
2. When an energy-isolating device cannot accept multiple locks, a special red multiple lockout hasp will be used.

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3. Only employees trained at the authorization level are allowed to perform lock out of machines or equipment.
4. The power source of any equipment, machine or process that must be set-up, adjusted, repaired, serviced, installed or where maintenance work is to be performed and unintended motion or release of energy would cause personal injury, shall be locked out by each employee doing the work. Sources of energy, such as springs, air, hydraulic, steam and gravity shall be evaluated in advance to determine whether to retain or relieve the pressure prior to starting the work.
5. Safety locks are for the personal protection of the employee and are only to be used for locking out equipment.
6. Padlocks, equipment adapters and "Danger Tags" shall be obtained from supervisors.
7. Personal safety locks shall contain a brass (or other suitable material) tag with the employee's name and department number stamped on it.
8. One key for every personal safety lock issued shall be retained by the employee to whom it was issued. A second key shall be secured by and accessible only to that employee's supervisor.
9. Employees shall request assistance from their supervisor if they do not know where or how to lockout equipment.
10. Any questions concerning the lockout procedure should be directed to the employee's supervisor.

10.2.5.8 Specific Requirements

10.2.5.8.1 Locking Out and Isolating the Power Source (Group Lockout)

1. Equipment, machines or processes main disconnect switches shall be turned off and locked in the off position only after the electrical power is shut off at the point of operation control. Failure to follow this procedure may cause arcing, and possible explosion.
2. A machine must have specific procedural steps for shutting down equipment.
3. If a shift or personnel change occurs before the maintenance or servicing is finished, it is the responsibility of the off-going and on-coming shift supervisors involved with the locked out equipment/machine to:
 - a. Ensure that the continuity of the energy control procedure is maintained until the on-coming shift supervisor arrives and takes control of the job.

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- b. Ensure that personnel changing shifts will install an equipment lock to the lockout adapter prior to removing their personal safety lock unless the equipment is ready to go back into service.
 - c. Attach a tag indicating the status of the machine/equipment will be attached to the equipment lock.
4. A machine connected to over a 110 volt source of power by a plug-in cord shall have a locking device applied to the plug attached to the cord leading to the machine to be considered locked out.
5. A machine connected to a 110 volt source of power by a plug-in cord shall be considered locked out if the plug is disconnected and tagged with a do not start tag.
6. After locking out the power source, the employees shall try the equipment, machine or process controls to ensure no unintended motion will occur or test the equipment to determine that the energy isolation has been effective.
7. When two or more employees work on the same equipment, each is responsible for attaching his/her lock. Safety locks and adapters are to be fixed on levers, switches, valves, etc., in the non-operative (off) position.
8. An employee who is assigned to a job and upon arrival finds a "lock," "equipment adapter," and "danger tag" affixed to the equipment shall take the following action:
 - a. Affix his/her personal lock to the "Equipment Adapter."
 - b. After checking to see that all other employees that may be working on the equipment, are out of harms way, try the controls to ensure no unintended motion will occur before starting work or test the equipment, machine or process by use of appropriate test equipment to ensure that the energy isolation has been effective.
9. When safety blocks are required they shall be used in conjunction with the lockout steps, not as a substitute.

10.2.5.9 Removal of Locks and Restoring Power Source

1. Power may be turned on when it is required to perform tests or adjustments. All of the rules pertaining to removing locks and restoring power shall be followed. The equipment or process shall again be locked out if it is necessary to continue work after completing the test or adjustments.
2. After the servicing and maintenance is completed, and the equipment is ready for normal production operations, check the area around the machines or equipment to ensure that no one is exposed to any danger.

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3. Upon completion of the work, each employee will remove his/her lock, rendering the machine operable when the last lock is removed. Machinery must have specific procedural steps for removing locks.
4. The employee responsible for removing the last lock, before doing so, shall assure that all guards have been replaced, the equipment, the machine or process is cleared for operation, and appropriate personnel notified that power is being restored.

10.2.5.10 Emergency Lock Removal

1. Supervision must verify that the Authorized Employee who applied the device is not at the facility.
2. The supervisor or facility manager must be present at the machine/equipment before the emergency spare key is used to remove the lockout device.
3. All reasonable effort must be made to contact Authorized Employee to inform them that their lockout device has been removed.
4. The supervisor is responsible for notifying the employee that his/her safety lock has been removed, when they return to the workplace and prior to them resuming work.
5. The supervisor is responsible for making certain all the requirements for restoring power are followed.

10.2.5.11 Tagout

Locks and tags shall be used to isolate equipment whenever feasible. If lockout is not possible, the supervisor shall recommend modification of equipment to allow for lockout. Some equipment cannot be locked out. This does not mean working with the energy source is not dangerous. Tagout means using special tags that warn people of the danger of starting or turning on the machine or releasing an energy source. Tags must:

1. Have a printed warning (legible and understandable) stating what could happen if the equipment or energy source is started or released.
2. Be “as effective as a lock”.
3. Be made of durable materials to withstand expected environmental conditions.
4. Indicate the identity of the employee applying the device.
5. Be attached with a heavy-duty nylon cable tie (or something similar) and cannot be reused.

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6. Be self-locking and cannot be released with less than 50 pounds of strength.
7. Be in plain view and at the same location as the energy-isolating device, when attached.
8. Not be bypassed, ignored or otherwise defeated.

Only the person originally attaching them may remove tags. (*Otherwise, follow emergency lock removal in Section 10.2.5.10.*)

When tagouts are used without a lock, employees must be trained in the limitations of tags and information listed above. When tags are used without a lock, management will establish a written procedure assuring the tagout process is just as effective as a lock-out process.

10.2.5.12 Contractors

Whenever contractors are working on State property, the supervisor or facility manager and the contractor will inform each other of their respective Lockout Procedures. If the activity also involves DMB employees, special care should be taken so that both parties are aware of the potential hazards associated with the coordination of lockout activities. This information should be communicated at a pre-start up meeting.

10.2.5.13 Annual Audit

Supervisors (who are authorized employees) are responsible for conducting a periodic inspection of the lockout procedure at least annually to ensure that the procedure and requirements are being followed. This inspection must conform to the following requirements from MIOSHA:

1. An authorized employee, other than the one(s) actually performing the lockout being reviewed must conduct this inspection.
2. The person conducting the inspection must witness a lockout being performed and review with each of those personnel, their responsibilities under the lockout program.
3. Any deficiencies identified from this inspection shall be immediately corrected through additional training, employee meetings, and disciplinary action, engineering changes or through any other effective means.
4. *See Appendix C Periodic Inspection Certification Form.*

10.2.6 TRAINING

Authorized employees will be trained initially and annually thereafter. Specifically, the training program must cover the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the method and means necessary for energy isolation and control.

Other employees will be trained as “affected employees”, when initially hired and annually thereafter, in the purpose and use of energy control procedures.

Retraining will be provided whenever there is a change in their job assignments, a change in machines, equipment, or processes that present a new hazard, or when there is a change in the energy control procedures. Retraining may be provided to establish proficiency.

Each supervisor must provide training to ensure that employees understand the purpose and function of the lockout program and that employees acquire the knowledge and skills required for the safe application, usage and removal of the energy controls. This training should include the following:

1. Each Authorized Employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
2. Each Affected Employee shall be instructed in the purpose and use of the energy control procedure.
3. All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or re-energize machines or equipment which are locked out.

10.2.7 REFERENCES & APPENDICES

For additional information refer to MIOSHA, General Industry Standards, Part 40 “Electrical Safety Related Work Practices” and Part 85 “The Control of Hazardous Energy Source”.

Appendices:

- A. Employee Certification
- B. Machine Specific Energy Control Evaluation/Procedure
- C. Periodic Inspection Certification

10.2.7.1 Appendix A

EMPLOYEE CERTIFICATION

I certify that I have had the opportunity to review this document, have been trained on the lockout/tagout procedure, and that I have received a copy of the LOCKOUT/TAGOUT POLICY.

My signature below indicates that I have received a copy of the Lockout/Tagout Policy and that I will comply with the requirements of the policy.

Employee Signature

Date

10.2.7.2 Appendix B

MACHINE SPECIFIC ENERGY CONTROL EVALUATION/PROCEDURE

Facility _____ Location _____
 Equipment/type of: _____ If applicable, Mfg. _____ Mdl. _____ SN _____
 Number of Similar Equipment _____ Number of Lockouts Needed _____
 Date evaluation completed _____ Conducted By _____

LOCKOUT REQUIREMENTS

Energy Sources	Assessment	Isolating Lockout Devices
<input type="checkbox"/> electrical	<input type="checkbox"/> wire <input type="checkbox"/> motor <input type="checkbox"/> capacitor	<input type="checkbox"/> disconnect <input type="checkbox"/> plug <input type="checkbox"/> circuit breaker <input type="checkbox"/> switch <input type="checkbox"/> key
<input type="checkbox"/> mechanical	<input type="checkbox"/> press <input type="checkbox"/> weight <input type="checkbox"/> spring <input type="checkbox"/> flywheel	<input type="checkbox"/> block <input type="checkbox"/> remove weight <input type="checkbox"/> unload spring <input type="checkbox"/> disengage
<input type="checkbox"/> hydraulic	<input type="checkbox"/> hose/pipe <input type="checkbox"/> pressure <input type="checkbox"/> accumulator	<input type="checkbox"/> bleed pressure <input type="checkbox"/> valve <input type="checkbox"/> disconnect
<input type="checkbox"/> air	<input type="checkbox"/> hose/pipe <input type="checkbox"/> compressor	<input type="checkbox"/> bleed pressure <input type="checkbox"/> valve <input type="checkbox"/> disconnect
<input type="checkbox"/> steam	<input type="checkbox"/> pipe <input type="checkbox"/> pressure <input type="checkbox"/> boiler <input type="checkbox"/> heat	<input type="checkbox"/> bleed pressure <input type="checkbox"/> valve
<input type="checkbox"/> heat	<input type="checkbox"/> oven <input type="checkbox"/> hot surface <input type="checkbox"/> furnace <input type="checkbox"/> heat	<input type="checkbox"/> cool down <input type="checkbox"/> fuel shutoff
<input type="checkbox"/> other	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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10.2.7.3 Appendix C

PERIODIC INSPECTION CERTIFICATION

CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

DATE: _____

INSPECTOR: _____

SIGNATURE: _____

**MACHINE OR EQUIPMENT ON WHICH
LOCKOUT / TAGOUT PROCEDURES WERE PERFORMED:**

EMPLOYEE(S) PERFORMING THE LOCKOUT/TAGOUT PROCEDURES

EMPLOYEE NAME (Please Print)	EMPLOYEE SIGNATURE
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Were all of the lockout/tagout procedures performed correctly? Yes _____ no _____

COMMENT ON IMPROPER LOCKOUT/TAGOUT PROCEDURES BEING USED ON THE REVERSE SIDE OF THIS SHEET. (Example: List improper procedures being used, which require retraining for the employee or modification of the procedures.):

10.3 ELECTRICAL POWER GENERATION, TRANSMISSION, AND DISTRIBUTION

10.3.1 PURPOSE

This standard establishes work practices and specific safety requirements to be followed during the operation and maintenance of electrical power generation, transmission, and distribution equipment. These requirements will significantly reduce the potential of injury to authorized electricians and management working with high voltage contacts, switchgear and distribution systems.

Numerous elements of this program are duplicated in other sections of the safety manual. However, they are contained in this section to minimize cross-referencing.

10.3.2 SCOPE

Occasionally, DMB electricians are required to perform periodic maintenance on specific high voltage equipment such as switchgear, and other high voltage equipment and distribution systems within state property. The Electrical Trades' Supervisor must carefully review the requirements stated herein, and apply these requirements to specific tasks which authorized electricians will perform.

Other standards reflecting additional information regarding work with high voltage can be found in the Reference Section 10.3.7.

10.3.3 DEFINITIONS

Affected Employee means an employee whose job requires him or her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout or whose job requires him or her to work in an area in which such servicing or maintenance is being performed.

Circuit means a conductor or system of conductors through which an electric current is intended to flow.

Clearance (between objects) means the clear distance between two objects measured surface to surface.

Clearance For Work means authorization to perform specified work or permission to enter a restricted area.

Deenergized means free from any electrical connection to a source of potential difference and from electric charge; not having a potential different from that of the earth.

Energized (alive, live) means electrically connected to a source of potential difference, electrically charged so as to have a potential significantly different from that of earth in the vicinity.

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Energy Isolation means lockout and tagout device application and removal, which may only be performed by the authorized employees who are performing the servicing or maintenance.

Energy Isolating Device means a physical device that prevents the transmission or release of energy, including, but not limited to, the following:

- a manually operated electric circuit breaker
- a disconnect switch
- a slide gate
- slip blind
- line valve
- any similar device with a visible indication of the position of the device. (Push buttons, selector switches, and other control-circuit-type devices.)

Energy Source means any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, or other energy source that could cause injury to personnel.

Equipotential Zone means

Exposed means not isolated or grounded.

Ground means a conducting connection, whether intentional or accidental, between an electric circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

Guarded means being covered, fenced, enclosed, or otherwise protected, by means of suitable covers or casings, barrier rails or screens, mats, or platforms, designed to minimize the possibility, under normal conditions, of dangerous approach or accidental contact by persons or objects.

Live-Line Tool means a non-current-carrying rod, tube or pole made from fiberglass-reinforced plastic (FRP) or wood, designed and constructed to withstand live voltage.

Lockout/Tagout Application means the established procedures for the application of energy control (the lockout or tagout procedures).

Step and Touch Potential means the voltage between the feet of a person standing near or touching an energized-grounded object. It is equal to the difference in voltage, given by the voltage distribution curve between two points at different distances from the electrode. A person could be at risk of injury during a fault simply by standing near the grounding point.

Notification means that affected employees must be notified by the employer or authorized employee of the application and removal of lockout or tagout devices.

Switch means a device for opening and closing or for changing the connection of a circuit. In this section a switch is understood to manually operable, unless otherwise stated.

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Voltage means the effect (rms) potential differences between any two conductors or between a conductor and the ground. Voltages are expressed in nominal values unless otherwise indicated.

10.3.4 RESPONSIBILITIES

10.3.4.1 Management

- Train and familiarize employees with the safety related work practices and emergency safety procedures that apply to their specific job task.
- Determine and conduct at least annual supervised inspections to ensure that each employee is complying with the safety related work practices herein.
- Retain employment records that indicate that the employee has received the required training.
- Provide required access to medical services, first aid, and cardiopulmonary resuscitation.
- Implement a program of Energy Control Procedures (Lockout/Tagout) with documented training and inspections.
- Provide equipment to ensure the prompt and safe rescue of employees from enclosed spaces.
- Assess each work area (hazard determination), and whether it is safe for employees to perform specific tasks (i.e., conducting atmospheric testing before allowing an employee to enter a confined space).
- Establish and enforce work practices for the protection of each worker from the hazards of high voltage testing and grounding systems.
- Ensure that only “qualified” and “authorized” employees work with or on exposed energized lines or parts of equipment.

10.3.4.2 Employee

- Based on qualification, employees will be assigned specific tasks relating to electrical work, which they must perform in a safe and competent manner as trained. Taking shortcuts, which deviate from these requirements is expressly prohibited.
- Distinguish exposed live parts from other parts of the electrical equipment.
- Determine the nominal voltage of exposed live parts.
- Know and follow the minimum clearance distances for specified voltages.

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- Utilize proper special precautionary techniques, personal protective equipment, insulating and shielding material, and insulated tools for working near or on exposed energized parts of electric equipment.
- Report to a Supervisor, any hazards or hazardous conditions that could cause injury.
- Recognize and avoid hazards involved in a specific job.
- Understand the application of energy control procedures for specific machinery and tasks.

10.3.5 REQUIREMENTS

Due to the comprehensive nature of this program, the detailed text of the application of these requirements to DMB electricians can be referenced in the MIOSHA, General Industry Safety Standard Part 85 “The Control of Hazardous Energy Sources”, and Part 86 “Electric Power Generation Transmission and Distribution”.

10.3.5.1 General Applicability

These rules establish the work practices necessary during the operation and maintenance of electrical power generation, transmission, and distribution facilities. These rules apply to all of the following:

1. Enclosed spaces
2. Hazardous energy control
3. Working near energized parts
4. Grounding for employee protection
5. Underground and overhead installations
6. Line clearance tree trimming
7. Substations and switchgear
8. Other conditions and equipment unique high voltage distribution systems.

10.3.5.2 Medical Services and First-Aid

1. In addition to general medical and first aid provisions, employees performing work on or near energized lines or equipment exceeding 50 volts, require that cardiopulmonary resuscitation (CPR) services must be available.
2. For fixed work locations such as state buildings, the number of trained persons available must be sufficient to ensure that each employee exposed

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to electric shock can be reached within 4 minutes.

3. Field-work involving 2 or more employees requires that at least 2 trained persons must be available.
4. In remote locations, all employees must be trained in the required medical services.
5. First-Aid kits must be properly maintained, and readily available, with frequent enough inspections to ensure that expended items are replaced at least annually.

10.3.5.3 Job Briefing

A Supervisor must conduct at least one job briefing with involved employees before the start of each job's day or shift. Additional job briefings must be held if a significant change in procedures occur. The briefings should cover:

1. Hazards associated with the job
2. Work procedures involved
3. Special precautions
4. Energy source controls
5. PPE requirements

A brief discussion is satisfactory if the work involved is routine and the employee by virtue of training and experience can reasonably recognize and avoid hazards involved with the job. A detailed discussion is required if:

1. The work is complicated or particularly hazardous.
2. The employee is unable to recognize or avoid involved hazards.

10.3.5.4 Hazardous Energy Control (Lockout/Tagout)

A Control of Hazardous Energy (Lockout/Tagout) Program is required for employees who perform servicing or maintenance of machinery or equipment where unexpected energizing, "start-up", or release of stored energy could occur and cause injury.

The DMB energy control program must meet the following requirements:

1. When an energy source is not capable of being locked-out, a tagout system will be used for employee protection.
2. If a tagout system of controlling hazardous energy is used in place of a lockout system, full compliance of tag-out related provisions must be followed by additional measures, such as:
 - a. The removal of an isolating circuit element
 - b. Blocking of a control switch
 - c. Opening of an extra disconnecting device

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- d. Removal of a valve or handle to reduce the likelihood of inadvertent energizing
3. Procedures must be documented and communicated for the control of potentially hazardous energy. The procedure must clearly and specifically outline the purpose, scope, responsibilities, authorization, rules, and techniques necessary to control hazardous energy. Measures for monitoring and enforcing compliance include but are not limited to the following:
 - a. A specific statement of the intended use of this procedure;
 - b. Specific steps for shutting down, isolating, blocking and securing machines or equipment from their energy source.
4. Specify the requirements for testing a machine or equipment to determine the effectiveness of the lockout or tagout devices or other energy control measures.
5. Supervision must conduct a periodic inspection to ensure that the procedures of the energy control program are being properly followed. Details of the inspection are as follows:
 - a. Performed by an authorized employee who is not using the energy control procedure being inspected.
 - b. Identification and correction of deviations or inadequacies.
 - c. Review with the authorized employee responsible for the specific energy control procedure.
 - d. Documentation of inspections must include the date of inspection, equipment involved, identity of the inspector and the authorized employees, and the specific procedures that were followed.
6. Training to ensure that employees understand the purpose and functions of the energy control program, and that the knowledge and skills necessary for the safe application, usage, and removal of energy controls are acquired and demonstrated.
 - a. Each authorized employee must receive training in the recognition of sites and magnitudes of hazardous energy sources, and the methods and means needed to isolate and control.
 - b. Any affected employee must be instructed in the purpose and use of the energy control program. Those employees whose work does not authorize them to implement the energy control procedures must be instructed that it is prohibited to attempt to restart or re-energize any machine or equipment that has been locked out.
 - c. All other employees, whose work operations are or may not be in an area where energy control procedures may be utilized, will be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.
7. When tagout or other warning devices are used, employees must also be trained in the following limitations:
 - a. Tags are essential warning devices affixed to energy isolating devices and do not provide the physical restraint equivalent to a lock.

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- b. They must be securely attached to the energy isolating device, and be legible, and understandable by affected employees.
 - c. Tags and lockout devices must be made of materials, which withstand environmental conditions.
 - d. Tags and lockout systems are not to be removed or bypassed by an unauthorized employee.
 - e. Tag and lockout systems will have standardized criteria: color, shape, and size.
 - f. Lockout devices must be substantial enough to prevent means of removal by the use of bolt cutters or metal cutting tools.
 - g. Tagout devices must be non-reusable and substantial enough to prevent means of accidental or inadvertent removal.
 - h. Each lockout or tagout device must have means to include provisions for authorized employee identification.
 - i. Tagout devices must warn against hazardous conditions if the machine or equipment is energized and must include a legend such as the following:
 - DO NOT START
 - DO NOT OPEN
 - DO NOT CLOSE
 - DO NOT ENERGIZE
 - DO NOT OPERATE
8. "Energy Isolation" Lockout/Tagout device application and removal may only be done by authorized employees performing the servicing or maintenance.
9. "Notification" will be made to any employee not authorized to apply or remove the warning device before the controls are re-energized.
10. Lockout/Tagout Application.
- a. The elements of action and the procedures to follow when applying a lock or tag systems to isolate an energy source are as follows:
 - b. Before an authorized or affected employee turns off machine or equipment they must have previous knowledge of the location and magnitude of the energy source, and means of isolating it.
 - c. Standard shutdown procedure.
 - d. All energy isolating devices must be located and operated to isolate the machine or equipment from its energy source.
 - e. Affix lockout/tagout devices to each energy-isolating device in the "safe" or "stop" position.
 - f. Tags must be positioned in the same location a lock would be applied; the tag must be located as close as possible to the device so that it would be obvious to anyone attempting to operate the device. Tags should only be used when lockout systems cannot be applied.
 - g. A test must be performed to verify de-energizing of the machine or equipment is properly isolated.
 - h. Verification of energy isolation must be maintained until servicing or maintenance is completed.

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11. Release from lockout/tagout.

Before lockout/tagout devices are removed and energy is restored to the machine or equipment, the following procedures must be followed by the authorizing employee:

- a. The work area must be inspected to ensure that nonessential items (servicing tools) are removed and all machine or equipment components are intact.
- b. Ensure that all employees have been safely positioned.
- c. The authorized employee will remove lockout/tagout devices from each energy-isolating device. If the authorized employee is not at the facility, a supervisor can remove the lockout/tagout devices and is informed the authorized employee of the removal when he returns to the facility.
- d. Notify affected employees of removal.

12. Temporary Removal.

To test, troubleshoot or position the equipment, the following sequence or actions must be followed:

- a. Clear machine or equipment of tools and materials
- b. Remove employees from the machine or equipment area
- c. Remove the lockout or tagout devices
- d. Energize and proceed with testing or positioning
- e. De-energize all systems and reapply energy control measures

13. Group Lockout/Tagout.

When servicing is performed by a crew, craft, department, or other group they must utilize a procedure, which affords the employees protection equivalent to that provided by the personal lockout/tagout device. Group lockout/tagout devices must be used in the actions and procedures specified in the following:

- a. The primary responsibility is vested in a set number of employees under the protection of a group lockout/tagout procedure.
- b. Provisions are made for an authorized individual to ascertain the exposure status of the group members. This may involve radios or other forms of communication in remote situations.
- c. The lockout/tagout control responsibility must be given to an authorized employee designated to coordinate affected work forces and ensure continuity of protection.
- d. Each authorized employee must affix a personal lockout device, group lock box, or comparable mechanism.

14. Shift or personnel changes.

If work continues beyond one shift or if personnel changes are made, follow MIOSHA standards. (*See Reference Section 10.3.7 for more references*).

10.3.5.5 Enclosed Spaces

In certain instances, employees may routinely enter enclosed spaces to perform service or maintenance tasks on electrical equipment. These requirements do not apply to vaults or rooms if a ventilation system is operating. Entries into

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enclosed spaces conducted in accordance with the confined space entry requirements are considered complying with this section.

In all other instances, these rules apply to any employee entry into enclosed spaces:

1. Safe work practices must be performed for entry and for rescue of employees from such spaces.
2. Employees entering enclosed spaces, as attendants, must be trained in the hazards of enclosed spaces, entry procedures, and rescue procedures.
3. Equipment will be provided to ensure the prompt and safe rescue of employees from enclosed spaces.
4. Before any employee entry or entrance cover is removed, the Electrical Supervisor must evaluate the enclosed space and determine whether it is safe for entry, by checking the atmospheric pressure, temperature differences, and monitoring for a hazardous atmosphere.
5. Any condition making it unsafe to remove the access cover must be eliminated before the entrance cover is removed.
6. When a vertical access cover is removed, the opening must be promptly guarded by a railing, temporary cover, or other barrier intended to prevent an accidental fall through the opening.
7. Employees may not enter an enclosed space while it contains a hazardous atmosphere, unless the entry conforms to permit-required confined space requirements.
8. While work is being performed in the enclosed spaces, provisions for first aid and CPR must be immediately available to render emergency assistance if needed. Instruments used to monitor the atmospheres in enclosed spaces must be kept in calibration, with a minimum accuracy of $\pm 10\%$.
9. Before any employee enters an enclosed space, the atmosphere must be tested for an oxygen deficiency and flammable gases or vapors. Monitoring must be done with a direct reading meter or similar instrument capable of collecting immediate data without analysis.
10. If a hazardous atmosphere is detected, forced ventilation must be used to maintain a safe respirable-atmosphere. A continuous atmospheric monitoring program must be maintained.
11. If continuous forced air ventilation is used, then it must begin and continue through the duration the employees are in the enclosed space. The air supply must be from a clean source and not cause additional hazards to the employees.

12. If open flames are used in the enclosed space, then atmospheric testing must be conducted continually.

10.3.5.6 Excavations

Additional information regarding excavation requirements are referenced in Section 12.7 “Excavating, Trenching, and Shoring”. Whenever doing any digging and excavations, contact “Miss Dig” at 1-800-482-7171 to locate exact location of underground electrical lines.

10.3.5.7 Personal Protective Equipment/Fall Protection

1. Personal fall arrest systems must meet the requirements under the *MIOSHA, Construction Safety Standard Part 45 “Fall Protection”*.
2. Safety straps, lifelines, and body harnesses must be inspected before each daily use to determine that the equipment is in safe working condition.
3. Defective equipment must be removed from service.
4. Fall arrest equipment, work positioning equipment, or travel restricting equipment must be used by employees working at elevated locations more than 4 feet above the ground on poles, towers, or similar structures if fall protection has not been provided.
5. Fall protection is not required if the employee is qualified to climb or change location to poles, towers, or similar structures, unless conditions enable or effect proper grip or footing (ice, high winds, and contaminants).

For related specifications refer to section 10.3.7.

NOTE 1: *This section does not apply to fall protection associated to portions of buildings, such as loading docks and work on electric equipment (transformers and capacitors), or fall protection associated with aerial lifts.*

NOTE 2: *Employees undergoing training are considered unqualified and are required to use fall protection any time they are more than 4 feet from the ground.*

10.3.5.8 Ladders, Platforms, Step Bolts, and Manhole Steps

Ladder and Manhole steps specifications can be referenced in *Section 12.10 Ladder Safety of this manual*. With the following additions and exceptions:

1. Ladders and Platforms must be secured to prevent their becoming accidentally dislodged.
2. Ladders and platforms may not be loaded in excess to the working load capacity.

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3. Ladders and platforms must only be used in application for the purpose that they were designed.
4. In configurations in which they are used, ladders and platforms must be capable of supporting 2.5 times the rated capacity.
5. Portable metal ladders and other conductive ladders may not be used near exposed energized lines or equipment. Unless it can be proven by the Electrical Trades' Supervisor that the use of a nonconductive ladder will create a greater hazard than the risk of using a metal ladder.

10.3.5.9 Hand and Portable Power Tools

10.3.5.9.1 Cord-and Plug Connected Equipment

1. Must be equipped with a cord containing a grounding conductor (this option may not be used where the introduction of the ground into the work environment increases the hazard to an employee).
2. Must be double-insulated to *conform to Section 12.9 Hand and Portable Power Tool*.
3. Must be connected to the power supply through isolating transformer with an ungrounded secondary.

10.3.5.9.2 Portable and Vehicle-Mounted Generators

1. The generator may only supply equipment located on the generator or the vehicle and cord-and-plug connected equipment through receptacles mounted on the generator or the vehicle.
2. The non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles must be grounded to the generator frame.
3. The frame of vehicle mounted generators must be bonded to the vehicle.
4. Any neutral conductor must be bonded to the generator frame.

10.3.5.10 Hydraulic and Pneumatic Tools

1. Safe operating pressures for hydraulic and pneumatic tools, hoses, valves, pipes, filters, and fittings may not be exceeded.
2. In the absence of defects, the maximum rated operating pressure is the maximum safe pressure.

3. If in contact with exposed electrical contacts the tools must be designed and maintained for such use.
4. The hydraulic system supplying a hydraulic tool used where it may contact exposed live parts, must provide protection against loss of insulating value for the voltage involved due to the formation of a partial vacuum in the hydraulic line.
5. A pneumatic tool used on energized electric lines or equipment or used where it may contact exposed live parts, must provide protection against the accumulation of moisture in the air supply.
6. Pressure must be released before connections are broken, unless quick acting, self-closing connectors are used. Hoses may not be kinked.
7. Employees may not use any part of their bodies to locate or stop hydraulic leaks.

***NOTE:** Hydraulic lines, without check valves, having a separation of more than 35 feet between the oil reservoir and the upper end of the hydraulic system promote the formation of a partial vacuum.*

10.3.5.11 Live-line Tools

10.3.5.11.1 Design

Live-line tools must be designed and constructed to withstand the following minimum tests:

1. 100,000 volts per foot of length for 5 minutes if the tool is made from fiberglass-reinforced plastic (FRP).
2. 75,000 volts per foot (2461 volts per centimeter) of length for 3 minutes if the tool is made of wood.
3. Other tests that the Trades' Supervisor can demonstrate are equivalent.

10.3.5.11.2 Condition

1. Each Live-line tool must be wiped clean and visually inspected for defects before each daily use.
2. If any defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is present, the tool must be removed from service and tested before being returned to service.

3. Live-line tools used for employee protection must be removed from service every 2 years for examination and whenever required because of defects, contamination, cleaning, and repair. Testing as follows:
 - a. Each tool must be thoroughly examined for defects.
 - b. If a defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the tool is found, the tool must be repaired and refinished or must be permanently removed from service. If no such defect is found or contamination, then the tool will be cleaned and waxed.

10.3.5.11.3 Testing

1. The tools will be tested as previously described, and afterward the tool must be examined if repair or refinishing is not performed, or if the tool is made of FRP rod or foam-filled FRP tube, and the Electrical Trades' Supervisor can demonstrate that the tool has no defects that could cause it to fail in use.
2. The test method used must be designed to verify the tool's integrity along its entire working length, and if the tool is made with fiberglass-reinforced plastic, its integrity under wet conditions.
3. The voltage applied during the tests must be as follows:
 - a. 75,000 volts per foot for 1 minute if the tool is made of fiberglass
 - b. 50,000 volts per foot of length for 1 minute if the tool is made of wood
 - c. Or other tests that the Electrical Trades' Supervisor can demonstrate are equivalent.

For related guidelines refer to section 10.3.7.

10.3.5.11.4 Material Handling and Storage

1. In areas not restricted to qualified employees only, materials or equipment may not be stored closer to energized lines or exposed energized parts of equipment than the following distances plus an amount providing for the maximum sag and side swing of all conductors and providing for the height and movement of materials handling equipment:
 - a. For lines and equipment energized at 50 kv or less, the distance is 10 feet.
 - b. For lines and equipment energized at 50 kv, the distance is 10 feet, plus 4 inches for every 10 kv over 50 kv.
2. In areas restricted to qualified employees, material may not be stored within the working space around energized lines or equipment.

10.3.5.11.5 Working On or Near Exposed Energized Parts

Employees working on exposed live parts, or near enough to them to present a hazard these following rules apply:

1. Only qualified employees may work on or with exposed energized lines or parts of equipment.
2. Only qualified employees may work in areas containing unguarded, uninsulated energized lines or parts of equipment operating at 50 volts or more.
3. Electric lines and equipment must be considered as energized unless properly locked out/tagged out. Two employees must be present while the following types of work are being performed:
 - a. Installation, removal, or repair of lines that are energized at more than 600 volts.
 - b. Installation, removal, or repair of de-energized lines if an employee is exposed to contact with other parts energized at more than 600 volts.
 - c. Installations, removal, or repair of equipment, such as transformers, capacitors, and regulators, if an employee is exposed to contact with parts energized at more than 600 volts.
 - d. Work involving the use of mechanical equipment, other than insulated aerial lifts, near parts energized at more than 600 volts, and other work that exposes an employee to electrical hazards greater than or equal to those posed by operations that are specifically listed above.
4. No specific number of employees is required for the following work:
 - a. Routine switching of circuits, if the Electrical Trades' Supervisor can demonstrate those conditions at the site allows this work to be performed safely.
 - b. Work performed with live-line tools if the employee is positioned so that he or she is neither within reach of or otherwise exposed to contact with energized parts.
 - c. Emergency repairs for the general public.

10.3.5.11.6 Minimum Approach Distance

1. The Trades' Supervisor must ensure that no employee approaches or takes any conductive object closer to exposed energized parts than set forth in the *MIOSHA Part 86 Tables R-6 through R-10*, unless:
 - a. The employee is insulated from the energized part (insulating gloves and sleeves are considered insulation of the employee only with regard to energized part upon which work is being performed).
 - b. The energized part is insulated from the employee and from any other conductive object at a different potential.

- c. The employee is insulated from any other exposed conductive object, as during live-line bare-hand work.

10.3.5.11.7 Type of Insulation

1. If the employee is to be insulated from energized parts by the use of insulating gloves; insulated sleeves may also be used, however, insulating sleeves need not be used under the following conditions:
 - a. If the exposed energized parts, on which work is not being performed, are insulated from the employee, and
 - b. If such insulation is placed from a position not exposing the employee's upper arm to contact with other energized parts.

10.3.5.11.8 Working Position

The Electrical Trades' Supervisor must ensure that each employee, to the extent that other safety-related conditions permit, works in a position from which a slip or shock will not bring the employee's body into contact with exposed, uninsulated parts.

10.3.5.11.9 Making Connections

1. The Trades' Supervisor must ensure that connections are made as follows:
 - a. In connections de-energized equipment or lines to an energized circuit by means of a conducting wire or device, the employee must first attach the wire to the de-energized part.
 - b. When disconnecting equipment or lines from an energized circuit by means of a conducting wire or device, an employee must remove the source end first.
 - c. When lines or equipment are connected to or disconnected from energized circuits, loose conductors must be kept away from exposed energized parts.

10.3.5.11.10 Apparel

1. When work is performed within reaching distance of exposed energized parts, Trades' Supervisor must ensure that each employee removes or renders all exposed conductive articles nonconductive. These articles include keys, watch chains, rings, wristwatches or bands, unless such articles do not increase the hazards associated with contact with the energized parts.
2. The Trades' Supervisor must train each employee in the hazards of flames and electric arcs.
3. The Electrical Trades' Supervisor must ensure that each employee who is exposed to the hazards of flames or electric arcs does not

wear clothing that, when exposed to flames or arcs, could increase the extent of injury that would be sustained by the employee.

**Note: Clothing made from the following types of fabrics, either alone or in blends, is prohibited, unless the electrical trades' supervisor can demonstrate that the fabric has been treated to withstand the conditions that may be encountered or that the clothing is worn in such a manner as to eliminate the hazard involved; acetate, nylon, polyester, rayon.*

10.3.5.11.11 Fuse Handling

When fuses must be installed or removed with one or both terminals energized at more than 50 volts, the electrical Trades' Supervisor must ensure that the tools or gloves rated for the voltage are used. When expulsion-type fuses are installed with one or both terminals energized at more than 300 volts, the electrical Trades' Supervisor must ensure that each employee wears eye protection, and uses the required tools rated for voltage, and is clear of the exhaust path of the fuse barrel.

10.3.5.11.12 Covered (Non-insulated) Conductors

Specific safety requirements must be established for the hazards of exposed live parts, and work performed in the proximity of covered (non-insulated) wires.

10.3.5.11.13 Non-Current-Carrying Metal Parts

Non-current-carrying metal parts of equipment or devices, such as transformer cases and circuit breaker housings, must be treated as energized at the highest voltage to which they are exposed, unless the electrical trades' supervisor inspects the installation and determines that's these parts are grounded before work is performed.

10.3.5.11.14 De-Energizing Lines and Equipment for Employee Protection

These requirements apply to the procedures of de-energizing conductors, parts, and electric equipment under the following conditions:

1. If a system operator is in charge of the lines or equipment and their means of disconnection, this section must be observed, in the order given.
2. If no system operator is in charge of the lines or equipment and their means of disconnection, one employee in the crew must be designated as being in charge of the clearance. That employee must take the place of the system operator, as necessary.
3. If only one crew will be working on the lines or equipment and if the means of disconnection is accessible and visible to and under the sole control of the employee in charge of the clearance, tags required

by the remaining provisions need not be used.

4. Any disconnecting means that are accessible to persons outside the Electrical Trades' Supervisor's control (for example, the general public) must be rendered inoperable while they are open for the purpose of protecting employees.

10.3.5.11.14.1 Order of de-energizing

1. A designated employee will make a request of the system operator of the specific site need to be de-energized. The employee that makes the request then becomes the employee in charge.
2. All switches, disconnects, jumpers, taps, and other means through which known sources of electric energy may be supplied to the particular lines and equipment to be energized must be opened. Such means must be rendered inoperable, unless its design does not so permit, and tagged to indicate that employees are at work.
3. Automatically and remotely controlled switches that could cause the opened disconnecting means to close must also be tagged at the point of control. The automatic or remote control feature must be rendered inoperable, unless its design does not so permit.
4. Tags must prohibit operation of the disconnecting means and must indicate that the employees are at work.
5. After the applicable requirements in paragraphs 1 through 4 of this section have been followed and the employee in charge of the work has been given a clearance by the system operator, the lines and equipment to be worked on must be tested to ensure that they are de-energized.
6. Protective grounds must be installed as required under *Section 10.3.5.11.15 "Grounding for Protection of Employees"*.
7. After paragraphs 1 through 6, have been followed, the lines or equipment involved may be considered de-energized.
8. If two or more independent crews will be working on the same lines or equipment, crew must independently comply with these requirements.
9. To transfer the clearance responsibilities, the employee in charge, must inform the system operator and employees in the crew of the new employee in charge.

10. To release clearance requirements, the employee in charge must:
 - a. Notify employees under his or her direction that the clearance is to be released.
 - b. Determine that all employees in the crew are clear of the lines and equipment.
 - c. Determine that all protective grounds installed by the crew have been removed.
 - d. Report this information to the system operator and release the clearance.
11. The person releasing a clearance must be the same person that requested the clearance, unless responsibility has been transferred.
12. Tags may not be removed unless the associated clearance has been released.
13. Only after all protective grounds have been removed, after all crews working on the lines or equipment have realized their clearances, after all employees are clear of the lines and equipment, and after all protective tags have been removed from a given point of disconnection may action be initiated to re-energize the lines or equipment at the point of disconnection.

10.3.5.11.15 Grounding for the Protection of Employees

1. This section applies to the grounding of transmission and distribution lines and equipment for the purpose of protecting employees, and to the protective grounding of other equipment as required elsewhere in this section.
2. For employees to consider lines or equipment as de-energized, the lines or equipment described under the *section 10.3.5.11.14* must have specific provisions for grounding. However, if it can be demonstrated that installation of the ground is impracticable or that the conditions resulting from the installation of a ground would present greater hazards than working without grounds, the lines and equipment may be treated as de-energized if the following conditions are met:
 - a. The lines and equipment have been properly de-energized.
 - b. There is no possibility of contact with another energy source.
 - c. The hazard of induced voltage is not present.
3. Equipotential zone
Temporary protective grounds must be placed and arranged to prevent each employee from being exposed to hazardous differences in electrical potential.

10.3.5.11.16 Protective grounding equipment

1. Protective grounding equipment must be capable of conducting the maximum fault current for the time necessary to clear the fault. This equipment must have an ampacity greater than or equal to that of No. 2 AWG copper.
2. Protective grounds must have impedance low enough to cause immediate operation of protective devices in case of accidental energizing of the lines or equipment.

For related guidelines refer to section 10.3.7.

10.3.5.11.16.1 Testing

Before any ground is installed, lines and equipment must be tested and found absent of nominal voltage, unless a previously installed ground is present

10.3.5.11.16.2 Order of Connections

When a ground is to be attached to a line or to equipment, the ground-end connection must be attached first, and then the other end must be attached by means of a live-line tool.

10.3.5.11.16.3 Order of removal

When a ground is to be removed, the grounding device must be removed from the line or equipment using a live-line tool before the ground-end connection is removed.

10.3.5.11.16.4 Additional precautions

When work is performed on a cable at a location remote from the cable terminal, the cable may not be grounded at the cable terminal when there is a possibility of hazardous transfer if a potential fault should occur.

10.3.5.11.16.5 Removal of grounds for test

Grounds may be removed temporarily during the tests. During the test procedure, the Trades' Supervisor must ensure that each employee uses insulating equipment and is isolated from any hazards involved. Additional measures may be necessary to protect each exposed employee in case the previously grounded lines and equipment become energized.

10.3.5.11.17 Testing and Test Facilities

This section provides the safe work practices for high-voltage and high-power testing performed in laboratories, shops, and substations, and in the field and on electric transmission and distribution lines and equipment, and not to testing involving continuous measurements as in routine metering, relaying, and normal line work.

1. The Electrical Trades' Supervisor must establish and enforce work practices for the protection of each worker from the hazards of high voltage or high power testing at all test areas, temporary and permanent. Such work practices must include, as a minimum, test area guarding, grounding, and safe use of measuring and control circuits. Periodic safety checks of field tests areas must also be included.
2. Employees must be trained in safe work practices upon their initial assignment to the test area, with periodic reviews and updates provided as required.

10.3.5.11.18 Guarding of Test Areas

1. Permanent test areas must be guarded by walls, fences, or barriers designed to exclude employees.
2. In field testing areas, or at temporary test sites, where permanent guards are not provided, one of the following means must be used to prevent unauthorized employees from entering:
 - a. The test area must be guarded by the use of distinctively colored safety tape that is supported approximately waist high and to which safety signs are attached.
 - b. A barrier must guard the test area or barricade that limits access to the test area to a degree equivalent, physically and visually, to the barricade specified above.
 - c. One or more test observers stationed must guard the test area so that the entire area can be monitored.
3. Any barriers must be removed when the protection they provide is no longer needed.
4. Guarding must be provided within test areas to control access to test equipment or to apparatus under test that may become energized as part of the testing by either direct or inductive coupling, in order to prevent accidental employee contact with energized parts.

10.3.5.11.19 Grounding Practices

The Trades' Supervisor must establish and implement safe grounding practices for the test facility.

1. All conductive parts accessible to the test operator during the time the equipment is operating at high voltage, must be maintained at ground potential except for portions of the equipment that are isolated from the test operator by guarding
2. Wherever ungrounded terminals of test equipment or apparatus under test may be present; they must be treated as energized until determined by tests to be de-energized.
3. Visible grounds must be applied, either automatically or manually with properly insulated tools, to the high-voltage circuits after they are de-energized and before work is performed on the circuit or item or apparatus under test. Common ground connections must be solidly connected to the test equipment and apparatus under test.
4. In high-power testing, an isolated ground-return conductor system must be provided so that no intentional passage of current, with its attendant voltage rise, can occur in the ground grid or in the earth. However, an isolated ground-return conductor need not be provided if the Electrical Trades' Supervisor can demonstrate that both the following conditions are met:
 - a. An isolated ground-return conductor cannot be provided due to the distance of the test site from the electric energy source.
 - b. Employees are protected from any hazardous steps and touch potentials that may develop during the test.
5. In tests where grounding of test equipment cannot be used (due to increased hazards to test personnel) a ground that the Electrical Trades' Supervisor can demonstrate affords equivalent safety must be clearly indicated in the test set-up.
6. When the test area is entered after equipment is de-energized, a ground must be placed on the high-voltage terminal and any other exposed terminals.
 - a. High capacitance equipment or apparatus must be discharged through a resistor rated for the available energy.
 - b. A direct ground must be applied to the exposed terminals when the stored energy drops to a level at which it is safe to do so.
7. If a test trailer or test vehicle is used in field testing, its chassis must be grounded. Bonding, insulating, or isolation must provide protection against hazardous touch potentials with respect to the vehicle, instrument panels, and other conductive parts accessible to employees.

10.3.5.11.20 Control and Measuring Circuits

1. Control wiring, meter connections, test leads and cables may not be run from a test area unless they are contained in a grounded metallic sheath and terminated in a grounded metallic enclosure or unless other precautions are taken that the Electrical Trades' Supervisor can demonstrate as ensuring equivalent safety.
2. Meters and other instruments with accessible terminals or parts must be isolated from test personnel to protect against hazards arising from such terminals and parts becoming energized during testing. If locating test equipment in metal compartments with viewing windows provides this isolation, interlocks must be provided.
3. The routing and connections of temporary wiring must be made secure against damage, accidental interruptions and other hazards. To the maximum extent possible, signal, control, ground, and power cables must be kept separate.
4. If employees will be present in the test area during testing, a test observer must be present. The test observer must be capable of implementing the immediate de-energizing of test circuits.

10.3.5.11.21 Safety Checks

1. Safety practices governing employees working at temporary or field test areas must provide for a routine safety check at the beginning of each series of tests.
2. The test operator in charge must conduct these routine safety checks before each series of tests and must verify at least the following conditions:
 - a. That barriers and guards are in workable conditions and are properly placed to isolate hazardous areas.
 - b. That system test status signals, if used, are in operable condition.
 - c. That test power disconnects are clearly marked and readily available in an emergency.
 - d. That ground connections are identifiable.
 - e. That personal protective equipment is provided and used as required.
 - f. That signal, ground, and power cables are properly separated.

10.3.5.11.22 Mechanical Equipment

Information regarding safe operations of elevating and rotating equipment near energized lines or equipment, are referenced in *Section 12.24 "Vehicle Mounted Elevating and Rotating Work Platforms"* of this manual, and for related specifications refer to *Section 10.3.7*.

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If, during operation of the mechanical equipment, the equipment could become energized, at least one of the following must be utilized:

1. The energized lines exposed to contact must be covered with insulating protective material that will withstand the type of contact that might be made during the operation.
2. The equipment must be insulated for the voltage involved. The equipment must be positioned so that its uninsulated portions cannot approach the lines or equipment any closer than the minimum approach distances defined in *MIOSHA, General Industry Safety Standard Part 86 "Electrical Power, Transmission Generation and Distribution"*, Tables R-6 through R-10.
3. Each employee must be protected from hazards that might arise from equipment contact with the energized lines. The measures used must ensure that employees will not be exposed to hazardous differences in potential. Unless the Electrical Trades' Supervisor can demonstrate that the methods in use protect each employee from hazards that might arise if the equipment contacts the energized line, measures used must include all of the following techniques:
 - a. Using the best available ground to minimize the time the lines remain energized.
 - b. Bonding equipment together to minimize potential differences.
 - c. Providing ground mats to extend areas of equipotential.
 - d. Employing insulating protective equipment or barricades to guard against any remaining hazardous potential differences.

10.3.5.11.23 Overhead Lines

This section provides the additional requirements for work performed on or near overhead lines or equipment:

1. Before elevated structures, such as poles or towers, are subjected to such stresses as climbing or the installation or removal of equipment may impose, the Electrical Trades' Supervisor must assure that the structures are capable of sustaining the additional or unbalanced stresses. If the pole or other structures cannot withstand the loads, which will be imposed, it must be braced or otherwise supported so as to prevent failure.
2. When poles are set, moved, or removed near exposed energized overhead conductor, the pole must not contact the conductor.
3. When a pole is set, moved or removed near an exposed energized overhead conductor, the Electrical Trades' Supervisor must ensure that each employee wears electrical protective equipment or uses insulated devices when handling the pole, and that no employee contacts the pole with any uninsulated part of his/ her body.

4. To protect employees from falling into holes into which poles are to be placed, the holes must be attended by employees or physically guarded whenever anyone is working nearby.

For related specifications refer to section 10.3.7.

10.3.5.11.23.1 Installing and removing overhead lines

1. The Electrical Trades' Supervisor must use the tension stringing method, barriers, or other equivalent measures to minimize the possibility that conductors and cables being installed or removed will contact energized power lines or equipment.
2. The protective measures required under "mechanical equipment" (*section 10.3.5.11.22*) must also be provided for conductors, cables, and pulling and tensioning equipment when the conductor or cable is being installed or removed close enough to energized conductors that any of the following failures could energize the pulling or tensioning equipment or the wire or cable being installed or removed:
 - a. Failure of pulling or tensioning equipment
 - b. Failure of wire or cable being pulled
 - c. Failure of the previously installed lines or equipment
3. If the conductors being installed or removed crossover energized conductors in excess of 600 volts and if the design of the circuit-interrupting devices protecting the lines so permits, the automatic re-closing feature of these devices must be made inoperative.
4. Before lines are installed parallel to existing energized lines, the supervisor must make a determination of the approximate voltage to be induced in the new lines, or work must proceed on the assumption that the induced voltage is hazardous.

Unless the supervisor can demonstrate that the lines being installed are not subject to the induction of a hazardous voltage or unless the lines are treated as energized, the following requirements also apply:

- a. Each bare conductor must be grounded in increments so that no point along the conductor is more than 2 miles from the ground.
- b. The grounds required in the paragraph above must be left in place until the conductor installation is completed between dead ends. The grounds must be removed as the last phase of aerial cleanup.
- c. If employees are working on bare conductors, grounds must also be installed at each location where these employees are working, and grounds must be installed at all open dead-end or catch-off points or the next adjacent structure.

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- d. If two bare conductors are to be spliced, the conductors must be bonded and grounded before being spliced.
5. Reel handling equipment, including pulling and tensioning devices, must be in safe operating condition and must be leveled and aligned.
6. Load ratings of stringing lines, pulling lines, conductor grips, load-bearing hardware and accessories, rigging, and hoist may not be exceeded.
7. Pulling lines and accessories must be repaired or replaced when defective.
8. Conductor grips may not be used on wire rope, unless the grip is specifically designed for this application.
9. Reliable communications, through two-way radios or other equivalent means, must be maintained between the reel tender and the pulling rig operator.
10. The pulling rig may only be operated only when it is safe to do so.
11. While the conductor or pulling line is being pulled (in motion) with a power-driven device, employees are not permitted directly under overhead operations or on the cross arm, except as necessary to guide the stringing sock or board over through the stringing sheave.

NOTE: Examples of unsafe conditions include employees in location prohibited by the above paragraph, conductor and pulling line hang-ups, and slipping of the conductor grip.

10.3.5.11.24 Live-Line Bare-Hand Work

1. Before using or supervising the use of live-line bare-hand techniques on energized circuits, employees must be trained in the technique and in associated safety requirements.
2. Before employees use the live-line bare-hand technique to energized high-voltage conductors, the following information must be determined:
 - a. The normal voltage rating of the circuit on which the work is to be performed.
 - b. The minimum approach distances to ground of lines and other energized parts on which work is being performed.
 - c. The voltage limitations of equipment to be used.
3. The insulated equipment, insulated tools, and aerial devices and platforms used must be designed, tested and intended for live-line

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bare-hand work. Tools and equipment must be kept clean and dry while they are in use.

4. The automatic re-closing feature of circuit interrupting devices protecting the lines must be made inoperative, if the design of the devices permits.
5. Work may not be performed when adverse weather conditions would make the work hazardous even after the work practices are employed. Additionally, work may not be performed when winds reduce the phase-to-phase or phase-to-ground minimum approach distances at the work location below that considered safe.

***NOTE:** Thunderstorms in the immediate vicinity, high winds, snow storms and ice storms are examples of adverse weather conditions that are presumed to make live-line bare-hand work too hazardous to perform safely.*

For additional references see Section 10.3.7.

10.3.5.11.25 Towers and Structures

The following requirements apply to work performed on towers or other structures, which support overhead lines:

1. No DMB employee is allowed to be under a tower while work is in progress, except where the Trades' Supervisor can demonstrate that such a working position is necessary to assist employees working above.
2. Tag lines or other similar devices must be used to maintain control of tower sections being raised or positioned, unless the use of such devices would create a hazard.
3. The load line may not be detached from a member or section until the load is safely secured.
4. Except during emergency restoration procedures, work must be discontinued when adverse weather conditions would make the work hazardous in spite of the work practices required.

For additional references see Section 10.3.7.

10.3.5.11.26 Gasoline Powered Saws

Gasoline-engine power saw operations must meet the following requirements:

1. Each power saw weighing more than 15 pounds (that is used in trees) must be supported by a separate line, except when work is performed from an aerial lift and except during topping or removing operations

where no support limb will be available.

2. Each power saw must be equipped with a control that will return the saw to idling speed when released.
3. Each power saw must be equipped with a clutch and must be so adjusted that the clutch will not engage the chain drive at idling speed.
4. A power saw must be started on the ground or where it is otherwise firmly supported.
5. A power saw engine may be started and operated only when all employees other than the operator are clear of the saw.
6. A power saw may not be running when an employee is carrying the saw up into a tree.
7. Power saw engines must be stopped for all cleaning, refueling, adjustments, and repairs to the saw or motor, except as the manufacture's servicing procedures require otherwise.
8. The proper PPE must be worn when operating a power saw.

10.3.5.11.27 Backpack Power Units For Use In Pruning and Clearing Trees

1. While a backpack power unit is running, no one other than the operator may be within 10 feet of the cutting head of a brush saw.
2. A backpack power unit must be equipped with a quick shutoff switch readily accessible to the operator.
3. A backpack power unit engine must be stopped for all cleaning, refueling, repairs, and adjustments to the saw or motor, except as the manufacture's servicing procedures require otherwise.

10.3.5.11.28 Rope

Employees working aloft in trees must use climbing ropes. These ropes must have a minimum diameter of 0.5 inch with a minimum breaking strength of 2300 pounds. Synthetic rope must have elasticity of not more than 7%.

1. Rope must be inspected before each use and, if unsafe taken out of service.
2. Rope must be stored away from cutting edges and sharp tools. Contact with corrosive chemicals, gas, and oil must be avoided.

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3. When stored, rope must be coiled and piled, or must be suspended, so that air can circulate through the coils.
4. Rope ends must be secured to prevent their unraveling.
5. Climbing rope must not be spliced to effect repair.
6. Rope that is wet, that is contaminated to the extent that its insulating capacity is impaired, or that otherwise is not considered to be insulated for the voltage may not be used near exposed energized lines.

10.3.5.11.29 Fall Protection

Each employee must be tied in with a climbing rope and safety saddle when the employee is working above the ground in a tree, unless he or she is ascending into the tree.

See Section 10.5 Fall Protection in this manual.

10.3.5.11.30 Communication Facilities

Microwave transmission

1. The Trades' Supervisor will ensure that no employee looks into an open wave guide or antenna that is connected to an energized source.
2. If the electromagnetic radiation level within an accessible area associated with microwave communications systems exceeds the radiation protection guide, the area must be posted with a warning symbol. The warning symbol for radio frequency radiation hazards must consist of a red isosceles triangle above an inverted black isosceles triangle, separated and outlined by an aluminum color border. The words "Warning: Radio-Frequency Radiation Hazard" must appear in the upper triangle. The lower half of the warning symbol must include the following statements. "Radiation in this area may exceed hazard limitations and special precautions are required. Obtain specific instruction before entering".
3. When an employee works in an area where the electromagnetic radiation could exceed the radiation protection guide, DMB will institute measures that ensure that the employee's exposure is not greater than permitted. Such measures may include administrative and engineering controls and personal protective equipment.

10.3.5.11.31 Underground Electrical Installations

10.3.5.11.31.1 Access

A fiberglass ladder or other climbing device must be used to enter and exit a manhole or subsurface vault exceeding 4 feet in depth. No employee will be allowed to climb into or out of a manhole or vault by stepping on cables or hangers.

10.3.5.11.31.2 Lowering Equipment Into Manholes.

Equipment used to lower materials and tools into manholes or vaults must be capable of supporting the weight to be lowered and must be checked for defects before use. Before tools or material are lowered into the opening for a manhole or vault, each employee working in the manhole or vault must be clear of the area directly under the opening.

10.3.5.11.31.3 Attendants For Manholes

1. While work is being performed in a manhole containing energized electric equipment, provisions for first aid and CPR must be available which meet the requirements stated herein.
2. Occasionally the employee on the surface may briefly enter the manhole to provide assistance, other than emergency assistance.

For additional references see Section 10.3.7.

10.3.5.11.32 Guarding of Rooms Containing Electric Supply Equipment

10.3.5.11.32.1 Rooms containing electrical supply equipment are required to be guarded if:

1. Exposed live parts operating at 50 to 150 volts to ground are located within 8 feet of the ground or other working surfaces, or
2. Live parts operating at 151 to 600 volts are located within 8 feet of the ground or other working surface inside the room and are guarded only by location, (guards must be provided around all live parts operating at more than 150 volts to ground without an insulating cover, unless the location of the live parts gives sufficient horizontal or vertical or a combination of these clearances to minimize the possibility of accidental employee contact), or
3. Live parts operating at more than 600 volts are located within the room or space, unless:
 - a. The live parts are enclosed within grounded, metal-enclosed equipment whose only openings are designed so that foreign objects inserted in these openings will be deflected from energized parts, or

- b. The live parts are installed at a height above ground and any other working surface that provides protection at the voltage to which they are energized corresponding to the protection provided by an 8-foot height at 50 volts.

10.3.5.11.32.2 The requirements of the guarding program are as follows:

1. The rooms and spaces must be enclosed within fences, screens, partitions, or walls so as to minimize the possibility that unqualified persons will enter.
2. Signs warning unqualified persons to keep out must be displayed at entrances to the rooms and spaces.
3. Entrances to rooms and spaces that are not under the observation of an attendant must be kept locked.
4. Unqualified persons may not enter the rooms or spaces while the electric supply lines or equipment are energized.

For additional references see Section 10.3.7.

10.3.5.11.33 Water or Steam Spaces (Boilers)

The following requirements apply to work in water and steam spaces associated with boilers:

1. A designated employee must inspect conditions before work is permitted and after its completion. Eye protection, or full-face protection if necessary, must be worn at all times when condenser, heater, or boiler tubes are being cleaned or repaired.
2. Where it is necessary for employees to work near tube ends during cleaning, shielding must be installed at the tube ends.

10.3.5.11.34 Turbine Generators

1. Smoking and other ignition sources are prohibited near hydrogen or hydrogen-sealing systems, and signs warning of the danger of explosion and fire must be posted.
2. Excessive hydrogen makeup or abnormal loss of pressure must be considered as an emergency and must be corrected immediately.
3. A sufficient quantity of inert gas must be available to purge the hydrogen from the largest generator.

10.3.5.11.35 Hydroplants and Equipment

Employees working on or close to watergates, valves, intakes, forebays, flumes, or other locations where increased water flow or levels may pose a significant hazard must be warned and evacuate such dangerous areas before water flow changes are made.

10.3.5.11.36 Capacitors

The following requirements apply to work performed on capacitors and on lines connected to capacitors

1. Before employees work on capacitors, the capacitors must be disconnected from energized sources and, after a wait of a least 5 minutes from the time of disconnection, short-circuited.
2. Before the units are handled, each unit in series-parallel capacitor banks must be short-circuited between all terminals and the capacitor case or its rack. If the cases of capacitors are on the ungrounded substation racks, the racks must be bonded to the ground.
3. Any line to which capacitors are connected must be short-circuited before it is considered de-energized.

10.3.5.11.37 Current Transformer Secondaries

The transformer secondary may not be opened while the transformer is energized. If the primary of the current transformer cannot be de-energized before work is performed, a relay, or other section of a current transformer's secondary circuit must be bridged so that the current transformer secondary will not be opened.

10.3.5.11.38 Series Street Lighting

1. If the open-circuit voltage exceeds 600 volts, the series street lighting circuit must be worked in accordance to the *sections 10.3.5.11.23 "overhead lines" or section 10.3.5.11.31 "underground electrical installations"*, as appropriate.
2. A series loop may be only opened after the street lighting transformer has been de-energized and isolated from the source of supply or after the loop is bridged to avoid an open-circuit condition.

10.3.5.11.39 Illumination

Sufficient illumination must be provided to enable the employee to perform the work safely.

10.3.5.11.40 Protection Against Drowning

1. Whenever an employee may be pulled or pushed, or may fall into water where the danger of drowning exists, the employee must be

provided with, and must use, U.S. Coast Guard approved floatation devices.

2. Each personal flotation device will be maintained in safe condition and must be inspected frequently enough to ensure that it does not have rot, mildew, water saturation, or any other condition that could render the device unsuitable for use.

Note: Employees may cross streams or other bodies of water only if a safe means of passage, such as a bridge, is provided.

10.3.5.11.41 Employee Protection In Public Work Areas.

1. Traffic control signs and devices will be used for the protection of employees working in public areas where appropriate.
2. Before employees begin work in the vicinity of vehicular or pedestrian traffic that may endanger employees, warning signs or flags and other traffic control devices must be placed in conspicuous locations to alert and channel approaching traffic.
3. Barricades will also be used where additional employee protection is required.
4. Excavated areas will also be protected with barricades.
5. At night, warning lights will also be displayed.

10.3.5.11.42 Backfeed

If there is any chance of voltage feedback from sources of co-generation or from secondary systems, additional protection must be considered; *reference MIOSHA Part 86 Section (7) "Back-feed" in "Electrical Power Generation, Transmission and Distribution"*.

See Section 12.23 of this manual, "Tree Trimming and Removal" for additional protective considerations and proper distance from electrical lines.

10.3.6 TRAINING

Employees need to be instructed in the care, use, operation, and hazards associated with electrical generation, transmission, and distribution of electric power. Training should consist of information contained within this written program and other information listed with in *Part 86 of MIOSHA*. Instruction can be on-the-job or classroom or a combination of both.

The training requirements are specifically oriented at those electricians and Trades' Supervisors, which engage in the maintenance and or repair of high voltage equipment. The Trades' Supervisor must retain training documentation.

Qualified employees must also be trained and competent in:

1. The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
2. The skills and techniques necessary to determine the nominal voltage of exposed live parts.
3. The minimum approach distances specified in this section corresponding to the voltage to which the qualified employee will be exposed.
4. The proper use of the special techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment.

Whenever there is a change in job assignments or equipment that may effect safety performance retraining may be required.

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10.3.7 REFERENCES

Due to the complexity and length of this standard certain technical information in the form of Tables and Charts has been omitted. It is very important to understand how these requirements relate to specific tasks. Specific questions may only be answered within the actual standard MIOSHA Part 86 “Electrical Power Generation, Transmission and Distribution”.

For guidance in the implementation of this section dealing with electrical power generation, transmission and distribution, refer to Appendices A, B, C, and D listed in the back section of MIOSHA Part 86 “Electrical Power Generation, Transmission and Distribution”. These appendices contain flow charts and illustrations for clarification, as well as definitions to help persons better understand specific meanings used throughout the standard.

Other safety requirements, which may also be applicable in performing high voltage work, include ” MIOSHA Part 40 “Electrical Safety Related Work Practices, MIOSHA Part 85 “The Control of Hazardous Energy”, and Part 90 “Confined Space Entry: Department of Consumer and Services”.

For additional information regarding shift or personnel change during lockout/tagout, refer to the MIOSHA, General Industry Safety Standard Part 86 R (8)(iii).

For additional information regarding fall arrest systems referred to MIOSHA, General Industry Safety Standard Part 86(F)(2) “Electrical Power Generation, Transmission, and Distribution”.

For additional information regarding safe operations of elevating and rotating equipment near energized lines or equipment refer to MIOSHA, General Industry Safety Standard Part 86 “Electrical Power Transmission and Distribution”.

For additional information containing test methods that can be used in determining whether a wood pole is capable of sustaining an employee climbing the pole, refer to MIOSHA, General Industry Safety Standard Part 86 “Appendix D”. This reference also gives information regarding whether the pole can sustain all other forces that will be imposed by the work to be performed.

For additional information on aerial lifts and minimum approach distances refer to MIOSHA, General Industry Safety Standard Part 86 “Electrical Power Generation, Transmission and Distribution”.

For additional information on line clearance for tree trimming, brush chippers, sprayers and related equipment, and stump grinders refer to MIOSHA, General Industry Safety Standard Part 86 “Electrical Power Generation, Transmission and Distribution”.

For additional information on entering manholes containing unguarded, uninsulated energized lines or parts of electric equipment operating at 50 volts or more refer to

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MIOSHA, see Part 86 “Electrical Power Generation, Transmission and Distribution”.

For additional information regarding electromagnetic radiation protection guidelines, refer to MIOSHA General Industry Health Standard R-2420 “Nonionizing Radiation”.

For guidelines on examining, cleaning, repairing, and inservice testing of live-line tools refer to the Institute of Electrical and Electronics Engineer’s Guide for In-Service Maintenance and Electrical Testing of Live-line tools IEEE Std. 978-1984.

For guidelines on protective grounding equipment refer to the American Society for Testing and Materials Standard Specifications for Temporary Grounding Systems to be used on De-energized Electric Power Lines and Equipment. ASTM F855-1990.

For guidelines on the dimensions of clearance distances about electric equipment in generating stations refer to the American National Standard – National Electric Safety Code, ANSI C-2-1987.

10.4 EMERGENCY RESPONSE

10.4.1 PURPOSE

The following emergency response plan specifies the designated action management and employees must take to ensure safety during emergencies. Due to emergency conditions, which may arise at any time and from many different causes, planning is necessary to minimize employee injury and property damage. Some of the obvious benefits from being prepared are reduced injuries and diminished property loss. Indirect benefits may include lower insurance costs, higher morale and reduced worker's compensation rates.

10.4.2 SCOPE

The following emergency response planning is limited to planning for response during and immediately following the emergency. It does not address planning for expediting the restoration of damaged facilities or continuity of operations.

10.4.3 DEFINITIONS

Buddy System means a system for organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

Cleanup Operation means an operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared up, or in any other manner processed or handled with the ultimate goal of making the site safer for people and the environment.

Emergency means any occurrence, situation or event that puts employees or property in jeopardy an such as, but not limited to, equipment failure, or operation of a relief device which is likely to, or does, result in massive release of vinyl chloride.

Emergency Response means a response effort by employee from outside the immediate release area or by other designated responders, for example, mutual-aid groups or local fire departments.

HAZMAT means “hazardous material response team”, which is an organized group of employees which is designated by the employer and which is expected to perform work to handle and control actual or potential leaks or spills of hazardous substances that may require coming in close proximity to the substance.

Health Hazard means a stress due to a physical condition, chemical exposure, or pathogen for which there is statistically significant evidence, based on at least 1 study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees.

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Qualified Person means a person who has scientific training, knowledge, and experience in the area for which the person has responsibility and the authority to control operations.

10.4.4 RESPONSIBILITIES

- The DMB Safety and Health Coordinator is responsible for assuring that all locations where department employees are situated have proper emergency response plans.
- Each location should have an individual assigned whose responsibility is to develop and maintain emergency response plans as outlined below. This can be the local Safety Officer, the Infrastructure Services and/or Tenant and Land Services Safety and Health Officer or others as designated. This individual is also responsible for communicating the emergency plan to all employees.
- Each location should also have an assigned emergency response team.

10.4.5 REQUIREMENTS

10.4.5.1 *Emergency Preparedness*

Each location will have a written emergency response plan covering the following potential emergencies:

1. Fire/explosion
2. Tornado
3. Bomb threat
4. Chemical spills
5. Violence in the workplace
6. Medical
7. Other hazards as appropriate

The plans must be kept up to date, reflecting both:

1. Changes in the physical layout
2. Changes in personnel

Special hazards at the location should be identified and special handling instructions included within the plan. Examples include:

1. Paint mix, storage and spraying
2. Flammable gas (propane) storage
3. Hazardous substance storage & usage areas
4. Dust collectors
5. Cryogenic storage tanks
6. Natural gas shutoff location

10.4.5.2 Emergency Response Teams

An emergency response team should be assigned at each location. The composition of the team will vary depending upon the size of the location. Primary and alternate individuals should be assigned to fulfill the following positions (At those locations where every position is not assigned, the position preceding an unassigned position is responsible for the subsequent duties):

1. Person in Charge – This is the minimum requirement at every location. This individual is responsible for initiating and managing the emergency plan from the Emergency Response Center. This individual is also responsible for notifying external emergency response agencies.
2. Situation Assessor – Locations with 50 or more employees should have an individual whose responsibility is to directly assess the seriousness of the situation and report back to the Person in Charge. The Situation Assessor will also be responsible for directing external emergency response agencies to the emergency site.
3. Evacuation Coordinator – Locations with 75 or more employees should have an individual whose sole duty during an emergency is to assure that all employees have been safely evacuated to the appropriate safe assembly area.
4. First Response Team – Locations with 150 or more employees should have individuals assigned to provide assistance in mitigating the impact of the emergency. Duties during the emergency may include shutting down critical equipment, providing first response medical aid (special certified training required), fighting incipient fires and assuring the operation of fire protection equipment. Duties immediately following the emergency can include salvage efforts and the provision of security for the damaged facility.
5. Special Hazards Team – Locations with 200 or more employees should have individuals assigned to deal with those special hazards during the emergency. Duties may include shutting off electrical, gas, paint and chemical supply lines and providing containment during hazardous material spills.

All duties should be clearly defined.

10.4.5.3 Emergency Response Center

An Emergency Response Center (ERC) should be established from which the emergency can be managed. The ERC can be as simple as a pre-agreed upon location where the Emergency Response Team can assemble. This can be the manager's office, the reception desk or a guard station. The location should be a safe distance from the expected site of the emergency. In the event that the ERC is unavailable for use, an alternate ERC should be designated along with a clear procedure for activating the alternative ERC.

The Emergency Response Center should contain a copy of the emergency response plans and other material necessary to manage the emergency response.

Adequate emergency communication facilities should be provided. This includes both external communications and internal communications for the general location population and the emergency response team members.

10.4.5.4 *Emergency Evacuation*

The primary purpose of any emergency response plan is to provide for the safe and prompt evacuation of all employees to secure areas. Proper evacuation routes should be identified and posted. Safe assembly areas should be identified for each work group and posted. Different assembly areas may be required for the following emergencies:

1. Fire/explosion
2. Tornado
3. Bomb threats

Proper emergency lighting and exit signs should be provided. All emergency exit routes should be clear and free of obstructions.

There should be a procedure for identifying and evacuating individuals with disabilities that would impair their ability to evacuate without assistance. The Evacuation Coordinator should maintain an up to date list of such individuals and assign responsibility for providing the assistance that they will need.

The Evacuation Coordinator should poll all supervisors to assure that all employees have been safely evacuated and report to the Person in Charge on any individuals that are unaccounted for.

10.4.5.5 *External Emergency Response Agencies*

It is important that internal emergency response efforts be coordinated with the various external emergency response agencies. The appropriate agency should be identified for each of the following types of emergencies:

1. Fire/explosion
2. Bomb threats
3. Chemical spills
4. Violence in the workplace
5. Medical

The emergency response plan should have a clear procedure for notifying the external emergency response agencies. The procedure should identify

- who has authority for notifying the external agency,
- when they are to be notified, and
- how they are to be notified.

The Person in Charge should review the appropriate sections of the emergency response plan at least annually with the external emergency response agencies.

10.4.6 TRAINING

At least annual training should be provided for all members of the emergency response team to assure that each member understands the current emergency response plan and their responsibilities under the plan.

Training on emergency evacuation procedures should be included in the initial orientation training for all new employees or employees newly assigned to the location.

Emergency drills should be held on a quarterly basis. A different emergency should be selected for each drill.

10.4.7 REFERENCES

For additional information on exit requirements refer to MIOSHA, General Industry Standard Part 6 Fire Exits

For additional information on Emergency Action/Fire Prevention Plans refer to MIOSHA, Occupational Health Standards for General Industry R 3304

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10.5 FALL PROTECTION

10.5.1 PURPOSE

The requirements stated within this work practice are to prevent injury to employees who are required to perform elevated work activities (greater than six feet from the ground) with various forms of fall protection or related safeguarding systems.

10.5.2 SCOPE

Only employees who have been trained in the requirements of fall protection standard are allowed to perform elevated work activities referenced herein. It is the responsibility of supervision to review related work practices and their assignment to trades personnel for appropriate method of preventing falls and associated hazards to personnel and the public.

Typical work assignments may include but are not limited to working in proximity to removed barriers, elevated and maintenance activities not protected by a standard barrier and construction or maintenance activities conducted near the edge of roofs.

All DMB employees will use a body harness instead of a body belt.

10.5.3 DEFINITIONS

Body Harness means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

Deceleration Device means any mechanism, such as a rope grab, rip-stitch lanyard, specially woven lanyard, tearing or deforming lanyards, automatic self retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

Guardrail System means a barrier erected to prevent employees from falling to lower levels.

Lanyard means a flexible line of rope, wire rope, or strap, which generally has a connector at each end for connecting the body harness to a deceleration device, lifeline, or anchorage.

Personal Fall Arrest System means a system used to arrest an employee in a fall from a working level. It consists of an anchorage; connectors, a harness, and may include a lanyard, deceleration device, lifeline or suitable combinations of these.

Safety Monitoring System means a safety and health system in which a competent person is responsible for recognizing and warning employees of fall hazards.

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Walking/Working Surface means any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, and runways from work and concrete reinforcing steel, but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

10.5.4 RESPONSIBILITIES

10.5.4.1 Management

- Train and retrain the employee how to select, use, and maintain specific fall protection.
- Assess the workplace and determine hazards that necessitate the use of fall protection.
- Provide necessary fall protection, which has been manufacture tested, at no cost to the employee.
- Determine if the walking/working surfaces have the structural integrity to support employees safely.
- Retain certification records of trained employees.
- Perform regular inspections of fall arrest systems.

10.5.4.2 Employee

- Demonstrate an understanding of the specific training.
- Be able to use the equipment properly before being allowed to work.
- Report defective or damaged fall protection equipment.
- Be aware that the strength of the anchorage point is based on the fall arrest.
- Perform pre-use inspection of fall arrest system.

10.5.5 REQUIREMENTS

Whenever an employee is working more than six (6) feet above the ground, floor, water, or other surface that is unprotected by a perimeter guard rail (excluding working on a portable ladder, or scaffold) the employee must be protected by a safety harness, safety monitoring system or other recognized means to prevent falls.

10.5.5.1 Specifications

The safety harness and any lifeline or lanyard may be used only for safe guarding the employee. A safety harness, lifeline or lanyard must not be used for moving or pulling loads, but for personal protective use only.

Specific Hardware	Safety Requirement
All hardware on the safety harness and lanyard.	They will be made of Cadmium plated dropped forged or pressed sheet, or metal of equivalent strength, free of sharp edges.
Safety harness and lanyard hardware.	Must withstand a tensile load of 4000 lbs. without cracking, breaking, or permanent deformation.
Alignments, safety harness, "D" ring, and snaps.	Must withstand 5,000 lbs. tensile strength and the buckle 2,000 lbs. tensile strength.
A lifeline secured above the employee's workplace.	Must be anchored through a structural member capable of supporting a dead weight of not less than 5,400 lbs.
Lifeline	Must not be less than ¾ manila rope or a material of equivalent strength, having a breaking strength of not less than 5,400 lbs.
Lanyard and safety strap.	Must not be less than ½ inch nylon rope, or its equivalent with neither a maximum length to provide a free fall of nor more than 6".
Lanyard	The breaking strength must be not less than 5,400 lbs.

10.5.5.2 Safety Precautions

1. Safety straps, safety harness, lanyard or lifeline, including hardware must be inspected before using each day. Damaged equipment must be immediately taken out of service.
2. A safety harness, lifeline or lanyard must be stored in a clean dry area away from excessive heat or other deteriorating conditions.
3. A lifeline or lanyard made of synthetic fibers should not be kinked, run over sharp corners, used when frozen, left in freezing temperatures when wet, or exposed to sources of ignition or flame.

10.5.5.3 Fall Protection Systems

10.5.5.3.1 Walking/Working Surfaces

Each employee on a walking/working surface which is 6 feet (1.8 meters) or more above a lower level, must be protected from falling by the use of guardrail systems or personal fall arrest systems for the following exposures:

1. Unprotected sides and edges
2. Leading edges
3. Hoist areas
4. Ramps, runways and other walkways
5. Excavations
6. Holes
7. Roofing work on low-slope roofs
8. Steep roofs
9. Wall openings
10. Walking/working surfaces not otherwise addressed

10.5.5.3.2 Protection of Falling Objects

Employees potentially exposed to injury from falling objects are required to wear a hard hat, and must be protected by one of the following measures:

1. Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels.
2. Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects cannot go over the edge if they were accidentally displaced.
3. Barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.

10.5.5.3.3 Standard Practices

Guardrail System Requirements:

1. Top rail 42 inches from walking/working level.
2. Midrail (or suitable alternative) 21 inches above walking/working level.

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3. Ability to withstand a force of at least 200 pounds in any outward or downward direction.
4. Surfaced as to prevent injury from puncture, laceration or snagging of clothing.
5. Designed so as not to constitute a projection hazard.
6. Inspected at regular intervals.

10.5.5.3.4 Personal Fall Arrest Systems

1. A body harness will always be the first option for protection.
2. Rigged such that an employee can neither free fall more than 6 feet (1.8 meters) nor contact any lower level.
3. Body harnesses and related components must be used only for employee fall protection and not to hoist materials.
4. Personal fall arrest systems and components subject to impact loading must be removed from service until inspected.
5. Prompt rescue of employees in the event of a fall.
6. Inspected prior to each use for wear, damage and/or deterioration with defective components removed.
7. Must not be attached to guardrail systems.

10.5.5.3.5 Covers

1. Secured when installed so as to prevent accidental displacement by wind, equipment or employees.
2. Capable of supporting at least twice the maximum load to which it is exposed (e.g., vehicles, equipment, or workers).
3. Color-coded or marked with the word "HOLE" OR "COVER" to provide warning of the hazard.

10.5.6 TRAINING

Employees need to be instructed and trained in the selection and use of personal fall arrest systems, along with the safe use of the systems.

The training program must include the following issues:

1. Application limits.
2. Proper anchoring.
3. Determination and deceleration distance, total free fall distance.

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4. Inspection and storage of systems.
5. Careless and improper use of equipment can cause in serious injury or death.
6. Limitations and unique conditions.
7. Proper climbing techniques.
8. Supplier and manufacturer information / Regulatory information.

10.5.7 REFERENCES

For additional information on fall protection programs refer to MIOSHA, Safety Standards for Construction Part 45 Fall Protection.

10.6 FEDERAL MOTOR CARRIER (CDL) SAFETY PROGRAM

10.6.1 PURPOSE

The purpose of this program is to help reduce or prevent commercial vehicle accidents. These guidelines are established to reinforce safe driving skills. By identifying and correcting vehicle safety hazards, developing defensive driving skills, and practicing safe driving techniques drivers of commercial vehicles will prevent vehicular damage and personal injuries.

10.6.2 SCOPE

This program is designed for vehicles used in commerce with a gross vehicle weight rating of more than 26,001 pounds, or a vehicle designed to transport 16 or more passengers including the driver.

Information for the requirements of DMB employees operating automobiles or pick up trucks are referenced within Section 12.13 "Motor Vehicle Safety."

Operators of off-road construction-type equipment i.e., "backhoe, graders, compactors, excavators, tractors, trenchers and bulldozers" may not be subject to Federal Motor Carrier regulations under current interpretations DOT requirements and may not require a commercial drivers license (CDL) to operate. Where such equipment is used expressly on public streets or highways for snow removal purposes, CDL requirements may apply. This is should be addressed on a case by case basis with the Safety and Health Unit..

10.6.3 DEFINITIONS

Commercial Driver's License (CDL) means a license issued by a State or other jurisdiction, in accordance with the standards contained in 49 CFR 383, to an individual which authorizes the individual to operate a class of commercial motor vehicle.

Commercial Motor Vehicle (CMV) means a motor vehicle or combination of motor vehicles used in commerce to transport passengers or property if the motor vehicle has:

1. Has a gross combination weight rating of 26,001 or more pounds inclusive of a towed unit with a gross vehicle weight rating of more than 10,000 pounds; or
2. Has a gross vehicle weight rating of 26,001 or more pounds; or
3. Is designed to transport 16 or more passengers, including the driver; or
4. Is of any size and is used in the transportation of materials found to be hazardous for the purposes of the Hazardous Materials Transportation Act and which require the motor vehicle to be placarded under the Hazardous Material Regulations (49 CFR Part 172, Subpart F).

Endorsement means an authorization to an individual's CDL required to permit the individual to operate certain types of commercial motor vehicles.

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Gross Combination Weight Rating (GCWR) means the value specified by the manufacturer as the loaded weight of a combination (articulated) vehicle. In the absence of a value specified by the manufacturer, GCWR will be determined by adding the GCWR of the power unit and the total weight of the towed unit and any load thereon.

Gross Vehicle Weight Rating (GVWR) mean the value specified by the manufacturer as the loaded weight of a single vehicle.

Hazardous Material means a substance or material, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated.

Motor Vehicle means a vehicle, machine, tractor, trailer, or semitrailer propelled or drawn by mechanical power used on highways, except that such terms does not include a vehicle, machine, tractor, trailer, or semitrailer operated exclusively on rail.

10.6.4 RESPONSIBILITIES

The operation of vehicles in conducting DMB business and how each vehicle is handled directly affects each respective department. Vehicular collisions are potentially the most costly losses we can experience.

10.6.4.1 Management

- Assume responsibility for the driving records of their employees while they are on duty.
- Establish internal requirements for personnel to fully adhere to established policies and periodically check compliance.
- Establish policies on disciplinary action that will be taken against employees and their supervisors who show a repeated disregard for good driving practices and ensure they are applied consistently.
- Insist that all assigned vehicles are maintained adequately for safe operation.
- Establish a vehicle inspection program to check for safety discrepancies, malfunctions, signs of abuse, unreported damage, and cleanliness. Have needed repairs made as soon as possible.
- Support driver-training programs to promote defensive driving.
- Review each vehicle collision and unsafe driving report with the employee and direct supervisor to determine means of preventing recurrence.

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- Enforce the wearing of seatbelts.
- Ensure that employees do not drive any vehicle unless they have a valid operator's license and are familiar with driving rules and regulations. All employee-driving functions should be reviewed to ascertain if duties will involve vehicle operations of a nature requiring increased license classification and/or training.
- Ensure that only authorized personnel operates motorized vehicles:
 - An employee should not be allowed to operate any vehicle until he/she has satisfactorily demonstrated his complete familiarity with its functions. The employee shall thoroughly understand the manufacturer's operating instructions, vehicle limitations, and emergency procedures, and be able to successfully pass an operator's checkout test to the satisfaction of the supervisor.
 - These procedures shall be accomplished for each type of vehicle the operator is required to operate:
 - ✓ Be alert in observing unsafe driving practices of employees and ensure that action is taken immediately to correct unsafe practices.
 - ✓ Review vehicle accident reports with employees at safety meetings to discuss what unsafe act(s) or condition(s) may have been responsible in order to prevent recurrence.
 - ✓ Periodically ride with drivers to check for compliance with operating instructions and traffic regulation. (The enclosed checklist should be used to document this activity.)
 - ✓ Ensure that unsafe vehicles are not driven until deficiencies have been corrected.
 - ✓ Ensure that all employees are briefed and understand that the use of seatbelts while driving or riding in a DMB vehicle is *mandatory*.

10.6.4.2 **Employee**

Follow defensive driving practices to help drivers protect themselves, other employees, and the public from accident/injury.

- Inspect the vehicle regularly. The inspection will include at least the following:
 - ✓ Lights – check that front & rear lights, brake lights, and directional signals are operating property and are clean.
 - ✓ Oils and Fluids - crankcase/transmission oil, radiator level, battery level, wind shield washer fluid, brake fluid level.
 - ✓ Windshield Wipers - worn out wipers should be replaced before the next rainy day to ensure the driver can see the road.
 - ✓ Windows and Windshield - cracked and broken glass should be reported and replaced, defrosters should be working properly, glass should be clean inside and out.
 - ✓ Tires - properly inflated with no obvious defects.
 - ✓ Brakes - working with "full" pedal; vehicles with defective brakes shall not be driven.

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- ✓ Mirror - adjusted and clean.
 - ✓ Vehicle Loading - tools and equipment tied down/secured for safe hauling.
 - ✓ General Vehicle Condition - dents, scrapes, and any other damage should be reported to the supervisor.
 - ✓ Emergency Equipment - fire extinguisher at full charge with current inspection tag (trucks only), reflectors and other suitable emergency equipment.
 - ✓ Horn - Horn is audible to alert other drivers and pedestrians.
-
- Report any evidence of accident damage immediately to the supervisor; otherwise, the damage may be charged to the employee.
 - Report any unsafe conditions immediately to the supervisor and request another vehicle. Vehicles with steering or braking defects shall not be driven and will be towed to an authorized garage for repair.
 - Call appropriate law enforcement agencies to report any and all collisions and provide information for management as soon as possible.
 - If involved in an accident, complete the accident report at the scene using the accident reporting kit in the glove box of the vehicle. Submit this report to your supervisor within 24 hours. If the accident results in injury, call your supervisor as soon as possible.
 - Never allow an unauthorized passenger or driver to ride in or operate a DMB vehicle.
 - Possess a valid operator's license and adhere to all applicable state and local motor vehicle laws.
 - Never allow passengers to ride other than in the passenger compartment. Violation of this rule will subject driver to termination.
 - Never operate a vehicle while under the influence of prescription or over-the-counter drugs that may impair driving skills. Employees taking medication and who are under the care of a physician should report this information to their supervisor. Use of alcohol and/or illegal drugs while operating a vehicle on DMB business will subject the driver to termination.
 - Secure the vehicle and the vehicle equipment when unable to provide direct supervision of it.
 - No one under 21 years of age is allowed to operate DMB-owned vehicles.

10.6.5 REQUIREMENTS

10.6.5.1 Driver Selection

10.6.5.1.1 Traffic Accident and Conviction Records

One of the most important references you can check for an experienced driver is the accident and conviction record kept by your state motor vehicle authority. Also be sure to check the records in other states where the applicant has driven regularly.

Do not delay these inquiries. To be of use, the information must be received before the end of any probationary period.

10.6.5.1.2 Physical Examinations

A pre-placement physical examination is required for all CDL licensed employees. A DMB approved doctor or clinic should give the examination. Discuss the purpose of the examination and the standards to be used with the doctor beforehand.

10.6.5.1.3 MVR Report Evaluation

Selection of employees who may be required to drive DMB vehicles should be done with care. Employers who have shown blatant disregard of previous, unsafe driving records or failure to properly screen prospective drivers have suffered severe punitive damages in vehicle accident/liability court cases. Evaluation of driver qualifications should be made through the following:

1. Applications - including a section that requests previous accident/moving violation history, license number and classification, and experience on types of vehicles.
2. Motor Vehicle Records (MVR) Checks - to review the applicant's previous driving record from the last three years and provide management with a good indication of what they may expect.

Motor Vehicle Records (MVR's) are extremely important for all drivers of DMB vehicles. Employers have been found guilty of "*negligent entrustment*" and have been fined punitive damages when an employee with a poor driving record is involved in an accident that results in serious injury or death. Basically, the employer failed to properly check the employee's driving record or knowingly allowed an employee with a poor record to drive.

The initial MVR checks will be done at the time of hire by the department doing the hiring, using the MVR Request form. The hiring of any employee who will operate vehicles on behalf of the DMB should be contingent upon

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receipt of an acceptable MVR report. The Human Resources Department will conduct all follow-up annual MVR checks written notices to management of any MVR activity.

The basic procedures for an MVR check are as follows:

1. A copy of the applicant's MVR is secured from the state(s) they lived in during the prior three years.
2. The MVR is evaluated according to established minimum standards.
3. MVR's are obtained for all drivers of DMB vehicles on an annual basis to help identify any deteriorating driving experience.
4. Employees with "borderline" MVR's are issued a written warning from the supervisor about further deterioration of their driving record and are placed on probation until the MVR improves.
5. Employees with MVR's, that exceed the established minimum standards will have driving privileges revoked. The employee will be considered for a driving position at such time as the MVR shows improvement. The criteria for an acceptable MVR are as follows:
 - a. No more than one moving violation in any one year period.
 - b. No more than one preventable accident in any two year period.
 - c. No restricted or suspended licenses in the last three years.
 - d. No DUI (driving under the influence) convictions in the last three years.

10.6.5.2 Commercial Driver's License Requirements

The Commercial Motor Vehicle Act (CMVA) of 1986 was passed by Congress to help control irresponsible and unqualified truck, heavy equipment and bus drivers who pose a serious threat to highway safety. Many of these problem drivers would seek to escape their responsibilities by carrying licenses from several states. Their traffic convictions would be spread over several states and help them avoid license suspension or revocation.

Effective April 1, 1992 the CMVA prohibits drivers from holding more than one license and states have adopted uniform standards that commercial drivers must pass before licensing. There are other requirements outlined in the text of the standard enclosed in this chapter.

With few exceptions, most drivers operating vehicles that fall in one of four categories must comply with the Act and acquire a Commercial Driver's License (CDL). The categories are based on weight, number of passengers, or type of material hauled and are as follows:

1. Any combination of vehicles with a Gross Combination Weight Rating (GCWR) of 26,001 or more pounds, providing the Gross Vehicle Weight Rating (GVWR) of the vehicle being towed is in excess of 10,000 pounds.

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2. Any single vehicle with a GVWR of 26,001 or more pounds or any such vehicle towing another not in excess of 10,000 pounds.
3. Any vehicle, regardless of size, designed to transport 16 or more persons, including the driver.
4. Any vehicle required by federal regulations to be placarded while transporting hazardous materials.

The only CDL driver exemptions are farm equipment operators (under certain restrictions), firefighting equipment operators, military vehicle operators, and recreational vehicle operators (when the vehicle is being used for personal reasons).

Drivers who operate DMB vehicles that fall into any one of these categories must have a CDL and comply with the elements of the Commercial Motor Vehicle Act. Failure to comply can lead to large fines and loss of driving privileges.

10.6.6 TRAINING

Licensing requirements for CDL's are administered through the Michigan Secretary of State's local office.

10.6.7 REFERENCES

For additional information on CDL requirements refer to the Federal Motor Vehicle Safety Act of 1986.

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10.7 FIRST AID/CPR

10.7.1 PURPOSE

These requirements stated herein reflect the general MIOSHA Occupational Health requirements for providing first aid and medical services for employees who experience occupational injuries/illnesses.

10.7.2 SCOPE

These requirements establish procedures to ensure the availability of first aid and medical services for employees who experience a work-related injury/illness. As a general practice, DMB facilities utilize outside medical services (i.e., 911 rescue or ambulance) to provide emergency medical services. In the absence of an outside medical service, DMB will ensure the availability of adequately trained personnel to render first aid/CPR and make available first aid supplies.

Several specific requirements exist within the requirements of MIOSHA, which relate to having employees trained and certified in first aid/CPR. Specifically, these requirements are stated within the following standards:

- Electric Power Generation, Transmission and Distribution General Industry Safety Standard Part 86. This standard is applicable to the DMB electricians who service high voltage electrical switchgear.
- Permit-Required Confined Space-General Industry and Occupational Health Standard Part 490. When DMB permit required confined space entries are made, it is required that rescue services and emergency medical services are on site and rescuing or treating the employee.
- Telecommunications-General Industry Construction Safety Standard Part 30. This standard is applicable to employees required to work with microwave and transmission equipment and other telecommunications systems.

10.7.3 DEFINITIONS

Eyewash means a device (connected to a water line or portable free standing unit) capable of delivering a constant flow of temperate water at a flow rate of 0.4 gallons per minute within 100 feet of the work area.

First Aid means the immediate and temporary care given to the injured before professional medical care is available.

First Aid Kit means a container including first aid supplies made available in appropriate work locations for employees to self administer minor injuries (e.g., adhesive bandage for a minor cut), or for use by an employee trained and certified in first aid/CPR.

First Aid Training means training received by the American Red Cross or similarly recognized organization resulting in a certification in First Aid and CPR.

Universal Precaution Kit or “Personal Protection Kit” means supplies to protect an employee (who has been trained in first aid/CPR) from a potential exposure to blood or other potentially infectious materials.

10.7.4 RESPONSIBILITIES

10.7.4.1 Management

- Ensure that medical care is readily available to employees who become injured or sick.
- In the absence of readily available emergency medical services, management must ensure the availability of an individual that is adequately trained and certified to render first aid.
- Designate what work sites and job activities will require trained first aiders, and provide appropriate training.
- Provide suitable facilities, readily available for immediate emergency use for the quick drenching or flushing of the eyes, in those locations where an employee may contact corrosive or hazardous materials,
- Provide first aid supplies in appropriate work locations for the emergency treatment of employee injuries.

10.7.4.2 Employees

- Immediately report to management any occupational injury or illness.
- Assist in summoning of emergency medical services for any injured coworker, contractor or visitor.

10.7.5 REQUIREMENTS

10.7.5.1 First Aid Procedures

The following guidelines are suggested to help establish First Aid Procedures:

1. First aid kits and universal precaution kits will be available at appropriate work locations. The size and type of kits will be determined by the number of employees and the type of potential hazards employees may be exposed to.
2. Minimum contents of first aid kits will be based on “Minimum Requirements for Workplace First Aid Kits”, ANSI Z 308.1-1998. (See Appendix A). Also included with the first aid kit will be materials such as latex gloves, antimicrobial hand wipes, and CPR barriers (a single use

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disposable medical device for CPR which uses a one-way valve to provide barrier against direct mouth to mouth contact.)

3. Additional first aid products may be included based upon the specific hazards existing in a particular work environment. The choice of first aid supplies should be in consultation with a healthcare professional or by a person competent in first aid and cognizant of the hazards found in the particular workplace environment.
4. In locations where first aid supplies are provided, employees will be informed as to the location of the first aid kit. In a work site that has a designated-trained first aider, employees will be informed as to who has received certified training.
5. A notice of emergency numbers will be posted throughout the premises and communicated to all employees.
6. At locations where first aid supplies are provided, a designated person from each work location will be in charge of the first aid supplies, and make them accessible to employees.
7. The individual designated will inspect first aid supplies regularly to ensure completeness, condition of contents and expiration dates.

10.7.6 TRAINING

1. The DMB Safety and Health Coordinator will identify those areas where individuals require First Aid/CPR training.
2. In locations where First Aid Response Teams are formed, training will be provided and refresher training completed as needed.

10.7.7 REFERENCES & APPENDICES

For additional information regarding first aid refer to MIOSHA Health Standard General Industry, General Work Place Requirements, “Medical & First Aid” Rule 4401.

ANSI Z 308.1-1998 “Minimum Requirement for Workplace First Aid Kits”.

Appendices:

A. First Aid Kits

10.7.7.1 Appendix A

FIRST AID KITS

Proposed Minimum Contents of First Aid Kit as recommended by ANSI Z 308.1-1998. Contents described are for a Type 1 Kit (intended for use in a stationary indoor setting)

1.	Absorbent Compress (32 sq. in.)	1
2.	Adhesive Bandages (1"X3")	16
3.	Adhesive Tape (5 yards)	2 rolls
4.	Antiseptic	10 individual-use applications
5.	Burn Treatment (.5 g application)	6 individual-use applications
6.	Sterile Pads (3"X3")	4
7.	Triangular Bandage (40"X40"X56")	1
8.	Medical Exam Gloves	2 pair
9.	CPR Barrier (single use disposable medical device for CPR use – one-way valve to provide barrier against direct mouth to mouth contact)	1

Note: The choice of first aid supplies should be in consultation with a healthcare professional or by a person competent in first aid and cognizant of the hazards found in a particular workplace environment.

UNIVERSAL PRECAUTION KITS

In appropriate work locations where Universal Precaution supplies are required to clean up a spill of blood or other potentially infectious materials, it is recommended that the following items be included in a universal precaution or "personal protection" kit:

- Medical exam gloves
- Apron
- Eye shield or safety glasses
- Shoe cover
- Scoop/scrapper
- Red waste bag labeled as containing potentially infectious material
- Germicidal wipe
- Antimicrobial wipe

10.8 HAZARD COMMUNICATION STANDARD

10.8.1 PURPOSE

The purpose of this program is to ensure that the hazards associated with chemicals used on-site are communicated to employees and management. Information concerning health hazards will be communicated by the use of container labeling, material safety data sheets, and training. This information will be used to evaluate and develop appropriate protective measures to safeguard employee health and safety.

This document details the Hazard Communication Program developed by the Department of Management and Budget for the purposes of:

- Further enhancing our employee awareness program and,
- Ensuring compliance with the MIOSHA Hazard Communication Standard/The Michigan Right to Know Law

MIOSHA requires employers to provide their employees with information about hazardous chemicals used in the workplace to which employees may be exposed. The Standard requires a written hazard communication program which includes information on container labeling and other forms of warning, material safety data sheets (MSDSs), and an employee information and training program.

MIOSHA delineates rights for employees including:

- The employees' right to notification of the location of the Material Safety Data Sheets.
- The employees' right to notification of the new or revised MSDSs no later than five (5) working days after receipt.
- The employees' right to request MSDSs from their employer.
- Employees' protection from discrimination or discharge as a result of requesting information on hazardous chemicals.

The goal of our program is to reduce the possibility of illnesses and injuries caused by exposure to chemicals. To accomplish our goal, we intend to provide employees with as much information as needed concerning the hazards of chemicals with which they have contact, presented in a usable, readily accessible form.

This Hazard Communication Program, including the material safety data sheets and the chemical inventory list will be reviewed on an annual basis to ensure that the plan reflects the latest changes in the workplace and regulatory requirements.

10.8.2 SCOPE

It is the responsibility of each supervisor and or facility manager to ensure that whenever a chemical is purchased, the hazards associated with its use are reviewed prior to its use on-site. All chemicals are required to have a material safety data sheet which is available to all employees. A current inventory list of chemicals must be maintained.

All employees must receive training upon assignment for the chemicals and associated hazards they may encounter. Employees performing non-routine tasks involving chemicals must receive training. The Hazard Communication Program applies to contractors performing services, maintenance, or construction on state property. The supervisor is responsible for ensuring the contractor notifies DMB of the chemicals they use. The contract with the vendor or contractor shall require submission of the vendor/contractor's Hazard Communication Program for review by the state.

10.8.3 GENERAL INFORMATION

This program is available for review by all DMB employees.

What Products and Materials Are Covered?

The MIOSHA standard applies to any chemical or combination of chemicals known to be present in the workplace to which employees may be exposed under normal conditions of use, or in a foreseeable emergency. Also covered by this standard are all materials commonly used by DMB employees in the course of their work. This includes, but is not limited to, lubricants, fuels, solvents, acids, inks, fire extinguishers, lighting devices, compressed gas containers, paints, glue, cleaning materials, welding rod, and disinfectants.

What Is Not Covered By This Standard?

The standard does not apply to any hazardous waste regulated by the U.S. Environmental Protection Agency (EPA), tobacco, wood or wood products, food, drugs, or cosmetics intended for personal consumption by employees in the workplace; and "articles." An "article" has been defined by the Occupational Safety and Health Administration (OSHA) as an item:

1. Which is formed to a specific shape or design during manufacture;
2. Which has end use functions dependent in whole or in part upon its shape and design;
3. Which does not release, or otherwise result in exposure to a hazardous chemical under normal conditions of use.

10.8.4 RESPONSIBILITIES

10.8.4.1 *Management Responsibilities*

Each DMB Office is responsible for maintaining a chemical inventory list and MSDSs for the chemicals it uses.

The DMB Safety and Health Unit is available to assist train key personnel and assist DMB Offices with the administration of the Hazard Communication Program.

The DMB Safety and Health Unit is responsible for the annual review of the Hazard Communication Program.

DMB Supervisors are responsible for providing employees with information from MSDSs to ensure their health and safety.

DMB Supervisors are responsible for ensuring that proper personal protective equipment is used.

10.8.4.2 *Employee Responsibilities*

DMB employees are responsible for informing management of hazards associated with chemical use, handling, or storage.

DMB employees are responsible for reporting any personal injury from a chemical exposure.

DMB employees are responsible for using the appropriate personal protective equipment (PPE) properly. If proper PPE is not available, a DMB employee shall not proceed with the task until all proper PPE and equipment is available.

10.8.5 HAZARD EVALUATION PROCEDURE AND DETERMINATION

DMB relies upon Material Safety Data Sheets from suppliers to meet hazard determination requirements. DMB is an end-user of various chemicals which have been found to present possible hazards to our workers. As a user, rather than a manufacturer or importer of chemicals, we are not required to evaluate those chemicals for their potential hazards. Any chemical which has ingredients listed in section 2 of the MSDS is deemed to be a hazardous chemical. Chemicals which are purchased from establishments such as hardware stores and department stores and are used in a similar manner and quantity as they are used in household situation do not require Material Safety Data Sheets.

10.8.6 MAINTENANCE OF A FILE OF MATERIAL SAFETY DATA SHEETS

Each DMB Office is responsible for compiling a master file of Material Safety Data Sheets (MSDS). It will be kept in the location designated on the State of Michigan Right to Know Poster. MSDSs will be available for review to all employees during each work shift. Copies will be available upon request to the individual indicated on the Michigan Right to Know Poster.

Chemical manufacturers, importers, wholesalers, distributors, and suppliers are required to provide the MSDS to us at the time of initial shipment of a chemical to our facility.

The MSDS contains information on the chemical such as physical properties, health and safety data, and first aid information which is useful in meeting the goals of this program. The form in Appendix 1 of this program will be used to evaluate individual MSDS information for required information.

MSDSs must be received with the first shipment of a chemical or be mailed to individual purchasing the chemical. Chemicals will not be used in our processes, even on a trial basis, unless the MSDS has been received and reviewed. If an MSDS is not received with the initial shipment of a chemical, DMB personnel will contact the manufacturer and/or supplier requesting the MSDS for that specific chemical.

MSDSs for each chemical in use at our facilities and projects will be maintained in the master MSDS binder or electronic file. The MSDSs will be filed by the Manufacturers' name and then by the product name.

Revised or updated MSDSs received from our suppliers will be logged and filed in the master MSDS binder or electronic file. If a revised MSDS alerts us to a new hazard previously not present in a work area, employees will be trained accordingly. Each DMB Office has the required MIOSHA Right-To-Know posters and will post the notification for employees for new or revised MSDSs within five days of receipt of the new or revised MSDSs.

10.8.7 CONTAINER LABELING AND OTHER FORMS OF WARNING

MIOSHA and OSHA require chemical manufacturers, importers, distributors to place warning labels on original containers of materials they send. If it is not feasible to place a label on a container, it may be sent to us along with the MSDS.

Each label should include:

- Name of the substance
- Name of the manufacturer or importer
- Emergency procedures and phone numbers
- Appropriate warning statements.

In addition, we are responsible for maintaining the integrity of all required DOT shipping labels on containers. These labels must not be removed until the container is empty.

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Each DMB Office will verify that chemical containers are properly labeled at the time they are received. Further, all containers, such as storage containers or bulk storage areas covered by the standard, will be appropriately labeled.

Each supervisor is responsible for ensuring that all portable containers used in their work area are labeled with identity and hazard warning.

All container labels will be legible, in English, and prominently displayed. If we are informed of a new hazard for a particular chemical, new labels will be placed on the container.

As an alternative to labeling individual containers, or when an item is not containerized (such as fumes or dust created by processes and procedures), signs or tags which identify the chemical and include appropriate hazard warning statements may be used.

Each DMB Office Safety Representative, Supervisors, and Managers will periodically inspect container labels, signs, and tags to ensure they are prominently displayed and legible. If missing or defaced, they will be replaced immediately. If the employees discover any unlabeled containers or labels which are defaced, they are expected to notify their supervisor.

Portable containers, holding a potentially hazardous chemical (e.g. a bucket of solvent) drawn by an employee from a labeled container and intended for use of that employee only during the course of his or her shift, are not required to be labeled. Containers into which chemicals will be transferred and which can be expected to be used by more than one employee or for a period longer than one shift must be labeled.

Under no circumstances are containers which were previously used as food or beverage containers to be used as portable containers.

If and when we are informed of new hazards by the chemical supplier, labels for these portable containers will be changed accordingly.

10.8.8 TRAINING EMPLOYEES FOR EVERYDAY OPERATIONS

Each DMB Office shall coordinate and maintain records of training conducted for the employees with DMB's Safety and Health Unit.

All employees who are exposed to chemical hazards will receive initial training. New employees will receive training as part of their new employee orientation. At a minimum, retraining will be conducted whenever a new hazard is introduced to a work area or whenever a new work assignment exposes an employee to chemical hazards for which he or she has not previously been trained.

More specifically, before starting work, or as soon as possible thereafter, each new employee will attend a safety class. In that class, each employee will be given information on:

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- Chemicals and their hazards in the workplace.
- How to lessen or prevent exposure to these chemicals.
- What DMB has done to lessen or prevent worker exposure to these chemicals.
- Procedures to follow if they are exposed.
- How to read and interpret labels and MSDSs.
- Where to locate MSDSs and from whom they may obtain copies.

During the training session, the employee will be informed that:

- DMB is prohibited from discharging or discriminating against an employee who exercises the rights regarding information about hazardous chemicals in the workplace.

- As an alternative to requesting an MSDS from DMB, the employee may obtain a copy from the Michigan Department of Consumer and Industry Services, Bureau of Safety and Regulation, Occupational Health Division, phone number 517/322-1608.

Training may be given in a classroom setting or individually, depending on the situation. Audiovisuals will be used when appropriate. All training will be documented by the instructor and attendance records taken. These attendance records will be kept by the Human Resources Department.

This written Hazard Communication Program, the labeling procedures, and the Chemical Listing and MSDSs which are part of this program, are all intended to provide additional information to employees.

10.8.9 TRAINING EMPLOYEES FOR HAZARDOUS NON-ROUTINE TASKS

From time to time, employees perform tasks of a non-routine nature which may expose them to certain chemical hazards.

Examples of non-routine tasks include:

- The cleaning of boilers.
- The use of cleaning solvents and degreasers.
- The cleaning of machines and equipment.
- Painting.
- The cleaning of containers (55 gallon drums, fiber barrels, etc.).
- Entry into confined spaces.

These non-routine tasks may expose workers to chemical hazards which have not been specifically addressed in our Hazard Communication Program.

When assigning employees to perform non-routine tasks, it is our intention and policy to identify the chemical hazards associated with performing non-routine tasks, provide information on recommended procedures, and to give specific instructions as appropriate. This information will include:

- Specific chemical hazards.

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- Protection/safety measures the employees must take to lessen risks.
- Measures DMB has taken to lessen the hazards including ventilation, respirators, the presence of another employee, and emergency procedures.

It is DMB's policy that no employee will begin work in a confined space, or any other non-routine task, without first notifying management and receiving a safety briefing.

10.8.10 INFORMING & POLICIES FOR OUTSIDE CONTRACTORS

It is the responsibility of the DMB to provide any contractors or other people on State of Michigan premises operated by DMB who might be exposed to our chemicals with the following information:

- Hazardous chemicals with which they may come in contact.
- Measures they may take to lessen the risks.
- Where to get MSDSs for the hazardous chemicals.
- Emergency procedures and first aid procedures.

It is the responsibility of the management of DMB Offices to provide any contractors or other people at one of our facilities who might be exposed to our chemicals with the above information.

It is the responsibility of the management of DMB Offices to obtain chemical information from contractors when they will expose our employees to hazardous chemicals which they may bring into our facilities. We are also to obtain a copy of their written Right to Know Plan for our review.

10.8.11 PIPE AND PIPING SYSTEMS

DMB facilities will label all piping systems in Buildings operated by DMB. In leased buildings If we encounter any chemicals flowing through unlabeled pipes, the hazards will be explained to employees in the course of their hazard communication training or as refresher hazard communications training.

10.8.12 HAZARDOUS CHEMICALS

The responsibility for determining whether a chemical is hazardous lies with the chemical manufacturer or importer of a chemical. As a user of chemicals, DMB may rely on the evaluation received from these suppliers through labels on containers and material safety data sheets.

Chemicals considered to be hazardous are those:

- regulated by OSHA in **29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances**;

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· included in the American Conference of Governmental Industrial Hygienists (ACGIH) latest edition of **Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment**;

· found to be suspected or confirmed carcinogens by the National Toxicology Program in the latest edition of the **Annual Report on Carcinogens**, or by the International Agency for Research on Cancer (IARC) in the latest edition of their IARC **monographs**

10.8.13 LISTING OF CHEMICALS IN USE

Each DMB Office is responsible for conducting a review of chemicals used in our processes including a walk-around inspection of our facilities. We have used the MSDSs provided to us by our suppliers to develop the inventory and listing of chemicals which is included in our Safety Manual and each DMB Office's MSDS collection

10.9 PERSONAL PROTECTIVE EQUIPMENT (PPE)

10.9.1 PURPOSE

The purpose of the Personal Protective Equipment (PPE) Program is to protect DMB employees from the risk of injury by creating a barrier against workplace hazards. Personal equipment is not a substitute for good engineering or administrative controls or good work practices, but should be used in conjunction with these controls to ensure the safety and health of employees. Personal protective equipment will be provided, used, and maintained when it has been determined that its use is required and that such use will lessen the likelihood of occupational injury and/or illness.

10.9.2 SCOPE

This program addresses eye, face, head, foot, and hand protection. Separate programs exist for respiratory and hearing protection since the need for participation in these programs is established through industrial hygiene monitoring. This program should be used in conjunction with the PPE Hazard Assessment and does not take the place of other DMB programs requiring personal protective equipment (Fall Protection, Bloodborne Pathogens, etc.)

10.9.3 DEFINITIONS

Apparatus means electrical equipment.

Conductor means a material, such as a bus bar, wire, or cable, suitable for carrying an electric current.

Electrical Worker means an operational or maintenance employee working on electrical conductors or equipment, except mining and construction operations.

Energized (sometimes known as “live”) means to be electrically charged, or that to which voltage is being applied.

Face Shield means a device worn in front of the eyes and a portion or all of the face; the main function of which is protection of the eyes and face.

Filter Lens means removable disc in the eyecup of a goggle that absorbs varying proportions of the ultraviolet, visible, and infrared rays according to the composition and density of the lens.

Headgear means that part of a protective helmet, hood, or face shield that supports the device on the wearer’s head, usually consisting of a headband and crown strap.

Inservice Load means an imposed physical load on a body harness from a free fall of more than 3 feet.

Insulated Barrier means a separation from another conducting surface by a dielectric substance or air space.

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Isolated means that all energized conductors or the exposed energized parts of equipment are isolated from the work area by an insulated barrier. Conductors may be isolated by moving them out of reaching distance by use of live (hot) line tools.

Lifeline means a rope line, except where used in tree trimming, attached at one end to a fixed object or attended by a person and to which a harness and lanyard is secured.

Protector means a device that provides eye or face protection against the hazards of processes encountered in employment.

Radiant Energy or Radiation means the three kinds of radiant energy that are pertinent to this standard:

- Ultraviolet
- Visible light
- Infrared

Shield means a device to be held in the hand, or supported without the aid of the operator, whose predominant function is protection of the eyes and face.

Work Gloves means gloves used as personal protective equipment to protect an employee from injuries on the job.

10.9.4 RESPONSIBILITIES

10.9.4.1 Supervisors

Supervisors have the primary responsibility for implementation of the PPE program in their work area. This involves:

- Providing appropriate PPE and making it available to employees.
- Ensuring employees are trained on the proper use, care, and cleaning of PPE.
- Maintaining records on employee training for PPE .
- Ensuring that the PPE Program elements are followed and that employees properly use and care for PPE.
- Seeking assistance from the Safety Coordinator to evaluate hazards.
- Notifying the Safety Coordinator when new hazards are introduced or when processes are added or changed.
- Ensuring defective or damaged equipment is immediately replaced.

10.9.4.2 Employees

The PPE user is responsible for following the requirements of the PPE Program:

- Wearing PPE as required.
- Attending required training sessions.
- Caring for, cleaning, and maintaining PPE as required.
- Informing the supervisor of the need to repair or replace PPE.

See Appendix A “General Guidelines for Choosing Personal Protective Equipment”

10.9.4.3 Safety Coordinator

The Safety Coordinator is responsible for the development, implementation, and administration of the PPE Program. This involves:

- Conducting workplace hazard assessments to determine the presence of hazards which necessitate the use of PPE.
- Conducting periodic workplace reassessments as requested by supervisors and/or as determined by the Safety Coordinator.
- Maintaining records on hazard assessments.
- Providing training and technical assistance to supervisors on the proper use, care, and cleaning of approved PPE.
- Providing guidance to the supervisor for the selection and purchase of approved PPE.
- Periodically reevaluating the suitability of previously selected PPE.
- Reviewing, updating, and evaluating the overall effectiveness of the PPE Program.

10.9.5 REQUIREMENTS

10.9.5.1 Hazard Assessment and Equipment Selection

MIOSHA requires an assessment be conducted to determine the need for personal protective equipment (PPE) and to help in selecting the proper PPE for each task performed. The results of this assessment are available from the DMB Safety and Health Coordinator.

10.9.5.2 Protective Devices

All personal protective clothing and equipment will be of safe design and construction for the work to be performed and must be maintained in a sanitary and reliable condition. Only those items of protective clothing and equipment that meet NIOSH (National Institute of Occupational Safety & Health) or ANSI (American National Standards Institute) standards will be procured or accepted for use. Newly purchased PPE must conform to the updated ANSI standards, which have been incorporated into the *MIOSHA, General Industry Standard Part 33 "Personal Protective Equipment" regulations*, as follows:

1. Eye and Face Protection, *ANSI Z87.1-1989*
2. Head Protection, *ANSI Z89.1-1986*
3. Foot Protection, *ANSI Z41.1-1991*
4. Hand Protection. There are no ANSI standards for gloves - selection must be based on the performance characteristics of the glove in relation to the tasks to be performed. *See Appendix C "Glove Chart"*.

Careful consideration will be given to comfort and fit of PPE in order to ensure that it will be used. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

10.9.5.2.1 Eye and Face Protection

Prevention of eye injuries requires that all persons who may be in eye hazard areas wear protective eyewear. This includes employees, visitors, researchers, contractors, or others passing through an identified eye hazard area. To provide protection for these personnel, supervisors of such areas must procure a sufficient quantity of goggles and/or plastic eye protectors that afford the maximum amount of protection possible. If these personnel wear personal glasses, they must be provided with a suitable eye protector to wear over them.

Suitable protectors must be used when employees are exposed to hazards from flying particles, molten metal, acids or caustic liquids, chemical liquids, gases, or vapors, bioaerosols, or potentially injurious light radiation.

1. Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment.
2. Side protectors must be used when there is a hazard from flying objects.
3. Goggles and face shields must be used when there is a hazard from chemical splash.

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4. Face shields must only be worn over primary eye protection (safety glasses or goggles).
5. For employees who wear prescription lenses, eye protectors must either incorporate the prescription in the design or fit properly over the prescription lenses.
6. Protectors must be marked to identify the manufacturer.
7. Equipment fitted with appropriate filter lenses must be used to protect against light radiation. Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.
8. Use safety glasses under face shield when welding.

10.9.5.2.1.1 Prescription Safety Eyewear

MIOSHA regulations require that each affected employee who wears prescription glasses while engaged in operations that involve eye hazards must wear eye protection that incorporates the required safety features in its design, or must wear eye protection that can be worn over the prescription lenses (goggles, faceshields) without disturbing the proper position of the prescription lenses or the protective lenses. Personnel requiring prescription safety glasses must contact their supervisor to request prescription safety glasses. *See Appendix B "Eye and Face Protection Chart"*.

10.9.5.2.1.2 Emergency Eyewash Facilities

Emergency eyewash facilities meeting the requirements of *ANSI Z358.1* (American National Standards Institute) will be provided in all areas where the eyes of any employee may be exposed to corrosive materials. All such emergency facilities will be located where they are easily accessible in an emergency and in good working condition.

10.9.5.2.2 Head Protection

Head protection will be furnished to, and used by, all employees and contractors engaged in construction and other miscellaneous work. Head protection is also required to be worn by engineers, inspectors, and visitors at construction sites when hazards from falling or fixed objects, or electrical shock are present. Bump caps/skull guards will be issued and worn for protection against scalp lacerations from contact with sharp objects. However, they will not be worn as substitutes for safety caps/hats because they do not afford protection from high impact forces or penetration by falling objects.

10.9.5.2.3 Foot Protection

Safety shoes must be worn by DMB employees where it has been determined that the type of work would require safety shoes. All safety footwear must comply with ANSI Z41-1991, "American National Standard for Personal Protection - Protective Footwear."

Safety shoes or boots with impact protection are required to be worn in work areas where carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection are required for work activities involving skid trucks (manual materials handling cars) or other activities in which materials or equipment could potentially roll over an employee's feet. Safety shoes or boots with puncture protection are required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal etc., could be stepped on by employees causing a foot injury.

10.9.5.2.4 Hand Protection

Suitable gloves must be worn when hazards from chemicals, cuts, lacerations, abrasions, punctures, burns, biological chemicals, and harmful temperature extremes are present. Glove selection must be based on performance characteristics of the gloves, conditions, duration of use, and hazards present. One type of glove will not work in all situations.

The first consideration in the selection of gloves for use against chemicals is to determine, if possible, the exact nature of the substances to be encountered. Read instructions and warnings on chemical container labels and MSDS's before working with any chemical. Recommended glove types are often listed in the section for personal protective equipment.

Chemicals eventually permeate all glove materials. However, they can be used safely for limited time periods if specific use and other characteristics (i.e., thickness and permeation rate and time) are known. The Safety Coordinator can assist in determining the specific type of glove material that should be worn for a particular chemical.

10.9.5.2.5 Fall Protection

See Section 10.5

10.9.5.3 Cleaning and Maintenance

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection. Personal

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protective equipment must not be shared between employees until it has been properly cleaned and sanitized. PPE will be distributed for individual use whenever possible.

It is also important to ensure that contaminated PPE, which cannot be decontaminated, is disposed of in a manner that protects employees from exposure to hazards.

10.9.5.4 Recordkeeping

Written records must be kept of the names of persons trained, the type of training provided, and the dates when training occurred. The supervisor must maintain their employees' training records for at least 3 years. The safety coordinator must maintain the Hazard Assessment Documentation for each work site evaluated for at least 3 years.

10.9.6 TRAINING

Any worker required to wear PPE must receive training in the proper use and care of PPE. Periodic retraining must be offered to both the employees and the supervisors, as needed. The training must include, but not necessarily be limited to, the following subjects:

1. When PPE is necessary to be worn.
2. What PPE is necessary.
3. How to properly don, doff, adjust, and wear PPE.
4. The limitations of the PPE.
5. The proper care, maintenance, useful life and disposal of the PPE.

After the training, the employees must demonstrate that they understand the components of the PPE Program and how to use PPE properly, or they must be retrained.

10.9.7 REFERENCES & APPENDICES

*For additional information regarding PPE refer to MIOSHA, General Industry Safety Standard Part 33
“Personal Protective Equipment”*

For additional information refer to:

*American National Standards Institute, American
National Standard ANSI Z41-1991, “Personnel Protection
- Protective Footwear”.*

*American National Standards Institute, American
National Standard ANSI Z87.1-1989 "Practice for
Occupational and Educational Eye and Face Protection".*

*American National Standards Institute, American
National Standard ANSI Z89.1-1986 "Safety Requirements
for Industrial Head Protection".*

Appendices:

- A. General Guidelines for Choosing PPE
- B. Eye and Face Protection Selection Chart
- C. Glove Chart

10.9.7.1 Appendix A - General Guidelines for Choosing Personal Protective Equipment

1. Description and Use of Eye/Face Protectors

- a. **Safety Glasses.** Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, etc. Safety glasses are also available in prescription form for those persons who need corrective lenses.
- b. **Single Lens Goggles.** Vinyl framed goggles of soft pliable body design provide adequate eye protection from many hazards. These goggles are available with clear or tinted lenses, perforated, port vented, or non-vented frames. Single lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to insure protection along with proper vision.
- c. **Welders/Chippers Goggles.** These goggles are available in rigid and soft frames to accommodate single or two eyepiece lenses.
 - 1) Welder's goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.
 - 2) Chippers/Grinders goggles provide eye protection from flying particles. The dual protective eye cups house impact resistant clear lenses with individual cover plates.
- d. **Face Shields.** These normally consist of an adjustable headgear and face shield of tinted/transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various sizes, tensile strength, impact/heat resistance and light ray filtering capacity. Face shields will be used in operations when the entire face needs protection and should be worn to protect eyes and face against flying particles, metal sparks, and chemical/biological splash.
- e. **Welding Shields.** These shield assemblies consist of vulcanized fiber or glass fiber body, a ratchet/button type adjustable headgear or cap attachment and a filter and cover plate holder. These shields will be provided to protect workers' eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electric arc welding and oxyacetylene welding and cutting operations. Welding shields are to be worn with safety glasses.

2. Head Protection

Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object. Head protectors, in the form of protective hats, must resist penetration and absorb the shock of a blow. The shell of the protective hat must be hard enough to resist the blow and the headband and crown straps keep the shell away from the wearer's skull. Protective hats can also protect against electrical shock.

Protective hats are made in the following types and classes:

- a. Type 1 - Helmets with a full brim.
- b. Type 2 - Brimless helmets with a peak extending forward from the crown.
- c. Class A - General service, limited voltage. Intended for protection against impact hazards. Used in mining, construction, and manufacturing.
- d. Class B - Utility service, high voltage. Used by electrical workers.
- e. Class C - Special service, no voltage protection. Designed for lightweight comfort and impact protection. Used in certain construction, manufacturing, refineries, and where there is a possibility of bumping the head against a fixed object.

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3. Foot Protection

There are many types and styles of protective footwear and it's important to realize that a particular job may require additional protection other than listed here. Footwear that meets established safety standards will have an American National Standards Institute (ANSI) label inside each shoe.

- a. **Steel-Reinforced Safety Shoes.** These shoes are designed to protect feet from machinery hazards such as falling or rolling objects, cuts, and punctures. The entire toe box and insole are reinforced with steel, and the instep is protected by steel, aluminum, or plastic materials. Safety shoes are also designed to insulate against temperature extremes and may be equipped with special soles to guard against slip, chemicals, and/or electrical hazards.
- b. **Safety Boots.** Safety boots offer more protection when splash or spark hazards (chemicals, molten materials) are present:
 - 1) When working with corrosives, caustics, cutting oils, and petroleum products, neoprene or nitrile boots are often required to prevent penetration.
 - 2) Foundry or "Gaiter" style boots feature quick-release fasteners or elasticized insets to allow speedy removal should any hazardous substances get into the boot itself.
 - 3) When working with electricity, special electrical hazard boots are available and are designed with no conductive materials other than the steel toe (which is properly insulated).

4. Hand Protection

Skin contact is a potential source of exposure to toxic materials. It is important that the proper steps be taken to prevent such contact. Most accidents involving hands and arms can be classified under four main hazard categories: chemicals, abrasions, cutting, and heat. There are gloves available that can protect workers from any of these individual hazards or any combination thereof.

Gloves should be replaced periodically, depending on frequency of use and permeability to the substance(s) handled. Gloves overtly contaminated should be rinsed and then carefully removed after use.

Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects, and very hot or very cold materials. The types of glove materials to be used in these situations include leather, welder's gloves, aluminum-backed gloves, and other types of insulated glove materials.

Careful attention must be given to protecting your hands when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevent the hands from contacting the point of operation, power train, or other moving parts. To protect hands from injury due to contact with moving parts, it is important to:

- a. Ensure that guards are always in place and used.
- b. Always lock-out machines or tools and disconnect the power before making repairs.
- c. Treat a machine without a guard as inoperative.
- d. Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

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The following is a guide to the most common types of protective work gloves and the types of hazards they can guard against:

1. **Disposable Gloves.** Disposable gloves, usually made of light-weight plastic, can help guard against mild irritants.
2. **Fabric Gloves.** Made of cotton or fabric blends are generally used to improve grip when handling slippery objects. They also help insulate hands from mild heat or cold.
3. **Leather Gloves.** These gloves are used to guard against injuries from sparks or scraping against rough surfaces. They are also used in combination with an insulated liner when working with electricity.
4. **Metal Mesh Gloves.** These gloves are used to protect hands from accidental cuts and scratches. They are used most commonly by persons working with cutting tools or other sharp instruments.
5. **Aluminized Gloves.** Gloves made of aluminized fabric are designed to insulate hands intense heat. These gloves are most commonly used by persons working with molten materials.
6. **Chemical Resistance Gloves.** These gloves may be made of rubber, neoprene, polyvinyl alcohol or vinyl, etc. The gloves protect hands from corrosives, oils, and solvents. The following table is provided as a guide to the different types of glove materials and the chemicals they can be used against. When selecting chemical resistance gloves, be sure to consult the manufacturers' recommendations, especially if the gloved hand will be immersed in the chemical.

10.9.7.2 Appendix B - Eye and Face Protection Selection Chart

Source	Assessment of Hazard	Protection
IMPACT – Chipping, grinding, machining, drilling, chiseling, riveting, sanding, etc.	Flying fragments, objects, large chips, particles, sand, dirt, etc.	Spectacles with side protection, goggles, face shields. For severe exposure, use face shield over primary eye protection.
CHEMICALS – Acid and chemicals handling	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield over primary eye protection
	Irritating mists	Special-purpose goggles
DUST – Woodworking, buffing, general dusty conditions	Nuisance dust	Goggles, eyecup and cover types.
LIGHT and/or RADIATION		
Welding - electric arc	Optical radiation	Welding helmets or welding shields. Typical shades: #10-14
Welding - gas	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding #4-8, cutting #3-6, brazing #3-4
Cutting, torch brazing, torch soldering	Optical radiation	Spectacles or welding face shield. Typical shades: #1.5-3
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable.

10.9.7.3 Appendix C - Glove Chart

TYPE	ADVANTAGES	DISADVANTAGES	USE AGAINST
Natural rubber	Low cost, good physical properties, dexterity	Poor vs. oils, greases, organics. Frequently imported; may be poor quality	Bases, alcohols, dilute water solutions; fair vs. aldehydes, ketones.
Natural rubber blends	Low cost, dexterity, better chemical resistance than natural rubber vs. some chemicals	Physical properties frequently inferior to natural rubber	Same as natural rubber
Polyvinyl chloride (PVC)	Low cost, very good physical properties, medium cost, medium chemical resistance	Plasticizers can be stripped; frequently imported; may be poor quality	Strong acids and bases, salts, other water solutions, alcohols
Neoprene	Medium cost, medium chemical resistance, medium physical properties	NA	Oxidizing acids, anilines, phenol, glycol ethers
Nitrile	Low cost, excellent physical properties, dexterity	Poor vs. benzene, methylene chloride, trichloroethylene, many ketones	Oils, greases, aliphatic chemicals, xylene, perchloroethylene, trichloroethane; fair vs. toluene
Butyl	Specialty glove, polar organics	Expensive, poor vs. Hydrocarbons, chlorinated solvents	Glycol ethers, ketones, esters
Polyvinyl alcohol (PVA)	Specialty glove, resists a very broad range of organics, good physical properties	Very expensive, water sensitive, poor vs. light alcohols	Aliphatics, aromatics, chlorinated solvents, ketones (except acetone), esters, ethers
Fluoro-elastomer (Viton)	Specialty glove, organic solvents	Extremely expensive, poor physical properties, poor vs. some ketones, esters, amines	Aromatics, chlorinated solvents, also aliphatics and alcohols
Norfoil (Silver Shield)	Excellent chemical resistance	Poor fit, easily punctures, poor grip, stiff	Use for Hazmat work

10.10 PESTICIDE USE AND APPLICATION

10.10.1 PURPOSE

The requirements stated within this program reflect those measures and precautions to be taken in the storage, application, and use of pesticides in order to protect the safety and health of employees and the general public.

10.10.2 SCOPE

These requirements apply to those individuals who are involved in the storage, use and application of pesticides. DMB employees who apply pesticide products such as herbicide for weed control, insecticide for roach control or rodenticide for rodent control are required to be certified or registered through the Michigan Department of Agriculture as required by *Public Act 451, Natural Resources and Environmental Protection Act, Part 83*.

These requirements also apply to individuals who make additions of biocides (microbial pest management applications) to cooling towers, evaporative condensers, air washers, chillers and like equipment.

The information provided herein covers the common requirements relating to pesticide use and the federal FIFRA requirements. *See Section 10.10.7 for additional references.*

10.10.3 DEFINITIONS

Applicator means a person who applies pesticides by any method.

Commercial Applicator means all other certified applicators (other than Private Applicators.) The EPA has established rules and procedures to be followed by the states for certifying both groups of applicators.

FIFRA means the Federal Insecticide, Fungicide and Rodenticide Act of 1947 as amended. FIFRA requirements are administered in the State of Michigan through the Michigan Department of Agriculture.

General Use Pesticides means pesticides that may be applied by anyone. This differs from “Restricted use” pesticides.

Inherently Dangerous means danger inhering in an instrumentality or condition itself at all times, so as to require special precautions to prevent injury; not danger arising from mere casual or collateral negligence of others with respect to under particular circumstances.

Pesticide means a substance or mixture of substances intended for preventing, destroying, repelling or mitigating pests, or intended for use as a plant regulator, defoliant or desiccant. This definition includes insecticides, fungicides, microbicide, rodenticide and herbicide products as well as fertilizers containing pesticide such as weed and feed and grub control combinations.

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Private Applicator means an individual who can use or supervise the use of pesticides on property owned or leased by them or their employers for the purpose of producing an agricultural commodity. The EPA has established rules and procedures to be followed by the states for certifying both private and commercial groups of applicators.

Ready to Use Pesticide Product means a pesticide that is applied directly from the manufacturer's original container and consistent with label direction. A pesticide that doesn't require mixing or loading.

Note: At the present time, the Department of Agriculture is interpreting bagged fertilizer, containing pesticides or herbicides, as not being ready to use.

Restricted Use Pesticides means pesticides that may only be applied by certified applicators or persons working under the direct supervision of a certified applicator.

10.10.4 RESPONSIBILITIES

10.10.4.1 Management

- Ensure that the application of pesticides and related products is conducted in accordance with the requirements stated herein.
- Maintain application equipment in a sound mechanical condition.
- Ensure that where mixing and transferring of pesticides are conducted, steps are taken to minimize any incidental release to the environment.
- Ensure that any employee assigned to apply pesticide products are certified or registered by the Michigan Department of Agriculture.
- Ensure that an application log is maintained.

10.10.4.2 Employee

- Utilize any personal protective equipment indicated on the manufacturer's label.
- Apply pesticides in a manner consistent with established requirements of the manufacturer, the product label, and applicable regulatory requirements.
- Maintain and utilize equipment in a manner that prevents the incidental release of materials into the environment, or that prevents off-target drift.
- Utilize pesticide product application methods, which minimize exposure to the public and non-target animals.

10.10.5 REQUIREMENTS

10.10.5.1 General

The general requirements relating to pesticide application are as follows:

1. The selection and use of pesticides must be consistent with its label.
2. Applications must be made using practices, which minimize or prevent off target drift.
3. Application equipment must be in good mechanical condition and properly calibrated.
4. Application equipment shutoff valves must work properly.
5. Application equipment that is designed to draw water must have an anti-siphoning device.
6. Mixing operations must be performed to prevent incidental release to the environment, and on an impervious pad if performed at the same location for over 10 days in any calendar year.
7. All application equipment must use double clamped hose connections.
8. Application equipment must be periodically inspected and any damaged or worn parts or components repaired or replaced.
9. The loading system must be flushed with water at the completion of each load unless the application is using undiluted material.
10. Before applying the pesticide, the applicator must identify any sensitive areas that are located adjacent to the target area and determine appropriate precautionary measures to be used to minimize impact.

10.10.5.2 Registry of Persons Requiring Notification

The Department of Agriculture maintains a voluntary registry of persons who, due to a medically documented condition, require notification before the application of pesticides on property adjacent to their primary residence. Before a lawn or ornamental pesticide is applied, the applicator is required to provide notification (in writing not less than 24 hours prior to the application or by telephone the previous business day of the application) that the application will be taking place.

10.10.5.3 *Mixing and Loading Operations*

Mixing and loading operations must be performed on a pad, which meets the following requirements:

1. The pad must be impervious (i.e., sealed concrete, plastic, stainless steel, etc.)
2. The pad must be designed to contained spills (i.e., diked, bermed, sloped, etc.)
3. The pad must incorporate provisions for collecting liquids or pesticide containing residues.
4. The containment volume must be designed to withhold one-minute of discharging from associated equipment.
5. Outdoor locations must also have the capacity to hold and retain six inches of rainfall.
6. The pad must be capable of being thorough “cleaned” after spills so that residue will not runoff to a watershed.
7. In dispensing areas, shutoff valves or emergency stops must be within immediate reach (primary shutoff) and immediate vicinity (secondary shutoff) of attending personnel.

10.10.5.4 *Washing and Rinsing Operations*

The washing and rinsing of pesticide containers and application equipment must be performed in a contained area meeting the following requirements;

1. The pad must be impervious (i.e., sealed concrete, plastic, stainless steel, etc.).
2. The containment volume must be designed to withhold the volume of clean-up material expecting to be generated.
3. Washing and rinsing may be performed on the loading pad.

10.10.5.5 *Management of Excess Pesticides and Related Materials*

Pesticide residues and related materials must be disposed as dictated on the label of the container. Emergency recovery actions may be required if pesticide containing residues (spills other than intended application areas) impact soil or surface waters.

State and federal pollution control statutes regulate the disposal of pesticide residues and containers. Pesticide residues and containers must be separated

from ordinary rubbish and solid wastes. Disposal contractors may require special licensing and permits from the Department of Environmental Quality. The Safety and Health Coordinator can assist in determining appropriate disposal requirements of pesticide related wastes.

10.10.5.6 Off Target Pesticide Drift

Pesticide applications must be performed to minimize off target drift. The following requirements relate procedures to be followed to minimize this possibility:

1. Determine weather conditions such as prevailing wind direction and strength.
2. Assess the direction of off target drift and the proximity of any sensitive areas that may be impacted.
3. When drift is anticipated, due to the nature of application, a written drift management plan must be developed and utilized. Components of such a plan must include the following:
 - a. Secure consent of property owners prior to application.
 - b. Use the largest spray droplets possible.
 - c. Use equipment and techniques to minimize distance between the applicator and the target.
 - d. Utilize the lowest effective rates of application.
 - e. Establish a no spray buffer zone.
 - f. Establish maximum wind speeds above which application must not be made.
 - g. Utilize deflectors or wind breaks to contain drift.

10.10.5.7 Notification and Posting Requirements

1. The notification requirements specified within *Michigan Department of Agriculture R285.637.11* are applicable to DMB “applicators”. These requirements relate to placing lawn markers to notify any person as to the recent application of pesticide containing materials. The placement of lawn markers is considered by the Department of Management and Budget a protection measure for public safety and encourages placement of lawn markers where practical.
2. Applications of pesticides within state buildings require notification postings at the primary entry points of the building for 48 hours after application and information exchange with the facility manager regarding the application posting and integrated Pest Management Plan.

If the facility management contracts with a licensed firm to commercially apply pesticides, the contractor is responsible for notification requirements (including lawn markers and other forms of notification). *The specifications for lawn markers and indoor posting signs are contained within Michigan Department of Agriculture Rule R285.637.11.*

10.10.5.8 Integrated Pest Management Requirements

Any employee designated to perform a pesticide application in a public building is required to attend and complete an approved training program (offered and/or approved by the Michigan Department of Agriculture).

The applicator must ensure that prior to application of pesticides (other than disinfectants, germicides, and sanitizers) an integrated pest management plan is in place for that specific building and contains the following elements:

1. Site evaluation
2. Relationship between pest biology and pest management methods
3. Best available pest management methods
4. Selection of pest control methods which minimize public health risks
5. Continuous evaluation of program effectiveness and need for modification
6. Maintenance plan for application records *as specified within Michigan Department of Agriculture R285.637.14*

10.10.5.9 Pesticide Use In and Around Schools

Special provisions exist for the application of pesticides in and around public schools and day-care centers. Application must be consistent with the specifications as contained within *Michigan Department of Agriculture Rule R285.637.15*.

10.10.6 TRAINING

Due to the requirements for State of Michigan applicator registration and or certification, the Michigan Department of Agriculture, (517) 335-6933 handles applicator registration, associated testing and certification. DMB will work closely with the Michigan Department of Agriculture for training and testing.

10.10.7 REFERENCES

For additional information regarding specific use requirements and rules contact Michigan Department of Agriculture, (517) 373-1087. (R285.636 and R285.637)

For Additional detailed information on pesticide use and application refer to Michigan Department of Agriculture Public Act 451, Regulations 636 and 637.

For additional information on maintaining application logs refer to Michigan Department of Agriculture regulation 636, Rule 15, and Regulation 637, Rule 14.

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10.11 POWERED INDUSTRIAL TRUCKS

10.11.1 PURPOSE

The requirements stated within this written program are established to prevent property damage and injury to employees who are required to operate powered industrial trucks and other material handling equipment. It should be noted that tractors and other heavy equipment used in construction activities are not included under this program.

10.11.2 SCOPE

A powered industrial truck is a mobile, power-drive vehicle used to carry, push, pull, lift, stack, and/or tier material. Operators of powered industrial trucks are required to be trained and certified in the operation of such vehicles before they are allowed to operate them independently. Each truck has unique characteristics and some inherent hazards. Operator training will address the unique characteristics of each vehicle.

10.11.3 DEFINITIONS

Capacity means the capacity of a truck equipped with a load carriage, forks or with attachments, maximum weight in pounds, at a specified load center which the truck, based on the strength of its various components and applicable stability, can lift to the maximum elevation of the load engaging means. Alternate capacities may be established at the same specified load center and at less than maximum elevation of the load engaging means.

Carriage means the support structure for forks or attachment, generally roller mounted, travelling vertically within the mast of a cantilever truck.

Drift means to move without control.

Forks mean horizontal tine-like projections, normally suspended from the carriage, for engaging and supporting loads.

Fork Height means the vertical distance from the floor to the load carrying surface adjacent to the heel of the forks with mast vertical, and in the case of a reach truck, with the forks extended.

Fork-Lift Truck means a light-lift self-loading truck equipped with load carriage and forks for transporting and tiering loads.

High-Lift Truck means a self-loading truck equipped with an elevating mechanism designed to permit tiering.

Load Axle means the truck axle nearest the load.

Load Center means the horizontal longitude distance from the intersection of the horizontal load-carrying surfaces and vertical load-engaging faces of the forks, or equivalent load positioning structure, to the center of gravity of the load.

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Mast means a support member providing the guideway permitting vertical movement of the carriage. It is usually constructed in the form of channels or similar sections providing the supporting pathway for the carriage rollers.

Motorized Hand Truck means a truck designed to be controlled by a walking operator and used to lift, tow, carry, stock and tier materials.

Operator means an employee who has been trained, tested, and authorized by the present employer to operate a powered industrial truck.

Overhead Guard means a framework fitted to a truck over the head of a riding operator.

Pallet Truck means a self-loading low-lift truck equipped with wheeled forks of specific dimensions to go under a single faced pallet or between the top and bottom boards of a double faced pallet and having wheels capable of lowering into spaces between the bottom so as to raise the pallet off the floor for transportation.

Parking Brake means a device to prevent the movement of a stationary truck.

Powered Industrial Truck means a mobile, power driven vehicle used to carry, push, pull, lift, stack, or tier material.

Tire means a tire, which may be standard solid, cushion solid, pneumatic or solid pneumatic style.

Tiering means a process of placing a load on or above another load.

Truck. See Powered Industrial Truck.

Unattended Truck means a truck, which is beyond the vision or more than 25 feet from the operator, whichever is less.

10.11.4 RESPONSIBILITIES

10.11.4.1 Management

- Provide training.
- Test the employee, and verify certification.
- Provide a permit to an employee who can demonstrate safe operation of a powered industrial truck, after employee has met the testing and training requirements.
- Provide equipment necessary for safe and proper operation.
- Restrict the use of a powered industrial truck if it presents a hazard during operation to employees.

10.11.4.2 Employee (Operator)

- Perform daily checks of equipment.
- Report to supervisor any defects that would effect safe operation of the vehicle.
- Operate and/or maintain forklift in a safe and responsible manner, never place anyone in a hazardous situation.
- Report any accidents, involving injury to an employee or damage to property.
- Maintain clear access to evacuation exits, and fire equipment when parking or depositing loads.

10.11.5 REQUIREMENTS

1. When approaching aisle intersections, slow down, sound horn, and check for other equipment operating in the area.
2. Proceed through intersections and negotiate corners with caution.
3. Be alert and expect the unexpected.
4. Operate equipment defensively. Think ahead and “leave yourself an out” at all times.
5. When equipment is not in use, place gearshift in neutral position, lower forks or pallet to the floor and turn off key or switch. Set parking brake.
6. Come to complete stop before changing gears or direction.
7. Avoid abrupt stops, starts, or turns.
8. Park equipment in areas in a manner that will not interfere with the operation of other equipment.
9. If on an incline, set parking brake and block the wheels to prevent rolling.
10. Do not tamper with any equipment, or attempt to fix disabled equipment, without the supervisor’s prior approval.
11. Report all inoperable or malfunctioning equipment to your supervisor immediately.
12. Pedestrians have the right of way, always drive defensively.

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13. Know your equipment's capacity and don't overload it. Overloading could upset your equipment or cause hydraulic or mechanical failure, endangering you and your equipment.
14. Check the work area. Look for damaged floors, note overhead obstructions, note ramps, docks and check for other traffic in the area.
15. Operate trucks at a safe speed depending on the conditions in the work area. Check conditions in the area you are working. Keep equipment under control at all times.
16. Do not pass other vehicles traveling in same direction at intersections, blind spots or other dangerous locations.

10.11.5.1 Operator Certification

In order to operate a powered industrial truck, the Department must issue operators a permit. Operators will receive training and testing to assure their knowledge, skill, and ability to operate a powered industrial truck. Once every three years the operator will be required to pass a performance test and a written knowledge test and issued a new permit valid for three years. Prior to issuance, the operator may be required to present a valid Michigan Driver's license as evidence of adequate vision. In the event that an operator does not possess a valid driver's license, a vision test will be required. The permit must be carried by the operator and/or be made available upon request by MIOSHA during working hours.

10.11.5.2 Battery Charging

1. Only recharge electric batteries in a designated area. Such an area must have provisions for flushing and neutralization of spills, fire protection, and sufficient ventilation to dissipate hydrogen and other gases.
2. Battery charging locations must be equipped with suitable eyewash/safety showers.
3. Smoking and other sources of open flames must be prohibited.
4. The truck should be positioned and brake applied before removing or installing a battery. Where batteries are removed from the truck, appropriate material handling equipment must be provided. All metallic objects must not make contact with battery terminals.
5. When making electrolyte additions, always add acid to water. Never pour water into acid. Keep the vent cap in place and open battery compartment covers to dissipate gases.
6. Use personal protective equipment (i.e., rubber apron, boots, acid resistant gloves, face-shield and other related equipment) when making additions to electrolyte solutions.

10.11.5.3 Liquefied Petroleum Gas (LPG) Fueling

1. Smoking, open electrical equipment, and other sources of open flames must be prohibited in the immediate area (25 feet in all directions).
2. LPG tanks, hoses, regulators and fittings must not be modified except through the manufacturer or other authorized representative.
3. All LPG containers must be maintained according to the manufacturer's requirements.
4. Use personal protective equipment (i.e., insulated impermeable gloves, chemical goggles and a chemical face shield) when making connections to filled LPG tanks.

10.11.5.4 Pre-use Equipment Inspections

10.11.5.4.1 Daily Inspection

At the start of each daily shift, equipment operators will inspect their lift trucks or order pickers to insure safe and proper operation.

10.11.5.4.2 Check List

Check the following list of items: (The entire list will not apply to all machines. See Appendix A, Daily Inspection Checklist form)

1. Properly disconnect the charger and connect the battery
2. Safety equipment
3. Steering
4. Brakes
5. Warning lights
6. Horn
7. Overhead guard
8. Fork backrest
9. Hydraulic controls
10. Tires
11. Fluid levels
12. Fuel - gas, diesel and propane
13. Batteries
14. Fluid levels
15. Warning decals
16. Directional signals
17. Check floor beneath equipment for oil leaks

10.11.5.4.3 Defects

Any defect(s) discovered must be reported to your supervisor prior to operating the equipment.

10.11.5.5 Equipment Operation (Applies to all material handling equipment)

1. Do not drive any power equipment up to a person standing in front of a fixed object.
2. Keep arms and legs inside equipment operator's compartment at all times.
3. Be alert and cognizant of potential problems.
4. Do not ride on a truck or pallet lift that is designed for walking operation.
5. Do not place hands on or reach into the mast riser or lift mechanism.
6. Be particularly cautious when using the lifting mechanism. Do not allow another person under lift mechanisms or near equipment when it is in use.
7. Use extreme caution when handling long, wide, or high loads.
8. Spread forks as wide as possible to provide better balance.
9. Center the weight of the load on the forks and insure that the forks protrude at least 2/3rds of the way under the pallet. Use fork extensions when necessary.
10. Elevate forks only to pick up or stack load. Watch out for obstructions, especially overhead. Check clearance at all times. It is the operator's responsibility to assure equipment has ample clearance. Doorways overhead obstructions, equipment, etc., will not be identified with height restrictions.
11. When stacking or tiering, use the maximum amount of tilt needed to reduce possible tipping of the load.
12. Carry the load properly on the forks and flush against the platform backrest. Tilt the mast back for safe, steady carrying of the load.
13. Travel with a load no more than six to eight inches off the floor. When traveling with no load, forks should be tilted forward and as close to the floor as possible to maneuver safely.
14. Never leave unstable skids in the racks or on tiered stacks. Look for crushed cartons, which could present potential tipping. Be alert for any tiered stack that leans. If the material cannot be restacked promptly, notify the supervisor immediately.
15. Do not attempt to operate equipment that is malfunctioning.

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16. Do not exceed the load limit capacity of a fork truck or order picker. Check the manufacturer's data plate to determine the maximum weight limit.
17. When using an elevator, determine whether the combined weight of the lift equipment and the load is within the weight capacity of the elevator. Do not exceed the weight limit capacity of an elevator. Check for obstructions and make sure that there is adequate clearance before entering or exiting an elevator.
18. The operation of equipment on a ramp requires special caution. Travel slowly and do not turn. If the slope exceeds a 10-degree rise, travel with the load facing uphill. When unloaded, travel with the forks facing downhill to slow the truck down in the event the brakes fail. Take note of and appropriate precautions for wet conditions.
19. All trailers at loading dock must have wheel chocks in place before loading or unloading material. Check trailers for proper chocking prior to loading or unloading. Do not drive onto single axle trucks with forklift equipment. Use electric or hand operated Pallet Lifts only.
20. Charging areas must always be well ventilated to prevent battery acid gasses from building up. Do not use any type of open flame that could cause a spark near the charging area, as it could trigger an explosion. All gasoline, diesel fuel and liquid propane gas storage and refueling areas must be well ventilated. Avoid any concentration of fumes in these areas.
21. When a load obscures the driver's vision it may be necessary to operate the equipment in reverse. When this occurs, drive facing the direction of travel and exercise extreme care. Keep the speed to a safe minimum.
22. When tiering a load or positioning a pallet on racking, approach the stack or rack squarely, with mast vertical. Stop close to the stack, tier or rack and lift the load high enough to clear the top of the stack. Regulate lift speed at the hoist control levers, in conjunction with engine or motor speed.
23. When removing a load from a stack or rack, approach the stack or rack squarely with the mast vertical. Be sure that the forks are in position to enter pallet or skid freely, without damaging the material on the skid.
24. A power disconnect feature is provided on some battery powered equipment to enable the operator to disconnect all electric power in the event of an electrical malfunction. As a back up to this feature, the key or on/off switch will also turn off all electrical power.
25. Order Pickers have a direction indicator arrow painted on top of the drive unit. The arrow indicates the direction, which the drive tire is pointing. When working in high locations, it is particularly important to check the direction of the drive tire before moving.

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26. A safety shield is installed on all order pickers and some fork lift truck equipment to protect the operator from protruding objects while raising or lowering the mast or forks.
27. A yellow or red flashing light is mounted on most lift truck equipment. The light is intended to warn operators of other equipment and pedestrians of your presence in the area. The flashing light is activated when the key or switch is turned on and may not be controlled by the operator.

10.11.5.6 Order Pickers

1. Body harnesses and tether harnesses are installed on all order picking equipment. This safety device must be worn at all times during the operation of equipment to avoid serious injury resulting from a fall.
2. Side bars and safety chains designate the limits of the operating compartment on order pickers. Do not lean or sit on them. DO NOT ATTEMPT TO DRIVE AN ORDER PICKER WITH BAR IN THE RAISED POSITION.
3. Some order pickers have a pallet clamp to secure the pallet to the platform. To operate the clamp, raise the handle located under the control module. If there is no pallet clamp, make certain that a warehouse pallet, with a solid top and bottom, is attached.
4. To prevent damage to racks, enter aisles positioned as straight as possible. Sound horn when entering aisle intersections.
5. Be observant of overhead obstructions and avoid them. Watch for pallets that protrude from racks, sprinklers, pipes, ductwork, light fixtures and archways, etc., that the mast or platform could hit when elevating or driving through aisles. The equipment operator is responsible for assuring that his or her equipment and load can safely be moved without danger of damage or injury.
6. Platform should not be raised higher than six to eight inches off floor when traveling outside picking aisles.
7. When pulling items for an order from a rack, position the order picker as close to the rack as possible. This reduces the space between the pallet platform and rack, minimizing the chance of an accident such as a dropped box, package or a misstep.
8. Make sure that the load is distributed evenly on the pallet. Pack load tightly so that loose material doesn't fall onto a person or object below.
9. After pulling the needed items or an order, make certain there are no insecure or protruding boxes or materials, which could fall from the location. The weight of the material remaining on a rack should be evenly distributed so that it is not concentrated at the rear.

10. When the picking of an order is complete, deposit the load in its designated area, out of the way of traffic.

10.11.5.7 High Reach Lift Trucks

10.11.5.7.1 Function

The High Reach Lift Truck differs in operation and function from "sit down" type fork trucks and order pickers. The primary use of the High Reach Lift Truck is to locate and remove the pallets of material from high levels. This piece of equipment is operated with the operator in a standing position, has the capability of extending its forks and provides for a very short turning radius to accommodate mobility between racks and in narrow aisles.

10.11.5.7.2 Features

High Reach Lift Trucks have a horizontal steering wheel. This lift truck is very responsive to an operators hand movement due to the rear wheel steering mechanism. Extreme caution must be used when driving and turning this equipment.

High Reach Lift Trucks are designed with a set of outrigger frame supports in conjunction with the drive steering tire. The outriggers are to the outside and forward of the main body of the lift truck. Loads are carried above and between the outriggers. As outriggers are typically wider than the load being carried, extra caution must be used during operation to avoid damage or injury.

In addition to the normal lift and tilt controls, the High Reach Lift Truck also has a control lever to extend or retract the pallet. This feature is used to pick up, place, retract or locate pallets. When operating a High Reach Lift Truck without a load or during the transportation of a load, the forks must be in a retracted position as close to the operator's compartment as possible.

10.11.5.7.3 Operation

On a High Reach Lift Truck the operator stands up with their foot on the Motor Activation/Brake Pedal. This is the same procedure as used on Order Pickers. When the pedal is depressed, the electrical system engages the motor and releases the brake at the same time. When the operator's foot is lifted or removed from the pedal, the High Reach Lift Truck comes to a slow stop and the drive motor automatically shuts down. Acceleration, deceleration, forward, and reverse are all accomplished through a single hand operated control. On some models, the raising and lowering of the forks is also activated from the same control.

The operator must use caution when steering the High Reach Lift Truck due to the extremely short steering radius. In most instances driving will be performed while traveling in reverse. Loads should be tilted back, against the operator's compartment.

Caution must be used when approaching racks and locating material. Due to the design of this equipment, outriggers extend beyond the dimensions of the High Reach Lift Truck and the load being carried. Subsequently, the operator must be constantly alert so that the outriggers do not touch racking system frame works or merchandise. Outriggers extend approximately 6" (six inches) beyond the width of the truck and 21" (twenty-one inches) to the front of the operator's compartment.

When locating and retrieving material, maneuver the High Reach Lift Truck and load squarely in front of the location in which the material is placed. Raise the forks to the required height in a level position. Extend the forks slowly under the pallet (with forks level), watching for movement and listening for noise which would alert you to a potential problem. Once in position under the pallet, raise the forks slowly until the pallet is 2" to 4" (two inches to four inches) above the racking. Be certain that there are no overhead obstructions. Either retract the forks or back up the High Reach Lift Truck to remove the pallet from the rack. This decision is the responsibility of the operator who must determine which method is the safest for the situation. After it has been determined that the area beneath the pallet is clear and obstructions will not prohibit movement, free the pallet and proceed with the operation.

10.11.5.7.4 High Reach General Information

1. There is a nameplate on each Powered Industrial Truck that provides the following:
 - a. Load limit; the greatest weight that the forklift can carry.
 - b. Load center; the location of the center of the weight.
2. Regarding lift height, the load should not be overextended as it dramatically changes forklift stability and mast strength; for every six inches that you extend the load center, you must lower the weight limit by 500 pounds.
3. When elevating the load, use one smooth movement, then lower the load gently to the location that you want to set it at; jumpy movements strain the battery and the hydraulics.
4. Loads should not be stored any closer than 18 inches from the ceiling, sprinkler heads, lights, pipes, etc.
5. With any incline that is 10 degrees or more, you should drive with the load uphill.
6. Do not turn around on the ramp.

7. Be careful of loads shifting on inclines. The load is more likely to become unbalance on the ramp.
8. Ramps require increased stopping distances.

10.11.5.7.5 Driving Characteristics of a Forklift

1. The truck weight is used to counterbalance the load weight.
2. The load weight always needs to be considered.
3. Moving parts horizontally and vertically.
4. No springs or shock absorbers.
5. Rear wheel steering.

10.11.5.7.6 Stability Triangle

1. Three point suspension.
2. Center of gravity shift.
3. Heaviest weight should be put near the truck.
4. Seesaw principle.

10.11.5.7.7 Load Placement

1. Balanced loads.
2. Load weight vs. load center.
3. Effects of tilting the mast.
 - a. When elevating.
 - b. When traveling.

10.11.5.7.8 Review Of Basic Operating Principles

1. Know the limits of the forklift (found on the truck nameplate).
2. Do not overload.
 - a. Avoid excess weight.
 - b. Avoid unstable loads.
 - c. Make sure that the weight is distributed properly.
3. Stability triangle.
4. Seesaw principle.
5. Balanced loads.
 - a. Balanced pallet.
 - b. Strong enough, not broken pallet.
 - c. Heavier end toward the mast.
 - d. Tilting the mast alters the load center.
 - e. Ramps can cause even balanced loads to change weight center.
6. Smooth operation is essential.

10.11.6 TRAINING

The Powered Industrial Truck training program consists of instruction (both classroom-type and practical training) in proper vehicle operation, the hazards of operating the vehicle in the workplace, and the requirements MIOSHA Part 21 Powered Industrial Trucks.

In order to operate a powered industrial truck, operators must be issued a permit by DMB. Operators will receive a performance test (Appendix B) and a knowledge test (Appendix C) to assure their knowledge, skill and ability to operate a powered industrial truck. (Also, see Appendix D, Driving Test Summary) Once every three years or whenever refresher training is warranted (R408.12153 of part 21). Training should include:

1. Operating instructions, warnings and precautions for the types of truck the operator will be authorized to operate.
2. Differences between the truck and the automobile.
3. Truck controls and instrumentation: where they are located, what they do, and how they work.
4. Engine or motor operation.
5. Steering and maneuvering.
6. Visibility (including restrictions due to loading).
7. Fork and attachment adaptation, operation, and use limitations.
8. Vehicle capacity.
9. Vehicle stability.
10. Any vehicle inspection and maintenance that the operator will be required to perform.
11. Refueling and/or charging and recharging of batteries.
12. Operating limitations.
13. Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.
14. Safe use of a body harness and personal fall arrest system. (*See Section 10.5*).

10.11.6.1 Workplace Related Topics

Training must also include the following areas:

1. Surface conditions where the vehicle will be operated.
2. Composition of loads to be carried and load stability.
3. Load manipulation, stacking and unstacking.
4. Pedestrian traffic in areas where the vehicle will be operated.
5. Narrow aisles and other restricted places where the vehicle will be operated.
6. Hazardous (classified) locations where the vehicle will be operated.

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7. Ramps and other sloped surfaces that could affect the vehicle's stability.
8. Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.
9. Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

10.11.6.2 Refresher Training and Evaluation

Refresher training, including an evaluation of the effectiveness of that training will be conducted as required ensuring that the operator has the knowledge and skills needed to operate the powered industrial truck safely.

Refresher training in relevant topics shall be provided to the operator when:

1. The operator has been observed to operate the vehicle in an unsafe manner.
2. The operator has been involved in an accident or near-miss incident.
3. The operator has received an evaluation that reveals that the operator is not operating the truck safely.
4. The operator is assigned to drive a different type of truck.
5. A condition in the workplace changes in a manner that could effect safe operation of the truck.

10.11.6.3 Certification

DMB will certify that each operator has been trained and evaluated as required by the standard. The certification shall include the name of the operator, the date of the training, the date of evaluation, and the identity of the person(s) performing the training or evaluation.

10.11.7 REFERENCES AND APPENDICES

For additional information refer to MIOSHA, General Industry Safety Standard Part 21 “Powered Industrial Trucks”.

Appendices:

- A. Forklift Daily Inspection Checklist
- B. Lift Operator Skills Evaluation form
- C. Powered Industrial Truck Written Test
- D. Powered Industrial Truck Driving Testing Summary

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10.11.7.2 Appendix B

LIFT OPERATOR SKILLS EVALUATION FORM

Truck Type: Sit Down Stand Up Powered By: Electric Propane Gasoline

Employee Name _____ Years of Experience _____

Facility/Location: _____ Testing Date _____

Object: Rate each lift truck operator by how they perform basic forklift driving skills. Each operator is to be given the same assignment and instructions. Any infraction of these guidelines during the skills session should be counted as a violation and deducted from the point total. Value: 30 points

	Pass	Fail		Pass	Fail
1-8. Physical examination of lift truck: (Operator must demonstrate and describe inspection of each of these items.)			19. Did the operator back out and lower forks before moving?	<input type="checkbox"/>	<input type="checkbox"/>
• Tilt	<input type="checkbox"/>	<input type="checkbox"/>	20. Did the operator always look behind before backing up?	<input type="checkbox"/>	<input type="checkbox"/>
• Raise/Lower	<input type="checkbox"/>	<input type="checkbox"/>	21. Did the operator wear protective equipment?	<input type="checkbox"/>	<input type="checkbox"/>
• Horn	<input type="checkbox"/>	<input type="checkbox"/>	22. Did the operator drive around the debris or get off the lift and remove it?	<input type="checkbox"/>	<input type="checkbox"/>
• Tires	<input type="checkbox"/>	<input type="checkbox"/>	23. Did the operator set the load flat on the floor before getting off?	<input type="checkbox"/>	<input type="checkbox"/>
• Oil Leaks	<input type="checkbox"/>	<input type="checkbox"/>	24. Did the operator make any moves that were potentially dangerous?	<input type="checkbox"/>	<input type="checkbox"/>
• Mast Chains	<input type="checkbox"/>	<input type="checkbox"/>	25. Ask the operator for 3 safety rules to follow at a loading /receiving dock. They should include: (worth 3 points)	<input type="checkbox"/>	<input type="checkbox"/>
• Brakes	<input type="checkbox"/>	<input type="checkbox"/>	• Chock Wheels	<input type="checkbox"/>	<input type="checkbox"/>
• Hour Meter	<input type="checkbox"/>	<input type="checkbox"/>	• Check Flooring	<input type="checkbox"/>	<input type="checkbox"/>
9. Did the operator pull forward toward designated section of racking without striking anything?	<input type="checkbox"/>	<input type="checkbox"/>	• Proper Lighting	<input type="checkbox"/>	<input type="checkbox"/>
10. Did the operator place the forks under the pallet properly?	<input type="checkbox"/>	<input type="checkbox"/>	• Watch for Others	<input type="checkbox"/>	<input type="checkbox"/>
11. Did the operator raise or tilt the load properly?	<input type="checkbox"/>	<input type="checkbox"/>	• Check Dockplate	<input type="checkbox"/>	<input type="checkbox"/>
12. Did the posts strike any section of racking while removing the pallet?	<input type="checkbox"/>	<input type="checkbox"/>	• Inform others in area	<input type="checkbox"/>	<input type="checkbox"/>
13. Did the operator lower the pallet before moving/backing out?	<input type="checkbox"/>	<input type="checkbox"/>	• Other	<input type="checkbox"/>	<input type="checkbox"/>
14. Did the operator drive at a safe rate of speed?	<input type="checkbox"/>	<input type="checkbox"/>	26. Ask the operator for 3 safety rules to follow at the battery charging stations. They should include: (worth 3 points)		
15. Did the operator slow down or stop at cross aisles?	<input type="checkbox"/>	<input type="checkbox"/>	• Use of Safety Glasses & Gloves	<input type="checkbox"/>	<input type="checkbox"/>
16. Did the operator sound the horn?	<input type="checkbox"/>	<input type="checkbox"/>	• No Smoking	<input type="checkbox"/>	<input type="checkbox"/>
17. Did the operator pull into areas of racking properly when returning pallet back to the racking?	<input type="checkbox"/>	<input type="checkbox"/>	• Cleanup Procedures for Spills	<input type="checkbox"/>	<input type="checkbox"/>
18. Did the operator strike any racking on the way up or going into the racking?	<input type="checkbox"/>	<input type="checkbox"/>	• Eyewash Stations	<input type="checkbox"/>	<input type="checkbox"/>
			• Other	<input type="checkbox"/>	<input type="checkbox"/>

Note: On nos. 25 & 26 the operator must fully describe how to perform those functions. If they fail to name 3 items, do not give full credit.

TOTAL POINTS _____

SUPERVISOR _____

DATE _____ SCORE _____

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10.11.7.3 Appendix C

POWERED INDUSTRIAL TRUCK

WRITTEN TEST - SAMPLE

Employee's Name Phone Number

Division or Department Date

WRITTEN TEST

- | | | | |
|---|---|-----|--|
| T | F | 1. | An operator of a lift truck should never drive up to employees that are standing in front of a fixed object. |
| T | F | 2. | You may give a fellow employee a ride for a short distance. |
| T | F | 3. | Operators should never put their arms or legs outside the running lines of a moving truck. |
| T | F | 4. | Trucks and trailers must have two (2) rear wheels blocked or restrained by other mechanical means when being boarded by a rider type powered industrial truck. |
| T | F | 5. | It is safe practice for you to inspect the landing gears of semi-trailers to make sure it will hold the weight of your powered industrial truck and its load. |
| T | F | 6. | Only specially equipped trucks shall be used in hazardous areas. |
| T | F | 7. | You are required to report only accidents that involve injuries. |
| T | F | 8. | You should not fuel your truck while the engine is running. |
| T | F | 9. | When following another truck, you should maintain at least three (3) truck lengths. |
| T | F | 10. | The best method for crossing railroad tracks is diagonally. |
| T | F | 11. | When the load blocks your forward visibility, stand up and drive Slowly. |

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- T F 12. Drive at reduced speeds on wet or slippery floors.
- T F 13. Your lift trucks should never be left unattended with motor running.
- T F 14. Operators will check safety devices; brakes, horn, steering, parking Brake, upright operations, oil or fuel leaks at the beginning of each Shift.
- T F 15. When coming down a grade or ramp, your load should be trailing you.
- T F 16. When loading, the load should be tilted and cradled against the backrest.
- T F 17. When lowering the load, it is proper to stop it suddenly.
- T F 18. Other workers may stand close by when you stack materials, if they have a safe exit.
- T F 19. It is wrong to stack material in front of fire doors.
- T F 20. Material may be stacked in aisles and roadways, if enough room is left to get by.
- T F 21. Smoking or other sources of ignition should be kept away from the battery charging area.
- T F 22. The same weight can be lifted with the ends of the forks as can be lifted when the forks are run all the way underneath the load.
- T F 23. You may have people stand or add weight to the back of the truck in order to lift more weight with the fork.
- T F 24. A driver should always plan the path of travel to avoid obstacles.
- T F 25. A safe distance should be maintained from the edge of ramps and Platforms.
- T F 26. When parked on an incline, truck wheels should be blocked and wheels turned.
- T F 27. You can pass another truck traveling in the same direction at an Intersection if you sound your horn and signal your intention to pass.

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SELECT THE ANSWER WHICH IS MOST CORRECT

28. In checking your truck, you find the power steering system squeals as soon as you turn it. You should:
- A) Add fluid to the reservoir
 - B) Notify your supervisor
 - C) Operate truck to see if noise goes away
29. When changing directions:
- A) Always stop
 - B) Slow down at least 1 m.p.h.
 - C) Don't worry about speed as the lift truck is built to take the shock
30. You can increase the rated load capacity of your truck:
- A) By adding additional counter weighting with written approval from the manufacturer
 - B) If your lift is under 84 inches high
 - C) If it is only for less than 5 minutes.
31. As a driver, it is:
- A) Your responsibility to watch for pedestrians
 - B) Their responsibility to watch for you
 - C) Management's responsibility to keep them out of P.I.T. work areas
32. On a lift truck, your horn:
- A) Makes a good device to catch your buddy's attention
 - B) Should be sounded at intersections
 - C) Should be sounded when you're racing after another lift truck
33. If a mechanical trouble develops, you should:
- A) Fix it yourself, if minor in nature
 - B) Drive until repairs can be made
 - C) Report the trouble to your supervisor
34. Forks on empty parked trucks must always be:
- A) Two inches from the floor
 - B) Four inches from the floor
 - C) On the floor
35. Another person may ride the forks of a fork truck:
- A) If you need help reaching a high load
 - B) If the trip is a short one
 - C) If the truck is equipped with a special platform for doing so
36. When overtaking a pedestrian from the rear, you should:
- A) Continue on so long as he is not right in front of you
 - B) Go around him
 - C) Sound horn and steer clear of him

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37. When operating your truck on a public road you should:
A) Assume traffic will avoid you
B) Obey the rules of the road as though you were in a car
C) Drive backwards so you can see cars behind you
38. If you see a loose object lying on the floor, you should:
A) Make a written note to remind your supervisor to pick it up
B) Ignore it, someone will eventually move it
C) Stop and pick it up so you don't drive over it
39. Your powered industrial truck permit must be:
A) Filed with the State of Michigan
B) Secured in the back of your truck
C) Be carried or made available for inspection during working hours

_____ **TOTAL SCORE**

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10.11.7.4 Appendix D

**POWERED INDUSTRIAL
TRUCK DRIVING TESTING
SUMMARY**

Employee _____ Location _____

Department _____ Date _____

		<u>Pass</u>	<u>Fail</u>
1.	Testing	_____	_____
2.	Knowledge of Equipment	_____	_____
3.	Knowledge of state safety standard	_____	_____
4.	Operating Ability	_____	_____
5.	Knowledge of Daily Procedures	_____	_____
6.	Physical Requirements	_____	_____
7.	Valid Michigan Drivers License No.	_____	_____

COMMENTS _____

Acceptable _____ Declined _____

Signature of Tester _____

Date _____