



Consolidated Safety Rules

2025

Approved by MidAmerican Energy Company and IBEW Locals 109 and 499, with noted exceptions.

Form 40-250

**CAN YOU WRITE A
SAFETY RULE THAT
WILL ELIMINATE YOUR
RESPONSIBILITY TO
IDENTIFY THE HAZARDS AND
DEAL WITH THEM PROPERLY?**

Approved by MidAmerican Energy Company and IBEW Locals 109 and 499, with noted exceptions April 15, 2011 Effective date: July 1, 2011
Last revision date: November 1, 2024



From President and CEO Kelcey Brown

Excellence in safety begins with a shared goal to achieve Target Zero – zero incidents and zero accidents. Our ability to work safely is critical to the success of our business. But, more importantly, reaching Target Zero is the only way to ensure every one of us returns home safely at the end of the day. It's that simple.

Reaching Target Zero will require each of us to do our part. As a business, we're accountable for equipping employees with the tools and training that will keep all of us safe. As teams, we're beholden to our Brother's Keeper commitment – to have each other's backs and hold one another accountable for making safety our top priority. As individuals, we are personally responsible for:

- Following all appropriate and required safety protocols – every task, every time.
- Using the human performance tools and techniques that help us forecast and prevent errors.
- Identifying improvements to safety processes and procedures, and reporting risks to management.
- Respecting the risks involved in our work and wearing the PPE designed to protect us from harm – no matter what.

If you ever have reason to question your safety or if you're unsure how to handle a potential hazard, **stop**. Confirm the appropriate next steps with a team member or supervisor, and ensure it is safe before moving forward.

This is who we are. It's how we operate. It's reflected in our vision to be the best, our core principles and our culture of personal responsibility. It's what gets us home safe. It's non-negotiable and fundamental to being on this team.

We **can** achieve Target Zero. Thank you for doing your part to help make this happen.

Sincerely,

A handwritten signature in black ink, appearing to read "Kelcey Brown", with a stylized flourish at the end.

Kelcey Brown

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Definitions

Application of Rules

Each employee shall carefully study and adhere to those rules applying to specific duties. If a rule is not covered in the Electric, Gas or Generation rules, the General rules will cover the task.

Approved

Meeting all of the appropriate Federal, State or Local codes.

Competent Person

A Competent Person is, by regulatory definition, a person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

IDLH means immediate danger to life and health.

Qualified Employee

A Qualified Employee is, by regulatory definition, a person designated by the employer who, by reason of experience and training, has demonstrated the ability to safely perform assigned duties and, when required, is properly licensed in accordance with the Federal, State, and Local laws and regulations.

Qualified Electric Employee

An employee (person) knowledgeable in the construction and operation of the electric power generation, transmission, and distribution equipment involved, along with the associated hazards. Each qualified employee shall 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 voltages to which the qualified employee will be exposed and the skills and techniques necessary to maintain those distances.
4. The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and the insulated tools for working on or near exposed energized parts of electric equipment.
5. The recognition of electrical hazards which the employee may be exposed, and the skills and techniques necessary to control or avoid these hazards.

Request for Assistance

A qualified employee is expected to perform the duties in the same manner and with the same number of workers as any other worker of similar experience. Where outside influences create additional hazards to the employee or the public, appropriate actions will be taken to eliminate or protect against the hazard. This may include additional manpower. Such influences may include unfamiliarity, traffic, weather, darkness, size and weight of equipment, or other hazard causes.

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Procedure to Request Safety Rule Revisions and Interpretations

The procedures below have been developed by the General Safety Committee to provide instructions for employees to submit requests to recommend a new safety rule, revise an existing safety rule, or obtain an interpretation of a safety rule.

New or Revised Safety Rule Request

1. Employees shall complete a Safety Rule Request Form (40-9) and submit the form to the local safety committee. The form can be found online: http://myonline/mec/shared/sac/docs/forms/sits_template.pdf by selecting Forms - All MEC Employee Forms - Safety Rule Request Form.
2. **Local Safety Committee Review** – The local safety committee will review the request and approve or deny it. The request will be forwarded to the applicable divisional safety committee (electric, gas or generation) outlining the local safety committee’s action. The local safety committee chairperson will notify the originating employee of the local safety committee’s action.
3. **Divisional Safety Committee Review** – The applicable divisional safety committee will review the request and approve or deny it.
 - a. Approved requests will be forwarded to the other divisional safety committees to determine if the request impacts their work or conflicts with an existing divisional safety rule. If there are no conflicts, the rule will be forwarded to the next level of approval. If there is a conflict or a serious impact to their work, it can be denied with a clear explanation of the reason. The originating divisional safety committee chairperson will be notified of all other divisional committee actions on their requests **Note:** The applicable divisional safety committee chairperson will obtain input from all local safety committee chairpersons regarding potential impacts to their work.
 - b. The applicable divisional safety committee chairperson will forward the request to the General Safety Committee with documentation of all actions taken.
4. **General Safety Committee Review** – The General Safety Committee will review the request, including input from the local and divisional safety committee chairpersons, and approve or deny it.
 - a. Approved requests will be forwarded to the IBEW Union Locals and MEC senior management for approval or denial.
 - b. Once approvals are received from the IBEW Union Locals and MEC senior management, the request will be forwarded to Safety Audit and Compliance for inclusion in the safety rule book.
 - c. Denied requests will be returned to the applicable divisional safety committee chairperson with a reason for the denial. The divisional safety committee chairperson will notify the originating local safety committee chairperson.

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Safety Rule Interpretation

1. The employee and his/her supervisor will discuss and attempt to resolve the interpretation.
 - a. If agreement cannot be reached, the employee and supervisor will submit an interpretation request using the Safety Rule Request Form (40-9) as outlined in the above Section 1, and submit it to the local safety committee for review if there is an immediate operational need (less than 48 hours) to resolve the conflict.
 - b. For non-urgent requests, the form shall be submitted directly to the applicable divisional safety committee for review and a copy shall be provided to the local safety committee chairperson.
2. **Local Safety Committee Review** – The local safety committee will review the request and provide a response if there is an operational need to resolve the issue in less than 48 hours. The local safety committee chairperson will submit the request and their response to the applicable divisional safety committee for review.
3. **Divisional Safety Committee Review** – The divisional safety committee chairperson will schedule a conference call within 48 hours of receipt of the initial interpretation request. Attendees will include the divisional safety committee members, the local safety committee chairperson, and the originating employee and his/her supervisor, if deemed appropriate. The divisional safety committee will either approve the local safety committee's interpretation, provide an alternate response that will take precedence, or will refer the request to the General Safety Committee if a consensus cannot be reached.
4. **General Safety Committee Review** – If there is a conflict or a resolution on the rule interpretation cannot be reached by the appropriate divisional safety committee, the General Safety Committee chairperson will schedule a conference call within five business days of receipt of an interpretation request. Attendees will include the General Safety Committee members, divisional safety committee chairperson, local safety committee chairperson, and the originating employee and his/her supervisor, if deemed appropriate. The General Safety Committee will provide the final interpretation response to the divisional safety committee chairperson, who will notify the local safety committee chairperson and the employee and supervisor that originated the request. The General Safety Committee also will notify all local safety committee chairpersons, who will inform their employees of the interpretation, if applicable to their work.
5. It is understood that rulings made by the General Safety Committee will not prevent a bargaining unit employee from pursuing the grievance procedure.

Safety Rule Request Form	Number: _____ Assigned by safety issues tracking system
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1. Type of request: Interpretation New safety rule Revise existing safety rule
2. Employee issuing request: Work location: Date:
3. Name of approving local safety committee:
4. Date approved by local safety committee: Chairperson name:
5. Type of work covered by the rule: Electric Gas Supply General
6. Reason for the request:
7. Safety rule wording (may use attachment if needed):

Section and Paragraph Number <small>(List section/paragraph number where the rule exists or should be added.)</small>		Page Number
Enter rule as written:		
Enter rule as proposed:		

8. Other comments:
9. Attachments Describe:
10. Formal Committee and Executive Actions (completed by responsible parties)

Committee	Date of Action Taken		Action Description/Reason
	Approved	Denied	
Electric Divisional			Motion: Second: Vote: Unanimous
Gas Divisional			Motion: Second: Vote: Unanimous
Generation Divisional			Motion: Second: Vote: Unanimous
General Safety Committee			Motion: Last Name Second: Last Name Vote: Unan. Or list Approved/Rejected
IBEW 109 Executive Board			Wolfe, Tim tfwolfe@ibew109.com
IBEW 499 Executive Board			Faber, Sarah sarah@ibew499.com Phillips, Randy rphillips@ibew499.com
Date Published in Book			

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GENERAL

1.0 APPLICATION AND RESPONSIBILITY

1.1 Application of Safety Rules

- 1.1.1 These safety rules are designed to provide safety protection for all employees.
- 1.1.2 The Company shall furnish a copy of the safety rule book to each employee.
- 1.1.3 The current safety rule book shall be available to employees throughout their employment.
- 1.1.4 The Company shall require all employees to observe and adhere to all safety rules.
- 1.1.5 Each employee shall carefully study and adhere to those rules applying to specific duties.
- 1.1.6 These rules represent minimum requirements and are only intended to cover average conditions. Since it is impracticable to cover all conditions and emergencies, the earnest cooperation of all employees and supervision is requested in meeting conditions not covered in these rules.
- 1.1.7 These rules apply to all work undertaken by MidAmerican Energy employees.

1.2 Company Responsibilities

- 1.2.1 The Company shall have the same responsibility for safety as for any other part of operations.
- 1.2.2 The Company shall appoint individuals to supervise other employees and those appointed shall be responsible for safety.
- 1.2.3 The Company shall hold safety meetings at regularly scheduled times and require attendance by employees.
- 1.2.4 The Company shall furnish instructions indicating the proper procedure in an emergency.
- 1.2.5 The Company shall provide safety bulletin boards for use of safety material to be located in appropriate conspicuous places.
- 1.2.6 The Company shall provide, maintain and train in the use of all required protective devices and insist that employees use them properly.

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- 1.2.7 The Company shall provide accident report forms.
- 1.2.8 The Company is responsible for scheduling the investigation of personal injuries, near misses and vehicle accidents. An investigation to determine the root cause of such incident will include, at the discretion of the affected employee(s), a bargaining unit representative.
- 1.2.9 The Company owns the physical assets and is responsible for their safe operation. Employees shall follow the safety rules and regulatory requirements, incorporated into the safety rules, in order to ensure the safe operation of the Company's physical assets. If the Company chooses to develop safety procedures above the standards stated in the safety rules or applicable regulations, incorporated into the safety rules, for the safe operation of the Company's assets, the Company and Union will meet to develop and implement such safety procedures per Article XVI of the collective bargaining agreement.
- 1.2.10 The Company shall comply with Section 29 §1910.132.
 - 1.2.10.1 Hazard assessments are required to meet the OSHA minimum standards. Any personal protective equipment necessary to mitigate the identified hazard(s) that exceed the minimum regulatory requirements shall require review and approval by the appropriate divisional safety committee.
- 1.2.11 The Company shall take every reasonable measure to ensure work scheduled at customer premises (or at similar private property) takes cognizance of known pre-existing hazards or threats associated with the status of the immediate location and/or the residents and neighbors.
- 1.2.12 The Company shall post any changes in vehicle operations in accordance with federal, state and local motor vehicle laws each year to ensure drivers remain current with all federal, state, and local motor vehicle laws applicable to the operation of the Company vehicle they drive.
- 1.2.13 The Company shall be responsible for ensuring any unsafe equipment is removed from service.
- 1.3 Company Supervisor and Person in Charge Responsibilities (e.g., Foreman, Crew Leader, etc.)
 - 1.3.1 Supervisors and persons in charge shall have the same responsibility for safety as for any other part of operations and must be attentive to the conditions of the job. Each Supervisor or person in charge is responsible for accident prevention as it relates to employees under their direction and control, acknowledging that each employee is ultimately responsible for their own personal safety (see safety rule 1.4.1 – Employee Responsibilities).

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- 1.3.2 Supervisors and persons in charge shall be required to fully understand and comply with these safety rules.
- 1.3.3 Supervisors and persons in charge shall insist on employees observing these rules.
- 1.3.4 Supervisors and persons in charge are at all times responsible for the execution of the work in a safe manner, for the safety of all employees under their direction, and for the safety of the general public in connection with the work in which they are engaged.
- 1.3.5 Supervisors and persons in charge shall be responsible for the proper use of safety devices and equipment by employees under their direction to protect them and the general public.
- 1.3.6 Supervisors and persons in charge shall have the right to inspect and reject all tools and equipment, including employees personal tools used on work under their direction.
- 1.3.7 Supervisors and persons in charge shall instruct their employees as to the type of hazards, which are present on the job, and all employees shall ensure that job safety analysis briefings are conducted.
- 1.3.8 Supervisors shall assure that regular safety meetings are conducted for all employees under their supervision.
- 1.3.9 Supervisors and persons in charge shall be responsible for ensuring that work under their control is carried out using approved methods and equipment.
- 1.3.10 The employer shall provide the employee in charge of the job with all available information that relates to the determination of existing characteristics and conditions. A Job Safety Analysis (JSA) and job briefing shall be held by the employee in charge to ensure all employees involved in the work are familiar with the tasks involved. The job briefing must include:
 - a. Hazards associated with the job and actions taken to mitigate them.
 - b. Work procedures involved.
 - c. Special precautions.
 - d. Energy source controls.
 - e. Personal protective equipment requirements.

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1.3.11 A more extensive discussion shall be conducted:

- a. If the work is complicated or particularly hazardous.
- b. If the employee(s) cannot be expected to recognize and avoid the hazards involved in the job.
- c. If the scope of the work changes or is interrupted.

1.4 Company Employee Responsibilities

1.4.1 Employees are responsible for their own personal safety.

1.4.2 Employees shall practice and observe the safety rules with special attention to all safety devices, and equipment required and provided for their own protection, and must be attentive to the condition of the job.

1.4.3 Practical jokes, scuffling, horseplay and unnecessary distractions on the job are prohibited (e.g., non-job related texting, ear piece use).

1.4.4 Possession of intoxicating liquors or illegal drugs on the job is strictly prohibited. Anyone under the influence of liquor, illegal drugs, or in a condition that makes the employee unable to perform work will not be allowed on the job.

1.4.5 Employees shall use all protective devices as required and shall exercise proper care and treatment of such protective devices. There shall be no alteration of safety equipment. Employees shall inspect all tools and equipment, including personal tools prior to use.

1.4.6 If a job is determined to be or has become immediately dangerous to life or health, the employee shall call for additional assistance. In the cases of emergency where danger to life or health would be aggravated by delay in waiting for the arrival of additional help, the hazard may be cleared if this can be done without endangering the employee involved. A reasonable request for qualified assistance will not be denied.

1.4.7 The employee shall notify the supervisor in charge as soon as practical of all injuries, no matter how slight, and all injury reports shall be completed in a timely manner.

1.4.8 No employee shall perform work using equipment, tools or PPE that does not meet minimum company standards.

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1.4.9 When an employee observes a hazardous condition that may cause injury, property damage or interfere with public service, he shall report it promptly to a proper authority and when necessary, guard the hazardous condition if it involves company facilities or public danger. Equipment found to be defective shall be removed from service, tagged and reported to supervision.

1.5 Non-company Personnel Responsibilities

1.5.1 Non-company personnel shall perform the contracted work in accordance with Federal, State or Local codes and OSHA requirements at a minimum.

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2.0 FIRST AID AND CPR

- 2.1 All employees shall be given the opportunity to receive first-aid training and represented employees shall be given the opportunity to receive cardiopulmonary resuscitation (CPR) training, including automated external defibrillator (AED).
 - 2.1.1 AED units shall be maintained and inspected in accordance with the manufacturer instructions and company policy.
- 2.2 Approved first-aid and burn kits shall be available at all working areas and vehicles. The first-aid and burn kits shall be inspected frequently, but at least once per year for completeness and cleanliness. The Company is responsible for supplying the proper first aid kit replacement materials and providing the list of required items. Employees shall report the need for replacement of first aid supplies.
- 2.3 All employees will be trained in the hazards of Blood borne Pathogens, under the MidAmerican Energy Blood borne Pathogen Protection Program, which meets minimum OSHA requirements. Employees are recommended to use personal protective equipment if there is a possibility of exposure to body fluids when performing first-aid/CPR. The Company will make personal protection equipment available in a Blood borne Pathogen Protection kit.
- 2.4 All equipment and environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials.
- 2.5 Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

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3.0 COMPRESSED GASES

- 3.1 Care shall be exercised in handling all gas cylinders. They shall not be dropped Or jarred. A suitable cylinder cart, chain or steadying device shall be used when cylinders are in use.
- 3.2 Valve protection shall be kept in place except while regulators and hoses are attached.
- 3.3 Refillable propane and acetylene cylinders shall be secured in an upright position at all times.
- 3.4 Gas cylinders shall be kept away from heat and a safe distance from welding or cutting operations where sparks could reach them.
- 3.5 Oxygen cylinders shall not be stored near highly combustible materials, especially oil and grease. They shall be separated in storage from fuel gas cylinders or combustible materials according to local codes.
- 3.6 Cylinders, except those that are non-refillable, containing chlorine, propane, or hydrogen shall not be stored in a general storeroom. They shall be stored in separate, well-ventilated fireproof areas.
- 3.7 Cylinders may be stored outdoors provided valves and safety devices are protected against accumulations of ice, snow and extreme weather.
- 3.8 Nothing shall be hung on the regulators or cylinder valves. The recessed top of cylinders shall not be used as a place for tools.
- 3.9 Cylinders shall not be allowed to come in contact with energized conductors or ground wires from electrical equipment. Cylinders shall not be used as supports for welding or cutting purposes.
- 3.10 The cylinder safety relief devices and valves shall not be tampered with or repairs attempted. In case of leakage, the cylinder shall be moved to the open air away from all danger of fire, properly barricaded and permitted to discharge slowly.
- 3.11 Oxygen should not be used as a purge medium, nor should pressurized oxygen be used as a test medium.
- 3.12 Under no circumstances shall oxygen be used as a substitute for compressed air. Oxygen or acetylene from cylinders shall not be used to blow out lines or services or to operate air tools.
- 3.13 No attempt shall be made to mix gases in a cylinder.
- 3.14 Valves on empty compressed gas cylinders shall be closed. Empty compressed gas cylinders shall be so marked or stored separately from full cylinders.

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- 3.15 All compressed gas cylinders shall be properly identified. Identification can be stenciled, stamped or labeled on the shoulder of the cylinder. Suppliers shall be responsible for providing this identification.
- 3.16 Shipping and handling procedures for compressed gas shall be completed in accordance with Federal, State and Homeland Security regulations.

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4.0 WELDING AND CUTTING

- 4.1 Welding and cutting shall be performed only by properly trained persons.
- 4.2 Special precautions shall be taken in the following situations:
 - a. When welding or cutting, precautions shall be taken to prevent sparks or hot metal from falling onto people or flammable materials. When requested by the welder, a helper shall stand by to watch for unsafe conditions and to provide warning and assistance.
 - b. Where combustible materials, such as paper clippings or wood shavings are present, the floor shall be swept clean to a safe distance before welding. Combustible floors shall be kept wet or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc-welding or cutting equipment shall be protected from possible shock.
 - c. Adequate protective measures, such as barriers and screens must be taken to protect other employees and the public. When material is hot, it shall not be left unattended unless properly barricaded or identified.
 - d. Welding screens shall be used whenever other persons could be exposed to the arc of the welding operation. Welders shall not strike an arc with an electrode when there are persons nearby who might be affected by the arc.
 - e. If the object to be welded or cut cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place.
- 4.3 Suitable fire extinguishing equipment shall be immediately available at all locations where welding and cutting equipment is used.
- 4.4 A hot work permit shall be obtained when required by the Company's hot work permit procedure. When working inside a building, the job site will be policed for fire prevention after the welding or cutting ceases.
- 4.5 All welding and cutting equipment including goggles, helmets and other approved protective devices shall be inspected prior to each use. When working with welding equipment, approved goggles or helmets, gloves and other approved protective devices shall be worn. While doing any welding that leaves an ear exposed to sparks and flying weld metal, the welder shall wear ear protection.
- 4.6 Where normal ventilation in general welding, cutting or burning operation indoors is not sufficient, local exhaust ventilation or appropriate respiratory protective equipment shall be used.
- 4.7 Adequate ventilation or approved respiratory equipment shall be used while welding or air arcing in confined spaces or enclosed areas or while brazing, cutting, air arcing or welding zinc, brass, and bronze, stainless steel, copper or galvanized or lead coated material contaminated with paints or solvents.

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- 4.8 Hose and cable shall be arranged to minimize possible damage to them, and tripping hazards. Hose should be stored in well ventilated boxes, compartments or areas.
- 4.9 When welding or cutting a container or tank, no welding or cutting should be performed until all flammable residues have been thoroughly cleaned and purged. When welding small attachments to the outside of tanks, or similar devices, the tank should be vented and necessary precautions for cooling the tank should be provided. Open flames or electric arcs should not be allowed to come in contact with the contents of the tank.
- 4.10 Compressed gas cylinders should not be used without a pressure-reducing regulator attached to the cylinder valve, except when connected to a manifold system.
- 4.11 When welding equipment is not in use or is unattended after use, the cylinder valves should be closed, the pressure on the hose should be released, and the pressure regulating device adjustment screw backed off.
- 4.12 The valves of compressed cylinders should be opened slowly and only with the special wrench provided. Never stand in front of gauges when opening valves. Special wrenches should be left connected to the compressed gas cylinder while it is in use so that it can be turned off quickly in case of emergency.
- 4.13 Only a friction lighter should be used to initially light the torch.
- 4.14 Welding, cutting torches and hoses will be inspected before each use. Torches and hoses in need of repair will be repaired or replaced before use. Welding hose shall only be repaired by approved methods.
- 4.15 Liquid leak check rather than flame shall be used to locate leaks at fittings. Hose may be checked for leaks by immersion in water and pressurizing it at normal working pressure.
- 4.16 Employees shall never permit oil or grease to come in contact with oxygen or acetylene cylinder valves, regulators, gauges or fittings, nor shall employees allow oily hands or gloves to contact the same.
- 4.17 When in use, oxygen cylinder valves shall be fully opened, while acetylene cylinder valves shall never be open more than one and one-half turns. Acetylene pressure on outlet gauges shall not exceed 15 pounds per square inch under any conditions.
- 4.18 The manufacturers' instructions for operation of electric welding machines or equipment shall be followed.
- 4.19 The use of low voltage rubber gloves should be considered when welding under wet conditions.

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- 4.20 Electrodes should be removed from the electrode holder when not in use, and the holder so placed that they cannot make electrical contact with personnel or conducting objects.
- 4.21 Defective welding machines or equipment shall not be used and shall be tagged and removed from service until repairs can be made.

5.0 HOUSEKEEPING AND FIRE PROTECTION

- 5.1 All places of employment, passageways, storerooms, service rooms and vehicles shall be kept clean, orderly and in a sanitary condition.
- 5.2 The floor of every work room shall be maintained in a clean and, so far as possible, dry condition. Where wet processes are used, drainage shall be maintained, and false floors, platforms, mats or other dry standing places should be provided where practicable.
- 5.3 Every floor, working place and passageway shall be kept free from protruding nails, splinters, holes or loose boards.
- 5.4 Broken glass or other sharp-edged objects shall not be placed in wastebaskets unless properly protected.
- 5.5 All temporary floor openings will be constantly attended or properly guarded with a standard railing, mid-rail and toe board.
- 5.6 A fire extinguisher, of the proper type, shall be available at the work site at all times and attended as conditions warrant.
- 5.7 Adequate fire prevention methods shall be used at all times.
- 5.8 Fire protection systems will not be taken out of service or modified without approval from the designated Company authority.
- 5.9 Dedicated fire protection equipment will not be used for routine work activities such as wash downs, to ensure its availability for emergency use is not compromised.

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6.0 STORAGE BATTERIES

- 6.1 Flames and sparks shall be kept away from the vicinity, as hydrogen may be present.
- 6.2 Care shall be exercised when using tools around batteries to prevent short circuiting battery terminals.
- 6.3 Batteries will be maintained in a condition and kept in an environment to prevent excessive generation and concentration of hydrogen gas.
- 6.4 Employees shall not open batteries in spaces where the room temperature is above 125° F. The room or compartment shall be ventilated and the temperature reduced before working on the batteries.
- 6.5 Smoking is not permitted within 25 feet of storage batteries.
- 6.6 When working around banks of batteries and it becomes necessary to cover the batteries, as much air space as possible shall be maintained between the cover and the batteries.
- 6.7 Employees shall consider all conductive live parts of batteries operating at 50 volts or more as energized equipment and shall be treated as such.
- 6.8 Equipment shall be available for flushing and neutralizing spilled electrolyte and for fire protection when batteries are being moved.
- 6.9 Approved face shields, aprons, and rubber gloves shall be available and used by workers handling acids or working with batteries.
- 6.10 Facilities and/or equipment for quick flushing and neutralizing of the eyes and body shall be available within 25 feet when working on batteries. (Exception: The flushing station will be optional when inspecting electrolyte level externally without opening cells, taking voltage cell readings, or working on the charging system where there is no hazard from splashing electrolyte.)
- 6.11 Employees shall not pour water into undiluted acid; the undiluted acid shall be poured slowly into the water.
- 6.12 Slings or lifting devices must be designed for lifting batteries.

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7.0 VEHICLE OPERATIONS

7.1 Driving, Backing and Parking

- 7.1.1 Employees shall follow all applicable Federal, State, Local and Department of Transportation regulations.
- 7.1.2 Operating and maintenance procedures, as specified by the vehicle manufacturer, shall be followed. Only qualified employees who have a valid license or permit for the equipment being used shall operate motor vehicles on company business.
- 7.1.3 The vehicle driver shall report any defects that have developed to the Company Fleet representative or the designated servicing authority. Any item that makes the vehicle unsafe shall be repaired prior to vehicle operation.
- 7.1.4 When entering or leaving any building, enclosure, alley or street, where vision is obstructed, a complete stop shall be made and it is recommended the horn should be sounded; the driver then shall proceed with caution. Automatic garage doors and moving gates should be opened fully before entering or exiting.
- 7.1.5 In so far as practical, company vehicles should stay out of customer driveways to eliminate backing hazards.
- 7.1.6 Care shall be exercised in fueling motor vehicles, gasoline powered equipment or storage containers. All engines shall be turned off during fueling. Use of any ignition source near a fueling operation is prohibited. Cell phones and two-way radios are examples of ignition sources. Employees shall remain outside the vehicle and watch the fueling activities.
- 7.1.7 With the exception of entering or leaving the building, engines shall never be run within an enclosed garage or building unless adequate ventilation has been provided to remove carbon monoxide and other noxious exhaust gases.
- 7.1.8 Each driver will make a circle of inspection immediately prior to moving or backing the vehicle. Driver reminders such as the cone best practice, and window or dashboard stickers are recommended and encouraged. All drivers must use extreme caution in backing vehicles. If another employee is present, the second employee shall direct the driver; this includes passenger vehicles when vision is obscured.
- 7.1.9 When driving crane type trucks on a public roadway, booms shall be stowed and if a means to secure the boom is provided by the manufacturer, it shall be used to secure the boom to prevent against side sway.

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- 7.1.10 Vehicles and equipment left on the job site overnight adjacent to highways or in public thoroughfares must be guarded with proper warning devices and barricades.
- 7.1.11 When a vehicle is parked, the driver shall make sure the vehicle is left in a safe position. The transmission shall be placed in parking position or in the lowest gear, and the parking brake shall be set. When parked on an incline, the front wheels shall be cut into the curb. For vehicles furnished with wheel chocks, the wheel chocks shall be used.
- 7.1.12 Towed equipment, when it is separated from the towed vehicle, shall have the wheels chocked or blocked when parked.
- 7.1.13 When vehicles or equipment are parked on a street or highways as part of a work project, they shall be parked to offer the least traffic impediment and to provide safe access to tool compartments. Traffic control devices should be used in accordance with federal, state or local requirements.
- 7.1.14 When patrolling lines or conducting mobile leak survey, high-intensity rotating beacons or strobe lights shall be used when stopped or traveling less than 35 MPH in the right-of-way. A vehicle's flashing emergency/hazard lights may be used when stationary and when moving in the right-of-way if a self-cancelling device is installed and functioning, which will enable the operator to engage a left or right turn signal.
- 7.1.15 If an overhead garage door must be left in a partially open position, the door must be approximately three feet from the floor or less. Where this door position is not practical, the doorway shall be fully marked with a flagged barrier between four and five feet high, or appropriate fixed barricades the full width of the doorway.

7.2 Garage Operations

- 7.2.1 Raised booms or buckets shall be properly supported when work under them is necessary. Any adjustments or repairs other than on the motor shall not be attempted with the equipment motor running unless necessary to make the adjustments or repairs.
- 7.2.2 Engine-driven equipment must be turned off before refueling, greasing or oiling.
- 7.2.3 Fuel shall not be poured into the carburetor to start the vehicle.
- 7.2.4 When using floor jacks (for repairs) the vehicle or equipment shall be blocked to avoid rolling, and support jacks shall be used.
- 7.2.5 Approved absorbent material shall be used to keep floor free of grease and oil.

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- 7.2.6 When unloading fuel, the truck shall be solidly grounded or bonded.
- 7.2.7 Vehicles will be towed only by approved methods.
- 7.3 Hauling Poles, Ladders, Pipe and Overhanging Loads
 - 7.3.1 Materials shall be securely fastened by approved binders to prevent a hazard due to shifting.
 - 7.3.2 Material that extends beyond the front, rear or sides of the vehicle shall be flagged and/or lighted according to the current Department of Transportation standards.
 - 7.3.3 When hauling poles or pipe where the vehicle must enter congested areas or heavy traffic conditions, escort vehicles should be used.
 - 7.3.4 Employees shall give special consideration to the safe placing, blocking and barricading of pipe or poles delivered to the job site. Avoid obstructing driveways and walkways. Protect against pipe or poles rolling into streets or vehicular traffic and warn traffic if it is stored in a street.
 - 7.3.5 Employees should avoid line-of-fire positions such as the inside the angle of a winch line, or the zone beneath a suspended load whenever vehicle loading and unloading operations are in progress.
- 7.4 Work Area (Work Zone) Protection
 - 7.4.1 Work area protection shall be set up prior to starting work and shall safeguard employees, pedestrians, motorists and equipment and shall minimize traffic interference. The use of adequate barriers, warning signs, lights, flags, traffic cones, barricade rope and flag persons on approaches to work areas, excavations, open manholes and parked equipment will provide work area protection. Unauthorized persons will not be permitted into hazardous areas.
- 7.5 Inspection of Equipment
 - 7.5.1 No commercial motor vehicle shall be driven unless the driver is satisfied the following parts and accessories are in good working order, nor shall any driver fail to use or make use of such parts and accessories when and as needed:
 - a. Service brakes, including trailer brake connections
 - b. Parking (hand) brake
 - c. Steering mechanism
 - d. Lighting devices and reflectors
 - e. Tires
 - f. Horn

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- g. Windshield wiper or wipers
- h. Rear-vision mirror or mirrors, and
- i. Coupling devices.

8.0 AERIAL DEVICES

Note: See specific operational sections for any additional requirements.

- 8.1 All personnel operating aerial devices shall be trained and qualified.
- 8.2 The critical safety components of mechanical elevating and rotating equipment shall receive a thorough visual inspection before use on each shift. Note: Critical safety components of mechanical elevating and rotating equipment are components whose failure would result in a free fall or free rotation of the boom.
- 8.3 Each mobile crane and mobile work platform shall be inspected annually. The inspection shall be performed in accordance with equipment operation and maintenance manuals. A written record of the inspection shall be maintained on file.
- 8.4 Booms and platforms shall be secured before traveling.
 - 8.4.1 When traveling in a mobile platform, the gate shall be latched in a closed position.
 - 8.4.2 When traveling in a mobile platform, a safety harness and lanyard must be worn and attached when an attachment point is provided.
- 8.5 Aerial devices shall be inspected before each use. These devices shall be put through a functional check to ensure proper operation before each use.
- 8.6 Mobile work platforms, including articulating boom lifts, boom trucks with man baskets, cranes with man baskets, scissor lifts and forklifts with man baskets:
 - 8.6.1 Never use a mobile work platform as a crane.
 - 8.6.2 When working from the elevated platform, employees shall wear a safety harness with its lanyard attached to a designated attachment point on the platform. Equipment without attachment points shall not be used. Employees shall follow the guidelines set forth in the MidAmerican Energy Elevated Work Procedures.

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- 8.6.3 Never position step ladders or other items to extend the reach from the platform or to gain access to or to leave the platform. Feet shall remain firmly positioned on platform deck.
- 8.6.4 Never walk or climb on boom to gain access to or leave the platform.
- 8.6.5 Employees shall use a hand line and tool bag for raising and lowering tools and materials. The tool bag shall be inspected before use.
- 8.6.6 The boom truck or crane shall not be moved with personnel in the bucket.
- 8.7 The brakes shall be set and outriggers, when used, shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline.
- 8.8 Belting off to an adjacent pole, structure or equipment while working from an aerial lift shall not be permitted.
- 8.9 Boom and basket load limits specified by the manufacturer shall not be exceeded.
- 8.10 Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders or other devices for a work position.
- 8.11 When work does not involve power transmission or distribution construction and maintenance, minimum clearance distances shall be 20 feet unless verified to allow distances based upon the OSHA guidelines below:
 - For voltages to ground 50kV or below – 10 feet (305 centimeters);
 - For voltages to ground over 50kV – 10 feet (305 centimeters) plus 4 inches (10 centimeters) for every 10kV over 50kV.

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9.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

9.1 Application and Responsibility

9.1.1 For the safe performance of work, the Company provides approved personal protective equipment including (but not limited to) hard hats, safety glasses, spoggle-type full-seal safety eyewear and goggles, hearing protection and protective gloves. All required equipment is for employee protection and shall be used in accordance with the specific provisions of this section and the wider requirements of these safety rules.

9.2 Head Protection

9.2.1 An approved hard hat will be worn by all employees in any area when there is any likelihood of head injury from moving or falling objects.

9.2.2 The shell and suspension of approved hard hats shall be inspected regularly for cracks, cuts, excessive wear or other damage that might minimize their protection.

9.2.3 Damaged hard hats shall be replaced.

9.2.4 Head protection will not be altered in any manner, and will be used in accordance with the manufacturers' recommendations.

9.2.5 All employees shall wear a company-approved hard hat in areas posted "Hard Hats Required."

9.3 Eye Protection

9.3.1 Employees shall use approved eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acidic or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. Face shields are only to be used as secondary protection and must only be used with goggles, spoggles or safety glasses with side shields.

9.3.2 Goggles and face shields are required when there is an exposure to corrosive (acids and caustics) materials.

9.3.3 Face shields with goggles, face shields with spoggles, or face shields with safety glasses and side shields are required when there is an exposure to high velocity particles or objects produced from tools or other work conditions.

NOTE: For specific requirements for Generation employees, see CSR 50.14, 50.14.1, 50.4.2, and 50.14.3.

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9.4 Hearing Protection

- 9.4.1 All employees shall wear ANSI-approved hearing protection while working in high noise level areas or when there is any likelihood of hearing damage that can be mitigated by the use of such hearing protection equipment.
- 9.4.2 The hearing protection used will conform to the specified requirements of the Company Hearing Conservation Program, which meets minimum OSHA requirements.

9.5 Respiratory Protection

- 9.5.1 Approved respiratory protection shall be worn when the job requires it.
- 9.5.2 The respiratory protection used will meet or exceed government and company specifications, and conform to the Company Respiratory Protection Program, which meets minimum OSHA requirements.

9.6 Foot Protection

- 9.6.1 Footwear must at all times be suitable for the type of work being performed, and where foot protection is required; it shall be of an approved type.
- 9.6.2 Safety toe footwear meeting ASTM F2413-05 I/75 C/75, or meeting equivalent test requirements, is required for employees per OSHA regulations.

9.7 Work Apparel and High Visibility Vests

- 9.7.1 High visibility apparel meeting ANSI/ISEA 107-2004 Class 2 or Class 3 requirements is required to be worn when in the right-of-way of all public roads. Reflective legwear meeting Class E requirements shall be worn on highway ROW's after dark.
- 9.7.2 When working on or near moving or rotating equipment, employees shall not wear loose fitting clothing or dangling jewelry.
- 9.7.3 Clothing suitable to prevailing weather conditions and to the job being performed shall be worn.
- 9.7.4 On the upper part of the body, a shirt must be worn.
- 9.7.5 No short pants will be allowed except meter-readers, meter-utility person and other classifications that are allowed to wear shorts approved by the Company. Shorts must be of a professional style and be free from modification, excessive wear and tear or damage (i.e. no cut-offs or shorts with holes).

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9.7.6 U.S. Coast Guard approved personal flotation devices will be used when the employee is working over water that poses a drowning hazard.

9.7.7 When work is performed within reaching distance of exposed energized parts of equipment, the employer shall ensure that each employee removes or renders nonconductive all exposed conductive articles, such as key or watch chains, rings, or wrist watches or bands, unless such articles do not increase the hazards associated with contact with the energized parts.

9.8 Flame Resistant (FR) Clothing

Note: Employees should refer to Appendix 6, Flame-Resistant Apparel Safety Rules for Electric Work, for specific requirements, which meet minimum OSHA requirements.

9.8.1 The Company shall 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 electric arcs could increase the extent of injury that would be sustained by the employee.

9.8.2 Clothing made from acetate, nylon, polyester, rayon, and polypropylene fabrics, either alone or in blends, is prohibited, unless it has been demonstrated that the fabric has been treated to withstand the conditions that may be encountered by the employee or that the employee wears the clothing in such a manner as to eliminate the hazard involved.

9.8.3 Employees shall utilize company provided protective smocks and coveralls or properly rated employee purchased protective FR clothing when exposed to the hazards of flames or electric arcs. The Company shall provide facilities for proper care of company provided protective smocks or coveralls.

9.9 Hand Protection

9.9.1 Gloves must at all times be suitable for the type of work being performed and where hand protection is required it shall be of an approved type. For example, when handling rough or sharp-edged materials, winch lines or other work offering obvious hazards to hands. Gloves shall not be worn when they create a hazard around moving parts.

9.9.2 The Company shall select and require employees to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns and harmful temperature extremes.

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10.0 EXCAVATING, TRENCHING AND BORING

10.1 Definitions

- 10.1.1 Angle of slope – The greatest angle above the horizontal plane at which a material will lie without sliding.
- 10.1.2 Bank – A mass of soil rising above a digging level
- 10.1.3 Braces (trench) – The horizontal members of the shoring system whose ends bear against the uprights or stringers.
- 10.1.4 Excavation – Any manmade cavity or depression in the earth's surface, including its sides, walls or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation. If installed forms or similar structures reduce the depth-to-width relationship, an excavation may become a trench.
- 10.1.5 Sides, Walls or Faces – The vertical or inclined earth surfaces formed as a result of excavation work.
- 10.1.6 Slope – The angle with the horizontal at which a particular earth material will stand indefinitely without movement.
- 10.1.7 Trench – A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.
- 10.1.8 Trench jack – Screw or hydraulic type jacks used to cross bracing in a trench shoring system.
- 10.1.9 Trench shield – A shoring system composed of steel plates and bracing, welded or bolted together, which support the walls of a trench from the ground level to the trench bottom and which can be moved along as work progresses.
- 10.1.10 Unstable soil – Earth material, because of its nature or the influence of related conditions, cannot be depended upon to remain in place without extra support, such as would be furnished by a system of shoring.
- 10.1.11 Uprights – The vertical members of a shoring system.

10.2 General

- 10.2.1 Excavation equipment shall not be operated until the construction route has been inspected. Adequate precautions shall be given to conditions that may cause equipment rollover.

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- 10.2.2 All bystanders shall be kept clear of trenching machines and other construction equipment while in operation.
 - 10.2.3 When it is necessary to leave excavating equipment unattended, the hydraulic operated attachments shall be latched or lowered to the ground, and the ignition system locked.
 - 10.2.4 No employee shall be permitted under suspended loads.
 - 10.2.5 To avoid being struck by material or falling debris, bystanders shall stand clear of vehicles being loaded or unloaded.
 - 10.2.6 Before any excavating or trenching operations are started, the area to be worked shall be checked carefully for conditions which may require additional precautionary measures to be taken such as the type of soil, locating of underground utility lines, underground pipe, cable, lines or traffic. All locates shall be made by authorized personnel.
 - 10.2.7 Protective barriers or suitable guards and warning signs shall be erected before removing manhole covers in places accessible to vehicular or pedestrian traffic.
 - 10.2.8 An employee shall be stationed at the surface when there is an employee in a manhole and shall not leave the manhole unwatched until all employees are out and the cover has been replaced, unless superseded by the MEC Confined Space Program, which meets minimum OSHA requirements.
- 10.3 Excavations near Other Buried Utilities and Facilities
- 10.3.1 If underground electric lines are marked in the vicinity of excavation work, personnel shall use cautious digging techniques to excavate and identify the location of the underground electric lines.
 - a. When an underground electric line is exposed, it shall not be touched or manually moved by an unqualified person.
 - b. Design consideration shall be given on the chosen location of the new underground facility and determine if the construction could be moved to another location to avoid accidental contact of the exposed line.
 - c. If it is determined that work cannot be relocated to another location, and the location of the conductor presents the possible hazard of electrical contact, notification to the appropriate electric utility shall be made.

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- d. If it is required to de-energize the conductor, move, support or provide proper protective cover-up for those working near the line, only qualified electric utility personnel shall perform the work.
- 10.3.2 When excavating in close proximity of buried facilities, it shall be done only by hand digging, water cutting or vacuum excavation.
- 10.3.3 Whenever crossing buried facilities using boring or directional drilling and the foreign facility is under a sidewalk, driveway or hard surface, it shall be done only by one of the following:
- a. Removing hard surfaces, sidewalks or driveways and hand exposing to verify depth, or
 - b. Excavating in close proximity to the crossing, where not covered by a hard surface and if in the competent person's opinion the depth represents the depth at the point of crossing and is not in the way of the boring or directional drilling, or
 - c. Use other methods to determine the depth of the foreign utility that, in the facility owner/operator's judgment, the foreign utility is not in danger of being in the way of the crossing.
- 10.3.4 If utility cables or pipes are damaged, the following steps shall be taken:
- a. The utility company owning the cable or line shall be notified at once.
 - b. The area shall be barricaded and the public kept out until hazardous conditions can be eliminated.
- 10.4 Excavations and Trenches
- Note:** Minimum requirements for trench shoring shall be in accordance with the manufacturer's tabulated data or OSHA regulations. (See Appendices 1 and 2)
- 10.4.1 Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.
- 10.4.2 When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure the atmosphere remains safe.

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- 10.4.3 Sides of trenches in hard or compact soils, including embankments, shall be shored or otherwise supported when the trench is more than 5 feet in depth. In lieu of shoring, the sides of the trench above the 5 foot level may be sloped to preclude collapse, but shall not be steeper than the maximum allowable slope for that soil type. Regardless of the pipe size outer diameter, the bottom vertical height of the trench must not exceed 4 feet (1.2 m) for the first bench. Subsequent benches may be up to a maximum of 5 feet (1.5 m) vertical in Type A soil and 4 feet (1.2 m) in Type B soil to a total trench depth of 20 feet (6.0 m).
- 10.4.4 In trenches or excavations less than five feet in depth in which an employee must work, where the soil is unstable or where vibration from nearby traffic might cause a fault, work shall be guarded by a shoring system, sloping/benching of the ground, or some other protective system.
- 10.4.5 Minimum requirements for aluminum hydraulic trench shoring shall be in accordance with the manufacturer's tabulated data for the aluminum hydraulic shoring.
- 10.4.6 Minimum requirements for other trench shoring systems shall be installed according to OSHA's tabulated data or be designed and approved by a registered professional engineer.
- 10.4.7 Minimum requirements for sloping shall be in accordance with Appendix 2, Excavation Slope and Bench Ratios.
- 10.4.8 Portable trench boxes or sliding trench shields may be used for the protection of personnel, in lieu of a shoring system or sloping. Where such trench boxes or shields are used, they shall be designed, constructed, and maintained in a manner that will provide protection equal to or greater than the sheeting or shoring required for the trench.
- 10.4.9 When trenches are left open, warning devices, barriers, barricades, or guardrails shall be placed to adequately protect the public and employees.
- 10.4.10 Trees, boulders and other surface encumbrances in a position so as to create a hazard to employees involved in excavation work shall be secured or removed.
- 10.4.11 Excavations shall be inspected by a competent person prior to the start of work and throughout the shift. Thorough inspection shall be conducted after every rainstorm or other hazard-increasing occurrence, and employee protection against slides and cave-ins shall be increased if necessary.

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- 10.4.12 Extra precautions shall be taken in sloping or shoring the sides of excavations adjacent to the previously backfilled excavation or a fill, particularly when the separation is less than the depth of the excavation. Soil type shall be downgraded.
 - 10.4.13 Suitable means should be used to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. Water shall not be allowed to accumulate while working in the excavation.
 - 10.4.14 If it is necessary to place or to operate equipment, materials, or other heavy objects on a level above and near an excavation, the side of the excavation shall be braced as necessary to resist the extra pressure due to such superimposed loads.
 - 10.4.15 In excavations which employees may be required to enter, excavated and other material shall be effectively stored and retained at least 24 inches from the edge of the excavation.
 - 10.4.16 If it is suspected that the stability of adjoining structures will be affected by an excavation, the site will be inspected by a qualified individual.
 - 10.4.17 The angle of slope shall be flattened when an excavation has water conditions, salty materials, loose boulders and areas where erosion, deep frost action and slide planes appear.
 - 10.4.18 When employees are required to be in trenches 4 feet or more in depth, an adequate means of exit, such as ramping, a ladder, or steps, shall be provided and located so as to require no more than 25 feet of lateral travel to be reached.
 - 10.4.19 Backfilling and removal of trench supports should progress together from the bottom of the trench. Jacks or braces should be released slowly, and, in unstable soil, ropes or hooks should be used to pull out the jacks or braces from above after employees have cleared the trench.
 - 10.4.20 When employees are to work in a prone position in any trench or excavation less than five feet, the competent person shall consider the use of shoring, benching or sloping.
- 10.5 Boring Operations
- 10.5.1 A minimum of two qualified employees (one of which shall be a journeyman to deal with any unexpected situations) are required for all pneumatic/hydraulic mole and boring operations.

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- 10.5.2 Before starting the machine, check all safety devices (chain guards, engine covers, and belt guards, seat belt) to make sure they are functioning properly for safe operation. Before climbing on or off any equipment, make sure you have safe footing. When loading, unloading or operating the machine, the operator shall keep all company personnel and bystanders a safe distance from the equipment.
- 10.5.3 The employee directing the boring head will be clearly visible or have established voice communication with the machine operator at all times when the head is turning. Signals to the person operating the boring equipment shall be given by one person designated to perform the task. This designated person shall make certain that all others are in the clear. The operator shall, however, obey a "stop" signal given by anyone. The operator shall be at the controls of equipment while it is in operation.
- 10.5.4 When working with boring equipment, employees shall not wear loose fitting clothing or dangling jewelry.
- 10.5.5 Employees using trenchers, backhoes, moles or boring equipment that may contact an energized line, shall ground the equipment or protect the area to keep persons from contacting the equipment unless they are insulated or isolated from ground.
- 10.5.6 Insulating rubber gloves shall be inspected for corona cracks or snags and gloves will be given the roll and air test at the beginning of the work period each day to locate possible pinholes or other unsafe conditions of the material, and at any other time when there is any reason to question their condition.
- 10.5.7 Directional boring equipment requires additional safety precautions including grounding of equipment, the use of dielectric boots and gloves and/or rubber blankets.

Note: Rubber goods used by qualified electrical workers for use within the minimum approach distances of exposed energized parts have testing requirements refer to the Consolidated Safety Rule section 28.

Dielectric boots shall be visually inspected prior to each use, if damage, defects, or significant wear are apparent they shall be replaced.

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11.0 FLOOD OR HIGH WATER CONDITIONS

- 11.1 Boat operators shall be appointed by the supervisor or foreman/crew leader in charge.
- 11.2 Boats shall be reasonably stable (not easy to tip) and water-worthy. Occupants shall not stand while a boat is moving.
- 11.3 The state license shall control the maximum number of occupants in boats, with no fewer than two.
- 11.4 The boat's motor shall not be larger than allowed on the boat's rating plate.
- 11.5 U.S. Coast Guard approved life jackets shall be worn by each person on board and there shall be a flotation device that can be thrown.
- 11.6 The speed of a motorboat shall not cause a damaging or hazardous wake.
- 11.7 Required equipment on boats:
 - a. Adequate anchor with at least 30 feet of nylon line that is at least 3/8 inches in diameter.
 - b. Pair of oars.
 - c. Boat hook.
 - d. Approved fire extinguisher.
 - e. Toolbox supplied as needed: first aid kit, flashlight, extra batteries, portable radio or cell phone, and a whistle or audible warning device.
- 11.8 Icy conditions require extreme caution. Avoid operating boat in main water flow if possible.
- 11.9 Night use of boats:
 - a. Avoid use of boats after dark. If night use is necessary, prior supervisory approval must be obtained.
 - b. Night use requires running lights, spotlights and a portable radio/cell phone. Use running lights after sundown.

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12.0 HAND POWER TOOLS GENERAL

- 12.1 All tools, regardless of ownership, shall be appropriate for the work involved and maintained in good condition. (Tools are subject to inspection at any time. A supervisor has the authority and responsibility to condemn unsafe tools, regardless of ownership.)
- 12.2 Unsafe tools identified by the employee will be removed from use and notified to the appropriate repair or replacement authority.
- 12.3 Hammers with metal handles, screwdrivers with metal continuing through the handle, metallic measuring tapes, metallic rules or cloth tapes with metal reinforcing shall not be used on or near energized electrical circuits or equipment.
- 12.4 Tools shall not be thrown from place to place or from person to person. Tools that must be raised or lowered from one elevation to another shall be placed in tool buckets or firmly attached to hand lines.
- 12.5 Tools or material shall never be placed where they pose a hazard to people below.
- 12.6 Impact tools such as chisels, punches, drift pins that become mushroomed or cracked shall be dressed, repaired or replaced before further use.
- 12.7 Chisels, drills, punches, ground rods, and pipes shall be held with suitable holders or tongs (not with the hands) while being struck by another employee.
- 12.8 Tools shall be used only for the purposes for which they have been designed with care exercised not to exceed the limitations of the tool.
- 12.9 Tools with sharp edges shall be stored and handled so that they will not cause injury or damage.
- 12.10 Wooden handles that are loose, cracked or splintered shall be replaced. The handle shall not be taped or lashed with wire.
- 12.11 Tools shall be kept on tool boards, tool racks, toolboxes, body belts or other suitable storage areas.
- 12.12 When working on or above open grating, a canvas or other suitable covering shall be used to cover the grating to prevent tools or parts from dropping to a lower level where others are present or the danger area shall be barricaded or guarded.
- 12.13 The insulation on hand tools shall not be depended upon to protect users from high voltage shock (except approved live line tools).

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- 12.14 On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

13.0 AXES, PICKS AND SLEDGE HAMMERS

- 13.1 An employee shall carry an axe with the head forward, by holding the handle in his hand next to the head. He shall not carry any type of axe or bush hook on his shoulder.
- 13.2 Cutting edges of axes and picks shall be kept sharp and axes shall be sheathed when not in use. Handles shall be smooth and securely fastened and not split.

14.0 JACKS, HOISTS AND LOAD BINDERS

- 14.1 Employees shall center the jack properly under the load; and if there is danger of the head slipping, a timber on top of the jack will help keep it in position.
- 14.2 Employees shall never rely on jacks alone to support any load that they have to work under; instead, they shall use substantial blocking, or stands.
- 14.3 Hoist and load binders shall not be loaded in excess of their rating.

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15.0 PORTABLE ELECTRIC TOOLS, EXTENSION CORDS AND GENERATORS

- 15.1 The non-current carrying metal parts of portable electric tools such as drills, saws, and grinders shall be effectively grounded when connected to a power source unless:
 - a. The tool is an approved double insulated type or
 - b. The tool is connected to the power supply by means of an isolating transformer or other isolated power supply.
- 15.2 All powered tools shall be examined prior to use to insure general serviceability and the presence of all applicable safety devices.
- 15.3 All tools shall be kept in good repair and shall be disconnected from the power source while repairs are being made.
- 15.4 Electrical tools shall not be used where there is hazard of flammable vapors, gases, or dusts.
- 15.5 Ground fault circuit interrupters, GFCI/GFI, shall be used with portable electric tools and heaters.
- 15.6 In industrial or construction applications, 120 Volt AC extension cords shall be three conductors and used with GFCI/GFI, where practical. Flat electrical extension cords are prohibited.
- 15.7 Trouble lights shall be UL approved.
- 15.8 All broken and defective cords shall be returned immediately for repair or replacement.
- 15.9 Trouble lights with broken light bulbs shall not be changed unless the cord is disconnected from the supply outlet. Empty sockets are not permitted in such places as inside tanks, heaters, boiler drums, etc.
- 15.10 Any handheld extension light that is used in any metal vessel such as a boiler, condenser or storage tank shall be the low voltage type or GFCI/GFI protected.
- 15.11 Portable and vehicle mounted generators used to supply cord and plug connected equipment shall meet the following requirements:
 - a. The noncurrent carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles shall be bonded to the generator frame.

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- b. In the case of vehicle mounted generators, the frame of the generator shall be bonded to the vehicle frame.
- c. Any neutral conductor shall be bonded to the generator frame.

16.0 CONFINED AND ENCLOSED SPACE

Note: For entry into a Gas Distribution Vault/Pit, see Section 43.0.

16.1 Confined Spaces

- 16.1.1 An employee entering a space that by design has limited opening for entry and exit, unfavorable natural ventilation, may contain or produce dangerous air contaminants, and is not intended for continuous employee occupancy, shall follow the applicable MidAmerican Energy Confined Entry Program, which meets minimum OSHA requirements, and has been written and approved for the specific sites.
- 16.1.2 When welding, solvents or other hazards are introduced to the space, ventilation shall be used.

16.2 Enclosed Spaces

- 16.2.1 Definitions. Enclosed space – A working space, such as a manhole, vault, tunnel or shaft that has the following:
 - a. Limited means of egress or entry,
 - b. Is designed for periodic employee entry under normal operating conditions, and
 - c. Under normal conditions does not contain a hazardous atmosphere, but may contain a hazardous atmosphere under abnormal conditions.
- 16.2.2 Employees may not enter any enclosed space while it contains a hazardous atmosphere unless the entry conforms to the generic permit-required confined spaces standard.
- 16.2.3 Attendants. While work is being performed in the enclosed space, a person with first aid training shall be immediately available outside the enclosed space to render emergency assistance if there is reason to believe a hazard may exist in the space or if a hazard exists because of traffic patterns in the area of the opening used for entry. The attendant should perform no other duties that might interfere with the primary duty to monitor and protect the authorized entrants. The attendant also may be the person in charge of entry.

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17.0 ELEVATED WORK SAFETY

17.1 General Requirements

- 17.1.1 Employees exposed to an open-sided floor or platform 4 feet or more above the adjacent floor or ground level shall be guarded by a standard railing, or the use of personal fall protection will be required. When working from an aerial lift that can move both horizontally and vertically, employees shall be required to use personal fall protection.
- 17.1.2 These fall protection requirements do not apply to climbing and walking surfaces on commercial motor vehicles and to the sides of loading docks where guardrails would prevent the performance of work. Fall protection requirements for pole climbing and excavation will be separately specified in those sections.

17.2 Personal Fall Protection

- 17.2.1 Personal fall protection is provided by one of three methods, all of which require the use of a harness, connecting device(s) and anchor point(s):
 - a. Fall restraint system: connects an employee to an anchorage using a short enough tether that the employee cannot reach a fall hazard.
 - b. Positioning system: a body harness system or lineman's belt rigged to support an employee on an elevated vertical surface to allow work with both hands.
 - c. Fall arrest systems: a system used to arrest an employee in a fall from an elevated working level. The fall arrest system includes a body harness, lanyard and anchorage.
- 17.2.2 Fall protection equipment and components shall be used only for employee protection as part of a fall restraint, positioning device, or fall arrest system, and not to hoist materials. Straps, cables and chokers used for material rigging shall not be used as a component of a fall protection system unless identified for exclusive use in this service.
- 17.2.3 Fall arrest protection systems shall comply with all OSHA regulations regarding type, applicability, and condition. Full-body harnesses are required. The use of body belts is prohibited. The use of climbing belts by qualified Delivery Service employees is allowed. Approved climbing belts used by Delivery Services personnel must have fall protection and may only be used by a qualified employee climbing or changing location on poles, towers, or similar structures. With the noted exception being that if an employer can demonstrate that the qualified employee climbing with fall protection creates a greater hazard than climbing or changing location without fall protection.

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- 17.2.4 All fall arrest system connecting devices shall either have an integrated shock-absorber, be attached to a shock-absorbing device or shall be retractable. The combination of the connecting device and shock-absorbing device shall not allow the free-fall distance to exceed six feet or allow contact with any lower level, whichever is less.
 - 17.2.5 When transitioning from one point to another, at least one lanyard shall be attached to an anchorage point at all times, where possible.
 - 17.2.6 Personal fall protection equipment shall be inspected prior to each use for wear, damage and other deterioration in accordance with the manufacturer's instructions. Defective components shall be removed from service.
 - 17.2.7 Fall arrest/protection systems and components subjected to impact loading shall be immediately removed from service.
- 17.3 Scaffolds
- 17.3.1 Scaffolds shall be erected and inspected by qualified employees in accordance with OSHA standards.
 - 17.3.2 Employees shall verify scaffolds have been inspected and perform a visual check prior to use.
 - 17.3.3 Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended load.
 - 17.3.4 Where the potential to fall is greater than 4 feet, employees shall not use a scaffold unless proper guardrails or adequate fall protection are present to provide adequate fall protection.
 - 17.3.5 Scaffold planks shall be secured, made only of approved material and shall extend over the end support by not less than 6 inches (unless cleated) or more than 12 inches.
 - 17.3.6 Scaffolds shall not be moved without first removing all loose tools, material and equipment resting on the scaffold deck.
 - 17.3.7 All scaffolds shall rest on suitable footing and shall stand level. Movable scaffolds shall have the casters or wheels locked to prevent movement.
- 17.4 Portable Ladders
- 17.4.1 At a minimum, use type 1A (300 pounds load rating) non-conductive ladders, preferably fiberglass. Metal ladders can only be used under special circumstances.

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- 17.4.2 Employees shall select ladders of proper length to safely reach the desired height.
- 17.4.3 Employees shall inspect ladders thoroughly for missing or damaged components and loose fasteners. Use of damaged ladders or ladders that have been temporarily repaired is prohibited. Employees shall ensure all working parts are in good working order.
- 17.4.4 Ladders shall be clean and free of foreign material, such as wet paint, mud, snow, grease and oil prior to use.
- 17.4.5 Damaged ladders must be removed from service and labeled as defective until repaired or discarded.
- 17.4.6 Ladders shall be used only in accordance with manufacturer instructions. Ladders are to be used by one person only, unless specifically designed to be used by two persons. Employees shall not overload the ladder.
- 17.4.7 Employees shall not store materials on ladders.
- 17.4.8 Ladders shall not be subjected to impact or shock loading actions.
- 17.4.9 Ladders shall not be painted except for labeling.
- 17.4.10 Employees shall set all ladder feet on firm, level surfaces. Ladders shall not be placed on unstable, loose or slippery surfaces. Approved ladder leveling devices must be used on uneven ground. Ladders shall be placed where access is not obstructed. Employees shall not place ladders in front of doors without guarding or proper signage, caution tape or a barricade.
- 17.4.11 Employees shall face the ladder when climbing up and down and maintain three points of contact at all times.
- 17.4.12 Employees shall not overreach when performing tasks from a position on the ladder. Caution should be used when performing tasks that require the employee to push or pull to the side of the ladder.
- 17.4.13 Employees shall not climb from one ladder to another and shall not straddle the front and back of the ladder or sit on the ladder rungs. Employees shall not “walk” or “shift” the ladder while on it.
- 17.4.14 When portable ladders are not in use, they shall be secured to prevent falling or shall be laid down.

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17.5 Step Ladders

- 17.5.1 Employees shall ensure the step ladder is fully open and the spreaders are locked.
- 17.5.2 Employees shall climb only on the front side of the step ladder and face toward the step ladder when climbing up or down, maintaining three points of contact at all times.
- 17.5.3 Employees shall not climb, stand or sit above the second step from the top of the step ladder, unless specifically designed for that purpose. Employees shall not climb, stand or sit on the spreader braces, ladder top or pail shelf. If the height of the step ladder is less than four feet, the top step of a ladder can be used unless specifically designated "Do Not Use."
- 17.5.4 Employees shall not straddle front and back of the step ladder, and shall not climb from one ladder onto another.
- 17.5.5 Employees shall avoid pushing or pulling off to the side of the step ladder, and shall not "walk" or "shift" the ladder while standing on it.
- 17.5.6 When step ladders are not in use, they shall be secured against falling or shall be laid down.

17.6 Straight Ladders

- 17.6.1 Employees shall not overreach when performing tasks from a position on the straight ladder. Caution should be used when performing tasks that require the employee to push or pull to the side of the ladder.
- 17.6.2 Employees shall ensure that the top and bottom of the ladder are stable and the rung locks are engaged before climbing.
- 17.6.3 Employees shall climb only on the front side of the ladder and face the ladder when climbing up or down, maintaining three points of contact at all times.
- 17.6.4 Employees shall secure the top and bottom of the ladder from movement where practical.
- 17.6.5 Employees shall not climb above the top support point. Employees shall not climb from one ladder to another if they are in parallel. If two ladders are required for cross-over access, the ladders must be properly secured together.
- 17.6.6 Employees shall avoid pushing or pulling off to the side of the-ladder, and shall not "walk" or "shift" the ladder while standing on it.

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17.6.7 When straight ladders are not in use, they shall be secured against falling or shall be laid down.

18.0 PNEUMATIC AND HYDRAULIC TOOLS

- 18.1 Employees shall ensure all applicable guards are in place prior to use and safety devices, such as kill switches, have not been defeated.
- 18.2 Pneumatic tools and their exhaust ports shall never be pointed at another person.
- 18.3 Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.
- 18.4 Safety clips or retainers, where applicable, shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.
- 18.5 Compressed air shall not be used for personal cleaning purposes, except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment.
- 18.6 The manufacturer's stated safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.
- 18.7 The use of hoses for hoisting or lowering tools shall not be permitted.
- 18.8 All compressed air hoses exceeding 1/2 inch inside diameter shall have a safety device at the sources of supply or branch line to reduce pressure in event of hose failure.
- 18.9 Before making adjustments or changing air tools, unless equipped with quick change connectors, the air shall be shut off at the air supply valve ahead of the hose. The hose shall be bled at the tool before breaking the connection.
 - 18.9.1 Pressure shall be released before connections are disconnected, unless quick acting, self-closing connectors are used. Hoses may not be kinked.
- 18.10 Compressed air tools, while under pressure, shall not be left unattended.
- 18.11 All connections to air tools shall be made secure before turning on air pressure.
- 18.12 Air tools shall not be turned on until the tool is properly controlled.
- 18.13 All couplings and clamps on pressurized air hose shall be bridged with suitable fasteners unless quick acting, self-closing connectors are used.
- 18.14 Powered tools shall be operated only by persons who have been trained in their use.

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- 18.15 Pneumatic tools which are used on or that could reasonably be anticipated to contact energized electrical lines or equipment shall have an accumulator to collect moisture.

19.0 POWER LAWN MOWERS, EDGERS, SNOW BLOWERS

- 19.1 Employees shall ensure that all applicable guards are in place prior to use and safety devices, such as kill switches, have not been defeated.
- 19.2 Prior to refueling, the employee shall turn off the equipment and permit it to come to a complete stop and allow time for engine to cool. The motor shall be turned off and no smoking is permitted while the fuel tank is being filled. The tank shall be filled from an approved safety container.
- 19.3 The spark plug wire shall be removed prior to making repairs to the equipment.
- 19.4 When operating a power mower, the operator shall:
- a. Remove any loose material from the area to be mowed.
 - b. Avoid standing in front of the discharge opening.
 - c. When mowing with a hand operated mower on a slope or incline, mow across the face of the slope.
 - d. When mowing with a riding mower, mow up and down the slope.

20.0 HANDLING MATERIALS

- 20.1 Manual
- 20.1.1 An employee shall obtain assistance or use power equipment when lifting heavy or awkward objects.
 - 20.1.2 When two or more persons carry a heavy object that is to be lowered, there shall be a prearranged signal for lowering the load.
 - 20.1.3 Employees shall use care when handling damaged porcelain, particularly that which has been damaged as a result of fire because of its extreme brittleness and flaking tendencies. In handling damaged porcelain, suitable gloves shall be worn. If it is necessary to break up porcelain with a hammer or other tool, a face shield shall be worn.
- 20.2 Fork Lifts and Other Material Handling Equipment
- 20.2.1 Only qualified employees shall operate forklifts.
 - 20.2.2 Seat belts, when provided, shall be worn when operating forklifts.

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- 20.2.3 Brakes and controls shall be tested prior to use. Equipment with faulty brakes or mechanical or electrical defects shall be tagged unsafe and shall not be operated. Needed repairs shall be reported immediately.
- 20.2.4 Equipment shall always be operated at a safe speed for existing conditions.
- 20.2.5 Before moving the equipment, the operator shall make sure that no person or objects are in the path of the equipment. Clearances in all directions shall always be checked, particularly overhead clearances.
- 20.2.6 Forklifts shall not be fueled while the engine is running.
- 20.2.7 When picking up a load, forks shall be set squarely and placed under the load as far as possible. Loads shall not be raised or lowered while traveling. Loaded or empty forks shall be carried as low as possible, but high enough to clear uneven surfaces.
- 20.2.8 Loads shall not be suspended or swung over other persons. No one shall stand or walk under elevated forks.
- 20.2.9 The operator should always face in the direction of travel.
- 20.2.10 On inclines, all types of loaded lift trucks shall be driven with the load on the upgrade side of the driver whether ascending or descending.
- 20.2.11 Sudden stops that might spill the load shall be avoided.
- 20.2.12 All loads shall be securely fastened or safely positioned to prevent tipping or falling.
- 20.2.13 Lift bars on fork lift trucks that are moveable or replaceable shall be held firmly in place by a proper securing pin.
- 20.2.14 Only attachments provided by or approved by the manufacturer may be used; all attachments shall be properly secured.
- 20.2.15 No one other than the operator shall be allowed to ride the truck, fork lift or other equipment, except when seats are provided for this purpose.
- 20.2.16 When a fork lift is left unattended for an extended period of time in an area where other personnel may be present, the load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off and brakes shall be set.
- 20.2.17 Equipment with internal combustion engines shall not be operated in enclosed areas for prolonged periods of time so as not to exceed the allowable levels of carbon monoxide.

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- 20.2.18 When loading or unloading trucks or railroad cars, approved dock boards, properly secured, shall be used. The wheels of the truck or railroad car shall be chocked. The truck bed shall be inspected prior to driving fork lift into or onto the truck to assure that the truck bed will support the load.
- 20.2.19 Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.
- 20.2.20 Only loads within the rated capacity of the truck shall be handled.
- 20.3 Slings, Ropes, Cables and Chains
 - 20.3.1 Each sling shall be marked or coded to show the rated capacities for each type of hitch and type of synthetic web material.
 - 20.3.2 Slings, ropes, cables and chains shall be selected of size, strength and condition that will meet the requirements of each job.
 - 20.3.2.1 Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure it is safe. Defective rigging equipment shall be removed from service.
 - 20.3.3 Slings, ropes or cable shall be kept free of acid, oil, solder or grease.
 - 20.3.4 Care for Slings, Ropes, Cables
 - a. Slings, rope or cable shall not be overloaded and shall be protected from exposure to sharp edges.
 - b. Care shall be taken in making a sling, rope or cable secure.
 - c. Employees shall not put any strain on a sling, rope or cable with a kink in it.
 - d. Slings, rope or cable shall not be subjected to high temperature.
 - e. Chains, wire rope or cable shall not be used around storage batteries. Approved slings may be used to hoist/move batteries.
 - 20.3.5 Employees shall inspect synthetic rope thoroughly along its entire length for cuts, worn spots, mildew, acid stains and burns. The rope shall be untwisted at various places to look for dry rot and poor fiber. If any of these conditions are found to exist, it shall be removed from service.

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- 20.3.6 Web slings shall be removed from service when there are indicating marker threads showing through, acid or caustic burns, melting or charring on any part of the surface, snags, punctures, tears or cuts, or broken or worn stitches.
 - 20.3.7 Employees shall avoid sudden or abrupt application of loads to chains.
 - 20.3.8 Employees shall not kink or bolt a chain to shorten or lengthen it.
 - 20.3.9 Employees shall not use a chain if inspection shows a flaw, insecure weld, fracture or other defect.
 - 20.3.10 Suspended loads shall be kept clear of all obstructions.
 - 20.3.11 All employees shall be kept clear of loads about to be lifted and of suspended loads.
 - 20.3.12 Slings shall not be shortened with knots or bolts, or other makeshift devices.
 - 20.3.13 Where hazards to employees exist, tag lines or other suitable devices shall be used to control loads being handled by hoisting equipment.
- 20.4 Cranes, Derricks and Hoisting Equipment
- 20.4.1 Only qualified employees shall operate the hoisting equipment.
 - 20.4.2 Employees shall not be permitted to ride the hook, sling or load of any hoisting equipment.
 - 20.4.3 Load limits as specified by the manufacturer shall not be exceeded under any circumstances.
 - 20.4.4 Operating and maintenance procedures, as specified by the manufacturer, shall be followed.
 - 20.4.5 The following are the minimum checks to be made prior to use:
 - a. All control mechanisms for adjustment, wear and lubrication.
 - b. All safety devices for malfunction.
 - c. Deterioration or leakage in air or hydraulic systems.
 - d. Hooks, slings and load attachment devices.
 - e. Dry chemical fire extinguisher available.

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- f. For the first lift of each day, the load shall be test lifted and the brakes checked (load lifted several inches and then tested).
- 20.4.6 Other periodic inspections are necessary and shall be performed and recorded as required.
- 20.4.7 Any unsafe conditions disclosed by inspection shall be corrected before operation.
- 20.4.8 With every load, the slings and bindings shall be readjusted as necessary to ensure safety and stability.
- 20.4.9 All slings and other fittings shall be of sufficient strength, proper type, and safe for their intended use.
- 20.4.10 Signals to the equipment operator shall be visibly given by one person designated to perform this task. However, the operator shall obey a “Stop” signal given by anyone. Hand signals given to the operator shall conform to Appendix 4, Hand Signals – Boom Cranes.
- 20.4.11 Operators of cranes, derricks, hoists, backhoes and other hoisting equipment shall exercise extreme caution when in close proximity to energized lines or equipment.
- a. When performing power transmission or distribution construction or maintenance, refer to table 29.4.14 for applicable clearance requirements.
- b. When work does not involve power transmission or distribution construction and maintenance, minimum clearance distances shall be 20 feet unless verified to allow distances based upon the OSHA guidelines below:
- For voltages to ground 50kV or below – 10 feet (305 centimeters);
 - For voltages to ground over 50kV – 10 feet (305 centimeters) plus 4 inches (10 centimeters) for every 10kV over 50kV.
- 20.4.12 Winch lines, ropes or wire cable shall not be guided by hand when standing within reach of the drum or sheave.
- 20.4.13 Wire rope loops shall be made by proper splicing or mechanical clamping of the tail section. Wire rope clips shall not be used to form eyes in wire rope bridles or slings. Knots shall not be used in wire ropes for any purpose.
- 20.4.14 When U-bolt wire rope clips are used, the U-bolt shall be applied so the U section is in contact with the dead end of the rope.

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- 20.4.15 Operators shall not leave their positions at the controls of cranes, hoists, derricks or other lifting devices while the load is suspended, unless the Company can demonstrate that no employee (including the operator) might be endangered.
 - 20.4.16 Employees shall not work under suspended loads.
 - 20.4.17 Crane buckets shall always be lowered before a crane is left unattended.
 - 20.4.18 Shock loading (sudden stops or starts) of the equipment shall be avoided.
 - 20.4.19 The load shall be attached to the hook by means of slings or other approved devices.
 - 20.4.20 The load shall be well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.
 - 20.4.21 During hoisting, care shall be taken that there is no sudden acceleration or deceleration of the moving load and the load does not contact any obstructions.
 - 20.4.22 Employees operating a crane shall not move a suspended load over any person.
- 20.5 Overhead and Gantry Cranes
- 20.5.1 Either rail clamps or wheel brakes shall be applied at all times when outdoor cranes are not in use.
 - 20.5.2 Limit switches on cranes shall be tested regularly but shall not be relied upon to stop the motor. Action of the crane shall be controlled by the operator at all times.
 - 20.5.3 Cranes shall not be used to make a side pull.
 - 20.5.4 Except for floor operated cranes, alarms and signals shall be given before starting, and alarms repeated during travel of the crane.
 - 20.5.5 During hoisting, care shall be taken that there is no sudden acceleration or deceleration of the moving load and the load does not contact any obstructions.
 - 20.5.6 The hoist chain or hoist rope shall be free from kinks or twists and shall not be wrapped around the load.
 - 20.5.7 The load shall be well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.

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20.6 Housekeeping

- 20.6.1 Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion or pest harborage. Vegetation control will be exercised when necessary.

20.7 Loading and Unloading Cylindrical Materials

- 20.7.1 A Job Safety Analysis will be reviewed before loading or unloading pipe, drill rods, drums, tanks, reels, poles or any lading that has the capacity to roll.
- 20.7.2 All steel pipe, and drill rod shipments inbound and outbound from all MEC locations should be stacked or tiered appropriately with [at least] 4-inch-by-4-inch wood dunnage material of a type, thickness and width necessary to maintain sufficient spacing to allow forks to lift underneath the material during loading and unloading. Trailer stakes will be used where applicable, to prevent roll off. Should an inbound load arrive that does not meet these requirements a complete inspection and investigation for mitigating any possible hazards shall be performed, documented and approved by a supervisor, or if it is determined to still be a hazard the load may also be refused.
- 20.7.3 Poles may be bulk loaded so long as they are transported on a vehicle designed and built, or adapted, for transportation of poles and are fitted with a means to cradle the poles to prevent rolling such as bunks, bolsters, stakes or standards. If stakes or standards are not permanently attached to the vehicle, the stakes must be secured so that they cannot separate from the vehicle. Use of tie downs in combination with bunks, stakes, or standards and bolsters to secure the load is required.
- 20.7.4 Dunnage cannot be stacked upon itself between tiers.
- 20.7.5 Material placed upon dunnage must have supports or chocks. Dunnage shall have, no defects and be sufficiently fastened at each end, to prevent any movement of the material during the loading or unloading process.
- 20.7.6 When in the process of unloading tiered loads only the tier being unloaded will have the tie down straps removed. Additional tie downs where applicable shall be added if necessary to secure lower tiered material.
- 20.7.7 Employees when cutting binding straps and removing stakes shall always start at the center and work toward the ends of the load staying out of the line of fire.
- 20.7.8 Standing on cylindrical loads while bands or tie down devices are being released is prohibited.

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- 20.7.9 Pipe, poles, bar stock or other cylindrical materials not placed in a rack shall be stacked and blocked to prevent rolling, spreading or tilting. Vertical stakes shall be used on trailers or truck beds equipped with stake holders.
- 20.7.10 Always inspect cylindrical loads and stand clear of the load prior to removing the tie downs or straps. Check for "Line of Fire" hazards and mitigate them.
- 20.7.11 Control of loads will be maintained at all times.

21.0 ENVIRONMENTAL

21.1 Hazardous Substances

- 21.1.1 Examples of hazardous substances can include industrial cleaning compounds and solvents, boiler water treatment chemicals, pesticides and herbicides, acids, asbestos, caustics, solid, liquid and gaseous fuels, protective coatings and adhesives and reagent chemicals.
- 21.1.2 Material safety data sheets (MSDS) shall be available for all hazardous substances.
- 21.1.3 All hazardous chemicals shall be stored in closed, labeled and chemically impervious containers and in designated storage locations.
- 21.1.4 All hazardous substances shall be clearly labeled as to their contents. This includes stationary process vessels, as well as drums, cans and tubes. The only exceptions are "immediate use" containers, and consumer products and laboratory chemicals with the manufacturers hazard information on the container.
- 21.1.5 The Company shall assure that proper training has been accomplished for employees working with hazardous substances and the necessary personal protective equipment is available and properly used.
- 21.1.6 Employees handling toxic, flammable, or reactive materials shall familiarize themselves with all precautionary measures needed to be taken to handle such materials safely. Labels will provide some information on precautionary measures. In questionable or unfamiliar situations, employees shall consult the MSDS, their supervisor and/or Safety Audit and Compliance before using hazardous substances.
- 21.1.7 Employees handling hazardous substance shall wear the appropriate personal protective equipment (e.g., gloves, aprons, eye/face protection, respirator) and take all required precautionary measures.

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- 21.1.8 Whenever toxic or reactive chemical materials are handled, suitable facilities or emergency shower and/or eye wash stations shall be maintained nearby.
- 21.1.9 Qualified employees required to perform work with presumed asbestos containing materials or asbestos containing materials shall be trained to the limits required by OSHA and shall follow the Asbestos Handling Procedure written and approved for the specific sites.
- 21.1.10 Non-qualified employees who in the performance of their job duties become aware that asbestos containing material is present or may have been unexpectedly disturbed shall cease work and inform their supervisor prior to commencing the work.

Note: Refer to the MidAmerican Energy Hazard Communication Right-to-Know Program, which meets minimum OSHA requirements, for related information.

21.2 Solvents and Industrial Cleaning Compounds

- 21.2.1 When working with solvents or industrial cleaning compounds, wash your hands before smoking, eating or drinking. Do not smoke, eat or drink in areas where solvents or industrial cleaning compounds are in use.
- 21.2.2 Personal protective equipment shall be worn where eye or skin irritation is likely to occur, or personal clothing could be contaminated.
- 21.2.3 Adequate ventilation shall be provided whenever solvents or industrial cleaning compounds are used. Forced mechanical ventilation shall be used whenever it is necessary to use solvents or industrial cleaning compounds in confined spaces.
- 21.2.4 Spraying of solvents or industrial cleaning compounds is prohibited, except:
 - a. When vapors are effectively controlled by local exhaust ventilation.
 - b. When done outdoors to ensure vapor dilution.
 - c. When operator(s) and nearby personnel are qualified, provided and use adequate respiratory protection.
 - d. When the source of the spray is an aerosol can or small atomizing container and there is adequate room ventilation to dilute the vapors.
- 21.2.5 Solvents or industrial cleaning compounds shall not be heated unless specifically manufactured for that purpose.

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- 21.2.6 Solvents and industrial cleaning compounds shall be stored in closed, labeled containers.
 - 21.2.7 Flammable solvents or industrial cleaning compounds shall be stored in approved safety containers and shall be labeled.
 - 21.2.8 Smoking, open flames, or spark producing operations shall be prohibited in solvent or industrial cleaning compound storage areas.
 - 21.2.9 Metallic contact shall be maintained between containers when transferring flammable solvents or industrial cleaning compounds from one metal container to another.
 - 21.2.10 Materials that react with each other violently or produce harmful vapors when used shall not be stored side by side or mixed together.
- 21.3 Gasoline and Flammable liquids
- 21.3.1 Gasoline shall not be used as a solvent or for any cleaning purpose.
 - 21.3.2 Smoking, open flames, and spark producing operations shall be prohibited in any area where gasoline or other flammable liquids are handled, dispensed, or stored.
 - 21.3.3 Do not fill any portable container while it is inside a vehicle, a vehicle's trunk, pickup bed, or on any surface other than the ground. This includes pickup trucks, sports utility vehicles, vans and others.
 - 21.3.4 Gasoline or other flammable liquids shall be stored in OSHA approved safety cans, OSHA approved flammable liquid storage cabinets, or OSHA approved flammable liquid storage tanks.
 - 21.3.5 All storage containers shall be conspicuously labeled "FLAMMABLE" and shall bear the name of the substance stored therein.
 - 21.3.6 Metallic contact shall be maintained between containers when dispensing gasoline or other flammable liquids from one metal container to another.
 - 21.3.7 Open containers, glass containers or plastic containers shall not be used to store gasoline or other flammable liquids.

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22.0 Protection from Respirable Crystalline Silica Dust

22.1 General Considerations for OSHA construction standard

22.1.1 Where the job task exposes the employee to an unknown amount of respirable crystalline silica dust; water spray or vacuum based ventilation must be used to control, to the extent possible, the release of visible dust.

22.1.1.1 Water spray must be focused on the tool's point of contact such that the spray is wetting the visible dust before the visible dust can spread away from the point of operation.

22.1.1.2 Vacuum based ventilation must use a dust collection system consisting of a hood (also called a shroud) that surrounds or encloses most of the tool's point of contact and provides adequate suction for visible dust and debris to be removed during operation. The vacuum ventilation system must incorporate HEPA filtration where the exhaust may cause a respirable dust exposure.

22.2 Housekeeping

22.2.1 Dry sweeping or dry brushing of dusts suspected of containing respirable crystalline silica is not allowed.

22.2.2 Wet sweeping of dusts suspected of containing respirable crystalline silica may be done where HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure are not feasible.

22.2.3 Compressed air cannot be used to clean clothing or surfaces containing respirable crystalline silica unless the compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air

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25.0 TREE TRIMMING

25.1 General

- 25.1.1 Tree trimming shall be done under the direction of a journeyman or other qualified employee.
- 25.1.2 A qualified employee shall use a safety strap or lifeline when working in an elevated area such as trees, ladders and aerial buckets.
- 25.1.3 The snap used in the safety line for attaching to the "D" ring shall be of a self-locking safety type.
- 25.1.4 Life lines shall not be used to lower equipment or limbs of trees.
- 25.1.5 When climbers are used for tree trimming, they shall have gaffs of the proper type.
- 25.1.6 Employees shall not carry tools, except a hand saw sheathed and attached to a climbing belt while ascending or descending the tree. Tools shall be raised and lowered by means of a line.
- 25.1.7 When not in use all saws shall be sheathed or guarded.
- 25.1.8 At least two Journeymen shall work together when trimming trees that could contact high voltage lines or equipment. An appropriate apprentice may serve as one of the required tree trimmers.
- 25.1.9 No personnel or members of the general public shall be under the work area while trimming is being performed.

25.2 Powered Trimming Equipment

- 25.2.1 Employees operating chain saws shall wear all required PPE.
- 25.2.2 The chainsaw operator shall wear approved leg protection whenever a chainsaw is used for ground clearing.
- 25.2.3 Chain saw operators shall not wear loose clothing that may be caught in the moving parts of a saw.
- 25.2.4 Chain saws shall be maintained in a safe operating condition, cleaned periodically, and stored with chains and cutting bars sheathed.
- 25.2.5 Obstructions that create a hazard shall be removed from the work area before the start of sawing operations.

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- 25.2.6 When starting a chain saw, it shall be placed on or against a solid support or otherwise securely held such as when in an aerial bucket or tree.
- 25.2.7 Powered chain saws shall be gripped with both hands during the entire cutting operation, unless the qualified employee demonstrates that a greater hazard is posed by keeping both hands on the chain saw in that particular situation.
- 25.2.8 The chain saw motor shall be stopped whenever:
 - a. Working on any part of the chain or cutting bar.
 - b. The saw is being moved from one location to another.
 - c. Raising or lowering the saw, including in an aerial bucket.
 - d. Transferring the saw from one person to another.
 - e. The saw is unattended.
 - f. Changing work positions.
- 25.2.9 Employees shall not hand a pneumatic or hydraulic pruner or saw to another employee unless it is disconnected or valved off from the supply source.
- 25.2.10 The motor shall be shut off and no smoking permitted while the fuel tank is being filled. The tank shall be filled from an approved explosion-proof container. The motor shall not be started in the same location as where the tank was filled.
- 25.2.11 Gasoline powered chain saws shall not be operated in an unventilated enclosure.
- 25.2.12 A chain saw operator shall be properly located in a secure and safe working position and have maximum freedom of movement before starting the chain saw.
- 25.2.13 The running conditions of a chain saw shall be checked on the ground before raising it to an elevated work position.
- 25.2.14 A rope or hand line shall be used to raise and lower a chain saw, except a saw may be carried aloft in an aerial bucket.
- 25.2.15 A chain saw shall not be raised or lowered with the motor running including in an aerial bucket.
- 25.2.16 Special rules and instructions supplied by the manufacturer or affixed to the equipment shall be followed.

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- 25.2.17 All gas-powered chain saws shall include a chain brake.
- 25.2.18 The throttle lock shall only be used in starting operation.
- 25.2.19 Chain saws over 15 pounds total weight shall not be used in trees except when supported by a separate line.
- 25.2.20 Chain saws shall be secured at all times when not in use to prevent the saw from falling.
- 25.2.21 Employees shall not approach a chain saw operator within the reach of the saw while the saw is in operation.
- 25.2.22 Chain saws shall be so adjusted that at idle speed the clutch will not be engaged.

25.3 Wood Chipper Equipment

- 25.3.1 Chipper equipment shall be provided with a suitable housing which will be capable of effectively retaining broken chipper knives or foreign material.
- 25.3.2 Chipper tables shall be of sufficient length or guarded to prevent employees reaching the chipper blades.
- 25.3.3 Any chipper equipment to be repaired or adjusted shall be shut down and shall be provided with a positive means to prevent accidental starting.
- 25.3.4 Guards shall be installed over exposed adjacent blades when replacing chipper blades. When the chipper is in operation, at least two qualified employees shall be working on the ground in the immediate area.
- 25.3.5 A shut-off switch shall be installed within convenient reach of the employee feeding the chipper.
- 25.3.6 Care shall be taken that no foreign objects are fed into the chipper blades.
- 25.3.7 All tree materials are to be fed into the chipper equipment in a 'butt- first' direction.

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26.0 CLIMBING EQUIPMENT FOR ELECTRIC WORK POSITIONING

- 26.1 Body belts and safety straps when not in use shall not be stored with sharp edged tools. When a body belt, safety strap, and climbers are stored, gaff guards shall be installed.
- 26.2 Only approved climbing equipment and attachments shall be used.
- 26.3 Climbers and gaffs shall be kept properly sharpened in good shape, and shall not be used after gaffs are shorter than 1¼ inches for linemen and 1½ inches for tree trimmers.
- 26.4 Individual employees shall complete an inspection of climbing equipment prior to use and be responsible for keeping their climbing equipment in good condition at all times, and if there is deterioration or damage to make it unsafe, it shall not be used until repaired or replaced.
- 26.5 No body belts shall be used with rivets exposed towards the body.

27.0 PERSONAL PROTECTIVE GROUNDING

Note: Appendix 7, Transmission System Grounding Procedures, shall be followed for transmission grounding rules.

- 27.1 The term personal protective grounding as used in connection with electric lines or equipment means that such lines or equipment have been tested to determine if they have been de-energized using a live line indicating device prior to the application of grounding sets. Grounds shall be so located and arranged that employees are not exposed to hazardous differences in potential. Grounding practices that do not provide an equipotential zone in which an employee is safeguarded from voltage differences do not provide complete protection.
- 27.2 No circuit shall be considered dead unless properly grounded.
- 27.3 System ground devices shall be of the approved type and have capacity great enough to activate protective devices without destroying the grounding devices.
- 27.4 The following grounding sizes and requirements shall be used:
- Minimum of 1/0 copper grounding cable for 15kV and below.
 - Minimum of 4/0 copper grounding cable above 15kV, unless specific engineering studies indicate otherwise.

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- 27.5 The qualified employee installing personal protective ground(s) shall proceed as follows:
- a. Obtain clearances from the jurisdictional authority.
 - b. Test the conductors using approved methods and instruments to be sure that all phases to be worked on are de-energized. Approved methods for determining whether a line or equipment is de-energized (testing for potential) is a phase stick tester, potential transformer, a hot stick mounted multi-range voltage detector (set on the appropriate voltage range) or an auto ranging voltage detector.
 - c. Grounding devices shall be given a visual inspection prior to use.
 - d. Install a cluster bracket if working off a nonmetallic pole.
 - e. Connect one end of the grounding device to an established ground or a driven ground.
 - f. Every effort should be made to use the multi-grounded system neutral. In all cases where there is doubt that the neutral is multi-grounded, a separate driven ground (or other established ground) must be used.
 - g. A driven ground must be located out of the work area and not accessible to the public. The driven ground must be barricaded with as much area as practical around the driven ground to protect workers and the public from step potential in the event of energization.
 - h. Attach other end of the grounding jumper to the conductor to be grounded. This shall be done with a standard hot line tool.
 - i. Attach grounding device from the grounded conductors to other conductors to be grounded. This shall be done using stick grounds, or other approved hot line tools.
 - j. Employees shall maintain clearance from the grounding conductor until all connections are complete. They shall exercise extreme care that no part of the grounding equipment comes in contact with other energized conductors or equipment. The grounding conductors shall be secured to prevent whipping in the event of energization.
- 27.6 When removing a protective ground, the employees shall not remove the grounding device from the ground connection until the device has first been disconnected from all parts that are normally energized.

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- 27.7 Before work is done on transmission lines carrying two or more circuits, supported on metal cross arms which are not grounded to an overhead ground wire, the cross arms must be bonded to the grounded conductor to be worked upon.
- 27.7.1 Sufficient spare grounding devices for the purpose of protective grounding must be on hand before starting the job.
- 27.7.2 A hot stick-type grounding device shall be used when making the first attachment to the cross arms.
- 27.8 Protective grounds shall not be removed until all employees, except those doing the removing, are on the ground.
- 27.9 Orders to remove grounds must be given by the designated employee in charge of the work and by the employee who holds the clearance. Where hold tags have been placed on system grounding switches, said grounding switches shall not be opened without the authority of the person who originally authorized the placing of the hold tag or the person who has been delegated (on said hold tag) the authority to remove the ground.

28.0 TESTING OF PROTECTIVE EQUIPMENT

- 28.1 Live-Line Tools and Insulating Equipment
- 28.1.1 Live-line tools and insulating equipment used for employee protection shall be wiped clean and visually inspected for defects before each use. Insulating equipment includes rubber gloves, sleeves, line hose, blankets and other approved protective equipment. Defective tools and insulating equipment will be immediately removed from service and labeled defective.
- 28.1.2 Insulating equipment shall be inspected for damage or deterioration before each use and immediately following any incident that can reasonably be suspected of having caused damage or deterioration. Insulating gloves shall be given an air test along with the inspection.
- 28.1.3 Rubber goods and insulating equipment shall be removed from service and tested as outlined in the table below or more frequently upon request.

Equipment Type	Frequency of Testing
Live-line tools used for primary employee protection	Every 12 months
Insulating equipment other than gloves and sleeves	Every 6 months
Rubber gloves and sleeves	Every 6 months

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28.1.4 Mechanical hot-line jumpers used on voltages greater than 5,000 volts shall be considered un-insulated. If the mechanical hot-line jumper cable cannot be isolated so there is not a possibility of contact with personnel, other conductors, poles, cross arms, or hardware, the mechanical hot-line jumper cable shall be covered with line hose or blankets.

- a. Mechanical hot line jumpers tested at intervals per safety rule 28.1.3 shall be considered insulated up to 15kV.
- b. Any concern with the integrity of the insulation of a hot line jumper, rule 28.1.4 shall be followed.

28.1.5 Rubber protective equipment shall be kept, so far as practical, in a cool, dry, clean place and away from tools or objects that might puncture or damage it. This equipment shall be kept in the rubber goods compartment or proper container as provided. Only approved hand cleaners, bug sprays and lotions may be used prior to wearing rubber gloves or sleeves. Petroleum-based products react with the rubber, resulting in blistering and possible cracking.

28.2 Insulated Aerial Lifts

28.2.1 Daily inspection of aerial trucks shall be made according to the manufacturer recommendations prior to use. The insulated boom section, bucket and bucket liner shall be cleaned periodically between regular dielectric tests.

28.2.2 Bucket liners shall be tested every six months or more often upon request.

28.2.3 All aerial devices utilized for rubber gloving shall have a certified dielectric test annually by a qualified testing facility. In addition, aerial devices for rubber gloving may be subjected to an approved in-house field dielectric test every four months. All aerial equipment including digger derricks shall be tested annually per regulatory requirements or more frequently as requested.

28.2.4 A certified tester shall annually test all aerial devices and equipment designed for use near energized lines. The insulated section of aerial lifts shall always be retested by a certified tester immediately following any repair work involving this portion of the truck.

28.3 Grounding Devices Used for Personal Protection

28.3.1 Grounding devices shall be given a visual inspection prior to use.

28.3.2 Periodic resistance tests shall be performed at least annually. Grounding devices which fail the resistance tests shall be labeled defective and removed from service.

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29.0 ELECTRIC SYSTEM OPERATION SAFETY RULES

Note: Appendix 3, Regional Rubber Gloving Rules that may be in conflict with safety rules in this section shall be followed for specific rubber gloving work rules by area until this section is updated.

29.1 General Requirements

- 29.1.1 Only qualified employees (i.e., journeyman or journeyman and an appropriate step apprentice) may work on or with exposed energized lines or parts of equipment.
- 29.1.2 Only qualified employees may work in areas containing unguarded, un-insulated energized lines or parts of equipment operating at 50 – 600 volts.
- 29.1.3 All qualified employees under Section 29.0 shall have demonstrated proficiency and be up to date in CPR methods.
- 29.1.4 Electric lines and equipment shall be considered and treated as energized unless properly isolated, tested and grounded.
- 29.1.5 When passing any switch board, relay cabinet, panel, machine or other electrical apparatus, employees shall make every reasonable attempt to avoid touching any part or allowing metal tools to come in contact with the apparatus.
- 29.1.6 The employee shall ensure that connections are made as follows:
 - a. When connecting de-energized equipment or lines to an energized circuit by means of a conducting wire or device, an employee shall 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 shall remove the source end first.
 - c. When lines or equipment are connected to or disconnected from energized circuits, loose conductors shall be kept away from exposed energized parts.
- 29.1.7 If one or more employees are sent to perform work and it is determined it would be unduly hazardous to proceed, the employee(s) shall call for additional help and shall not proceed until additional help is obtained. Any reasonable request for qualified assistance will not be denied.

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29.2 Work on Facilities Energized Above 600 Volts

Working on or near exposed energized parts applies to work on exposed live parts, or near enough to them, to expose the employee to any hazard they present.

29.2.1 Except as provided in paragraph 29.2.2 of this section, at least two qualified employees shall 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. Installation, 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.
- e. Other work that exposes an employee to electrical hazards greater than or equal to those posed by operations that are specifically listed above.

29.2.2 Except as provided in paragraph 29.2.1, one qualified employee may perform the following operations:

- a. Routine switching of circuits if the employer can demonstrate that conditions at the site allow 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 nor otherwise exposed to contact with energized parts.
- c. Emergency repairs to the extent necessary to safeguard the general public.

29.2.3 Workers shall not stand on or otherwise be in contact with transformer cases or other similar equipment while working on energized wires or equipment.

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- 29.2.4 When an employee performs work within reaching distance of exposed energized parts of equipment, the employee must remove or render nonconductive all exposed conductive articles, such as key chains or watch chains, rings, or wrist watches or bands, unless such articles do not increase the hazards associated with contact with the energized parts.
- 29.2.5 Only insulated blocks, hoists or hand-lines will be used. All ropes shall be of synthetic material with good di-electric properties.
- 29.2.6 Only non-conductive and electrically tested hose and oil shall be used on or near energized lines or equipment.
- 29.2.7 If an employee(s) is sent to do a job and decides it would be too hazardous to proceed, the employee shall call for additional help and shall not proceed until additional help is obtained. In the case of an emergency where danger to life or property would be aggravated by delay in waiting for the arrival of the additional help, one may clear the hazard by de-energizing the line and/or equipment at the nearest structure if it can be done without presenting an unusual hazard to the employee.
- 29.2.8 When an occasion requires the second person to assist the first one, the individual may do so provided they both work on wires or parts of the same phase of polarity. Before they start to work, they shall get themselves in such a position that the presence of the second person does not increase the hazard.
- 29.2.9 Employees shall not place dependence for their safety on the insulating covering of conductors, wires or cables even though the insulation appears to be perfect.
- 29.3 Work on Facilities Energized between 50 and 600 Volts
 - 29.3.1 At a minimum, Class 0 rubber gloves shall be worn when working on any conductor or equipment at voltages between 50 and 600 volts to ground except when the employee is insulated or isolated from potential differences. **(Note: Rule Exception – Refer to Appendix 3)**
 - 29.3.2 Employees shall take necessary precautions to recognize and mitigate the risk through the proper use of work procedures, tools, cover-ups and PPE. Equipment insulation shall not be relied upon for personnel safety until the equipment has been inspected and insulation integrity determined to be intact.

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- 29.3.3 Work involving rubber gloving on lines or equipment energized at voltages greater than 300 volts shall require a minimum of two qualified employees (at least one of whom shall be a journeyman) except as provided for in paragraph 29.2.2 of this section.) **(Note: Rule Exception – Refer to Appendix 3)**
- 29.3.4 If one or more employees are sent to perform work upon facilities energized between 50 and 300 volts and it is determined it would be unduly hazardous to proceed, the employee(s) shall call for additional help and shall not proceed until additional help is obtained. Any reasonable request for qualified assistance will not be denied.
- 29.3.5 When work requires the second employee to assist the first employee, care shall be taken to ensure they both work on wires or parts of the same phase or polarity to avoid harmful voltage differences between energized conductors or parts. Before such two person work is commenced, the employees shall arrange themselves in such a position that the presence of the second person does not increase the level of hazard from the energized parts or conductors.
- 29.4 Work on Overhead Facilities Energized Above 600 Volts
- 29.4.1 General Requirements
- a. The term PRIMARY AREA as used in the following rules is any area from which a person can reach, slip or fall into any conductor or equipment energized at more than 600 volts.
 - b. Before entering a PRIMARY AREA to work on any conductor or equipment, employees will put on rubber sleeves and rubber gloves.
 - c. Before any work is started on conductors or equipment in a PRIMARY AREA, all conductors and equipment which a person can reach, slip, or fall into will be covered with dielectric equipment, except the conductor or equipment actually being worked on and that will be covered as much as possible without interfering with the work.
- 29.4.2 Contact with cover-up equipment on energized lines shall not be made intentionally by any part of the body other than by rubber gloves.
- 29.4.3 Consideration shall be given to the feasibility of de-energizing the circuit for work, or ‘hot sticking’ the circuit before rubber gloving work is selected as the work method to be used. If in the opinion of the individual doing the work, any conditions present a hazard to safe rubber gloving procedure, alternate methods will be used.

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- 29.4.4 At a minimum, class 2 rubber gloves (20 kV rating) shall be worn when working on any conductor or equipment energized at voltages above 600 volts to ground. **(Note: Rule Exception – Refer to Appendix 3)**
- 29.4.5 Work involving rubber gloving on lines or equipment energized at voltages above 600 volts shall require a minimum of three qualified employees (at least two of whom shall be journeymen or one journeyman and an apprentice in the appropriate step) except as provided for below on a voluntary basis: **(Note: Rule Exception – Refer to Appendix 3)**
- a. Emergency repairs to the extent necessary to safeguard the general public.
 - b. Installation of a single-phase, straight line pole and the subsequent transfer of conductors on a voluntary basis.
 - c. Installation or repair of a single-phase riser on single-phase overhead lines or the outer phases of a poly-phase overhead line.
 - d. Replacement of a single-phase damaged or suspect cut-out.
 - e. Replacement of damaged or suspect insulators and pins on overhead lines only where they are on outside phases of any poly-phase lines or conductors on the same or adjacent structure(s).
 - f. Replacement of single-phase pole mounted transformers only where they are outside the primary area of any poly-phase lines or conductors on the same or adjacent structure(s).
- 29.4.6 Employees shall not stand on or otherwise be in contact with transformer cases or other similar equipment while working on energized wires or equipment.
- 29.4.7 Jewelry, rings and watches shall not be worn while performing work by rubber glove techniques.
- 29.4.8 Only insulated blocks, hoists, or hand-lines will be used for work in proximity to lines or parts energized at 600V or above. All ropes shall be of synthetic material with di-electric properties.
- 29.4.9 If two or more employees are sent to perform work upon facilities energized at 600V or above, and the employees determine that it would be unduly hazardous to proceed, the employees shall call for additional help and shall not proceed until additional help is obtained. Any requests for qualified assistance will not be denied. In the case of emergency, where danger to life would be aggravated by the delay in waiting for the arrival of the additional help, the hazard may be cleared by de-energizing the line and/or equipment at the nearest structure if this can be done without endangering the employee(s) involved.

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- 29.4.10 When work requires more than one employee to rubber glove from one or more aerial platforms, care shall be taken to ensure they both work on wires or parts of the same phase or polarity to avoid harmful voltage differences between energized conductors or parts. Before such multi-employee work is commenced, the employees shall arrange themselves in such a position that the presence of additional employees does not increase the level of hazard from the energized parts or conductors.
- 29.4.11 Employees shall not place dependence for their safety on the manufactured insulated covering of conductors, or primary cables, even though the insulation appears to be perfect. Similarly, employees will not place dependence for their safety on the untested assumption that equipment, which is an integral part of pole mounted plant, is at the expected de-energized voltage or potential. Aerial and pole mounted plant includes overhead transformers, switchgear (circuit breakers, fuses, isolators and disconnects) and all electrical enclosures.
- 29.4.12 Direct contact with circuits using rubber gloves and other protective equipment in accordance with these procedures shall not be performed during fog, rain, snow, or high wind conditions. Lightning conditions in the area of the system should be particularly watched due to high potential surges that may be superimposed on the normal voltages.
- 29.4.13 When working out of an insulated aerial device above an energized under build on de-energized grounded lines or equipment or hot sticking, it is not necessary to wear rubber gloves and rubber sleeves if the minimum safe working distances, as stated in Table 29.4.14, can be maintained between the bottom of the bucket and the energized under build.

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29.4.14 The following minimum safe work distances from energized conductors or equipment will be maintained:

TABLE 29.4.14

Voltage in kilovolts phase-to-phase ^{① ② ③}	Distance to employee ^④					
	Phase-to-ground		Phase-to-phase			
	(m)	(ft-in)	(m)	(ft-in)		
0 to 0.050	Not specified		Not specified			
0.051 to 0.300	Avoid contact		Avoid contact			
0.301 to 0.750	0.33	1-1	0.33	1-1		
0.751 to 5.0	0.63	2-1	0.63	2-1		
5.1 to 15.0	0.65	2-2	0.68	2-3		
15.1 to 36.0	0.77	2-7	0.89	3-0		
36.1 to 46.0	0.84	2-10	0.98	3-3		
46.1 to 72.5	1.00	3-4	1.20	4-0		
Voltage in kilovolts phase-to-phase	Distance to employee from energized part ^{④ ⑤ ⑥ ⑩}					
	Without tools phase-to-ground		With tools phase- to-ground ^{⑦ ⑨}		Without tools phase- to-phase ^⑧	
	(m)	(ft-in)	(m)	(ft-in)	(m)	(ft-in)
72.6 to 121	1.06	3-6	1.13	3-9	1.42	4-8
121.1 to 145	1.21	4-0	1.30	4-4	1.64	5-5
145.1 to 169	1.36	4-6	1.46	4-10	1.94	6-5
169.1 to 242	1.87	6-2	2.01	6-8	3.08	10-2
242.1 to 362	3.19	10-6	3.41	11-3	5.52	18-2
362.1 to 420	3.99	13-2	4.25	14-0	6.81	22-5
420.1 to 550	4.78	15-9	5.07	16-8	8.24	27-1
550.1 to 800	6.53	21-6	6.88	22-7	11.38	37-5

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1. For single-phase lines off three-phase systems, use the phase-to-phase voltage of that system
2. For single-phase systems, use the highest voltage available.
3. Inadvertent movement factors used in these tables are as follows:
 - 0.301 kV to 0.750 kV = 0.31 m (1ft)
 - 0.751 kV to 72.5 kV = 0.61 m (2 ft.)
 - 72.6 kV to 800 kV = 0.31 m (1 ft.)
4. Distances listed area for standard atmospheric conditions defined as temperatures above freezing, wind less than 15 mi per h or 24 km per h, unsaturated air, normal barometer, uncontaminated air, and clean and dry insulators.
5. For voltages above 72.5 kV, distances are based on altitudes below 900 m (3000 ft.) above sea level. For altitudes above 900 m (3000 ft.), Rule 441A6 applies.
6. Distances were calculated using the following TOV values:
 - 72.6 kV to 362 kV = 3.5
 - 362.1 kV to 550 kV = 3.0
 - 550.1 kV to 800 kV = 2.5
7. Distances for live-line tool in the air gap were calculated by adding a tool factor to the electrical component (OSHA 29 CFR 1910.269 Appendix B [B68])
8. Phase-to-phase live-line tool in the air gap values are not available. If this situation exists, an engineering evaluation should be performed.
9. *With tools* means a live-line tool bridging the air gap to the employee from the energized part.
10. For bare hand work where the employee is at line potential, this distance is to an object at a different potential.

29.4.15 Class 2 rubber gloves shall be worn while manually operating any gang operated switch from the ground in excess of 600 volts unless using a hot stick.

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- 29.4.16 The maximum voltage of any lines or equipment to be handled with rubber gloves and other rubber protective equipment will be:
- a. 5,000 volts from phase to phase except when working from insulated aerial lifts in which case maximum voltage will be 15,000 volts from phase to phase.
 - b. If the minimum approach distance cannot be maintained between mechanical equipment or other conducting objects and the underbuilt on voltages at or below 15,000 volts, then necessary protective line covering must be used.
- 29.4.17 Every available measure to provide additional protection of the rubber gloving crew shall be taken by the jurisdictional authority and/or the hot line warning holder, including that reclosers and circuit breakers protecting the circuit on which rubber gloving is being performed have their reclosing mechanisms made inoperative during the time work is being performed. **(Note: Rule Exception – Refer to Appendix 3)**
- 29.4.18 It is understood that many factors influence the safety of qualified employees when completing rubber-gloving work. Such influences may include unfamiliarity, traffic, weather, darkness, size and weight of equipment, vehicles or other variables. Therefore, it is also understood that the pre-existing rubber-gloving work practices in place prior to the consolidation of these safety rules shall be in full force and effect for each former area of the company. In any event, all routine scheduled polyphase rubber gloving work on overhead lines at voltages above 600V which is expected to be completed in the hours of darkness shall be resourced with three or more qualified employees. Requests for additional assistance will not be denied.
- 29.4.19 Any poly-phase rubber gloving work on overhead lines at voltages above 600 volts shall primarily utilize elbow trucks as the isolated aerial platform. Rubber gloving from digger derricks will only be performed when it is voluntarily instituted by the crew actually performing the work. A bucket liner shall be used.
- 29.4.20 All lines or equipment energized above 15,000 volts phase-to-phase will be de-energized, isolated, tested, tagged and properly grounded before any work is attempted, or the work will be done with live-line tools or bare hand techniques.

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- 29.4.21 Devices used to open circuits at 600 volts or more under load conditions shall be designed to interrupt the current involved. Whenever practical, appropriately rated load interrupting devices (e.g., load busters) shall be used to interrupt load current. In other cases, the equipment can be opened only if it is determined the conditions do not pose an elevated risk to the employee by using one of the following procedures:
- a. De-energizing the line (upstream load-break device);
 - b. Removing the load; or
 - c. Opening a disconnect using an insulated tool from a remote location on the ground at a minimum of 20 feet from the device being operated.
- 29.4.22 Live-line tools shall be used to energize or de-energize distribution transformers with a hot line tap connection.
- 29.4.23 Live-line tools shall not be laid directly on the ground.
- 29.4.24 Live-line sticks and tools shall be kept as dry as possible and shall always be stored in a dry place or kept in their proper containers when not in use.
- 29.4.25 A visual marker to indicate minimum allowable approach distance as specified in Table 29.4.14 will be applied to hot sticks upon request. MidAmerican Energy's standard is described below:
- a. A white painted band shall be placed around the tool on 13-kV energized (live) conductors or equipment.
A black painted band shall be placed around the tool adjacent to the white band and toward the de-energized end of the tool.
 - b. A red painted band shall be placed around the tool conductors or equipment. A black painted band shall be placed around the tool adjacent to the red band and toward the de-energized end of the tool.
- 29.4.26 Link sticks shall be used with rope or an approved sling on energized lines above 600 volts. Ropes or approved slings used with link sticks shall be kept clean and dry.

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29.4.27 No pole will be set or removed in an energized line with any ground wire attached to the pole that is within reaching distance. Where butt-wrapped grounds are used, any portion of the ground wire within reaching distance shall be isolated from all portions exposed to energized facilities. Any qualified employees who guide or steer the butt of the pole in or near an energized line shall wear or use the appropriate rubber and other protective equipment. When poles are set, moved, or removed near exposed energized overhead conductors, the pole may not contact the conductors. Poles will be wrapped with rubber blankets or an approved insulating guard. If it is not possible to wrap the pole because of hardware, then any conductor that has a possibility of coming in contact with the pole must be covered with rubber line hose or plastic line guard.

29.5 Switching Procedures

29.5.1 All switching performed on distribution or transmission facilities shall conform to OSHA regulations and the approved MidAmerican Energy Company General Switching Procedures for Transmission Operations and Distribution Control.

29.5.2 Devices used to open circuits at 600 volts or more under load conditions shall be designed to interrupt the current involved. Whenever practical, appropriately rated load interrupting devices (e.g., load busters) shall be used to interrupt load current. In other cases, the equipment can be opened only if it is determined the conditions do not pose an elevated risk to the employee by using one of the following procedures:

- a. De-energizing the line (upstream load-break device);
- b. Removing the load; or
- c. Opening a disconnect using an insulated tool from a remote location on the ground at a minimum of 20 feet from the device being operated.

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29.5.3 This section applies when MidAmerican Energy employees are performing switching, operating or are working on **customer** owned equipment or company equipment within a customer-owned system.

- a. When MidAmerican Energy employees are required to perform work on customer or company owned equipment within the customer's electrical system, all facilities shall be considered energized unless de-energized, isolated, tagged, tested and grounded.
- b. If work is to be performed on customer equipment or systems where live-line techniques and minimum approach distances cannot be maintained, the customer shall provide a jurisdictional authority (JA) or competent person to assist MidAmerican Energy crews in proper location, de-energizing, isolation and Lockout/Tag out procedures. The customer's JA or competent person will provide the MidAmerican Energy person in charge with points of visible isolation for the work to be completed by MidAmerican Energy employees.
 1. Points of visible isolation will be opened, rendered inoperable if design permits, and properly tagged. Customers that have their own Lockout/Tag out procedures must provide the means for the customer's JA or competent person to issue a clearance or equivalent safety certificate to the MidAmerican Energy person in charge to allow work on the customer's equipment, including:
 - i. Receipt of whom the clearance or safety certificate is being issued to (MidAmerican Energy employee or customer's JA; Clearance Holder).
 - ii. Identification numbers of equipment being locked/tagged open to establish visible isolation boundaries.
 - iii. Equipment that is being repaired or serviced.
 - iv. List of all boundaries that establish visible isolation
 - v. Date and time issued
 - vi. Placement of a MidAmerican Energy-owned lock, when possible.

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- c. Upon receipt of the clearance or equivalent safety certificate from the customer's JA or competent person, the clearance holder shall check for potential and install grounds as necessary prior to proceeding with the work.
- d. When MidAmerican Energy employees are working on customer owned boundary equipment, (equipment providing the interface between MidAmerican Energy and the customer's distribution system), all existing MidAmerican Energy switching procedures shall apply to those boundary devices while work is being completed. The appropriate MidAmerican Energy Jurisdictional Authority (JA) will assume authority over that boundary device until all work is completed and clearances are released. During these periods, equipment will be locked and tagged by MidAmerican Energy personnel performing work. Where the customer's system contains or is interconnected to another source of potential, the customer's JA or competent person shall issue a Hold Order or equivalent safety certificate for the visibly open device on the customer's side of the boundary device to the MidAmerican JA.

30.0 ELECTRIC OVERHEAD SAFETY RULES

30.1 Pole Handling – Storage

- 30.1.1 Employees shall avoid unnecessary walking on top of a load of poles.
- 30.1.2 Employees shall avoid unnecessary walking on the loading/unloading side of the rail car or trailer transport.
- 30.1.3 Employees shall take such steps as required to prevent the movement of poles when stakes are removed and shipping binding straps are cut.
- 30.1.4 Employees when cutting binding straps and removing stakes shall always start at the center and work toward the ends of the car.
- 30.1.5 Employees shall release the load slowly after all employees have moved back to a safe position.
- 30.1.6 Poles shall be stored in an orderly fashion and shall not crisscross each other.
- 30.1.7 Poles shall be stored in such a fashion as to prevent their rolling.

30.2 Pole Loading, Transporting and Setting (see also general rules)

- 30.2.1 Poles shall only be transported from the storage area to installing location by means of an approved pole truck or pole trailer.

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- 30.2.2 Pole transporting vehicles shall not be loaded beyond rated capacity.
 - 30.2.3 All poles shall be secured to the transporting vehicle by suitable binders, cables or other approved methods before the vehicle is moved.
 - 30.2.4 Poles temporarily spotted along highways or streets shall be placed as far away from the traveled portion as practicable, and chocked to prevent rolling, if necessary.
 - 30.2.5 Pole holes shall never be left unguarded. Whenever anyone is working in the area on the ground, someone shall physically guard or attend to the holes. When it is necessary to leave an open pole or anchor hole, such hole shall be protected by a suitable cover or barricade.
 - 30.2.6 When raising poles manually, special care shall be exercised to see that pikes and gin poles are properly handled. Avoid dropping pike poles, as they might seriously injure a fellow worker.
- 30.3 Climbing and Securing Poles
- 30.3.1 Leather gloves shall be used in climbing poles to prevent injury to hands from tacks, nails or splinters.
 - 30.3.2 Before an employee climbs a pole, he shall make certain by inspection and testing, that the condition of the pole is sound and stable to permit climbing and working without the pole breaking. If the pole is found inadequate for safe climbing, it must be guyed, braced, or otherwise supported in such a manner as to allow employees to safely perform their work. This is especially important if a pole is to be stripped, or partially stripped, of its conductors.
 - 30.3.3 Poles found to be unsafe shall be clearly identified per recommendations of the Electric Divisional Safety Committee to identify them as unsafe to climb pending their replacement.
 - 30.3.4 When using pole steps for climbing, they shall be tested for safe condition before placing weight thereon. When employees find pole steps in an unsafe condition, they shall be removed.
 - 30.3.5 REMOVED (February 2015)
 - 30.3.6 When belted off on a structure, an employee shall not support himself on insulator brackets, cross arm braces or conductor.

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- 30.3.7 Safety straps shall not be put around poles above the top cross arm or attachment except where adequate precaution is taken to prevent belt from slipping over top of pole. Neither end of the safety strap shall be allowed to hang loose either in climbing or descending poles or other structures.
- 30.3.8 Employees must not crawl over insulator strings, but shall use a platform or other suitable device to work from when making dead-ends or doing other work beyond strings of insulators at such distance that they cannot reach the work from the pole or fixture. While working on the platform or other device they must secure themselves with their safety straps or a safety rope to prevent falling.
- 30.3.9 Employees shall not stand or sit on the tops of energized (live) overhead transformers or transformers near energized equipment.
- 30.3.10 When it is necessary to move conductors, energized or de-energized, which are above conductors energized, a thorough inspection for strength and good condition of adjacent poles, structures and the conductor-supporting hardware shall be made. Safeguards shall be installed on such adjacent poles or structures as may be necessary to prevent unexpected or uncontrolled movement of these adjacent poles, structures, conductor-supporting equipment or conductors.
- 30.3.11 When employees are required to climb through or work above energized circuits of over 600 volts, adequate spreading and guarding of the energized conductors shall be done to prevent accidental contact with energized lines.
- 30.3.12 Methods shall be instituted at the level of energized conductors on or above which work is being done that will effectively prevent ropes (except approved hot line ropes), hand lines, equipment or material passing through the conductor level, from making contact with energized wires.
- 30.3.13 Nails and unauthorized attachments shall be removed before climbing above such attachments. When through bolts present a hazard to climbing, they shall be trimmed to a safe length.
- 30.3.14 Employees shall use a lanyard and harness when transferring from the aerial basket to a pole or from a pole or structure to the aerial basket.

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30.4 Aerial Baskets and Man lift Equipment - Travel Procedures

- 30.4.1 The truck shall not be moved unless the boom is lowered and the outriggers retracted. If a means to secure the boom is provided by the manufacturer, it shall be used to secure the boom.
- 30.4.2 Riding in the bucket shall not be permitted but certain exceptions are allowed in designated operation where the vehicle is moved short distances and the bucket returned to the rest position for each move. The only exception to this rule applies to any device designed to be driven while in an elevated position (e.g., man lift) and precautions must be taken to ensure overhead clearances.
- 30.4.3 Climbers shall not be worn when working from a bucket.
- 30.4.4 When working from a bucket, personnel shall attach their fall arrest lanyard to the special attachments provided for that purpose on the boom or the bucket and shall keep their feet on the floor of the bucket at all times.
- 30.4.5 When a boom or aerial winch line of any vehicle or equipment is being used within the reach distance of energized (live) primary conductors, special precautions a, b or c (below) shall be taken by the crew leader, foreman or employee immediately in charge of the work. This rule does not apply to equipment with two sections of insulated boom, providing the dielectric tests on both booms are kept current (see note below).
 - a. When practicable, the frame of the equipment shall be adequately bonded to the system neutral.
 - b. If the system neutral is not available or if it is not practicable to bond the truck to the system neutral, the equipment frame shall be grounded.
 - c. If the frame of the vehicle is not adequately bonded or grounded as outlined in paragraphs a. or b. above, it shall be treated as an energized (live) primary conductor. All employees on the ground coming in contact with the vehicle shall wear rubber gloves "Class 2" and use other protective equipment necessary to protect them if the vehicle should become energized by the boom or winch line contacting an energized primary. Personnel shall remain on the equipment during the time the equipment's boom is working near an energized primary conductor. When working in areas that may include pedestrian traffic with uncontrolled access to the equipment in use, additional barricades or access control mechanisms shall be utilized until the equipment is no longer being used within minimum approach distance of energized primary conductors.

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Note: Aerial equipment having two sections of certified (tested annually for dielectric strength) insulated boom (i.e., double buckets, man-half buckets, squirt booms) do not have to be bonded to the neutral.

30.4.6 Before lowering the outriggers, stabilizers or hydraulic jacks, the operator shall be certain outriggers are set on pads or solid surfaces. Section pads shall be used on asphalt surfaces. The operator shall be certain no one is in a position where they will be injured.

30.4.7 Employees shall always stand firmly on the floor of the bucket and shall not sit or climb on the edge of the bucket or use planks, ladders or other devices for a work position.

30.5 Stringing or Removing Conductors and Static Wires

30.5.1 When stringing or removing wire over or alongside other energized high voltage conductors, the following practices shall be observed:

30.5.1.1 Tension stringing methods, barriers, or other equivalent measures shall be used to minimize the possibility that conductors and cables being installed or removed will contact energized power lines or equipment.

30.5.1.2 Where conductors, cables, or pulling and tensioning equipment is being used close enough to energized conductors when failure of the equipment could result in energizing the pulling and tensioning equipment or the wire or cable being installed or removed, measures will be taken that include at least one of the following:

- a. The energized lines exposed to contact shall be covered with insulating protective materials.
- b. The equipment shall be insulated for the voltage involved or positioned so that its un-insulated portions cannot approach the lines or equipment any closer than AC Live-Line Work Minimum Approach Distances, Table 29.4.14.

30.5.2 All of the following measures shall be taken unless alternative methods demonstrate that each employee is protected from the hazards of energized line contacts:

- a. Use of best available ground to minimize the time the lines remain energized.
- b. Bond equipment together to minimize potential differences.
- c. Provide ground mats to extend areas of equipotential.

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- d. Employ insulating protective equipment or barricades and personal protective equipment to guard against any remaining hazardous potential differences.
 - e. Each conductor shall be snubbed or dead ended at both ends before subsequent wires are strung.
- 30.5.3 When conductors being installed or removed cross over energized conductors in excess of 600 volts, automatic reclosing for all circuits shall be made inoperative if design permits.
- 30.5.4 Before lines are installed parallel to existing energized lines, a determination shall be made of the approximate voltage to be induced in the new line, or work shall proceed on the assumption that the induced voltage is hazardous. Unless it can be demonstrated that the lines being installed are not subject to induction or unless the lines are treated as energized, the following also applies:
- a. Each bare conductor shall be grounded in increments so that no point along the conductor is more than 2 miles from a ground.
 - b. These grounds shall be left in place until the conductor installation is completed between dead ends and then removed as the last phase of aerial cleanup.
 - c. If employees are working on bare conductors, grounds shall also be installed at each location where employees are working, and grounds shall be installed at all open dead-end or catch off points or the next adjacent structure.
 - d. If two bare conductors are to be spliced, the conductors shall be bonded and grounded before being spliced.
- 30.5.5 Load ratings of stringing lines, pulling lines, conductor grips, load bearing hardware and accessories, rigging, and hoists may not be exceeded.
- 30.5.6 Conductor grips may not be used on wire rope, unless the grip is specifically designed for this application.
- 30.5.7 Reliable and effective communications (2-way radio or equivalent) shall be maintained between the reel tender and the pulling rig operator. Hand signals for sagging conductors shall conform to Appendix 5, Hand Signals – Line Work.

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- 30.5.8 The pulling rig may only be operated when it is safe to do so. 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 over or through the stringing sheave. The employee guiding the wire on the reel shall stand well back to prevent being drawn into the reel by gloves or clothing being caught by wire kinks or joints.
- 30.5.9 When a reel from which cable is being removed is nearly empty, the last few turns of the wire should be carefully taken from the reel by hand and the end properly secured. Extreme caution shall be taken to avoid any loss of control and recoil of the wire being installed.
- 30.5.10 Guard poles, towers or other guard structures installed for the purpose of protecting employees, lines, conductors, or equipment during the course of construction shall be installed with the same clearance requirements as required for permanent construction, and with strength and safety factors as required to safely support the loads that may normally be imposed on them during their use.

30.6 Capacitor Banks

- 30.6.1 All new capacitor installations shall have a manually operated, visibly open isolating device to isolate the capacitors from the circuit to which it connects. An electrically or pneumatically operated capacitor switch or circuit breaker shall not be considered adequate for isolation purposes.
- 30.6.2 For fused only (no oil or vacuum switches) capacitor installations, the capacitor unit shall be isolated from its main source by opening the isolating device (fused cutout) with an approved load-buster tool or by using a testing device to verify no voltage/current is present prior to opening the isolated device with an approved live-line tool before any work on the unit(s) commences. The unit(s) shall be discharged in the prescribed manner.
- 30.6.3 For line connected (no fuse cutouts, oil, or vacuum switches) capacitor installations, the line shall be de-energized before isolating the capacitor unit(s) from the line section. Testing for line potential is required before isolation. Approved methods for determining whether a line or equipment is de-energized (testing for potential) is a phase stick tester, potential transformer, and hot stick mounted multi-range voltage detector (set on the appropriate voltage range) or an auto ranging voltage detector.
- 30.6.4 Capacitors shall be considered at full voltage until they have been removed from the line and the terminals short-circuited and discharged to ground.

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- 30.6.5 Capacitors that have been removed from service shall be short-circuited during storage and transport.
- 30.6.6 Before employees work on capacitors, the capacitors shall be disconnected and visibly isolated from energized sources. A capacitor is not considered de-energized until the following have occurred:
 - a. A 5-minute wait has occurred from the time of visible isolation, allowing the unit to partially discharge. An isolated capacitor is not de-energized until it is properly discharged.
 - b. The unit has been discharged using an external jumper. Appropriate PPE shall be utilized when discharging a capacitor.
 - c. Each unit in series-parallel capacitor banks shall be short-circuited between all terminals and the capacitor case or its rack. If the cases of capacitors are on ungrounded substation racks, the racks shall be bonded to ground. Any line to which capacitors are connected shall be short-circuited before it is considered de-energized.

31.0 UNDERGROUND ELECTRIC DISTRIBUTION SAFETY RULES

UED, Underground Electric Distribution, is a general term that covers the necessary facilities to furnish underground electric service to residential and commercial customers; it excludes network underground electric systems.

- 31.1 Employees shall not place dependence upon cable insulation, elbow insulation, or bushing cover for primary personal protection.
- 31.2 Underground Electric Distribution – Definitions
 - 31.2.1 Primary Compartment – A compartment containing voltages above nominal 600 volts.
 - 31.2.2 Secondary compartment – A compartment containing voltages below 600 volts.
 - 31.2.3 UED Concentric Cable – A conductor insulated and shielded for operation above 600 volts around which is wound a neutral, with or without an overall covering.
 - 31.2.4 UED Primary Cable – A conductor insulated for operation above 600 volts.
 - 31.2.5 Secondary Cable – A conductor insulated for operation below any nominal voltage of 600 volts.

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- 31.2.6 Exposed is defined as not isolated or guarded. A device or conductor is exposed unless:
 - a. It is operated under 600 volts and is properly insulated.
 - b. It is operated over 600 volts and is properly insulated and shielded.
- 31.2.7 Load Break – Elbow or other device designed to make or break energized primary circuits.
- 31.2.8 Non-Load Break – Elbow or other device that must be operated on de-energized primary circuits.
- 31.2.9 Shielding – Semi-conducting tape or covering applied over cable or elbow insulation to eliminate all but radial electrical stress within insulation.
- 31.2.10 Barriers – Material used to insulate or isolate phase to phase potential or primary and secondary compartments as in live front transformers.
- 31.3 Underground Electric Distribution - Public Protection
 - 31.3.1 Accessible, energized compartments of submersible and padmounted transformers, switches, pedestals and similar equipment installations shall be closed and locked while unattended.
 - 31.3.2 An open, energized primary and secondary compartment shall be attended by a qualified employee at all times.
 - 31.3.3 Qualified employee(s), approved barricades, safety markers or a combination of these shall be used to keep all unauthorized persons away from the work area.
 - 31.3.4 When it is necessary to use cable laid on the ground for emergency use, precaution shall be taken to properly barricade the cable, connections and terminations. Where it is installed across walks or driveways, the cable shall be protected by use of bridging to protect persons and to prevent damage to cable. An energized cable shall not be left unattended unless protected by covering or barricading and proper warning signs. Where any risk is identified to the general public, a qualified employee(s) at the site shall be provided until such time as the site can be completely secured.
- 31.4 Underground Electric Distribution – Location and Identification
 - 31.4.1 Identification signs, markers or tags shall be used to identify or locate cable installations. Improper or missing tags shall be either corrected when found or reported to supervision.

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- 31.4.2 The qualified employee in charge of the work shall review with crew members the location of all energized apparatus and cable terminations in the work area.
- 31.4.3 Class 2 rubber gloves with leather glove protectors shall be worn while cutting, connecting or disconnecting a primary neutral conductor.
- 31.4.4 In wet weather, in addition to the insulated tools, employees shall further protect themselves by wearing Class 2 rubber gloves.
- 31.5 Underground Electric Distribution – Work Rules
 - 31.5.1 Class 2 rubber gloves shall be worn while opening transformers, switchgear or any primary enclosure until an inspection and determination is made that all grounds are intact.
 - 31.5.2 Prior to working on URD cables, padmount and submersible transformers and vault cable connection points, a thorough inspection shall be made for exposed points, such as pulled elbows, tee bodies, uncapped bushings, and damaged equipment that may be energized at 600 volts or more.
 - 31.5.3 Under normal operating conditions and in the absence of any reported fault on the circuit, one qualified employee may install or remove fuses and connect locating equipment in energized, single-phase, dead-front, padmount transformers. One qualified employee also may operate the external switch handle on UED switchgear. If an additional qualified employee is requested, the request for assistance will not be denied. When switching with energized primary elbows, a second qualified employee or an apprentice in the appropriate step shall be required.
 - 31.5.4 One qualified employee may only install or remove 120/240 volt temporary construction services in energized, dead-front, padmount transformers. Reasonable requests for assistance will not be denied. **(Note: Rule Exception – Refer to Appendix 3)**
 - 31.5.5 One qualified employee may, on new construction, install or remove 120/240 volt services up to and including 4/0 services in dead-front padmount transformers if no digging is involved. Reasonable requests for assistance will not be denied. **Note:** subject to OSHA clarification expected in 2010. **(Note: Rule Exception – Refer to Appendix 3)**
 - 31.5.6 Before a transformer enclosure is opened, all unauthorized persons, including private citizens, shall be required to leave the work area and remain clear of all hazards involved in the work.
 - 31.5.7 A cable in a trench shall not be cut until identified and tested to assure it is de-energized and grounded. Prior to cutting, the cable shall be appropriately spiked or the cable shall be cut using a work method that isolates the workers from the cable.

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- 31.5.8 No work shall be performed in energized equipment containing exposed cable or apparatus over 600 volts except with hot line tools.
- 31.5.9 Any work, including the installation or removal of grounds in primary live-front equipment, shall not be done while any cables inside the equipment are energized unless the work area is isolated from energized equipment. If an outage can be arranged on the live-front equipment, the work will be done de-energized. All work on energized primary live-front equipment shall be performed by two qualified employees.
- 31.5.10 All doors to padmounted enclosures shall be firmly restrained while work is being performed.
- 31.5.11 Before cutting a neutral inside a padmount enclosure, a suitable jumper shall be installed.
- 31.5.12 Only elbow connectors designed and approved for load break shall be used to connect or disconnect an energized primary circuit or equipment.
- 31.5.13 UED cables in doubtful condition shall be de-energized before moving.
- 31.5.14 All energized bushings on dead-front equipment shall have in place either an elbow, elbow arrestor, an insulated cap with drain wire connected, or an insulated bushing cover.
- 31.5.15 UED equipment enclosures shall have adequate clearance for opening and closing of doors as well as adequate working space. Doors shall be inspected to assure a tight seal.
- 31.5.16 Elbow cable terminations shall be properly installed at all times on a bushing or parking stand.
- 31.5.17 Cable shall not be pulled through ducts or wire ways occupied by cable energized at over 600 volts or into compartments where there is exposed apparatus energized over 600 volts.
- 31.5.18 Cables energized at 480 volts shall not be connected to or removed from a padmounted transformer while energized.
- 31.6 Underground Electric Distribution – Grounding
 - 31.6.1 All underground cables, circuits and transformers 600 volts and above shall be de-energized, checked for potential and grounded before any work may be done on them.
 - 31.6.2 Both ends of a cable to be worked on shall be grounded before work begins.

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- 31.6.3 If work is to be done on the cable termination, the ground may be removed from that end of the cable provided the opposite end of the cable remains grounded.
- 31.6.4 De-energized cables shall be grounded as close to the work as possible.
- 31.6.5 If it is necessary to test the cable or install fault locating equipment, the grounds shall be removed. After the fault is located, the test equipment shall be removed and the grounds replaced before cable repair work is started.
- 31.6.6 Prior to grounding or installing fault locating equipment on a cable served from a live-front transformer, a cable shall have a visible open on both ends.
- 31.6.7 When work is done on equipment or cables of an underground system, precautions to prevent back feed shall be taken. This shall include grounding and tagging of secondaries where applicable.
- 31.6.8 When polyphase cable damage has been repaired, cables shall be retested, re-energized and phasing verified by the crew doing the work. A circuit found with faulty phasing shall be de-energized, tagged and the Jurisdictional Authority (JA) notified.
- 31.6.9 Approved live-line tools and appropriate PPE shall be used when switching an energized circuit (including secondary breakers) and operating load break devices.
- 31.6.10 Due to loop configurations of UED circuits, disconnect blades or fuses shall be considered energized when in the open position until tested and grounded.
- 31.6.11 When energizing a section of a cable, a pole mounted switch, a pole mounted fuse cutout, or equipment having a fault closing rating shall be used.
- 31.6.12 Switches and fuse/fuse holder assemblies in padmounted or submersible equipment shall not be used to interrupt or pick up load unless they are rated as load interrupting or load pick-up devices.

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32.0 ELECTRIC METERS AND METERING SAFETY RULES

- 32.1 When energizing a socket-type, self-contained meter, the following tests shall be conducted at the meter base before the meter is installed. No meter shall be installed if any of the tests below show abnormal conditions:
- a. Voltage on the line side of the socket shall be verified using an approved voltmeter. Tests shall include both phase-to-phase and phase-to-neutral tests. Verify proper voltage for meter being set.
 - b. Check for potential using an approved voltmeter, on the load side of the meter socket. Tests shall include both phase to phase and phase to neutral tests. No voltage shall be present on load side of meter socket. Exception: Tests conducted on delta systems with network sockets will yield different voltage readings.
 - c. Using an approved tester, check for shorts and or/load.
- 32.2 Wiring circuits connected to energized (live) (or possibly energized) current transformer secondaries shall never be opened at any point until the secondary has been short-circuited between that point and the transformer. Where practicable, the shorts shall be placed at the secondary terminals of the current transformers.
- 32.3 Where current transformers (CT) are installed in an isolated secondary compartment of an energized pad mounted transformer, any work shall require a second meter man or apprentice in the appropriate year or other qualified journeyman/apprentice, with the following exceptions:
- visual observation of CT's for abnormalities,
 - recording name plate data,
 - checking secondary voltage, or installing recorders.
- 32.4 The secondary of a current transformer may not be opened while the transformer is energized. If the primary of the current transformer cannot be de-energized before work is performed on an instrument, a relay or other section of a current transformer secondary circuit, the circuit shall be bridged or shorted so that the current transformer secondary will not be opened.
- 32.5 All instrument transformers used in electric metering circuits shall have their secondary circuits effectively grounded by grounding the common terminal or lead.
- 32.6 All meter sockets, meter enclosures, instrument transformer cases, and conduit runs shall be grounded.
- 32.7 No watt-hour meter shall be installed that has any part of the glass cracked or broken.

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- 32.8 When removing a socket-type meter with broken glass, meter removal device or material-handling gloves furnished for this purpose shall be used. Immediately after removing meter from socket, all broken glass shall be properly disposed of.
- 32.9 Before changing any self-contained, bottom-connected watt-hour meters, the service to the meter shall be de-energized where practicable. Where this is not practicable, as much load as possible shall be removed from the service before the meter is changed.
- 32.10 Where a customer will permit a short interruption of service, bottom-connected watt-hour meters used with current transformers not having a test switch installed as part of the metering equipment shall be changed only after the fused safety switch located ahead of the meter has been opened. A test shall be made to determine that all wires at the meter are de-energized.
- 32.11 Where a customer will not permit any interruption of service, a bottom-connected watt-hour meter used with current transformers not having a test switch installed as part of the metering equipment shall be changed only after shorting the secondary circuits of the current transformers. As each potential lead is removed from the meter, it shall be completely insulated. If an employee requests an outage one will be scheduled.
- 32.12 Minimum of Class 0 rubber gloves with leather protectors shall be worn when operating meter based by-pass switches or levers.
- 32.13 When working on energized meters operating at more than 300 volts, the meter disconnect or clamping lever bypass shall be operated prior to meter removal. If the bypass equipment is not in good working order, is not a clamping lever bypass, is carrying excessive load or does not exist, the meter socket must be de-energized prior to meter removal. The trained and qualified on site employee performing the work will determine equipment serviceability and appropriate action.
- 32.14 Cables or instrument wiring energized at 480 volts shall not be connected or removed while energized. Test instrument leads energized at 480 volts can be connected and removed as needed.
- 32.15 Socket-type watt-hour meters, which are to be used with metering current transformers, shall be installed in sockets equipped with current circuit-closing devices or test switches.
- 32.16 When turning off or on an electric meter that is equipped with a lever-action bypass device, if no load disconnect is accessible (for both turn on and turn off), a socket type breaker equipped device (i.e., EK Disconnect or equivalent) shall be used. The red disconnect adapter also should be used to alert other employees that a disconnect device is present.
- 32.17 Electric – Beyond the Meter Work. This section applies when MidAmerican Energy employees are switching or operating customer owned equipment. See safety rule 29.5.3 for clarification.

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- 32.18 Employees shall not pull electric meters in flood conditions while the meter is energized, including meters located inside customer premises.

33.0 ELECTRIC SUBSTATION SAFETY RULES

33.1 Electric Substation – Definitions

- 33.1.1 Substation – An assemblage of equipment used for the purpose of transmission line termination, switching and/or voltage regulation. May also serve as the source point for distribution feeders.

- 33.1.2 Visible Isolation – For purposes of these rules means a source of isolation of an electrical circuit from a line or piece of equipment. The point of isolation must be visible and characterized by an air gap in the circuit resulting in a visible open. In order to work behind a source of visible isolation, the air gap must be complete with no physical mechanism, insulated or otherwise, bridging the gap. The air gaps must be of sufficient distance to withstand the rated system Basic Insulation Level (BIL). Air gaps shall provide minimum metal-to-metal clearances as outlined by ANSI, ASTM or the manufacturer’s guidelines at the time of installation.

SYSTEM VOLTAGE (KV)	MINIMUM METAL TO METAL AIR GAP (INCHES)	
	SINGLE BREAK	DOUBLE BREAK
4	7	--
13	10	--
34.5	18	12
46	22	15
69	32	22
161	60	38
345	104	57

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33.2 Electric Substation – General

- 33.2.1 Gates to all operating substations shall be closed and locked. When company personnel are present, the gate may be left unlocked, however the gate must be closed and, if so equipped, the gate must also be latched or fastened, unless constant control of ingress/egress is maintained.
- 33.2.2 Precautions should be taken when setting ladders inside substations on rock or gravel. Employees will not climb straight ladders placed on these surfaces without another employee holding the ladder until the ladder is tied off.

33.3 Electric Substation – SF-6 - Sulfur Hexafluoride Gas

- 33.3.1 Current technical and governmental guidelines will be followed to prevent creating any hazards in the use and disposal of gas by-products.
- 33.3.2 All compressed gases are to be stored, transported, and handled only in cylinders or containers that are fabricated, tested, maintained, and marked in accordance with the requirements of the Department of Transportation (DOT). SF-6 gas is supplied in pressurized cylinders in accordance with industry and DOT standards regarding compressed gases.
 - a. Cylinders are never to be left stored insecurely and should always be stored in ventilated area where escaping SF-6 gas cannot accumulate.
 - b. Personnel shall refrain from smoking and using arc-producing equipment in the area while SF-6 gas is being handled.
 - c. SF-6 should only be handled outdoors unless ventilation equipment is present during the filling and retrieval of SF-6 filled equipment.
 - d. If arc by-products are found upon opening a SF-6 vessel, personnel are to create a safety zone around equipment and clean up all arc products prior to performing maintenance. Appropriate PPE (coveralls, gloves, respirators, masks) shall be worn.
 - e. Equipment should be purged with dry air and continuously ventilated while personnel are working on the apparatus. Confined Space Entry Procedures, which meet minimum OSHA requirements, are to be followed where breakers are able to be bodily entered.

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33.4 Electric Substation - Substation Equipment Operating Rules

- 33.4.1 At a minimum, Class 0 rubber gloves shall be worn when working on any exposed conductor or equipment at voltages between 50 and 600 volts to ground except when the employee is insulated or isolated from potential differences.
- 33.4.2 Before any attempt is made to do electrical work, other than on low voltage control devices, circuit breakers shall be cleared from the line in accordance with the General Switching Procedures. Proper precautions shall be taken to prevent unauthorized or accidental operation.
- 33.4.3 Manufacturer operating instructions that relate to the specific piece of equipment shall be observed and all required personal protective equipment shall be worn.
- 33.4.4 Where circuit breakers are operated by stored energy devices such as springs, solenoids, or compressed air, proper precautions shall be taken to prevent accidental operation of the device.
- 33.4.5 The secondary of a current transformer shall not be opened while energized. If the entire circuit cannot be properly de-energized before working on an instrument, a relay, or other section of a current transformer secondary circuit, the employee shall bridge the circuit so that the current transformer secondary will not be opened.
- 33.4.6 When working within an energized substation, under a designated clearance boundary, work areas within the clearance boundaries shall be clearly identified using high visible marking equipment, including tape, flags, cones or barricades. If the work location involves aerial work, additional consideration shall be given to making a three dimensional work location.
- 33.4.7 Every employee working on or about equipment or lines exposed to voltages higher than those guarded against by the safety appliances provided shall protect themselves from dangerous leakage or induction by application of grounds.
- 33.4.8 Employees should not work on equipment or lines in any position from which a shock or slip will tend to bring the body toward exposed parts at a potential different than the employee's body. Work should, therefore, generally be done from below rather than from above.
- 33.4.9 Whenever it becomes necessary to open or sever a portion of a substation grounding grid that will remain connected to the grounding system, a temporary bypass or jumper shall be installed across the point to be opened before the open is made. Class 2 rubber gloves shall be worn when cutting or disconnecting the ground wire, or remote cable cutters will be used.

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33.4.10 Two qualified employees shall be used while racking in or out breakers above 480 volts.

33.5 Electric Substation - Operating - Power Lines and Equipment Clearances

33.5.1 The control of System Operations or the appropriate jurisdictional authority over transmission lines and substation equipment starts when that line or piece of equipment is in such a position that it can be energized from the existing system. Clearance on substation and transmission lines and equipment under the responsibility of System Operations or the appropriate jurisdictional authority shall be requested and executed by following the General Switching Procedures in conjunction with 29 CFR 1910.269(m).

33.5.2 In an emergency, to protect life or property, a qualified employee may open circuits and stop moving equipment without special authorization if, in his judgment, his action will promote safety. System Operations or the appropriate jurisdictional authority shall be notified as soon as possible of such action, with reasons therefore.

33.5.3 When the Jurisdictional Authority is required to issue a Clearance or Hot Line Warning on a facility that is not completely under his/her jurisdiction, a Hold Order must be obtained from the Jurisdictional Authority responsible for the equipment outside his/her area of responsibility. The Hold Order must state the equipment is properly cleared and tagged and will not be altered until the Hold Order is released. This may be another MidAmerican Energy Jurisdictional Authority, foreign utility or a private company or individual.

33.6 Electric Substation – Grounding

33.6.1 Grounding Requirements (exceptions to Section 27.0):

- a. All equipment or lines that have been isolated and tagged must be treated as energized until the testing and grounding procedures have been completed. Exception: If the placement of grounds is impractical or creates a more hazardous situation, equipment and lines may be treated as de-energized provided all of the following conditions apply.
- b. The equipment's isolating devices are visibly open and under the control of the crew in charge of the clearance.
- c. There is no possibility of contact with another energized source.
- d. The hazard of induced voltage is not present.

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33.7 Electric Substation – Capacitors

- 33.7.1 When the rack mounting the capacitor unit(s) is insulated from the ground, the rack must be considered energized (live). It shall be clearly marked with signs, red tape, or red paint to point out that the rack is to be considered energized. The structural members which support the insulated rack shall be grounded. In addition, if the insulated rack is pole- or structure-mounted, adequate climbing space must be provided between the pole or structure and the insulated capacitor rack, and suitable "danger" signs must be mounted on the frame in a position visible to anyone climbing on the pole or structure.
- 33.7.2 When a capacitor unit(s) installation is at or near ground level, it shall be enclosed in a housing equipped with locks or surrounded by a suitable fence equipped with locks. Such housing or fencing shall be grounded and clearly marked by "Danger" signs.
- 33.7.3 An energized (live) capacitor or coupling capacitor device must be treated the same as any other energized device. No capacitor shall be worked on until it has been disconnected from its source, its isolating device opened, and the capacitor(s) properly discharged and grounded. Multiple-stacked coupling capacitor potential devices shall be discharged at the metal-flanged interconnection between capacitor units, in addition to grounding the phase bus and potential transformer tap within the cabinet.

34.0 NETWORK UNDERGROUND ELECTRIC SAFETY RULES

34.1 Network Underground Electric – Definitions

- 34.1.1 Work on Cable – Means anything which requires workers to remove portions of cable construction.
- 34.1.2 Quick Make Operator - A switch operating mechanism that ensures a minimum contact closing speed independent of the movement of the operating handle.
- 34.1.3 Single Open – An opening in an electrical circuit which is designed to withstand the rated system Basic Insulation Level (BIL).
- 34.1.4 Double Open – A double open in an electrical circuit shall consist of one of the following:
- a. An opening which will withstand twice the rated system BIL and requires two independent operations to close the circuit.
 - b. An opening that has a grounded metallic barrier separating the open contacts, is able to withstand rated system BIL from each contact to ground, and requires two independent operations to close the circuit.

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- c. Two separate devices in series, each of which is capable of withstanding the rated system BIL.
- 34.1.5 Network Protector – An electrically operated low voltage circuit breaker with self-contained relays that connects a network secondary system to a source.
- 34.2 Network Underground Electric – Moving Energized Primary Cable
 - 34.2.1 Employees shall not straighten or reverse a bend in a cable or attempt to move a cable where excessive bending is necessary or there is any evidence of a cable defect. Enough fireproofing shall be removed so that the cable can be carefully examined for defects which might develop into a fault if disturbed. Energized primary cables shall be moved only by a cable splicer or another employee who is qualified by similar training and experience.
 - 34.2.2 If reclosing is enabled, it shall be disabled and hot line warning established prior to working on any primary circuit.
 - 34.2.3 Any primary network cable found to be in a suspect or doubtful condition should not be handled or moved prior to de-energization.
- 34.3 Network Underground Electric – Furnaces
 - 34.3.1 Furnaces shall be located far enough from the workmen in a manhole to prevent solder or compound from flowing into the work area in the event of upsets or spillage.
 - 34.3.2 Cold solder scraps or ladles shall never be placed in a hot solder pot until the chill and any moisture have been removed from the scraps or ladle.
 - 34.3.3 The side of a compound container shall be preheated before placing container on furnace.
 - 34.3.4 Solder shall not be poured into a recess containing moisture.
 - 34.3.5 Suitable PPE shall be worn when handling hot solder or compound.
- 34.4 Network Underground Electric - Pulling Cable
 - 34.4.1 When pulling cable, precautions shall be taken against the worker becoming caught in cable sheaves, lashing or winch gear. Whenever possible all employees shall stand clear of the pulling line when under tension.

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- 34.4.2 When pulling operations involve heavy pulling tension, employees, where possible, shall vacate the manhole or vault during the operation. Otherwise, the employee shall position himself as clear as possible from the pulling line.
- 34.5 Network Underground Electric - Work on Energized Cables
- 34.5.1 All underground cables energized at a voltage above 600 volts nominal shall be de-energized before work on cable is started.
- 34.6 Network Underground Electric - Work on De-Energized Cables
- 34.6.1 All equipment or lines which have been isolated and tagged must be treated as energized until the testing and grounding processes have been completed.
- 34.6.2 Exception: If the placement of grounds is impractical or creates a more hazardous situation, equipment and lines may be treated as de-energized provided all of the following conditions apply:
- a. The equipment's isolating devices are visibly open and under the control of the crew in charge of the clearance.
 - b. There is no possibility of contact with another energized source.
 - c. The hazard of induced voltage is not present.
- 34.6.3 Where system design makes compliance with Section 27.0 impossible, the following rule shall apply:
- 34.6.3.1 Where it is not feasible to either ground or establish a double open, it is permissible to work behind a single open. If the single open consists of an oil filled device, the oil shall have been tested or changed out within the previous 24 months. There shall be no evidence of a potential defect or failure present in the device providing the single open.
- 34.6.4 Prior to manually cutting a high voltage cable the cable shall, where possible, be tested for potential by spiking remotely from outside the manhole or vault. Where this is not possible, a short section of the shielding or lead shall be removed and tests made with an approved testing device to determine whether or not the cable is de-energized. All appropriate PPE shall be worn during the testing operation.
- 34.7 Network Underground Electric - Underground Equipment Operating Rules
- 34.7.1 When any switches are operated, all required personal protective equipment shall be worn.

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34.7.2 Primary Switches - Oil Break, Switches

34.7.2.1 All underground oil break switches (except switches integral to network transformers) not equipped with a quick-make operator shall be operated from outside the vault or manhole when any circuit to the switch is energized.

34.7.2.2 All underground oil break switches equipped with a quick-make operator shall whenever possible be operated from outside the vault or manhole when any circuit to the switch is energized. When it is not possible to operate from outside the manhole or vault, special precautions shall be taken to assure the correct switching sequence is followed and all required personal protective equipment shall be worn.

34.7.3 Vacuum, Air, or SF6 Break Switches

34.7.3.1 The operating instructions that relate to the specific switch shall be observed and all required personal protective equipment shall be worn.

34.7.4 Switches integral to network transformers.

34.7.4.1 Prior to operating the transformer primary switch, the worker shall verify that the associated network protector is open.

34.7.4.2 Closing to the ground position shall only be performed after the worker has verified that the transformer is de-energized with the switch in the closed position. This shall only be done by verifying zero voltage on all three phases of the transformer secondary or after another ground has been placed on the primary. Whenever possible, the primary circuit should be de-energized before operating the transformer switch.

34.7.4.3 Energizing a transformer for the first time, or after repairs or changes have been made, shall be performed remotely from the vault with all personnel having been removed from the vault. No person shall enter the vault until the transformer has been energized for at least five minutes.

34.8 Network Protectors

34.8.1 No protector shall be put in service energized until it has been tested at normal operating voltage.

34.8.2 No energized in service protector shall be manually tripped except when the enclosure door has been cracked open for ventilation but still closed and secured.

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- 34.8.3 The protector door shall be appropriately secured until the protector contacts are open and the operating handle placed in the manually open position. Further precautions deemed necessary by the crew doing the work can be done at this time.
- 34.8.4 Whenever the door of an energized network protector is opened workers shall wear appropriate PPE.
- 34.8.5 If a network protector fails to trip when a feeder breaker is opened, the following procedures shall be followed:
 - a. The feeder shall be re-energized.
 - b. The protector shall be placed in the manual open position and the contact operation verified.
 - c. The feeder shall be de-energized and the transformer primary switch opened.
 - d. Before the protector is returned to service, the cause of the malfunction shall be determined and corrected.

34.9 480 Volt Circuits

- 34.9.1 This section applies to all network equipment, cables, and circuits operating at a nominal phase-to-phase voltage between 300 volts and 600 volts.
- 34.9.2 Whenever possible, work on this cable or equipment shall be done with the circuit de-energized.
- 34.9.3 Cables shall not be connected to or removed from a network protector or transformer while energized.
- 34.9.4 No work shall be undertaken on an energized 480-volt network bus unless the bus is protected by ground fault relaying and the relaying is tested immediately prior to beginning work.
- 34.9.5 While working 480 volt energized equipment, two qualified employees will be present.

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GAS

40.0 GAS OPERATIONS SAFETY RULES

40.1 Planned work on gas facilities shall incorporate procedures to shut off or minimize the escape of gas. No portion of a pipeline, large service or main shall be cut under pressure, unless the flow of gas is shut off or minimized by the use of line valves, line plugging equipment, bags, stoppers or pipe squeezers. Where 100% shutoff is not attained, the following precautions are recommended:

- a. For a non-explosive, oxygen deficient atmosphere, the use of personal protective equipment (PPE), including a respirator must be used if the employee chooses to enter the area.
- b. Plan the job to minimize the escape of gas and sequence steps to limit the time and amount of gas to which personnel are exposed.
- c. The size and position of the cut should allow the gas to vent properly even with an employee in the excavation.
- d. If the atmosphere tests less than 80% LEL and greater than 19.5% oxygen, then work may proceed in a normal manner. If the atmosphere tests greater than 80% LEL or less than 19.5% oxygen, then either:
 1. Make reasonable efforts to stop the flow of gas remotely before entering the trench or excavation; or
 2. Ventilate to maintain or bring the atmosphere within safe limits before entering the trench or excavation; or
 3. Wear appropriate PPE, including approved supplied air respirators, approved gas extraction suit, and rescue harness and line before entering the hazardous atmosphere.

An employee may refuse to enter the area with the PPE referenced in paragraph 3. above due to Immediate Danger to Life and Health (IDLH).

- e. Employees shall not enter any bell whole, manhole or trench unless there is at least one employee for every employee in the hole who is in a position and equipped to render assistance.
- 40.2 There shall be no open flame, or creation of sparks in any area where any explosive mixture is present. All electronic devices brought into the area must be intrinsically safe, and cannot be allowed to cause distractions. The existence or absence of an explosive mixture shall be confirmed by test with a company approved gas detection tester.

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- 40.3 At least two operator qualified employees shall be present at all times where a pressurized gas line must be opened for maintenance or repairs. The employees shall not leave their post until the gas line has been secured and employees are clear. Exception: Purging of gas service lines.
- 40.4 Tapping and stoppering equipment shall only be handled by employees trained in its use. Only explosion proof equipment shall be used under hazardous conditions. When using motor assisted tapping equipment without feed assist, there shall be two operator qualified employees operating the equipment, plus a third person as a fire watch.
- 40.5 Bags and stoppers must be used according to manufacturer's recommendations.
- 40.6 Employees shall not enter any bell hole, manhole or trench unless there is at least one other qualified employee who is in a position and equipped to render assistance.
- a. The second employee shall be outside the excavation and is considered to be in position to render assistance if they are within sight and talking distance of the person in the excavation. The second employee is considered to be equipped to render assistance if able to summon emergency assistance without leaving sight and talking distance of the person in the excavation. The competent person will determine if the assistance is adequate for the work and site conditions. Job conditions that require fire watch, as covered by rule 40.3, require the second employee to be continuously in position at the edge of the excavation with a fire extinguisher.
- 40.7 Use of manual tapping equipment ¾" to 2" operating at 70 pounds or below, and stop changers shall be performed by or under the direction of two employees, one of whom must be operator qualified (2 journeymen, or 1 journeyman and 1 apprentice at the appropriate step).
- 40.8 All stoppering devices shall be inspected prior to use and those showing signs of deterioration shall be tagged as defective, removed from service and reported to the relevant supervisor.
- 40.9 Bags shall not be left in service unattended. Plugs, stoppers and squeeze-offs shall not be left in service unattended overnight with open end of pipe.
- 40.10 Bypass installations shall be clear of the work area and protected from damage.
- 40.11 Whenever a section of metallic pipe carrying gas is to be cut by means other than a torch, a metallic electric bond or jumper shall be established across the point where the cut is to be made; follow the procedures set forth in the MidAmerican Energy Gas Operating Standards, section G1.30.

Consolidated Safety Rules

- 40.12 When working with meters and pressure regulators, special precautions need to be taken if employee(s) suspect or encounter mercury. Only qualified employees shall work on meters and regulators containing mercury. The MidAmerican Energy Hazard Communication Right-to-Know Program, which meets minimum OSHA requirements, provides additional personal safety information. MidAmerican Energy Environmental Services should be contacted for additional clean-up information.
- 40.13 When an employee is working on the ground in the vicinity of overhead lines, minimum clearance distances shall be 20 feet unless verified to allow distances based upon the OSHA guidelines below:
- For voltages to ground 50kV or below – 10 feet (305 centimeters);
 - For voltages to ground over 50kV – 10 feet (305 centimeters) plus 4 inches (10 centimeters) for every 10kV over 50kV.

41.0 GAS OPERATIONS – FIRE PROTECTION

- 41.1 Adequate fire prevention methods shall be used at all times.
- 41.2 Smoking shall be prohibited in bell holes, vaults or any other place where gas may be present in the atmosphere.
- 41.3 When purging a gas main or service, it should be grounded to prevent static build-up. Metallic fittings shall be used to direct the gas away from buildings or electrical installations.
- 41.4 A fire extinguisher, of the proper type, shall be available at the work site at all times and shall be removed from the vehicle and attended as conditions warrant.
- 41.5 When welding or fusing is done on any gas main under pressure, a qualified employee shall be stationed outside and upwind of the hole with an approved fire extinguisher and keep the employee performing the task in view at all times.
- 41.6 Where personnel are exposed to the potential hazard of escaping gas or fire, such as major leaks, tie-ins or similar work, a qualified employee shall be stationed upwind of the work area with an approved-type fire extinguisher and keep the exposed personnel in view at all times.

42.0 ODORANT

- 42.1 Odorant shall be handled as a flammable liquid.
- 42.2 Employees shall contact the relevant supervisor in the event of a leak or spill. Odorant shall be neutralized or cleaned up immediately. Employees should avoid inhalation, contact with the skin or eyes, and ignition sources.

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- 42.3 An employee must be alert to the hazard of a gauge glass shattering under pressure. All single tubed site glasses shall be suitably protected and such shields kept in place except when work is actually being done upon the gauge.
- 42.4 Before any work, repairs or filling are attempted on an odorizer, a fire extinguisher of the proper type shall be available at the work site at all times, and shall be removed from the vehicle and tended by a second person whenever flaring or working with open liquid odorant.
- 42.5 When conditions require venting pressure to atmosphere during odorant transfer or maintenance operations, the gas shall be vented or flared as outlined in

MidAmerican Energy Gas Operating Standards, section G45. A site specific JSA shall be completed prior to starting the work to identify and address the risks. The burn-off hose shall be no shorter than 20 feet in length and shall have a stand no less than 6 ½ feet high.

- 42.5.1 When venting operations are conducted through a control valve only, the fire extinguisher shall be removed from the vehicle and tended by a second employee. When venting operations are conducted through a control valve and a permanent stack, the second employee is not mandated.
- 42.5.2 When flaring operations are conducted, the gas valve controlling the flare and the fire extinguisher shall be tended during the entire flaring process. At least two people must be on site when flaring operations are conducted. There shall be no open flame, smoking or creation of sparks in any area where any explosive mixture is present. The existence or absence of an explosive mixture shall be confirmed by test with a company-approved gas detection tester.
- 42.6 Due consideration shall be given to wind direction and any other condition that may exist that could cause an immediate hazard.
- 42.7 When filling odorant storage tanks, the transport vehicle shall be effectively grounded and wheels chocked.
- 42.8 No tool shall be left hanging on any valve when not in use.
- 42.9 Approved goggles or face shields must be worn when handling odorant.

43.0 GAS DISTRIBUTION AND TRANSMISSION ENCLOSURES (BUILDINGS, REGULATOR AND VALVE VAULTS AND PITS)

- 43.1 Entry into gas distribution and transmission vaults and pits for regulators and valves is regulated by Department of Transportation and the procedures are covered in this section.

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- 43.2 A “Safe Atmosphere” is an area that when tested by an approved and properly calibrated test device, confirms that concentrations of the gases are as follows:
- Oxygen > 19.5% and < 23.5%
 - Hydrogen Sulfide less than 10 pp
 - Carbon Monoxide less than 50 ppm
 - Flammability levels less than 80% LEL
- 43.3 When working in meter or border station buildings or similar areas, consideration must be given to maintaining a safe atmosphere. Adequate ventilation shall be provided using blowers if necessary.
- 43.4 Gas Distribution Vault/Pit Entry Procedure
- 43.4.1 Engine exhausts shall be kept away from the space opening.
 - 43.4.2 All sources of ignition should be kept away from the work area, except as may be required in the performance of the work.
 - 43.4.3 When working in vaults and pits, employees shall not work less than two in a crew. One employee shall be on the outside in a position and equipped to render assistance.
 - 43.4.4 Before a cover is removed, the atmosphere shall be tested by inserting a probe through available vent holes, peg holes, or lifting cover slightly to insure a safe atmosphere. If a safe atmosphere does not exist, remove cover and ventilate immediately.
 - 43.4.5 When covers are removed, care shall be used and covers laid flat and not propped up. Open pits should be barricaded. Protective barriers or suitable guards and warning signs shall be erected before removing manhole covers in places accessible to vehicular or pedestrian traffic.
 - 43.4.6 If a safe atmosphere exists, remove the cover and test the atmosphere at various depths, minimum top, middle and bottom. If a safe atmosphere does not exist, ventilate immediately.
 - 43.4.7 If a safe atmosphere exists without ventilation, the employee may enter the space.
 - 43.4.8 If a safe atmosphere is established within 15 minutes after the beginning of ventilation and is maintained 15 minutes after ventilation is stopped, continuous ventilation is not required.

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43.4.9 Do not enter if ventilation must be left on.

43.4.10 Atmosphere monitoring shall continue for the duration of the entry.

43.4.11 If a safe atmosphere cannot be established by ventilation, and is either flammable or oxygen deficient, subsequent entry shall only proceed by following the provisions of the MidAmerican Energy Confined Space Entry Program, which meets minimum OSHA requirements.

44.0 WADING SAFETY

44.1 Wading should be avoided if possible.

44.2 Extreme caution shall be used when wading. A probe stick shall be used to determine safe areas of passage. Consideration shall be given to current, depth, and terrain.

44.3 Hip boots/waders and an approved life jacket shall be worn while wading when the employee is working in water that poses a drowning hazard.

44.4 Employees shall not wade into flooded areas unless there is at least one other qualified individual who is in a position and equipped to render assistance.

44.5 A minimum of a cell phone is mandatory/radio use might be necessary in some locations.

44.6 The maximum depth of water an employee should be wading in is at a point midway between the knee and waist.

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GENERATION

50.0 GENERAL

- 50.1 Employees shall not ride a coal-handling conveyor belt at any time. Employees shall not cross over the conveyor belt, except at walkways, unless the conveyor's energy source has been de-energized and has been locked out or tagged.
- 50.1.1 No one shall work on, over, under or in close proximity to conveyor belts while in operation, except when performing maintenance activities that would require belts to be run, for example training of conveyor belts will be excluded from this rule.
- 50.2 Only qualified employees may operate railroad equipment. Before a main-line engine or plant locomotive under locomotive power approaches a dedicated crossing, a horn or whistle shall be used to warn employees in the area. This does not apply to trains under train positioner control.
- 50.3 No flying switches shall be made. Employees performing switching operations shall communicate by radio or hand signaling.
- 50.3.1 When performing switching for plant locomotives, switchmen may ride on the side ladder of cars provided there is adequate clearance throughout the entire route.
- 50.4 Employees shall not be allowed on the rotary dumper unless it has been properly isolated. Employees shall not enter the dumper path unless it has been properly isolated and all hazardous energy has been blocked or controlled. Employees shall not be allowed on the positioner unless the positioner drive has been properly isolated, or the positioner is designed to be occupied while in motion. Employees shall not be on cars unless the positioner has been isolated.
- 50.5 When utilizing a main-line train engine or plant locomotive to unload or position/spot coal cars, the fuel handling technician shall maintain radio contact with the engine operator.
- 50.6 When it is necessary for an employee to get onto or in between coal cars to perform work, the train shall be parked and the brakes locked before any work begins.
- 50.7 Employees shall only cross trains at walkways where provided, except as allowed in Rule 50.6 above.
- 50.8 Employees shall keep clear of the path and pinch points of the car hopper doors.
- 50.9 An employee entering a bunker or silo shall follow the confined space entry procedure.
- 50.10 An employee may not work on or beneath overhanging coal in coal bunkers, coal silos or coal storage areas, unless the employee is protected from all hazards posed by shifting coal.

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- 50.11 All coal conveyors that start automatically or remotely shall have a start warning horn or similar device giving an audible warning all along the conveyor system to employees that the conveyor is about to start. The warning shall be recognized for its purpose and sounded far enough in advance to allow personnel to move clear.
- 50.12 When operating the vacuum truck, three qualified people will be used. **Exception:** Two qualified employees may be used when visual contact and a reasonable distance is maintained between the hose operator and the truck operator.
- 50.13 Seat belts will be worn in vehicles and on mobile equipment with rollover protection when provided (ROPS).
- 50.14 Supply employees shall use approved spoggle-type full-seal eyewear or other eye and face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acidic or caustic liquids, chemical gases or vapors, or potentially injurious light radiation as based on the certified Personal Protective Equipment Hazard Assessments and as identified on the Job Safety Analysis.
 - 50.14.1 Goggles may be used in lieu of spoggles or in addition to spectacles (safety or otherwise) for corrective lenses.
 - 50.14.2 Full-face respirators can also provide full-seal eye protection. However, full-face respirators cannot be worn over regular spectacles that utilize temple pieces or other devices that interfere with the proper seal of the respirator. Spectacle kits for the respirator will be required if corrective lenses are needed by the wearer.
 - 50.14.3 Where spoggle-type full-seal safety eyewear is determined to present a hazard greater than the protection it is intended to provide, other safety eyewear shall be donned. Each such case requires supervisor approval, shall be assessed independently and documented on the JSA where two or more employees are working together. The hazards and alternatives shall be discussed during the job brief.

51.0 HAZARDOUS ENERGY CONTROL

- 51.1 Whenever work is to be performed on equipment, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained or otherwise rendered safe according to the MidAmerican Energy Isolation and Control Program for Supply, which meets minimum OSHA requirements, and is approved by the General Safety Committee.
- 51.2 All generation site employees shall be trained in the hazardous energy control program approved by the General Safety Committee.

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52.0 SAFETY VALVES

- 52.1 During normal operation, do not lock or gag a safety valve unless engineering review determines there are redundant safety valves with adequate flow capacity and the applicable code allows it.
- 52.2 Do not work in the safety valve outlet path when valve is under pressure or could be pressurized.

53.0 INTERLOCKS AND MACHINE GUARDING

- 53.1 No equipment shall be left unattended and in an operable state with the protective device removed unless the area is properly secured.
- 53.2 No safety feature on any operating equipment shall be voided or bypassed except for test, repair or adjustment of the device. No person may circumvent/disable any safety system for test, repair or adjustment of the device without the full knowledge and consent of the supervisor in charge of the operation of the equipment.
- 53.3 No applicable guard on any operating equipment shall be removed except for testing, repair or adjustment of the equipment.
- 53.4 Guarding shall comply with all Local, State and Federal Regulations.

54.0 ELECTRIC SAFETY RULES FOR GENERATION EMPLOYEES

- 54.1 General Requirements
 - 54.1.1 Only qualified employees (i.e. a journeyman, or a journeyman and an appropriate step apprentice) may work on or with exposed energized lines or parts of equipment.
 - 54.1.2 Only qualified employees may work in areas containing unguarded, uninsulated energized lines or parts of equipment operating at 50 – 600 volts.
 - 54.1.3 All qualified employees under Section 54.0 shall have demonstrated proficiency and be up to date in CPR methods.
 - 54.1.4 Electric lines and equipment shall be considered and treated as energized unless properly isolated in accordance with the MidAmerican Energy Isolation and Control Program for Supply, which meets minimum OSHA requirements.

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- 54.1.5 When passing any switch board, relay cabinets, panels, machine or other electrical apparatus, employees shall make every reasonable attempt to avoid touching any part or allowing metal tools to come in contact with the apparatus.
- 54.1.6 The employee shall ensure that connections are made as follows:
 - a. When connecting de-energized equipment or lines to an energized circuit by means of a conducting wire or device, an employee shall 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 shall remove the source end first.
 - c. When lines or equipment are connected to or disconnected from energized circuits, loose conductors shall be kept away from exposed energized parts.
- 54.1.7 If one or more employees are sent to perform work and it is determined it would be unduly hazardous to proceed, the employee(s) shall call for additional help and shall not proceed until additional help is obtained. Any reasonable request for qualified assistance will not be denied.
- 54.2 A documented Job Safety Analysis shall be completed by the employee in charge to ensure all employees involved in the work are familiar with the tasks involved. The JSA should include:
 - a. Hazards associated with the job.
 - b. Work procedures involved.
 - c. Special precautions.
 - d. Energy source controls.
 - e. Personal protective equipment requirements.
 - f. Additional briefing is required if there is a change in the previously discussed work plan, or if new or unfamiliar employees become involved in the work plan.
- 54.3 Working in proximity to exposed energized hazards
 - 54.3.1 Definitions
 - 54.3.1.1 Exposed conductor is defined as not isolated or guarded. A device or conductor is exposed unless:

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- a. It is operated under 600 volts and is properly insulated.
 - b. It is operated over 600 volts and is properly insulated and shielded.
 - c. It is covered with approved protective equipment.
- 54.3.2 Working in proximity is working outside the minimum approach distances as recognized in Table 54.5.10.
- 54.3.2.1 Qualified personnel working outside the minimum approach distance as outlined in Table 54.5.10 is considered working within proximity to exposed energized hazards:
- 54.3.2.2 Equipment energized less than 600 volts – Employee(s) shall take necessary precautions to recognize and mitigate the risk through the proper use of work procedures, tools, cover-ups and PPE. Equipment insulation shall not be relied upon for personnel safety until the equipment has been inspected and insulation integrity determined to be intact.
- 54.3.2.3 Non-electric qualified personnel working within proximity to exposed energized hazards shall be under the direction of a qualified electrical worker unless:
- a. The work area is beyond 8 feet from exposed (un-insulated) energized parts operating at 50-150 volts, and the possibility of contacting or dropping items onto energized equipment has been eliminated.
 - b. The work area is beyond 8 feet from exposed (un-insulated) energized parts operating at 151-600 volts and the work area is guarded providing a physical barrier between the work area and the exposed energized equipment.
 - c. The work area is beyond 8 feet from exposed (un-insulated) energized parts operating more than 600 volts or the energized equipment is enclosed within a grounded metal enclosed housing. The housing or equipment must be designed with openings so that foreign objects inserted in these openings will be deflected away from energized parts.
- 54.3.2.4 Any work completed within an energized substation yard performed from an elevated lift or ladder shall be completed under the direction of a qualified electric worker.

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- 54.3.3 Employees shall make sure there are no inadvertent accidental ground paths when working in or near proximity to exposed energized wires or equipment.
 - 54.3.4 Only insulated blocks, hoists, or hand-lines will be used for work in proximity to lines or parts energized at 50V or more. All ropes shall be of synthetic material with good di-electric properties.
 - 54.3.5 If an employee is sent to perform work in proximity to energized parts or facilities, and determines that it would be unduly hazardous to proceed, the employee shall call for additional help and shall not proceed until additional help is obtained. Request for qualified assistance will not be denied. In the case of emergency where danger to life would be aggravated by delay in waiting for the arrival of the additional help, the hazard may be cleared by de-energizing the equipment if this can be done without endangering the employee involved.
- 54.4 Works upon Facilities Energized between 50 and 600 Volts
- 54.4.1 At a minimum, class 0 rubber gloves (750V rating) shall be worn when working on any conductor or equipment at voltages between 50 and 600 volts to ground except when the employee is insulated or isolated from potential differences.
 - 54.4.2 Equipment energized less than 600 volts – Employee(s) shall take necessary precautions to recognize and mitigate the risk through the proper use of work procedures, tools, cover-ups and PPE. Equipment insulation shall not be relied upon for personnel safety until the equipment has been inspected and insulation integrity determined to be intact.
 - 54.4.3 Employees shall make sure there are no inadvertent accidental ground paths when working on exposed energized wires or equipment.
 - 54.4.4 When an employee performs work within reaching distance of exposed energized parts of equipment, the employee must remove or render nonconductive all exposed conductive articles, such as key chains or watch chains, rings, or wrist watches or bands, unless such articles do not increase the hazards associated with contact with the energized parts.

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- 54.4.5 Only insulated blocks, hoists, or hand-lines will be used for work on lines or parts energized between 50V and 600V. All ropes shall be of synthetic material with di-electric properties.
 - 54.4.6 If one or more employees are sent to perform work upon facilities energized between 50V and 300V, and it is determined that it would be unduly hazardous to proceed, the employee(s) shall call for additional help and shall not proceed until additional help is obtained. Any request for qualified assistance will not be denied. In the case of emergency where danger to life would be aggravated by delay in waiting for the arrival of the additional help, the hazard may be cleared by de-energizing the equipment if this can be done without endangering the employee(s) involved.
 - 54.4.7 When work requires the second employee to assist the first employee, care shall be taken to ensure they both work on wires or parts of the same phase or polarity to avoid harmful voltage differences between energized conductors or parts. Before such two person work is commenced, the employees shall arrange themselves in such a position that the presence of the second person does not increase the level of hazard from the energized parts or conductors.
 - 54.4.8 Employees shall not place dependence for their safety on the manufactured insulated covering of conductors, or primary cables, even though the insulation appears to be perfect. Similarly, employees will not place dependence for their safety on the untested assumption that equipment, which is an integral part of electrical plant, is at the expected de-energized voltage or potential. Electrical plant includes underground and overhead transformers, switchgear (circuit breakers, fuses, isolators and disconnects) and all electrical enclosures.
- 54.5 Works upon Plant Facilities Energized above 600 Volts
- 54.5.1 General Requirements
 - 54.5.1.1 The term PRIMARY AREA as used in the following rules is the area from which a person can reach, slip or fall into any conductor or equipment energized at more than 600 volts.
 - 54.5.1.2 Before entering a PRIMARY AREA to work on any conductor or equipment, employees will put on rubber sleeves and rubber gloves.

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- 54.5.1.3 Before any work is started on conductors or equipment in a PRIMARY AREA, all conductors and equipment which a person can reach, slip, or fall into will be covered with dielectric equipment, except the conductor or equipment actually being worked on and that will be covered as much as possible without interfering with the work.
- 54.5.2 Contact with cover-up equipment on energized equipment shall not be made intentionally by any part of the body other than by rubber gloves.
- 54.5.3 Consideration shall be given to the feasibility of de-energizing the circuit for work, or 'hot sticking' the circuit before rubber gloving work is selected as the work method to be used. If in the opinion of the individual doing the work, any conditions present a hazard to safe rubber gloving procedure, alternate methods will be used.
- 54.5.4 At a minimum, class 2 rubber gloves (20kV rating) shall be worn when working on any exposed conductor or equipment energized at voltages above 600 volts to ground.
- 54.5.5 Two employees shall be used while racking breakers above 600 volts in or out, unless a remote mechanical device is used. When two or more people are used, one person must be at the required distance of clearance.
- 54.5.6 Employees shall not stand on or otherwise be in contact with transformer cases or other similar equipment while working on energized wires or equipment.
- 54.5.7 Jewelry, rings and watches shall not be worn while performing work by rubber glove techniques.
- 54.5.8 Only insulated blocks, hoists, or hand-lines will be used for work in proximity to lines or parts energized to 600V or above. All ropes shall be of synthetic material with good dielectric properties.
- 54.5.9 If two or more employees are sent to perform work upon facilities energized at 600V or above, and the employees determine that it would be unduly hazardous to proceed, the employees shall call for additional help and shall not proceed until additional help is obtained. Any requests for qualified assistance will not be denied. In the case of emergency, where danger to life would be aggravated by delay in waiting for the arrival of the additional help, the hazard may be cleared by de-energizing the equipment if this can be done without endangering the employee(s) involved.

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54.5.10 The following minimum safe work distances from energized conductors or equipment will be maintained:

TABLE 54.5.10
AC Live-Line Work Minimum Approach
Distance

Voltage in kilovolts phase-to-phase ^{① ② ③}	Distance to employee ^④					
	Phase-to-ground			Phase-to-phase		
	(m)	(ft-in)	(m)	(ft-in)	(m)	(ft-in)
0 to 0.050	Not specified			Not specified		
0.051 to 0.300	Avoid contact			Avoid contact		
0.301 to 0.750	0.33	1-1	0.33	1-1	0.33	1-1
0.751 to 5.0	0.63	2-1	0.63	2-1	0.63	2-1
5.1 to 15.0	0.65	2-2	0.68	2-3	0.68	2-3
15.1 to 36.0	0.77	2-7	0.89	3-0	0.89	3-0
36.1 to 46.0	0.84	2-10	0.98	3-3	0.98	3-3
46.1 to 72.5	1.00	3-4	1.20	4-0	1.20	4-0
Voltage in kilovolts phase-to-phase	Distance to employee from energized part ^{④ ⑤ ⑥ ⑩}					
	Without tools phase-to-ground		With tools phase- to-ground ^{⑦ ⑨}		Without tools phase- to-phase ^⑧	
	(m)	(ft-in)	(m)	(ft-in)	(m)	(ft-in)
72.6 to 121	1.06	3-6	1.13	3-9	1.42	4-8
121.1 to 145	1.21	4-0	1.30	4-4	1.64	5-5
145.1 to 169	1.36	4-6	1.46	4-10	1.94	6-5
169.1 to 242	1.87	6-2	2.01	6-8	3.08	10-2
242.1 to 362	3.19	10-6	3.41	11-3	5.52	18-2
362.1 to 420	3.99	13-2	4.25	14-0	6.81	22-5
420.1 to 550	4.78	15-9	5.07	16-8	8.24	27-1
550.1 to 800	6.53	21-6	6.88	22-7	11.38	37-5

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1. For single-phase lines off three-phase systems, use the phase-to-phase voltage of that system
2. For single-phase systems, use the highest voltage available.
3. Inadvertent movement factors used in these tables are as follows:
 - 0.301 kV to 0.750 kV = 0.31 m (1ft)
 - 0.751 kV to 72.5 kV = 0.61 m (2 ft.)
 - 72.6 kV to 800 kV = 0.31 m (1 ft.)
4. Distances listed area for standard atmospheric conditions defined as temperatures above freezing, wind less than 15 mi per h or 24 km per h, unsaturated air, normal barometer, uncontaminated air, and clean and dry insulators.
5. For voltages above 72.5 kV, distances are based on altitudes below 900 m (3000 ft.) above sea level. For altitudes above 900 m (3000 ft.), Rule 441A6 applies.
6. Distances were calculated using the following TOV values:
 - 72.6 kV to 362 kV = 3.5
 - 362.1 kV to 550 kV = 3.0
 - 550.1 kV to 800 kV = 2.5
7. Distances for live-line tool in the air gap were calculated by adding a tool factor to the electrical component (OSHA 29 CFR 1910.269 Appendix B [B68])
8. Phase-to-phase live-line tool in the air gap values are not available. If this situation exists, an engineering evaluation should be performed.
9. *With tools* means a live-line tool bridging the air gap to the employee from the energized part.
10. For bare hand work where the employee is at line potential, this distance is to an object at a different potential.

54.5.11 Class 2 rubber gloves shall be worn while manually operating any gang operated switch in excess of 600 volts.

54.5.12 The maximum voltage of any lines or equipment to be handled with rubber gloves and other rubber protective equipment will be:

- a. 5,000 volts from phase to phase.
- b. If the minimum approach distance cannot be maintained between mechanical equipment and other conducting objects and the under build on voltages at or below 15,000 volts, then necessary protective line covering must be used.
- c. Work on an energized generator bus is prohibited.

54.5.13 It is understood that many factors influence the safety of qualified employees when completing rubber-gloving work. Such influences may include unfamiliarity, traffic, weather, darkness, size and weight of equipment, vehicles or other variables. Therefore, it is also understood that the pre-existing rubber-gloving work practices in place prior to the consolidation of these safety rules shall be in full force and effect for each former area of the Company. In any event, all routine scheduled polyphase rubber gloving work on overhead lines at voltages above 600V which is expected to be completed in the hours of darkness shall be resourced with three or more qualified employees. Requests for additional assistance will not be denied.

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- 54.5.14 All lines or equipment energized above 15,000 volts phase-to-phase will be de-energized, tested, and properly grounded before any work is attempted, or the work will be done with hot line tools or bare hand techniques.
- 54.5.15 Live-line tools shall be used to both open and close cutouts and hook operated disconnected switches at all voltages. Hearing protection is also recommended while closing cutouts.
- 54.5.16 Live-line tools shall not be laid directly on the ground.
- 54.5.17 Live-line sticks and tools shall be kept as dry as possible and shall always be stored in a dry place or kept in their proper containers when not in use.
- 54.5.18 An approved visual marker to indicate minimum allowable approach distance as specified in Table 54.5.10 shall be supplied for all live line tools upon request.
- 54.5.19 Link sticks shall be used with rope on energized lines above 600 volts. Ropes used with link sticks shall be kept clean and dry.
- 54.5.20 The employee shall ensure that connections are made as follows:
- a. When connecting de-energized equipment or lines to an energized circuit by means of a conducting wire or device, an employee shall 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 shall remove the source end first.
 - c. When lines or equipment are connected to or disconnected from energized circuits, loose conductors shall be kept away from exposed energized parts.
- 54.5.21 If any defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is present after wiping, the tool shall be removed from service, and examined and tested before being returned to service. Live-line tools used for primary employee protection shall be removed from service every two years and whenever required for examination, cleaning, repair and testing as follows: each tool shall be thoroughly examined for defects. If a defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is found, the tool shall be repaired and refinished or shall be permanently removed from service. If no such defect or contamination is found, the tool shall be cleaned and waxed.

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54.6 Switching Procedures

- 54.6.1 All switching performed on distribution or transmission facilities shall conform to the approved MidAmerican Energy General Switching Procedures.
- 54.6.2 When passing any switch board, relay cabinets, panels, machine or other electrical apparatus, employees shall make every reasonable attempt to avoid touching any part or allowing metal tools to come in contact with the apparatus.
- 54.6.3 Non-load-break disconnecting switches in series with a circuit breaker must never be opened until a check has been made to be sure that the circuit breaker has opened correctly, unless load break tools are used.

55.0 GENERATION PERSONAL PROTECTIVE GROUNDING

- 55.1 The term personal protective grounding as used in connection with electric lines or equipment means that such lines or equipment have been tested to determine if they have been de-energized using a live line indicating device prior to the application of grounding sets. Grounds shall be so located and arranged that employees are not exposed to hazardous differences in potential. Grounding practices that do not provide an equipotential zone in which an employee is safeguarded from voltage differences do not provide complete protection.
- 55.2 No circuit shall be considered dead unless properly grounded.
- 55.3 Grounding devices shall be of the approved type and have capacity great enough to activate protective devices without destroying the grounding devices.
- 55.4 An approved voltage detection device shall be used as test equipment to make certain lines and cables or equipment are de-energized.
- 55.5 The employee installing protective ground(s) shall proceed as follows:
 - a. Test the conductors using approved methods and instruments to be sure that all phases to be worked on are de-energized.
 - b. Connect one end of the grounding jumper to an established ground or a driven ground.
 - c. Every effort should be made to use the multi-grounded system neutral. In all cases where there is doubt that the neutral is multi-grounded, a separate driven ground (or other established ground) must be used.

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- d. Employees shall maintain clearance from the grounding conductor until all connections are complete. They shall exercise extreme care so no part of the grounding equipment comes in contact with other energized conductors or equipment. The grounding conductors shall be secured to prevent whipping in the event of energization.
- 55.6 When removing a protective ground, the employees shall not remove the grounding device from the ground connection until the device has first been disconnected from all parts normally energized.
- 55.7 Sufficient spare grounding devices for this purpose must be on hand before starting the job.
- 55.8 Orders to remove grounds must be given by the designated employee in charge of the work and by the employee who holds the clearance. Where hold tags have been placed on station grounding switches, said ground switches shall not be opened without the authority of the person who originally authorized the placing of the tag or the person who has been delegated (on said tag) the authority to remove the ground.
- 55.9 Grounding Requirements, Exception to Paragraph 55.2
- a. All equipment or lines that have been isolated and tagged must be treated as energized until the testing and grounding processes have been completed.
 - b. Exception: If the placement of grounds is impractical or creates a more hazardous situation, equipment and lines may be treated as de-energized provided all of the following conditions apply.
 - c. The equipment's isolating devices are open and isolated using the MidAmerican Energy Isolation and Control Program for Supply, which meets minimum OSHA requirements.
 - d. There is no possibility of contact with another energized source.
 - e. The hazard of induced voltage is not present.

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56.0 TESTING OF PROTECTIVE EQUIPMENT

56.1 Live-Line Tools and Insulating Equipment

56.1.1 Live-line tools and insulating equipment used for employee protection shall be wiped clean and visually inspected for defects before each use. Insulating equipment includes rubber gloves, sleeves, line hose, blankets and other approved protective equipment. Defective tools and insulating equipment will be immediately removed from service and labeled defective.

56.1.2 Insulating equipment shall be inspected for damage or deterioration before each use and immediately following any incident that can reasonably be suspected of having caused damage or deterioration. Insulating gloves shall be given an air test along with the inspection.

56.1.3 Rubber goods and insulating equipment shall be removed from service and tested as outlined in the table below or more frequently upon request.

Equipment Type	Frequency of Testing
Live-line tools used for primary employee protection	Every 12 months
Insulating equipment other than gloves and sleeves	Every 6 months
Rubber gloves and sleeves	Every 6 months

56.1.4 All jumpers used on voltages greater than 5,000 volts shall be considered un-insulated. If the jumper cable cannot be isolated so there is not a possibility of contact with personnel, other conductors, poles, cross arms or hardware, the jumper cable shall be covered with line hose or blankets in the same manner as those conductors would normally be covered.

56.1.5 Rubber protective equipment shall be kept, so far as practicable, in a cool, dry, clean place and away from tools or objects that might puncture or damage it. This equipment shall be kept in the rubber goods compartment or proper container as provided. Only approved hand cleaners, lotions and creams shall be used prior to wearing rubber gloves or sleeves. Petroleum-based products react with the rubber, resulting in blistering and possible cracking.

56.1.6 Employees shall consider all conductive live parts of batteries operating at 50 volts or more as energized equipment and shall be treated as such.

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56.2 Insulated Aerial Lifts

- 56.2.1 Visual inspection of critical safety components of aerial transfer shall be made daily before use. The insulated boom section, bucket and bucket liner shall be cleaned periodically between regular dielectric tests. Special attention to the following shall be given by the operator of the equipment prior to daily operation:
- a. Inspect hydraulic hoses and remote controls for twisting, chafing and proper adjustments.
 - b. With oil lines; under pressure, inspect all hydraulic fittings, pump and cylinders, for evidence of leakage.
 - c. Check oil level of hydraulic and remote control reservoirs. Oil shall be added if required.
 - d. Check unit for proper operating speed and rate of drift. Drifting or improper speed shall be reported immediately.
 - e. Operation of all controls shall be checked regularly through their maximum working range.
 - f. Check maximum allowable load operation through all positions periodically.
 - g. Check boom and leveling wire rope cable for frayed strands, security of terminals and correct adjustment.
 - h. Check limiting device on lever type leveling system for proper working range.
 - i. Check booms for cracked welds or distorted members.
- 56.2.2 All aerial devices utilized for rubber gloving shall have a certified dielectric test annually by a qualified testing facility.
- 56.2.3 A certified tester shall annually test all aerial devices and equipment designed for use near energized lines. The insulated section of aerial lifts shall always be retested immediately following any repair work involving this portion of the truck by a certified tester.
- 56.2.4 Bucket liners shall be tested every six months or more often upon request.

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56.3 Grounding Devices Used For Personal Protection

56.3.1 Grounding devices shall be given a visual inspection prior to use.

56.3.2 Periodic resistance tests shall be performed at least every two years or more often upon request.

57.0 BARRICADES, BARRIERS AND ACCESS CONTROL

57.1 All work areas where hazards from falling objects or other serious hazards requiring restricted or prohibited access exist, must be flagged off and properly marked with appropriate barrier tape as defined in 57.4.1.1 through 57.4.1.4.

57.2 Excavations, floor openings, open-sided floors, platforms, runways, ditches or other open areas must be marked and barricaded or constantly attended. Those conditions presenting a fall hazard of four or more feet must be guarded by a standard railing, an appropriate guardrail system, or a barricade as outlined in paragraph 57.5.1.3.

57.3 Careful job planning is essential before any barrier or barricade is installed to help ensure its effectiveness. The use of barriers and barricades as described here will differentiate between the more serious hazards in the work place and those requiring only caution. Barriers and barricades shall be used to warn personnel of possible hazards, and to prohibit passage and/or entry into areas considered to be danger zones.

Note: Barrier tape alone is not acceptable for prohibiting access to high hazard areas, such as those referenced below.

57.4 Warning Tape as Access Barriers

57.4.1 The use of warning tape for barriers is divided into four main colors:

57.4.1.1 Yellow or Yellow and Black barrier tape – Restricted Access:

This barrier tape is used to caution personnel of hazards within the confines of the restricted area. These hazards are not such that passage through the barrier would be prevented.

- a. Yellow tape should be viewed as a CAUTION sign. Caution signs are used to warn against potential hazards or to caution against unsafe practices.
- b. All employees must be instructed that caution signs indicate a possible hazard against which proper precaution should be taken.

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- c. The use of yellow barrier tape should be restricted to those situations where there is a known potential hazard or when proper precaution is needed.
- d. Employees should not cross the barrier unless they have read the caution notice, are alert for the potential hazard and take the proper precautions. Before entering the restricted area, personnel shall observe the activities taking place and determine if it is safe to proceed through the barrier.

57.4.1.2 Red or Red and Black barrier tape – Prohibited Access:

This barrier tape is used to prohibit entry or passage through an area by all personnel except those authorized to perform work within the confines of the barrier.

- a. Red tape should be viewed as a DANGER sign and all employees must be instructed that danger signs indicate immediate danger and that special precautions are necessary. Danger signs must never be ignored or bypassed.
- b. The use of red barrier tape should be restricted to those situations where immediate danger is present or very likely.
- c. Employees should not cross the barrier unless they are directly involved with the work, such as the employee(s) performing the work or supervisors and engineers involved with the work.
- d. Persons for whom crossing the barrier is appropriate must not do so until they have followed any safety precautions specified for the barricaded area, i.e. donning necessary PPE.
- e. Additional signs or a watchman may be necessary to prevent entry by unauthorized personnel.

57.4.1.3 Purple or Purple and Yellow barrier tape – Prohibited Access:

This barrier tape denotes the temporary use of a radioactive source and means absolutely no entry by personnel other than those authorized to enter.

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- a. Purple or Yellow and Purple barrier tape should be viewed as a DANGER sign and all employees must be instructed that danger signs indicate immediate danger and that special precautions are necessary. Danger signs must never be ignored or bypassed.
- b. The use of Purple or Yellow and Purple barrier tape should be restricted to those situations where the danger from a radioactive source is present or very likely to be present.
- c. The non-destructive testing or x-raying of pipe is an example requiring this type of barrier.

57.4.1.4 Blue or Blue and White barrier tape and Blue Cones – Prohibited Access:

This barrier tape and cones are used to prohibit entry or passage through an area by all personnel except those authorized and donned in the appropriate PPE for arc flash protection to perform switching or live electrical work with the risk of arc flash within the arc flash hazard boundary of the work being performed.

- a. Blue tape and cones should be viewed as a DANGER sign for electrical arc flash.
- b. The use of blue barrier tape or cones should be restricted to those situations where arc flash danger is present or very likely.
- c. Persons for whom crossing the barrier is appropriate must not do so until they have followed any safety precautions specified for the restricted area, i.e. donning necessary PPE.
- d. Signs or a watchman may be necessary to prevent entry by unauthorized personnel.

57.4.2 These barrier colors shall be standardized at all Company locations.

57.5 Rigid Barricades, Standard Railings and Guard Rail Systems

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- 57.5.1 These types of barricades shall be used to eliminate or prohibit access or entry into a high hazard area. High hazard areas are considered to be any area where there are floor or wall openings, excavations, ditches, open-sided floors, platforms, runways, or other open fall hazards, etc.
- 57.5.1.1 Standard railings shall conform to OSHA §1910.23(e). They shall be 42 inches nominal from upper surface of top rail to floor, with an intermediate rail that shall be approximately halfway between the top rail and the floor, and toe boards where required. Post spacing shall not exceed 6 feet for wood railings or 8 feet for steel railings. Standard railing shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail.
- 57.5.1.2 Guardrail systems and their use shall comply with OSHA §1926.502(b). Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches \pm 3 inches above the walking/working level. Mid-rails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edges of the guardrail system. Top rails and mid-rails shall be at least one-quarter inch nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than 6-foot intervals with high-visibility material. Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds applied in any outward or downward direction, at any point along the top edge.
- 57.5.1.3 Rigid barricades other than standard railings and guardrail systems shall meet the basic intent and design criteria of standard railings or guardrail systems. They may be constructed of material, such as lumber, steel, scaffolding, wire rope and other materials. This type barricade shall be used to eliminate or restrict entry into a high hazard area.
- 57.6 Combinations of these barricades are also acceptable. For example, a rigid barricade can be painted red or include red danger tape as part of the barricade.

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57.7 A tag shall be installed on all barricades. The tag must indicate the name of the company as well as the date, time, reason for installing and the name of the individual responsible for the barricade. Tags must be placed on every side of the area where entry into the area may reasonably be expected. This may require more than one tag per barricade. All barricades shall be removed immediately after the work is complete and there is no longer a hazard involved in and around the surrounding area.

57.8 Barricades placed in or adjacent to roadways and traffic paths shall be provided with flashing lights for visibility during dark hours. Barricades used as traffic control devices should meet the Manual on Uniform Traffic Control Devices

(MUTCD) requirements:

<http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/mutcd2009r1r2edition.pdf>

58.0 GENERATION SUBSTATION SAFETY RULES

These rules apply to work performed in electrical substations. They were developed to supplement the general Company safety rules. Unless otherwise specifically addressed by these rules, all other Company safety rules and procedures must be strictly followed.

58.1 Generation – Definitions

58.1.1 Visible Isolation – For purposes of these rules means a source of isolation of an electrical circuit from a line or piece of equipment. The point of isolation must be visible and characterized by an air gap in the circuit resulting in a visible open. In order to work behind a source of visible isolation, the air gap must be complete with no physical mechanism, insulated or otherwise, bridging the gap. The air gaps must be of sufficient distance to withstand the rated system Basic Insulation Level (BIL). Air gaps shall provide minimum metal-to-metal clearances as outlined by ANSI, ASTM or the manufacturer's guidelines at the time of installation.

SYSTEM VOLTAGE (KV)	MINIMUM METAL TO METAL AIR GAP (INCHES)	
	SINGLE BREAK	DOUBLE BREAK
4	7	--
13	10	--
34.5	18	12
46	22	15
69	32	22
161	60	38
345	104	58

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- 58.2 Gates to all operating substations shall be closed and locked. When company personnel are present, the gate may be left unlocked, however the gate must be closed and, if so equipped, the gate must also be latched or fastened, unless constant control of ingress/egress is maintained.
- 58.3 Generation – Substation Equipment Operating Rules
- 58.3.1 Operating instructions that relate to the specific piece of equipment shall be observed and all required personal protective equipment shall be worn.
- 58.3.2 Where circuit breakers are operated by stored energy devices such as springs, solenoids, or compressed air, etc., proper precautions shall be taken to prevent unauthorized or accidental operation of the device.
- 58.3.3 The secondary of a current transformer shall not be opened while energized. If the entire circuit cannot be properly de-energized before working on an instrument, a relay, or other section of a current transformer secondary circuit, the employee shall bridge the circuit with jumpers so that the current transformer secondary will not be opened.
- 58.3.4 When working within an energized substation under a designated clearance boundary, work areas within the clearance boundaries shall be clearly identified using high visible marking equipment, including tape, flags, cones or barricades. If the work location involves aerial work, additional consideration shall be given to making a three- dimensional work location.
- 58.3.5 Every employee working on or about equipment or lines exposed to voltages higher than those guarded against by the safety appliances provided shall protect himself from dangerous leakage or induction by application of grounds.
- 58.3.6 Employees shall not work on equipment or lines in any position from which a shock or slip will tend to bring the body toward exposed parts at a potential different than the employee's body. Work shall, therefore, generally be done from below, rather than from above.
- 58.3.7 Whenever it becomes necessary to open or sever a portion of a substation grounding grid that will remain connected to the grounding system, a temporary bypass or jumper shall be installed across the point to be opened before the open is made. Class 2 rubber gloves shall be worn when cutting or disconnecting the ground wire, or remote cable cutters will be used.

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58.4 Electric Substation-Operating-Power Lines and Equipment Clearances

- 58.4.1 The control of System Operations or the appropriate jurisdictional authority over transmission lines and substation equipment starts when that line or piece of equipment is in such a position that it can be energized from the existing system. Clearance on substation and transmission lines and equipment under the responsibility of System Operations or the appropriate jurisdictional authority shall be requested and executed by following the General Switching Procedures in conjunction with OSHA regulations.
- 58.4.2 In an emergency, to protect life or property, a qualified employee may open circuits and stop moving equipment without special authorization if, in his judgment, his action will promote safety. System Operations or the appropriate jurisdictional authority shall be notified as soon as possible of such action, with reasons therefore.
- 58.4.3 When the Jurisdictional Authority is required to issue a Clearance or Hot Line Warning on a facility that is not completely under his/her Jurisdiction, a Hold Order must be obtained from the Jurisdictional Authority responsible for the equipment outside his/her area of responsibility. The Hold Order must state that the equipment is properly cleared and tagged and will not be altered until the Hold Order is released. This may be another MidAmerican Energy Jurisdictional Authority, foreign utility or a private company or individual.

59.0 LIQUIFIED NATURAL GAS

- 59.1 Rotating machinery shall not be operated without the guards installed. Care shall be exercised when inspecting operating machinery to avoid being caught by moving belts or catching clothing on rotating shafts. Loose-fitting clothing shall not be worn when working around moving machinery.
- 59.2 Approved spark-resistant safety tools shall be utilized for work in the plant where there is potential for ignition.
- 59.3 A sufficient number of dry chemical extinguishers shall be placed to provide fire control equipment and supplies.
- 59.4 Prior to connecting LNG/LPG loading lines from the truck transport to the unloading rack, a secure ground connection shall first be made from the rack to the truck. The wheels of each truck shall be blocked while unloading.
- 59.5 The employee in charge of unloading the LPG or LNG shall make certain that hose lines are completely depressurized before ordering such lines disconnected.
- 59.6 Truck tank transports shall be visually checked for leaks before making any connections.

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- 59.7 Employees shall wear company-approved gloves and a face shield when working with liquid LNG/LP.
- 59.8 A check shall be made to be certain there are no ignition sources in the vicinity before connection is made to the truck transport.
- 59.9 When making connections between receiving tanks and truck transports, non-sparking tools shall be used.
- 59.10 A trained person shall remain at or near the truck or transport whenever product is being transferred.
- 59.11 During transfers, receiving tanks shall be monitored at all times to be certain they are not overfilled.
- 59.12 The receiving tank, gauges and pressure shall be checked at regular intervals to prevent overfilling or over-pressuring.
- 59.13 In no instance shall the propane-receiving tank be filled in excess of the recommended level corresponding to the liquid temperature as specified on the manufacturers' plates on the tanks.
- 59.14 Before disconnecting the truck transport hose, the vapor and liquid valves shall be closed and lines vented. Valves shall be checked to be certain they are not leaking.
- 59.15 In case of fire, refer to MidAmerican Energy Gas Emergency Response Plan, which meets minimum OSHA requirements.
- 59.16 Non-explosive-proof electrical equipment, welding equipment, or other devices with open flames or devices which may provide a source of ignition, shall not be used within the battery limits until sufficient precautions and tests with combustible gas indicators have been made to assure that a non-hazardous condition exists.

60.1 PROPANE GAS

- 60.1 Established procedures must be followed in cutting, joining, and pinching off any gas main or service.
- 60.2 Truck tank transports and bobtails shall be visually checked for leaks before making any connections.
- 60.3 A check shall be made to be certain there is no smoking or open flames in the vicinity before connection is made to the truck transport.
- 60.4 Receiving tanks shall be checked to determine that sufficient space is available to receive the shipment.

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- 60.5 During unloading, the receiving tank gauges and pressure shall be checked at regular intervals to prevent overfilling or over pressuring.
- 60.6 In making connections between receiving tanks and truck transports non- sparking tools shall be used.
- 60.7 Before disconnecting truck transport hose, the vapor and liquid valves shall be closed and lines vented. Valves shall be checked to be certain they are not leaking.
- 60.8 Each truck or transport shall have wheels chocked when loading, unloading or parked.
- 60.9 A vehicle condition report will be filled out daily.
- 60.10 No smoking is allowed in, around or within 25 feet of a propane truck or transport.
- 60.11 Each propane truck or transport shall have a minimum of a 20 pound dry chemical with a B.C. rating.
- 60.12 Vehicles transporting more than 1,000 pounds of propane gas, including the weight of the containers, shall be placarded as required by the Department of Transportation.
- 60.13 A trained person shall remain at or near the propane truck or transport whenever product is being transferred.
- 60.14 Trucks unloading into storage containers shall be at least 10 feet from the container.
- 60.15 Employees shall wear company-approved gloves while handling liquid propane.

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APPENDICES

Appendix 1 – Aluminum Hydraulic Shoring for Trenches

Appendix 2 – Excavation Slope and Bench Ratios

Appendix 3 – Regional Rubber Gloving Work Practices

Appendix 4 – Hand Signals – Boom Cranes

Appendix 5 – Hand Signals – Line Work

Appendix 6 – Flame-Resistant Apparel Safety Rules for Electric Work

Appendix 7 – Transmission System Grounding Procedures

Appendix 8 – Hand Signals – Spotter

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**ALUMINUM HYDRAULIC SHORING FOR TRENCHES
OSHA 1926 SUBPART P, APP D**

**TABLE D - 1.1
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES FOR SOIL TYPE A**

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER Note (2)	3 INCH DIAMETER
OVER 10 UP TO 15	8				
OVER 15 UP TO 20	7				
OVER 20	Note (1)				

**TABLE D - 1.2
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES FOR SOIL TYPE B**

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER Note (2)	3 INCH DIAMETER
OVER 10 UP TO 15	6.5				
OVER 15 UP TO 20	5.5				
OVER 20	Note (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

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**TABLE D - 1.3
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS FOR SOIL TYPE B**

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS			
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN(3))	WIDTH OF TRENCH (FEET)			
			UP TO 8		OVER 8 UP TO 12	
			HORIZONTAL SPACING	CYLINDER DIAMETER	HORIZONTAL SPACING	CYLINDER DIAMETER
OVER 5 UP TO 10	4	3.5	8.0	2 IN	8.0	2 IN Note (2)
		7.0	9.0	2 IN	9.0	2 IN Note (2)
		14.0	12.0	3 IN	12.0	3 IN
OVER 10 UP TO 15	4	3.5	6.0	2 IN	6.0	2 IN Note (2)
		7.0	8.0	3 IN	8.0	3 IN
		14.0	10.0	3 IN	10.0	3 IN
OVER 15 UP TO 20	4	3.5	5.5	2 IN	5.5	2 IN Note (2)
		7.0	6.0	3 IN	6.0	3 IN
		14.0	9.0	3 IN	9.0	3 IN
OVER 20	Note (1)					

**TABLE D - 1.3
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS FOR SOIL TYPE B (Continued)**

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS		TIMBER UPRIGHTS		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN(3))	WIDTH OF TRENCH (FEET)		MAX. HORIZONTAL SPACING (ON CENTER)		
			OVER 12 UP TO 15		SOLID SHEET	2 FT	3 FT
			HORIZONTAL SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	8.0	3 IN	---	---	3X12
		7.0	9.0	3 IN			
		14.0	12.0	3 IN			
OVER 10 UP TO 15	4	3.5	6.0	3 IN	---	3X12	---
		7.0	8.0	3 IN			
		14.0	10.0	3 IN			
OVER 15 UP TO 20	4	3.5	5.5	3 IN	3X12	---	---
		7.0	6.0	3 IN			
		14.0	9.0	3 IN			
OVER 20	Note (1)						

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

*Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

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**TABLE D - 1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS FOR SOIL TYPE C**

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS			
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN(3))	WIDTH OF TRENCH (FEET)			
			UP TO 8		OVER 8 UP TO 12	
			HORIZONTAL SPACING	CYLINDER DIAMETER	HORIZONTAL SPACING	CYLINDER DIAMETER
OVER 5 UP TO 10	4	3.5	6.0	2 IN	6.0	2 IN Note (2)
		7.0	6.5	2 IN	6.5	2 IN Note (2)
		14.0	10.0	3 IN	10.0	3 IN
OVER 10 UP TO 15	4	3.5	4.0	2 IN	4.0	2 IN Note (2)
		7.0	5.5	3 IN	5.5	3 IN
		14.0	8.0	3 IN	8.0	3 IN
OVER 15 UP TO 20	4	3.5	3.5	2 IN	3.5	2 IN Note (2)
		7.0	5.0	3 IN	5.0	3 IN
		14.0	6.0	3 IN	6.0	3 IN
OVER 20	NOTE (1)					

**TABLE D - 1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS FOR SOIL TYPE C
(Continued)**

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS		TIMBER UPRIGHTS		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN(3))	WIDTH OF TRENCH (FEET)		MAX. HORIZONTAL SPACING (ON CENTER)		
			OVER 12 UP TO 15		SOLID SHEET	2 FT	3 FT
			HORIZONTAL SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	6.0	3 IN	3X12	---	---
		7.0	6.5	3 IN			
		14.0	10.0	3 IN			
OVER 10 UP TO 15	4	3.5	4.0	3 IN	3X12	---	---
		7.0	5.5	3 IN			
		14.0	8.0	3 IN			
OVER 15 UP TO 20	4	3.5	3.5	3 IN	3X12	---	---
		7.0	5.0	3 IN			
		14.0	6.0	3 IN			
OVER 20	Note (1)						

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

*Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

Consolidated Safety Rules

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Excavation Slope and Bench Ratios

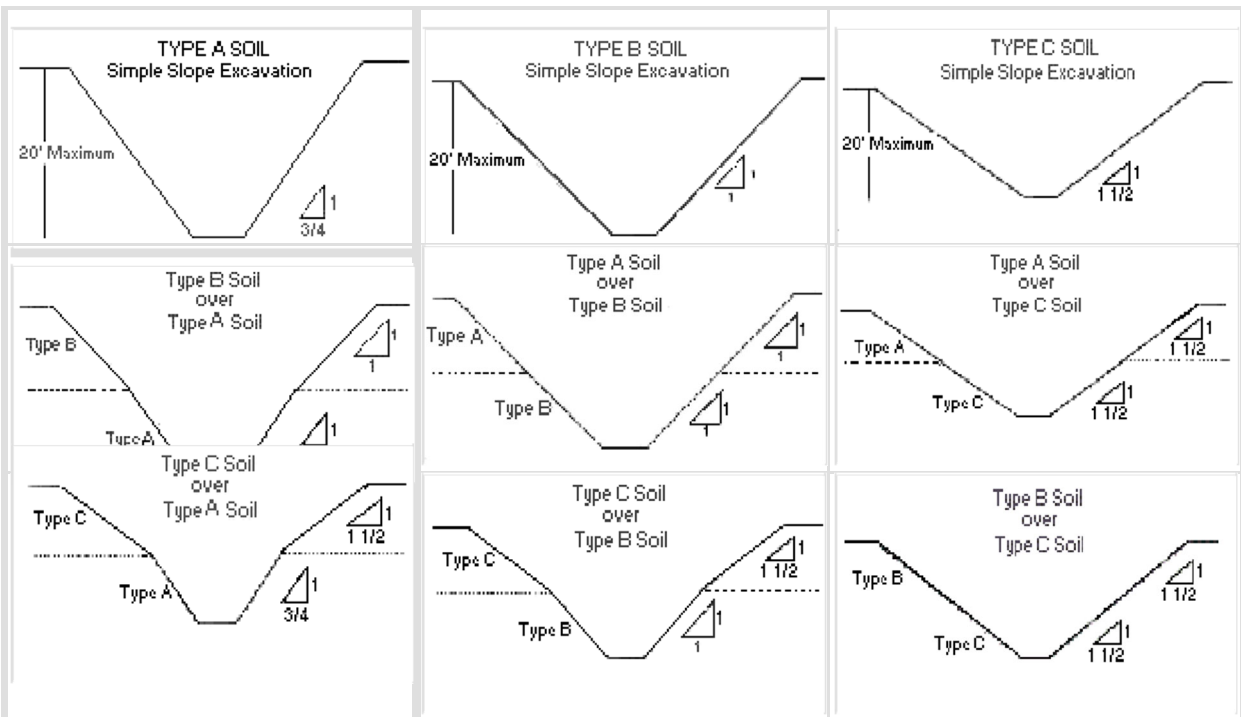
Sloping: Maximum allowable slopes for excavations less than 20 ft (6.09 m) based on soil type and angle to the horizontal are as follows:

FIGURE 2-1 – ALLOWABLE SLOPES

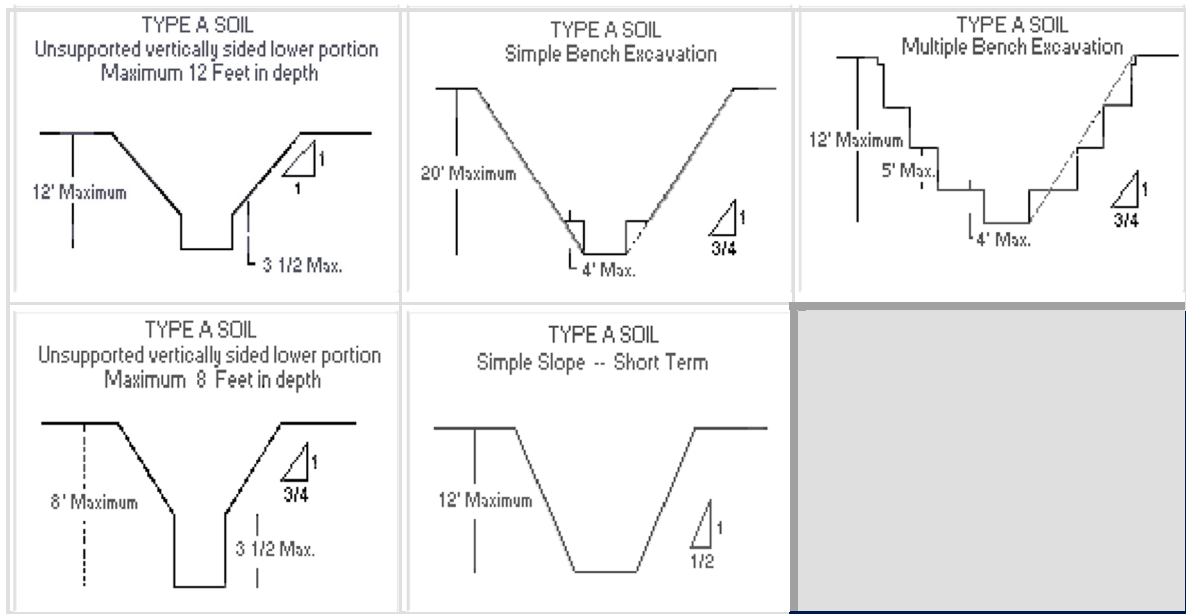
Soil type	Horizontal: Vertical Ratio	Slope angle
Stable Rock	Vertical	90°
Type A	¾:1	53°
Type B	1:1	45°
Type C	1½:1	34°
Type A (short-term)	½:1	63°

(For a maximum excavation depth of 12 ft)

FIGURE 2-2 – SLOPE CONFIGURATIONS: EXCAVATIONS IN LAYERED SOILS



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Benching: There are two basic types of benching, simple and multiple. The type of soil determines the horizontal to vertical ratio of the benched side.

Benching is the process of cutting benches or steps into the excavation (see Figure 2-4). The angle used for benching is based on a ratio of horizontal to vertical cuts. It should be noted that benching is reserved only for cohesive soils; the flatter the angle of the slope, the greater the protection factor for the employee.

- **Type A Soil:** The ratio is $\frac{3}{4}$ ft. horizontal for every foot vertical (53° from the horizontal).
- **Type B Soil:** The ratio is 1 ft. horizontal for every foot vertical (45° from the horizontal).
- **Type C Soil:** Not permissible.

As a general rule, the bottom vertical height of the trench must not exceed 4 ft (1.2 m) for the first bench. Subsequent benches may be up to a maximum of 5 ft (1.5 m) vertical in Type A soil and 4 ft (1.2 m) in Type B soil to a total trench depth of 20 ft (6.0 m). All subsequent benches must be below the maximum allowable slope for that soil type. For Type B soil the trench excavation is permitted in cohesive soil only.

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FIGURE 2-4 – EXCAVATIONS MADE IN TYPE B SOIL

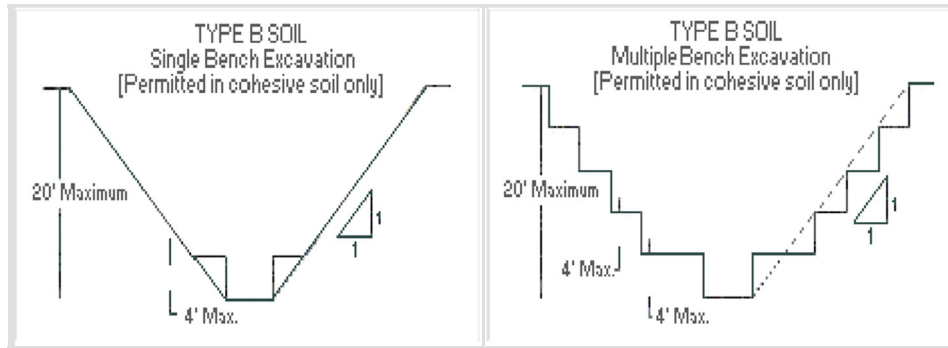
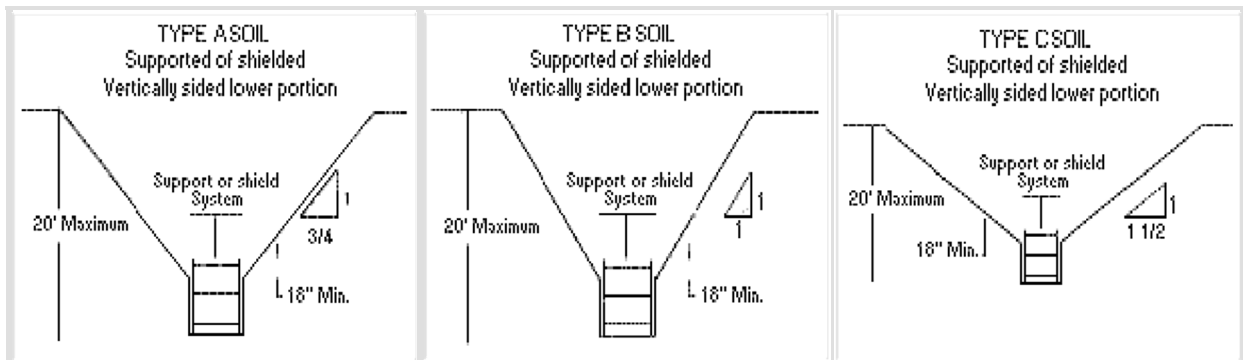


FIGURE 2-5 – SLOPE AND SHIELD CONFIGURATIONS



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Regional Rubber Gloving Work Practices

IBEW Rubber Gloving Rules

General statement of rules, training, procedures and usage for gloving voltages above 600 volts.

Energized work may be performed either by rubber gloving from an approved insulated aerial device or using hot line tools. The method or methods used on energized circuits or equipment up to 8.6 kV shall be determined by the Crew Leader and supervisor. If the Crew Leader and the supervisor cannot agree as to the appropriate method to use, the Crew Leader will make the decision. It is the responsibility of the Crew Leader to use the most productive method available, consistent with safety.

It is understood that whenever the word “gloves” is used in the following sections, it shall mean both gloves and sleeves.

I. POLICY AND PROCEDURE

Work methods permit the handling up to 8.6 kV voltage energized distribution conductor utilizing rubber gloves and sleeves, providing the work is performed from only approved insulated aerial devices. Work will be performed by qualified personnel only. This includes Crew Leader Line Mechanics, Journeyman Line Mechanics, and Apprentice Line Mechanics in the appropriate phase. Hereafter, the term Line Mechanic will refer to any person in one of these three classifications.

II. EQUIPMENT AND TOOLS

Approved Insulated Aerial Devices. Insulated aerial devices approved for rubber gloving include:

Insulated Aerial Devices with bucket liner(s).

Digger-Derricks with insulated boom extension and pin on buckets. This device may be used for rubber gloving on all single phase and straight line three phase construction. This device is not to be used for rubber gloving three phase junction poles or three phase angle pole construction. Gloving from digger derricks will be performed only when it is voluntarily instituted by the crew actually performing the work.

III. WORK PRACTICES

The work practices will be those established in the rules and training procedures for gloving up to 8.6 kV class distribution conductors.

IV. EMPLOYEE REQUIREMENTS

Work involving rubber gloving on lines or equipment energized at voltages above 600 volts shall require a minimum of three qualified employees (at least two of whom shall be

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journeyman or one journeyman and an apprentice in the appropriate step), except as provided for below:

- a. Emergency repairs to the extent necessary to safeguard the general public.
- b. Installation of a single-phase, straight line pole and the subsequent transfer of conductors.
- c. Installation or repair of a single-phase riser on single-phase overhead lines or the outer phases of a poly-phase overhead line.
- d. Replacement of a single-phase damaged or suspect cut-out.
- e. Replacement of damaged or suspect insulators and pins on overhead lines only where they are on outside phases of any poly-phase lines or conductors on the same or adjacent structure(s).
- f. Replacement of single-phase pole mounted transformers only where they are outside the primary area of any poly-phase lines or conductors on the same or adjacent structure(s).

Work involving rubber gloving that fits the exception criteria may be completed with two qualified employees (at least one of whom shall be a journeyman) on a voluntary basis. An apprentice is only considered to be qualified upon successful completion of rubber gloving coursework and training in the qualifying phase of their apprenticeship.

V. WORKING CONDITIONS FOR RUBBER GLOVING

Work on energized conductors and equipment shall only be performed by qualified employees wearing 20 kV rubber gloves with 20 kV sleeves and working at all times from an approved insulated aerial device which is maintained in good mechanical and electrically insulated condition.

Upon request of the crew, the nearest upstream reclosing devices shall be placed in non-automatic mode. Furthermore, any additional upstream reclosing devices may be placed in non-automatic mode.

When work is being performed on energized conductors of the 8.6 kV class, the work shall be confined to one work location unless it is a coordinated job involving more than one structure. The job shall be so coordinated that the workers are safeguarded from unexpected changes in clearances due to the moving of conductors or equipment. If clearance changes are due to be made, the work shall stop until the changes are made and all personnel on the job are completely made aware of these changes.

20 kV protective devices shall be used on all work up to 8.6 kV.

Rubber gloving work on up to 8.6 kV shall not be started or continued during fog, rain or snow. Where equipment is wet from prior precipitation, all such equipment shall be adequately wiped down.

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VI. TRAINING

Knowledge of rubber gloving shall be imparted to Line Mechanics through the normal course of the Line Mechanic apprenticeship program. Training in rubber gloving will commence in the apprenticeship program for the Apprentice Line Mechanic at the appropriate phase.

Training courses will be established with topics such as, but not limited to inspection, operation and maintenance of approved aerial devices, schooling in the actual operation of the bucket and work with rubber gloves on conductors energized up to 8.6kV, construction standards, explanation of high voltage safety rules and practices, and instruction in the use of live line tools. This training program will encompass classroom work and actual field training.

Classroom sessions to be conducted by qualified trainers who are thoroughly familiar with the details of the training program.

- a. Theory of isolation and insulation
- b. Explanation of distribution circuits
- c. Display and explanation of the use of special cover-up equipment and tools
- d. Showing of slides or films covering typical job methods
- e. Each Line Mechanic attending classes shall cover the procedures for all work methods
- f. Question and answer period

Field Training to be conducted by qualified trainers who have been trained in the proper procedures for 8.6 kV class rubber gloving work.

- a. Demonstrations of jobs such as pin-type insulator change, arm change, changing dead-end insulators
- b. Demonstrations of cover-up methods on dead structure from bucket trucks
- c. Training on live circuits up to 8.6 kV class

VII. TESTING AND EQUIPMENT

Rubber gloves: New gloves are to be tested for three minutes and in-service gloves are tested for one-minute and 30 seconds. Gloves may be tested more often upon request.

Sleeves: New sleeves are to be tested three minutes and in-service sleeves are tested for one minute and 30 seconds. Sleeves may be tested more often upon request.

Rubber Insulating Blankets and Line Hose: New blankets and line hose are tested for three minutes and in-service blankets and line hose are tested for one minute and 30 seconds. Blankets and line hose may be tested more often upon request.

Protective Cover-up Equipment (i.e. Fiber pole guards, line guards, cross arm covers) shall be exchanged, cleaned and inspected as necessary. If after cleaning and inspection the insulation value is suspect, dielectric testing shall be conducted at 20 kV ac for one minute.

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Jumpers: 15 kV jumpers with or without pick-up heads shall be used. All jumpers used on voltages greater than 5,000 volts shall be considered uninsulated. If the jumper cable cannot be isolated so there is not a possibility of contact with personnel, other conductors, poles, cross arms or hardware, the jumper cable shall be covered with line hose or blankets in the same manner as other conductors would normally be covered. Mechanical hot line jumpers tested at intervals per safety rule 28.1.3 shall be considered insulated up to 15kV.

Truck Booms: All insulated aerial devices shall have a certified Dielectric Test performed annually by a qualified testing facility. A bucket liner will be tested at the same time as the aerial lift.

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Periodic testing schedule: Sufficient supplies of the above equipment shall be available to facilitate the following testing frequency:

EQUIPMENT	TEST FREQUENCY
Rubber gloves	90 days
Rubber sleeves	90 days
Rubber cover-up	6 months
Rubber line hose & hoods	6 months
Plastic cover-up	As needed
Hot Sticks and Live-line tools	12 months
Ground sets	12 months
Aerial lifts and bucket liners	12 months
Aerial lifts utilized for rubber gloving	6 months

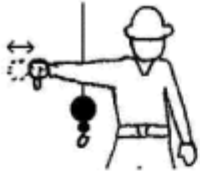





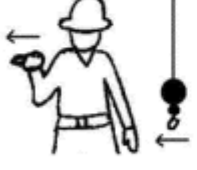
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HAND SIGNALS FOR CRANE OPERATION

When there is a lot of traffic at a worksite, it is essential for workers to be able to use hand signals. Here are some standard hand signals for crane operation.

 <p>STOP – With arm extended horizontally to the side, palm down, arm is swung back and forth.</p>	 <p>EMERGENCY STOP – With both arms extended horizontally to the side, palms down, arms are swung back and forth.</p>	 <p>HOIST – With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.</p>
 <p>RAISE BOOM – With arm extended horizontally to the side, thumb points up with other fingers closed.</p>	 <p>SWING – With arm extended horizontally, index finger points in direction that boom is to swing.</p>	 <p>RETRACT TELESCOPING BOOM – With hands to the front at waist level, thumbs point at each other with other fingers closed.</p>
 <p>RAISE THE BOOM AND LOWER THE LOAD – With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.</p>	 <p>DOG EVERYTHING – Hands held together at waist level.</p>	 <p>LOWER – With arm and index finger pointing down, hand and finger make small circles.</p>
 <p>LOWER BOOM – With arm extended horizontally to the side, thumb points down with other fingers closed.</p>	 <p>EXTEND TELESCOPING BOOM – With hands to the front at waist level, thumbs point outward with other fingers closed.</p>	 <p>TRAVEL/TOWER TRAVEL – With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.</p>

HAND SIGNALS FOR CRANE OPERATION—continued

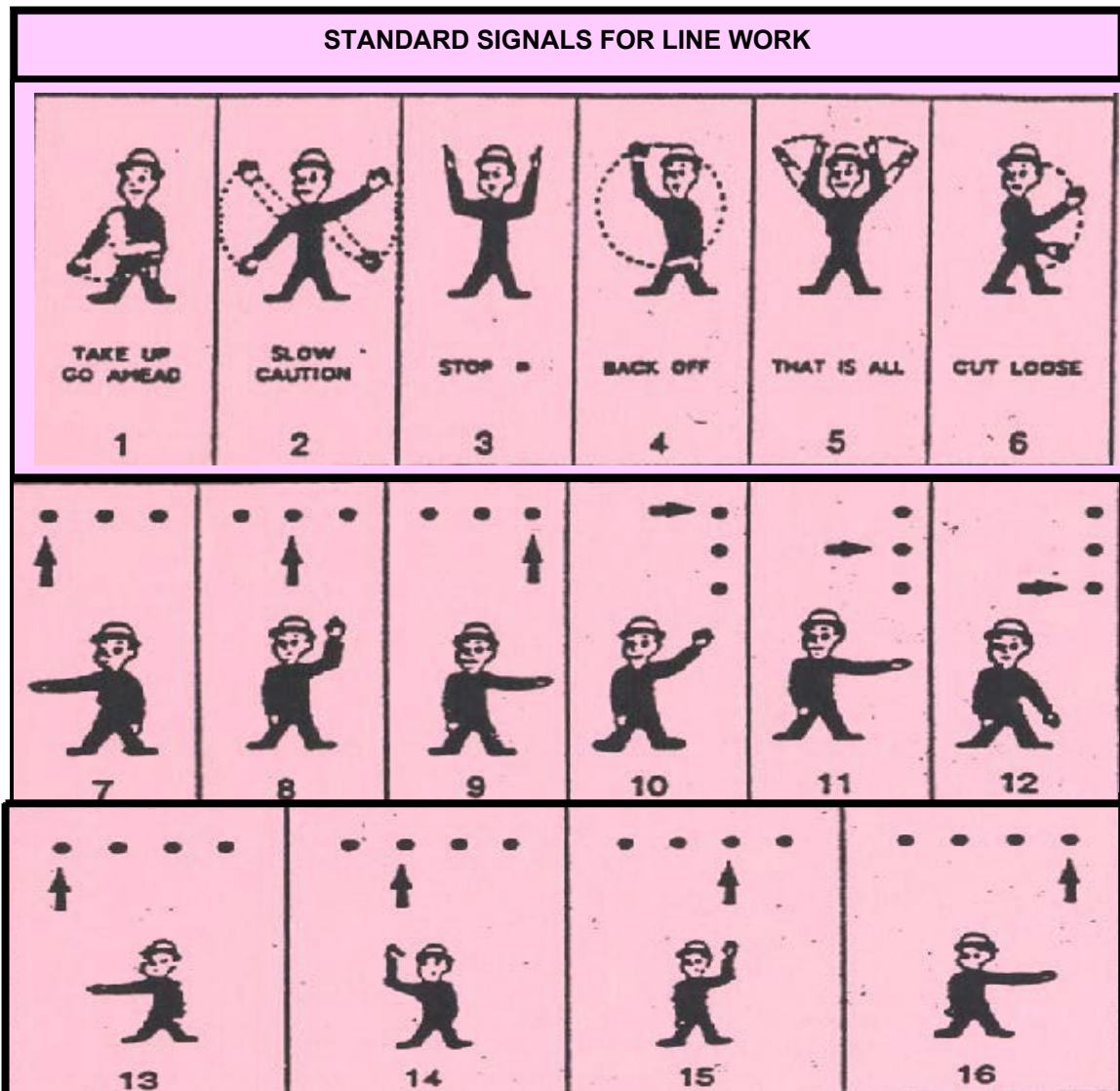
 <p>LOWER THE BOOM AND RAISE THE LOAD – With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.</p>	 <p>MOVE SLOWLY – A hand is placed in front of the hand that is giving the action signal.</p>	 <p>USE AUXILIARY HOIST (whipline) – With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.</p>
 <p>CRAWLER CRANE TRAVEL, BOTH TRACKS – Rotate fists around each other in front of body; direction of rotation away from body indicates travel forward; rotation towards body indicates travel backward.</p>	 <p>USE MAIN HOIST – A hand taps on top of the head. Then regular signal is given to indicate desired action.</p>	 <p>CRAWLER CRANE TRAVEL, ONE TRACK – Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.</p>
 <p>TROLLEY TRAVEL – With palm up, fingers closed and thumb pointing in direction of motion, hand is jerked horizontally in direction trolley is to travel.</p>		

Source for hand signals: OSHA 29 CFR 1926, Subpart CC, Appendix A

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Hand Signals – Line Work



1. This signal is used to indicate the direction of pull. Faster or slower motions of this signal are used to indicate speeds other than caution or slow speeds. Where there is a choice of conductors to be pulled, this signal is given with one of the indicating signals Nos. 7 to 12 inclusive.
2. This signal always follows either No. 1 or No. 4 and is an indication of slow speed for caution. This signal shall be given continuously while the pull is being made at slow speed and is to be terminated by either giving the No. 1, No. 4 (depending on direction), or No. 3 signal.
4. This signal is used to indicate the direction of pull and is used in slacking or lowering as No. 1 is used for taking up.
- 7-16. These signals are always used in connection with either No. 1 or No. 4 and are given at the same time as either No. 1 or No. 4. In using No. 10, No. 11, and No. 12, the man's arm on the wire side to be pulled is used for the indicating signal.

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Flame-Resistant Apparel Safety Rules for Electric Work

I. Purpose

1. This section refers to wearing approved Flame-Resistant (FR) clothing in accordance with OSHA 29 CFR 1910.269 (I)(6)(iii).
2. This appendix covers MidAmerican Energy Company employees working on transmission and distribution equipment and inside the perimeter of an energized transmission/distribution substation
3. MidAmerican Energy Company employees working on transmission or distribution equipment and exposed to hazards of electric arcs shall wear the appropriate flame-resistant, arc-rated protective clothing system rated no less than 8 cal/cm². In all cases, the outer-most layer, such as shirts, jackets and rainwear, shall be made of FR material.
4. Employees shall wear an FR clothing system with an effective protection level of 8 cal/cm² when exposed to electricity while performing work under the following conditions (recognizing that all possible conditions are not listed below):
 - a. Work in the proximity of potentially high energy electric arcs. (E.g. rubber glove work, switching).
 - b. Hot stick work.
 - c. Pulling high-voltage fuses and switches.
 - d. Installing, maintaining, testing or removing meters, checking voltage and/or rotation.
 - e. Working on energized switchgear, bus compartments and transformers unless noted with labeling.
 - f. When performing electric work or trouble shooting within 20' of an exposed energized conductor or equipment in an energized substation.
5. Non-electrically qualified MidAmerican Energy personnel, such as auto/truck mechanics, gas metering employees and meter readers that the 20' required distance from exposed energized conductors are not required to wear FR clothing in energized MidAmerican Energy substations.
6. All non-electrically qualified personal shall be under the direct supervision of a qualified employee in energized MidAmerican Energy substations.

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7. All clothing worn as undergarments beneath approved FR clothing shall either be 100 percent natural fiber or an FR-rated apparel item. Note: Natural fiber undergarments can only be worn under FR clothing that has the cal/cm² comparable to the exposure. If the exposure exceeds the cal/cm² of the outer garment, the next layer must add pre-tested additional FR protection to address the rated exposure and cannot be of natural fiber. In addition, natural fiber clothing is not approved as an FR outer layer for protection against exposure to an arc flash.
8. The outer-most layer of below-waist clothing shall be FR clothing. It shall have the same protection level of 8 cal/cm² when exposed to electricity, as required for FR clothing worn above the waist, to provide the same rated level of protection.

II. Maintenance, Care and Replacement

1. Guidelines for care, maintenance, repair and replacement of FR clothing:
 - a. Damaged FR clothing shall not be worn and must be repaired before use. Repair kits are available by contacting the Safety Help Line at 866-681-7233.
 - b. Employees shall not alter MidAmerican Energy Company approved FR clothing in any way, such as tailoring long sleeve shirts to short sleeve.
 - c. FR clothing shall be inspected periodically by the user for signs of damage.
 - d. After receipt of FR clothing from the vendor, no additional unapproved items shall be sewn on or attached to MidAmerican Energy Company approved FR clothing and MEC logos shall not be removed, modified or covered.
 - e. Employees are responsible for proper laundering according to manufacturer's instructions, unless otherwise agreed to by collective bargaining agreements or understandings.

III. Employee Responsibilities

1. Ensure that FR clothing is worn at all times when there is potential exposure to the hazards of electrical flames or arcs, as noted in Section VI, Work Exposures and Required Protection Table.
2. FR clothing should be treated as personal protective equipment when the potential for ignition of clothing or thermal skin burns from an electric arc exists.
3. Employees shall have FR clothing readily available for use.
4. FR clothing sleeves shall be rolled down when exposed to a potential arc flash.

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IV. Short-Sleeved Flame-Resistant T-Shirts

1. The use of long sleeve 8 cal/cm² FR shirts is required while using class 2 rubber gloves and sleeves.
 - a. *Note: The use of short-sleeved FR or 100 percent cotton T-shirts as the outer layer when exposed to secondary voltages is strictly prohibited. The outer layer of any layering system must be FR with an arc rating.*

V. Layering

1. Employees shall wear the appropriate level of FR clothing to protect them from the anticipated level of effective arc energy. Employees that are exposed to arc flashes may layer their FR clothing to meet the required level of protection.
2. The appropriate level of protective FR clothing shall cover the employee's entire body with the noted exceptions:
 - a. Arc-rated protection is not necessary for the employee's hands when the employee is wearing rubber insulating gloves with protectors. When rubber gloving is not required, and the estimated incident energy is no more than 14 cal/cm², heavy-duty leather work gloves (12oz or greater) are used.
 - b. Arc-rated protection is not necessary for the employee's feet when the employee is wearing heavy-duty work shoes or boots.
 - c. Arc-rated protection is not necessary for the employee's head when the employee is wearing company approved head protection so long as the estimated incident energy is less than 9 cal/cm² for exposures involving single-phase arcs in open air, or 5 cal/cm² for other exposures.
 - d. The protection for the employee's head may consist of company approved head protection and a face shield with a minimum arc rating of 8 cal/cm² if the estimated incident-energy exposure is less than 13 cal/cm² for exposures involving single-phase arcs in open air, or 9 cal/cm² for other exposure.
 - e. For exposures involving single-phase arcs in open air, the arc rating for the employee's head and face protection may be 4 cal/cm² less than the estimated incident energy.

Note: Acceptable protection for specific cal/cm² is outlined in the Work exposures and Required protection table found in appendix 6 VI.

Note: FR high-visibility traffic vests shall not be considered as a component of the layering system.

VI. Arc-rated Head and Face Protection Requirement

1. An approved arc-rated face shield, or an arc-rated balaclava and arc-rated goggles shall be worn as defined in the work exposures and required protection table below.

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Work Exposures and Required Protection Table

Work Type	Minimum Protection Factor	Exposures Area	Arc-Flash Face Shield or FR Balaclava and Arc-Flash Goggle or Hood or Safety Glasses if Greater Hazard
Secondary Voltages 50-999 volts			
Rubber gloving all other energized exposed lines and equipment unless clarified below	8 cal/cm ²	Upper/lower body	No
Insulated test equipment used on padmount equipment, switchgear, or in vaults or manholes		Upper/lower body	No
120/208 volt self-contained and instrument rated metering class 200 and class 320		Upper/lower body	Yes
277/480 self-contained metering class 200	20 cal/cm ²	Upper/lower body	Yes
277/480 self-contained metering class 320	De-energize	NA	NA
277/480 volt cabinets and panels with edge-mounted parallel bus bars	De-energize	NA	NA
Testing voltage, rotation or amp readings (no status change) < 277 volts	8 cal/cm ²	Upper/lower body	No
Testing voltage, rotation or amp readings, including status changes \geq 277 volts	8 cal/cm ²	Upper/lower body	Yes
Primary Distribution Voltages 1 kV – 15kV			
Hot sticking, testing and grounding	8 cal/cm ²	Upper/lower body	No
Hot sticking padmount and primary enclosure equipment		Upper/lower body	No
Hot sticking padmount and primary enclosure equipment with less than or equal to 4' Hot stick		Upper/lower body	Yes
Rubber gloving all energized exposed lines and equipment at primary voltages 1 kV to 15 kV		Upper/lower body	No
Transmission Voltages 34.5 kV-345 kV			
Hot sticking open air	8 cal/cm ²	Upper/lower body	No
Testing and grounding	8 cal/cm ²	Upper/lower body	No
Test and ground wind farm collector circuit 34.5 kV	8 cal/cm ²	Upper/lower body	No

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Work Exposures and Required Protection Table

Substation			
AC/DC protected control voltage systems	8 cal/cm ²	Upper/lower body	No
Battery banks (wet or dry)	8 cal/cm ²	Upper/lower body	No
When working within 20' of an exposed energized conductor or equipment in an energized substation or the fence line, whichever is less	8 cal/cm ²	Upper/lower body	No
Work on energized open air-bus protected by circuit switcher or power fuses	8 cal/cm ²	Upper/lower body	No
Metal-clad switchgear/motor control centers/panel boards 50-480 volt	8 cal/cm ²	Upper/lower body	Yes for ≥ 277V
When switching using hot-stick or gang operated switch in a substation	8 cal/cm ²	Upper/lower body	No
1 kV-38 kV metal-clad switchgear	device label	Upper/lower body	Yes

VII Flame-Resistant Clothing Program Eligibility

Eligible employees shall be provided FR clothing based on their applicable letters of agreement.

Transmission System Grounding Procedures**1. Transmission Grounding****A. Equipotential Grounding**

The standard method for placement of personal protective grounds at the work site shall be equipotential grounding. Where several work sites are involved, all shall be grounded so that each has the capacity to protect crew members against the maximum available fault current for the line segment being worked on.

B. When working on parallel transmission lines, the hazard of electromagnetic induction may exist; see section D.D. on “Induced Currents and Voltages.” Before any personal protective grounds can be attached, an appropriate clearance shall be obtained and the circuit shall be tested to determine that it is de-energized. Where energized parallel lines are present, proper consideration shall be given to the effects of induction. If the test for a de energized circuit leaves any doubt, System Operations shall be contacted before any attempt is made to install protective grounds. Re-verification of electrical clearance boundaries may be necessary as part of this step.**C. Once verification is made that the circuit to be grounded is de-energized and a clearance established, grounds may be installed. Grounding cable lengths shall be kept as short as possible and arranged in such a manner as to minimize the possibility of injury from cable movement in the event the circuit is accidentally energized. Ground cluster bracket shall be used on non-metallic structures construction to establish an equipotential zone in the work area.****D. Special Grounding Situations**

a. **Dead-End Structures:** When working on dead-end structures where the circuit has been opened by disconnecting or cutting jumpers, a temporary grounding jumper shall be installed from the grounded side to the ungrounded side or install grounds on both sides of the work area.

b. **Conductor Splicing:** Where conductor splices are being installed, a temporary ground jumper shall be installed from the grounded side to the ungrounded side or install grounds on both sides of the work area.

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- c. **Stringing Operations:** When a conductor is being strung in or removed, and there exists the possibility that it could come into contact with lines energized in excess of 50 volts or receive an induced voltage from lines energized in excess of 50 volts, the following requirements must be observed:
- A traveling ground shall be installed ahead of tensioning equipment and bonded to the tensioning equipment with an approved grounding cable
 - When an existing conductor or a conductive pulling line is used to pull in new conductor, a traveling ground shall be installed and bonded to the pulling equipment with an approved grounding cable. Conductor being pulled with rope shall be grounded at the pulling end as soon as it can be reached from the ground or provisions shall be made to insulate or isolate the worker.
 - When the stringing operation has been completed, or if work is to be done on the conductors before the stringing operation has been completed, the conductors shall be grounded before the running or traveling grounds are removed.
 - When stringing over or adjacent to energized circuits, all circuit breaker recloser mechanisms impacting the circuits below shall be disabled
- d. **Multiple Crews Working on the Same Transmission Line Where Induced Currents and Voltages are Present Due to Parallel Transmission Lines:**

POTENTIALLY LETHAL VOLTAGES CAN BE PRESENT ON DE-ENERGIZED, UNGROUNDED CONDUCTORS OPERATING IN PARALLEL WITH ENERGIZED CONDUCTORS. Additional operational procedures need to be utilized whenever work is completed on parallel transmission circuits.

Whenever there are multiple crews working on the same de-energized transmission line where the hazards of induced currents and voltages are present due to the proximity of other energized transmission lines running in parallel with the de-energized transmission line, the following procedures shall be followed:

- Crews shall leap frog each other working on alternate structures. Grounds shall be applied at each structure and an equipotential zone shall be created.
- When multiple grounds are to be installed by crews at different work locations on the same circuit, crews shall work within a 3 to 4 mile distance of each other, thereby limiting the amount of mutual induction caused by ground current circulation.
- One master set of grounds shall be applied to the transmission line within that 3 to 4 mile distance and shall be tied into the best ground source available. Each crew at their specific work location will then create an equipotential zone on the structure by installing a cluster bracket.
- Due to the possibility of arcing when removing safety grounds, special precautions shall be taken when removing the protective grounds. Due to differences in potential between the conductor and protective grounds, grounds should be removed in a deliberate, continuous and swift motion.

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- e. **Multiple Crews Working on the Same Transmission Line Where No Induced Currents and Voltages are Present:** Whenever there are multiple crews working on the same de-energized transmission line and where no other hazards present from induced currents and voltages, the following grounding procedures shall be followed:
- Each crew at their specific work location shall install a set of grounds and create an Equipotential work zone using the cluster bracket. The grounds shall be tied into the best ground source available.
 - Crews will still be allowed to work two spans away from the grounded structure in either direction, but will still be required to equipotential the structure they are working on by installing the cluster bracket(where applicable) and installing a ground cable from the cluster bracket to the conductor being worked on.
 - When work proceeds to more than two spans away from the grounds, the crew shall transfer the existing set of grounds to their new work location and proceed as outlined and install a ground cable from the conductor being worked on.

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Spotter Hand Signals



Backward Travel



Forward Travel



Turn Left



Turn Right



Distance to Stopping Point



Emergency Stop