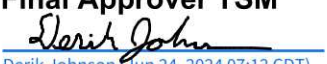




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| Originator TSM Safety Department | Final Approver TSM  Derik Johnson (Jun 24, 2024 07:12 CDT) | | Date 06/12/2024 |
| Subject General Guidelines for Contractors Working on or Near Energized Substations/Transmission Lines | | | |

1.0 PURPOSE / SCOPE

- 1.1 This procedure applies to all Basin Electric Power Cooperative's (BEPC's) contractors working on or near substations or energized transmission lines where there is a potential for electrical contact. This applies to both Transmission and Distribution maintained assets including new construction and maintenance of existing facilities.
- 1.2 All contractors shall comply with the requirements of this procedure in conjunction with other Federal, State, Local and Basin Electric Power Cooperative requirements while working in or near energized substation, switchyards, or energized transmission lines.

2.0 DEFINITIONS OF TERMS

- 2.1 **Barricade:** A physical obstruction such as tapes, cones, or A-frame type wood or metal structures intended to provide a warning about and to limit access to a hazardous area.
- 2.2 **Barrier:** A physical obstruction which is intended to prevent contact with energized lines or equipment or to prevent unauthorized access to a work area.
- 2.3 **Boundary Delineation:** Designated area established by a BEPC/TSM qualified employee to identify hazard areas.
- 2.4 **Clearance:** A statement with documentation from the Operations Supervisor to the Clearance Supervisor declaring that the equipment to be worked on has been isolated from all sources of Primary System Energy.
- 2.5 **Energized (alive, live):** Electrically connected to a source of potential difference, or electrically charged so as to have a potential significantly different from that of earth in the vicinity.
- 2.6 **Equipment:** Any machine, device, or apparatus, either electrical or mechanical, capable of being elevated or extended into the minimum approach distance.



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- 2.7 Hot Line Order: A statement with documentation from an Operations Supervisor to a HLO Supervisor that the reclosing is turned off and that the equipment covered by the Hot Line Order will not be intentionally re-energized until contact has been made with the HLO Supervisor.
- 2.8 Minimum Approach Distance: The closest distance an employee is permitted to approach an energized or a grounded object.
- 2.9 On-Site Coordinator: Basin Electric Power Cooperative on-site employee that interfaces with contractors.
- 2.10 Qualified Employee: One knowledgeable in the construction and operation of the electric power generation, transmission, and distribution equipment involved, along with the associated hazards.

3.0 APPLICABILITY / RESPONSIBILITY

3.1 Applicability

This procedure applies to all contractors who may be performing work within BEPC's substations or other high voltage electrical areas that are under the responsibility of BEPC's Transmission System Maintenance (TSM) division.

3.2 Responsibility

3.2.1 BEPC/TSM Safety Coordinator is responsible for:

- 3.2.1.1 Participating in a Safety Review Team to implement, review, and update the program at least once every three years.
- 3.2.1.2 Performing routine safety checks of work practices and providing reference when requested.
- 3.2.1.3 Informing the contractor, and BEPC supervision when necessary, of violations of the safety program and procedures.
- 3.2.1.4 Enforcing these guidelines and correcting any unsafe practices or conditions immediately.



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3.2.1.5 Organizing training sessions for affected employees and supervisors to increase knowledge of these guidelines and help them in recognizing hazards.

3.2.2 BEPC/TSM Supervisors are responsible for:

3.2.2.1 Administration of this program and enforcing these guidelines to ensure compliance by the contractor.

3.2.2.2 Ensuring that TSM employees and contractors are trained and knowledgeable in the requirements of the guidelines before work begins.

3.2.2.3 “Following-up” on and taking corrective actions on reported unsafe or hazardous situations.

3.2.3 Qualified Employee is responsible for the knowledge and application of:

3.2.3.1 The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.

3.2.3.2 The skills and techniques necessary to determine the nominal voltage of exposed live parts.

3.2.3.3 The minimum approach distances specified in this section corresponding to the voltages to which the qualified employee will be exposed.

3.2.3.4 The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment.

3.2.4 BEPC On-Site Coordinators are responsible for:

3.2.4.1 Notifying appropriate TSM personnel prior to the contractor beginning work.

3.2.4.2 Ensuring that contractors are trained and knowledgeable in the requirements of the guidelines before work begins.



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3.2.4.3 Ensuring contractors meet the terms of this procedure when they perform operations where electrical contact may occur.

3.2.4.4 Enforcing these guidelines to ensure compliance by the contractor and correcting any unsafe practices or conditions immediately.

3.2.5 Contractors are responsible for the knowledge and application of:

3.2.5.1 Following specific procedures and guidelines while performing work at substations or near energized transmission lines.

3.2.5.2 Providing qualified employees to complete the work in a safe a professional manner.

3.2.5.3 Ensuring the safety of their employees.

4.0 SAFETY / ENVIRONMENTAL

4.1 All Contactor employees are required to follow all applicable safety and environmental rules and regulations including:

4.1.1 Occupational Safety and Health Administration (OSHA) Regulations 29 CFR 1910.269 – Electrical Power Generation, Transmission, and Distribution

4.1.2 OSHA 29 CFR 1926.1400 – 1442 Cranes & Derricks in Construction

4.1.3 BEPC Program No. SAF 030 - Contractor Safety Access and On-Site Requirements.

4.2 Prior to the contractor starting work at the jobsite of an energized area a meeting will take place with the contractor (and employees), BEPC On-Site Coordinator and a BEPC/TSM qualified employee to review the scope of work and hazard mitigation measures. Details of the safe work area and special requirements shall be documented on TSM's "Special Work Permit" (ref. Appendix C).

4.2.1 Limits and conditions noted on the Special Work Permit shall be shared amongst all parties noted above.



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4.2.2 Special Work Permit will remain at the worksite until the work is completed, signed off and released by the contractor.

5.0 GUIDELINES / PROCEDURE

5.1 Only qualified employees may work on or with exposed energized lines or parts of equipment. Only qualified employees may work in areas containing unguarded, un-insulated energized lines or parts of equipment operating at 50 volts or more.

5.2 High voltage lines and equipment shall be considered energized and appropriate minimum approach distances adhered to until testing is complete and protective grounds are installed by a TSM employee or by a contractor who has been qualified by a TSM employee (ref. Appendix B).

5.2.1 The contractor is responsible and required to install an additional personal protective ground.

5.3 The contractor shall ensure that no part of a person's body and no material or equipment that the person is holding, carrying or is supported by, which is not insulated for the voltage concerned, must not come any closer to any live exposed conductor than the minimum approach distances shown in Appendix A.

5.4 Working in Substations presents electrical arc flash hazards. Electrical arc flash hazards require certain personal protective equipment (PPE) be used to safely perform the work.

5.4.1 Minimum PPE Requirements:

5.4.1.1 Safety eyewear with side shields complying with ANSI Z87.1.

5.4.1.2 Hardhat complying with ANSI Z89.1

5.4.1.3 Arc Rated clothing with a minimum arc rating of Category 2 shall be worn as the outermost layer when personnel work on energized equipment/lines or when distance and position will expose the worker to electric arc or flame hazards. (ref. Appendix A).

5.4.1.3.1 Undergarments and any clothing worn under the Arc Rated clothing shall be natural fiber. No synthetic material shall be worn under the Arc Rated clothing.



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5.4.1.4 Safety footwear in compliance with OSHA 29CFR 1910.136.

5.4.1.5 Additional PPE that may be required based on a hazard assessment may include arc rated balaclava, arc rated face-shield and leather gloves.

5.5 Site Access

5.5.1 Access routes for vehicle entry and pedestrian entry into the work site and work area shall be established by the On-Site Coordinator and/or TSM personnel.

5.5.1.1 When feasible, routes shall be established to prevent vehicles and pedestrians from passing directly through areas that are energized.

5.5.1.2 The On-Site Coordinator shall notify the contractor in the event that the access routes are altered.

5.5.2 Contract employees are not allowed to utilize alternative routes without prior approval by the BEPC On-Site Coordinator.

5.6 Boundary Delineation

5.6.1 Boundary delineation of work area will be required for any contractor employees working near live conductors or lines.

5.6.1.1 Boundary areas will be established, installed, altered or removed only by a BEPC/TSM qualified employee.

5.6.1.2 Safety barriers, barricades or other means shall be placed to identify electrical hazard boundaries and prevent contact with potentially dangerous energized equipment.

5.6.1.2.1 Boundaries will be indicated by utilizing cones, ropes, warning signs or other applicable means.

5.6.1.3 Contractor shall not enter any area within a substation that is barricaded unless under the supervision of the BEPC/TSM qualified employee or BEPC On-Site Coordinator.



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5.6.1.4 If Boundary Delineation is to be altered upon request by the contractor, the On-Site Coordinator and a qualified BEPC/TSM employee shall be notified and a "Variance Request" completed. (ref. Appendix D)

5.7 On-site Vehicles/Equipment

- 5.7.1 When driving in substations, vehicles and equipment may only cross cable trenches at designated crossing areas where the trench and covers have been reinforced or unless otherwise directed by TSM personnel.
- 5.7.2 Operators shall be aware of overhead structures and equipment.
- 5.7.3 Vehicles/equipment used in an energized substation shall be grounded to the ground grid if there is potential for contact with energized equipment.
- 5.7.4 All vehicles/equipment in transit shall maintain minimum approach distances from energized equipment (ref. Section 5.8.2).
- 5.7.5 An escort may be designated to assist the operator in guiding the vehicle/equipment and assuring proper minimum approach distances are maintained.
- 5.7.6 Parking of trucks, equipment, and personal vehicles should be in authorized and safe areas only.
- 5.7.7 All roadways, walkways and access-ways must remain accessible and open. In the event that roadways need to be blocked due to work scope the On-Site Coordinator shall be notified by the contractor.



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5.8 Clearance Requirements for Equipment Being Operated Near Energized Facilities

5.8.1 Operation of Equipment by Non-TSM Employees:

5.8.1.1 Non-TSM employees shall not set up or operate any piece of equipment where it is possible to bring such equipment or any part thereof within the minimum clearance distance specified in Appendix A of any high-voltage (600 volts or above) line or installation unless at least one of the following safety precautions has been taken:

5.8.1.1.1 The utility company or owner of the line has been notified, the line de-energized and grounded, and positive control measures taken to prevent energizing of the line during the progress of the work.

5.8.1.1.2 Adequate guards have been installed, or barricades erected, to prevent the equipment or any part thereof from coming within the specified minimum clearance distance of an energized conductor or part.

5.8.1.1.3 A full-time signalperson, aided by an automatic warning device installed on the equipment and/or an insulated measuring device, is utilized to warn the operator when the equipment approaches the specific minimum approach distance. The signal person, whose only function will be monitoring the distance, shall be in direct communication with the operator.

5.8.2 Equipment in transit, with no load and boom lowered, shall meet the minimum clearance of:

5.8.2.1 10 feet (3 meters) for voltages less than 50KV,

5.8.2.2 20 feet (6 meters) for voltages over 50 KV and up to and including 345 KV,

5.8.2.3 25 feet (7.6 meters) for voltages over 345 KV and up to and including 750 KV.



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5.8.3 The contractor is responsible for complying with all other equipment requirements noted in OSHA Regulations 29 CFR 1926.1400 – 1442 and 29 CFR 1910.269.

6.0 ATTACHMENTS

- 6.1 Clearance Requirements for Equipment Being Operated by Non-TSM Employees Near Energized Facilities
- 6.2 Minimum Approach Distance
- 6.3 TSM Special Work Permit
- 6.4 TSM Variance Request for Minimum Approach Distance

7.0 REFERENCES

- 7.1 NFPA 70E Standard for Electrical Safety in the Workplace – 2009 Edition
- 7.2 OSHA Regulation 29 CFR 1910.269 Regulations for Electric Power Generation, Transmission, and Distribution
- 7.3 OSHA Regulation 29 CFR 1926.1400 – 1442 Cranes & Derricks in Construction
- 7.4 BEPC Program No. SAF 030 - Contractor Safety Access and On-Site Requirements



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APPENDIX A

| Clearance Requirements for Equipment Being Operated by Non-TSM Employees Near Energized Facilities | | | |
|---|--|--|---------------------------------------|
| Nominal Phase-to- Phase Voltage (Kilovolts) | | Minimum Approach Distance (Feet) | Minimum Approach Distance (Meters) |
| ≤50 | | 10 (Minimum for any energized conductor) | 3.0 |
| 69 | | 11 | 3.2 |
| 115 | | 12 | 3.7 |
| 138 | | 13 | 3.9 |
| 161 | | 14 | 4.2 |
| 230 | | 16 | 4.9 |
| 345 | | 20 | 6.0 |
| 500 | | 25 | 7.6 |

Note: If Minimum Approach distances noted in Appendix A “Clearance Requirements for Equipment Being Operated by Non-TSM Employees Near Energized Facilities” would need to be entered by the contractor, the BEPC On-Site Coordinator and a qualified TSM employee shall be notified and a “Variance Request” completed. (ref. Appendix D)



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APPENDIX B

The minimum approach distance specified in this section corresponding to the voltage to which the **Qualified Employee** will be exposed.

WARNING

AC LIVE-LINE WORK MINIMUM APPROACH DISTANCE

Mechanical Equipment shall be operated by trained Basin Electric employees so that the minimum approach distances of the following table are maintained from exposed energized lines and equipment, unless precautions outlined in the Transmission System Maintenance Safety and Health Manual and Barehand Maintenance Procedures have been taken.

This table is to be used on lines longer than 200 miles without lightning/surge arresters installed at the midpoint

| Voltage Level | Phase to Ground Exposure (0 - 3000 ft) | Phase to Phase Exposure (0 - 3000 ft) | Phase to Ground Exposure (3001-4000 ft) | Phase to Phase Exposure (3001-4000 ft) | Phase to Ground Exposure (4001-5000 ft) | Phase to Phase Exposure (4001-5000 ft) | Phase to Ground Exposure (5001-6000 ft) | Phase to Phase Exposure (5001-6000 ft) |
|---------------|--|---------------------------------------|---|--|---|--|---|--|
| 345kV | 8'-4" | 14'-10" | 8'-5" | 15'-2" | 8'-8" | 15'-7" | 8'-11" | 16'-0" |

This table is to be used for all transmission lines except lines greater than 200 miles without lightning/surge arresters installed at the midpoint

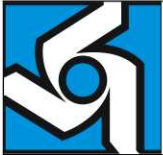
| Voltage Level | Phase to Ground Exposure (0 - 3000 ft) | Phase to Phase Exposure (0 - 3000 ft) | Phase to Ground Exposure (3001-4000 ft) | Phase to Phase Exposure (3001-4000 ft) | Phase to Ground Exposure (4001-5000 ft) | Phase to Phase Exposure (4001-5000 ft) | Phase to Ground Exposure (5001-6000 ft) | Phase to Phase Exposure (5001-6000 ft) |
|---------------|--|---------------------------------------|---|--|---|--|---|--|
| 242.1 - 362kV | 7'-3" | 12'-11" | 7'-5" | 13'-2" | 7'-7" | 13'-6" | 7'-8" | 13'-10" |
| 121.2 - 242kV | 5'-5" | 8'-5" | 5'-8" | 8'-7" | 5'-7" | 8'-8" | 5'-9" | 9'-0" |
| 72.6 - 121kV | 3'-3" | 4'-4" | 3'-3" | 4'-5" | 3'-4" | 4'-6" | 3'-5" | 4'-7" |
| 48.1 - 72.5kV | 3'-4" | 4'-0" | 3'-5" | 4'-1" | 3'-8" | 4'-2" | 3'-7" | 4'-4" |
| 38.1 - 48kV | 2'-10" | 3'-3" | 2'-10" | 3'-4" | 2'-11" | 3'-5" | 3'-0" | 3'-6" |
| 15.1 - 36kV | 2'-7" | 3'-0" | 2'-7" | 3'-0" | 2'-8" | 3'-1" | 2'-8" | 3'-2" |
| 8.1 - 15kV | 2'-2" | 2'-3" | 2'-3" | 2'-4" | 2'-3" | 2'-5" | 2'-3" | 2'-6" |
| 751 - 5100V | 2'-1" | 2'-1" | 2'-2" | 2'-2" | 2'-3" | 2'-3" | 2'-3" | 2'-3" |
| 301 - 750V | 1'-2" | 1'-2" | 1'-2" | 1'-2" | 1'-2" | 1'-2" | 1'-3" | 1'-3" |
| 50 - 300V | Avoid Contact | Avoid Contact | Avoid Contact | Avoid Contact | Avoid Contact | Avoid Contact | Avoid Contact | Avoid Contact |

NOTE - Minimum approach distance table based on 1910.269 OSHA Guidelines and Basin Electric Power Cooperative Engineering Study.

NOTE - The insulated portion of an aerial lift operated by a qualified employee in the lift is exempt from the requirement.

NOTE - The minimum phase-to-ground and phase-to-phase clearance may be cumulative during nonbonded operations.

**BASIN ELECTRIC
POWER COOPERATIVE**



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APPENDIX C



Basin Electric Power Cooperative

TSM SPECIAL WORK PERMIT

PERMIT NUMBER: _____

A POWER SYSTEM CLEARANCE HOT LINE ORDER HAS BEEN ISSUED ON THE FOLLOWING FACILITY:
(Check the appropriate box)

TO PERMIT WORK BY CONTRACTOR FORCES. THE UNDERSIGNED HAVE DISCUSSED THE WORK TO BE DONE, REVIEWED THE DETAILS OF THE ABOVE LISTED PROTECTIVE ACTION FOR ADEQUACY, AND DEFINED THE LIMITS AND CONDITIONS OF THE SAFE WORKING AREA. THE LIMITS OF THE SAFE WORKING AREA ARE AS FOLLOWS:

NOTE Draw sketches and/or single line diagrams on reverse side showing safe working limits and hazards if applicable.

CLEARANCE NO: _____ (Signature)

HOT LINE ORDER (HLO) DATE: _____ TIME: _____ TSM REPRESENTATIVE HOLDING CLEARANCE OR HLO

This Work Permit issued at the worksite DATE: _____ TIME: _____ and the contractor is authorized to proceed with the work in the area designated above.

(Signature)
Contractor's Authorized Worksite Representative

(Signature)
TSM/BEPC Representative in Charge of Worksite

RELEASE OF SPECIAL WORK PERMIT

I HEREBY CERTIFY THAT ALL PROTECTIVE GROUNDS AND BARRIERS HAVE BEEN REMOVED AND THAT ALL PERSONNEL ARE CLEAR OF THE AREA COVERED BY THIS WORK PERMIT

CONTRACTOR'S AUTHORIZED REPRESENTATIVE:

(Signature) DATE: _____ TIME: _____



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APPENDIX D

| | | |
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| | Basin Electric Power Cooperative | |
| TSM VARIANCE REQUEST FOR MINIMUM APPROACH DISTANCE | | |
| Variance Requester: _____ Date: ____/____/____ | | |
| <ol style="list-style-type: none"> 1. The stated requirement needs to be varied because: 2. How will proper protection and safety of personnel be provided, if applicable: 3. This variance will remain effective from : _____ to: _____ | | |
| <p>Concurred by: (signing below indicates that all parties have discussed and agreed to the terms noted above)</p> <p>TSM Safety Coordinator: _____ Date: ____/____/____ <small>(signature required)</small></p> <p>TSM Superintendent: _____ Date: ____/____/____ <small>(signature required)</small></p> <p>BEPC On-Site Coordinator: _____ Date: ____/____/____ <small>(signature required)</small></p> <p>Contractor Representative: _____ Date: ____/____/____ <small>(signature required)</small></p> <p>Approved by:</p> <p>TSM Division Manager: _____ Date: ____/____/____ <small>(or TSM Designee)</small> <small>(signature required)</small></p> | | |

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Final Audit Report


2024-06-24

| | |
|-----------------|--|
| Created: | 2024-06-21 |
| By: | Stefanie Schettler (sschettler@becp.com) |
| Status: | Signed |
| Transaction ID: | CBJCHBCAABAAJLYbDWcbBLw-3yz-N1oDyqRQwIxK-sJA |

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