

“B” SUMMARY OF CAPABILITIES FOR ELECTRIC T&D ENDORSEMENT

The CUSP endorsement for T&D includes operation, maintenance and construction of electric power transmission and distribution lines, including transformers and control equipment which are located outside of a generation plant.

Work on overhead lines includes structure installations and replacement and conductor stringing which could involve live line work on low and high voltage systems. Work on underground systems includes cable installation and removal, splicing and cable terminations.

The work on equipment such as transformers, regulators, circuit breakers and reclosers may be located on or in overhead structures, substations, sub-surface vaults and surface mounted pads.

Transmission & Distribution work frequently requires extended hours and out of town work for power restoration during storms and other outages.

All endorsement summaries represent safety related capabilities which a CUSP may be expected or responsible for within the scope of the endorsement. They are intended to give a snapshot of knowledge, skills and attitudes a CUSP uses to identify and address safety and compliance related strategies for protecting workers and avoiding unintended outcomes.

Capability Name	Relevance to the CUSP	Example of a Supporting Ability
<p>B1 - Training and Qualification</p> <p>29 CFR, 1910.269(a)(2) Training.</p> <p>IEEE C2, National Electric Safety Code, Part 4,</p>	<p>Confirm workers have been trained and are qualified to perform their job assignments.</p>	<p>Determine that all workers are familiar with safety-related work practices, procedures and requirements for the risk of the hazards involved.</p> <p>Ensure that electrically qualified workers are proficient in:</p> <ul style="list-style-type: none"> ● Distinguishing live parts from other parts ● Determining nominal voltage ● Minimum approach distances which workers will be exposed ● Use of precautionary techniques ● Recognizing electrical hazards ● Control or avoid electrical hazards ● Emergency procedures

<p>B2 - Information Transfer</p> <p>29 CFR, 1910.269(a)(3), Information transfer.</p>	<p>Provide for the exchange of information so work rules and procedures provide equal protection for workers of the contract and the host employer</p>	<p>Coordinate the exchange of the following information related to the safety of the individuals performing work:</p> <ul style="list-style-type: none"> ● Characteristics of installations ● Conditions and hazards known to exist or anticipated to arise during work ● Information about the design and operation of installations ● Contract employer responsibilities to advise host of conditions on unique or unanticipated hazards
<p>B3 - Job Briefings</p> <p>29 CFR, 1910.269(c) Job briefing</p>	<p>Ensure the person in charge conducts a job briefing before the start of each job.</p>	<p>CUSPs ensures the lead workers is provided with the following information:</p> <ul style="list-style-type: none"> ● Nominal Voltage ● Transient overvoltage ● Induces voltages ● Location of grounds ● Condition of protective grounds ● Locations of circuits and equipment ● Condition of poles ● Environmental conditions relation to safety <p>Require job briefings cover no less than the following:</p> <ul style="list-style-type: none"> ● Hazards associated with the job ● Work procedures involved ● Special precautions ● Energy-source controls ● Personal protective equipment ● Scope and complexity of the work shall govern the number and extent of briefing. ● Emergency Action Plan

<p>B4 - Personal Protective Equipment</p> <p>29 CFR, 1910 Subpart I - Personal Protective Equipment</p> <p>29 CFR, 1910.269(g) Personal protective equipment</p> <p>29 CFR, 1910.269 App F - Work-Positioning Equipment Inspection Guidelines</p> <p>29 CFR, 1926 Subpart E - Personal Protective and Life Saving Equipment.</p> <p>ASTM F887, Standard Specifications for Personal Climbing Equipment.</p>	<p>Able to determine the appropriate personal fall arrest system, work-positioning equipment, or fall restraint system for work on poles, towers and similar structures and aerial lifts.</p>	<p>Familiar with the use and inspection of the following fall protection and climbing equipment:</p> <ul style="list-style-type: none"> ● Pole climbers ● Wood Pole Fall Restriction Devices (WPFRD) ● Positioning lanyard and strap ● Body belts ● Harnesses ● Shock Absorbing Lanyards ● Self-Retractable Lifeline (SRL) flammability requirement ● Training requirements for selected devices
<p>B5 - Working on or near exposed energized parts, lines or equipment.</p> <p>29 CFR, 1910.269(l) Working on or near exposed energized parts.</p> <p>29 CFR, 1910.269 App B - Working on Exposed Energized Parts. And App C Protection From</p>	<p>Understanding the minimum approach distances and working rules to protect workers from hazardous differences of potential.</p>	<p>Determine the following variables relating to work within the minimum approach distance:</p> <ul style="list-style-type: none"> ● Worker qualification ● Two worker rule ● Considered and treated as energized ● Minimum Approach Distance <ul style="list-style-type: none"> ○ Transient overvoltage ○ Alternative minimum approach distances ○ Altitude corrections factors ○ Unanticipated movement ● Isolate and insulate requirement <ul style="list-style-type: none"> ○ Cover closest first ○ Cover from below ○ Second point of contact

<p>Hazardous Differences in Electric Potential.</p> <p>IEEE C2, National Electric Safety Code, Part 4.</p> <p>IEEE 516, Guide for Maintenance Methods on Energized Power Lines</p>		<ul style="list-style-type: none"> ● Workers reach and extended reach ● Workers position related to conductors ● Workers wearing exposed conductive articles ● Requirements for energized work <ul style="list-style-type: none"> ○ Precautions for fusing ○ Opening and closing circuits under load ○ Connections and jumpers
<p>B6 - Material Handling</p> <p>29 CFR, 1910.269(k)(2) Materials storage near energized lines or equipment</p>	<p>Able to identify correct procedures.</p>	<p>Familiar with best practices and requirements for moving, storing and handling material:</p> <ul style="list-style-type: none"> ● Positive control during movement ● Clearance from energized parts. ● Correct equipment for loading and unloading.
<p>B7 - Protection from flames and electric arcs</p> <p>29 CFR, 1910.269(l)(8) Protection from flames and electric arcs.</p> <p>29 CFR, 1910.269 App E, Protection From Flames and Electric Arcs.</p> <p>IEEE C2, National Electric Safety Code, Part 4.</p>	<p>Identify arc hazards and protect workers from burn injuries.</p>	<p>Capable of applying the following processes:</p> <ul style="list-style-type: none"> ● Assess the workplace for electric-arc hazards ● Estimate the available heat energy by considering: <ul style="list-style-type: none"> ○ Fault current ○ Clearing time ○ Voltage and arc gap ○ Work task hazards ○ Distance to arc ● Selecting protective clothing and other protective equipment ● Work practices to minimize arc exposure: <ul style="list-style-type: none"> ○ Blocking reclosers ○ Maintain maximum distances to arc ○ Work from under

<p>B8 - De-energizing lines and equipment for employee protection</p> <p>29 CFR, 1910.269(m) Deenergizing lines and equipment for employee protection.</p> <p>IEEE C2, National Electric Safety Code, Part 4.</p>	<p>Protect workers by treating as energized all lines and equipment which have not been prepared for a clearance.</p>	<p>Recognize and verify the following steps are observed for a clearance:</p> <ul style="list-style-type: none"> ● Designated control operator or authority. ● Identify sources of energy including back feed ● Request de-energized ● Switched open & verified air gap ● Automatic equipment inoperable ● Address stored energy in capacitors ● Open points are tagged ● Test for the absence of nominal voltage ● Temporary protective grounds installed <ul style="list-style-type: none"> ○ Limit fault current with bracket or trip grounds ○ Protect from difference in potential with equipotential grounds and bonds ● Responsibilities for receiving, holding, transferring and returning a clearance
<p>B9 - Temporary Protective Grounding (TPG)</p> <p>29 CFR, 1910.269(n) Grounding for the protection of employees.</p> <p>IEEE C2, National Electric Safety Code, Part 4.</p> <p>IEEE 1246, Guide for Temporary Protective</p>	<p>Understand the practices, technical information, and safety criteria for various TPG conditions which may include OH lines, UG cables, substations and mobile equipment.</p>	<p>Possess a working knowledge of the following principles and how to apply them for worker protection.</p> <ul style="list-style-type: none"> ● Induction ● Trip or bracket grounding ● Equipotential zones ● Available fault current ● Clearing time ● Ground cables: ampacity, length and movement ● Grounding equipment, inspection, installation and removal ● Test for the absence of nominal voltage ● Live line tools ● Establish a grounding plan

<p>Grounding Systems Used in Substations</p> <p>IEEE 1048, Guide for Protective Grounding of Power Lines</p>		<ul style="list-style-type: none"> ● Earth electrode in order of lowest impedance: <ul style="list-style-type: none"> ○ Multi grounded neutral system ○ Grounded static wire ○ Structure ground ○ Anchor rod ○ Temporary ground rod
<p>B10 - Mechanical Equipment</p> <p>29 CFR, 1910.269(p) Mechanical equipment.</p> <p>ANSI/SAIA A92.2, Vehicle-Mounted Elevating and Rotating Aerial Devices.</p>	<p>Ensure workers correctly operate mechanical elevating and rotating equipment and that appropriate electrical protection is applied.</p>	<p>Applicable requirements for lifting, rigging and set up including:</p> <ul style="list-style-type: none"> ● Inspection ● Operator attending controls ● Fall protection ● Outriggers use and set up ● Lift plan when necessary ● Load test when personnel basket is installed per manufacturer recommendation ● Correct equipment application ● Climbing on or exiting equipment using 3 points of contact <p>Applicable requirements for operations near energized lines or equipment.</p> <ul style="list-style-type: none"> ● Minimum approach distance ● Insulated portion of the boom ● Operated by a qualified employee ● Designated observer ● Extra precautions <ul style="list-style-type: none"> ○ Covering with insulating protective material ○ Position equipment correctly ○ Measures to protect workers from difference in potential such as trip grounds, equipotential mats, ○ Required PPE ○ Barricades ● Multiple pieces of equipment are bonded to maintain an equipotential zone

<p>B11 - Electrical Protective Equipment and Live Line Tools</p> <p>29 CFR, 1910.269(j), Live-line tools</p> <p>29 CFR,1910.137 Electrical Protective Equipment.</p>	<p>Understand the purpose, application and use of rubber gloves, sleeves, cover-up and live line tools to insulate workers.</p>	<p>Familiar with the selection, use, inspection and testing which includes:</p> <ul style="list-style-type: none"> ● Design and specific type ● Test and use voltage rating ● Periodic testing requirement ● Removal from service due to defects ● In service care ● Proper storage ● Min. tool insulation distance (MTID) ● E-rated hardhat ● Dielectric footwear
<p>B12 - Stringing Conductors for Installation and Removal</p> <p>29 CFR, 1910.269(q)(2) <i>Installing and removing overhead lines.</i></p> <p>IEEE 524, Guide for the Installation of Overhead Transmission Line Conductors.</p>	<p>Be familiar with safe work practices to ensure stringing operations are planned and set up correctly.</p>	<p>Ensure correct procedures are in place for the following stringing operations:</p> <ul style="list-style-type: none"> ● Adjacent to energized lines <ul style="list-style-type: none"> ○ EPZ and barricades ○ Line grounding and bonding ○ Static and induction ● Equipment <ul style="list-style-type: none"> ○ Set up and guying ○ Rating of pulling equipment ○ Rating of the stringing blocks ● Correct Kellum grip and swivel size ● Guard structures

<p>B13 - Work on Poles and Structures</p> <p>29 CFR, 1910.269(q)(1) General.</p> <p>29 CFR, 1910.269(q)(4) Towers and structures.</p> <p>29 CFR, 1910.269 App D - Methods of Inspecting and Testing Wood Poles.</p>	<p>Be familiar with safe work practices to ensure stability of existing structures and adherence to fundamental rules for their installation and removal.</p>	<p>Ensure workers address all issues regarding structural stability of poles, towers and similar structures by:</p> <ul style="list-style-type: none"> ● Inspection and testing ● Bracing and other support as needed ● Consider loads and strains ● Loading, unloading and transportation <p>Be familiar with hazards while setting and removing poles, towers and similar structures:</p> <ul style="list-style-type: none"> ● Proximity to exposed energized lines ● Faulty or conductive rigging ● Overloading equipment ● Equipment failure / loss of load ● Condition of adjacent structures ● Fall protection when exposed to the leading edge of an open hole <p>Be familiar with controls associated with above stated hazards.</p> <ul style="list-style-type: none"> ● Worker protection, <ul style="list-style-type: none"> ○ De-energized and grounded ○ Equipment grounding/bonding ○ Rated protective equipment ○ Pole cover ○ Insulated cant hooks and tools ○ Tag lines ○ Dielectric Gloves and footwear ● Dedicated spotter ● Barricading ● Inspect adjacent structure
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<p>B14 - Work in Substations.</p> <p>29 CFR, 1910.269(u) Substations.</p> <p>IEEE 1246, Guide for Temporary Protective Grounding Systems Used in Substations</p>	<p>Be familiar with the hazards of substations and for safeguarding workers while installing, operating, or maintaining them.</p>	<p>Able to identify and verify safe work requirements and procedures in substations which include:</p> <ul style="list-style-type: none"> ● Entry <ul style="list-style-type: none"> ○ Notifications ○ Inspections ○ Restrictions ● Qualified and authorized workers ● Vehicle and equipment entry ● Material handling ● Temporary and permanent fencing ● Working on the ground grid; maintaining safe continuity ● Mobile equipment <ul style="list-style-type: none"> ○ Set up ○ MAD ○ Grounding and bonding ● Operation of equipment <ul style="list-style-type: none"> ○ Equipment and configuration pre-check ○ Racking circuit breakers ○ Adjusting and setting regulators ○ Blocking reclosers ○ Switching capacitors
<p>B15 - Highly Specialized Work Practices</p> <p>29 CFR, 1910.269(q)(3) Live-line barehand work.</p> <p>29 CFR, 1910.269(o) <i>Testing and test facilities.</i></p> <p>29 CFR, 1910.97 Nonionizing radiation.</p> <p>IEEE 4,, Standard for High-Voltage Testing Techniques</p>	<p>Become aware of the different work practices which require special precautions, training and experience.</p>	<p>Understand the need to seek out specific information, standards and expert advice on less common high hazards tasks which may include:</p> <ul style="list-style-type: none"> ● Applying diagnostic test equipment ● Bare hand work ● Work involving helicopter ● Directional boring ● Network protector devices ● Non ionized radiation ● Electromagnetic fields

<p>B16 - Confined / Enclosed Space</p> <p>Permit Required Confined Space, 29 CFR, 1910.146 29 CFR, 1926.1204</p> <p>OSHA Publication, 3138, Permit Required Confined Space</p> <p>Enclosed Space 29 CFR, 1910.269(e)</p>	<p>Understand the requirements of a permit required confined space and the conditions for reclassification to an enclosed space.</p>	<p>Must have a clear understanding of the hazards, controls, rescue procedures and equipment for work in an Enclosed Space:</p> <ul style="list-style-type: none"> ● Pre-entry testing ● Ventilation requirements ● Openings are guarded from falls ● Rescue equipment ● Entrants and attendants shall have enclosed spaces training which include: <ul style="list-style-type: none"> ○ Hazards identification ○ Procedures to control hazards ○ Safe work practices ○ Rescue procedures
<p>B17 - Operation of Cranes, Derricks and related Rigging</p> <p>29 CFR, 1926 Subpart CC - Cranes and Derricks in Construction.</p>	<p>Know the requirements for power-operated lifting equipment to prevent unsafe operation. These rules apply to insulated booms and non-insulated boom equipment.</p>	<p>Be aware of the requirements and standards for:</p> <ul style="list-style-type: none"> ● Ground conditions requiring ground protection mats, blocking or cribbing ● Operator qualification and certification. ● Signal person qualifications ● Rigger Qualification ● Selection & inspection of wire rope, chains, hooks, slings & shackles ● Lift Plans & load estimations ● Equipment inspection requirements ● Work area control ● Identify swing hazards ● Safety warning devices ● Restrictions on non-electrically qualified operator, Minimum Approach Distance
<p>B18 - General Construction</p> <p>ANSI / ASSP A10 The Construction and Demolition Operations Compendium of Standards</p>	<p>Become familiar with hazards & work practices of various areas of general construction as work requires.</p>	<p>Able to research, select & apply relevant standards & requirements to ensure worker safety & correct operational procedures on:</p> <ul style="list-style-type: none"> ● Directional boring ● Erecting steel structures

<p>B19 - Environmental and Health hazards in General Construction</p> <p>29 CFR, 1926 Subpart Z - Toxic and Hazardous Substances</p>	<p>Prevent exposures to substances, material or conditions which could cause illness or harm.</p>	<p>Identification & awareness of construction related health hazards and industrial hygiene controls:</p> <ul style="list-style-type: none"> ● Respirable Crystalline Silica ● Asbestos ● Lead ● PCBs ● SF6 ● Biohazards
<p>B20 - Work on Underground Facilities</p> <p>29 CFR, 1910.269(t) Underground electrical installations.</p> <p>IEEE C2, National Electric Safety Code, Part and 3 and 4.</p>	<p>Be familiar with safe work practices and adherence to fundamental rules for the construction, maintenance and operations of Underground Distribution Facilities.</p>	<p>Applicable requirements for operations near energized underground cables or equipment:</p> <ul style="list-style-type: none"> ● Switching <ul style="list-style-type: none"> ○ Feed through bushings. ○ Parking stands. ○ 6 foot live line tool or longer. ● Grounding <ul style="list-style-type: none"> ○ Equipotential Zones ○ Trip Grounds ● Worker isolation and insulation <ul style="list-style-type: none"> ○ Insulating gloves ○ Insulating standing blankets or mats ○ Dielectric overshoes ● Equipment hazard identification <ul style="list-style-type: none"> ○ Pre entre. ○ Facility/equipment. ○ Nominal voltage ○ Multiple cables ○ Concentric neutral or sheath continuity ● Worker Protection from <ul style="list-style-type: none"> ○ Arc thermal ○ Step and touch potential ○ Ground potential rise ○ Abnormal cables and equipment

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