

**Work scope details:**

Title: XFMR Secondary Absence of Voltage Verification

Work Scope Summary: - The task involves verifying the absence of voltage at the secondary terminals of a transformer (XFMR) after power isolation. This verification is crucial to ensure safety from arc flash hazards, specifically at a Hazard Risk Category 4 (HRC4) level. The work must be conducted at a safe distance that aligns with the arc flash protection ratings to confirm an Electrically Safe Work Condition.

Key Work Scope Components: - Isolation of power at the transformer (XFMR). - Verification of absence of voltage at XFMR secondary terminals. - Assessment and adherence to arc flash protection ratings. - Ensuring compliance with HRC4 safety standards. - Declaration of an Electrically Safe Work Condition upon successful verification.

**Relevant previous events and lessons learned:**

Event Title	Event Summary	Lessons Learned	Reference link
Preventing Arc Flash Events	Hazardous energy control processes are designed to protect workers from exposure to hazardous energy, including electrical energy. Arc flashes can cause severe injuries or death. Conditions can result from accidental contact, buildup of conductive dusts, corrosion, dropped tools, or improper work procedures.	Always be prepared for what can go wrong. Hazards are identified and evaluated for every task, every time. Maintain a healthy respect for what can go wrong. Everyone is personally responsible for ensuring safe operations.	<a href="#">Link</a>
Near Miss -- Arc Flash Damages Equipment, a Noncontributing LOTO Violation Noted	On March 12, 2013, two electricians were troubleshooting a 480-volt heater when an arc flash occurred. The heater had been electrically isolated using a lockout-tagout on the circuit breaker. An arc occurred when the test leads contacted the switch components, destroying the ends of the meter test leads. No injuries occurred.	A Lessons Learned Bulletin is being developed and will be communicated as part of the Corrective Action Plan for this report.	<a href="#">Link</a>

**Missing Hazards:**

Hazard	Missing or Inadequate Mitigation in Current Work Control Document	Recommended Mitigation for Revision	Reference link	SBMS Link
Ergonomic Conditions	None	Conduct exposure assessment, evaluate work station/posture, diversify activities, specify PPE, use special tools, implement stretch breaks/exercises, and worker rotation	N/A	<a href="#">Link</a>

Arc Flash	None	Implement NFPA 70E requirements, de-energize equipment before inspections, and use appropriate PPE	<a href="#">OSHA Arc Flash Guide</a>	<a href="#">Link</a>
Accidental Contact with Electrical Systems	None	Regular inspection and maintenance, implement hierarchy of hazard control	<a href="#">HSE Electrical Hazard Control Measures</a>	<a href="#">Link</a>
Conductive Dust Buildup	None	Implement bonding and grounding, regular cleaning, and use of dust collection systems	<a href="#">CCOHS Combustible Dust</a>	<a href="#">Link</a>
Corrosion	None	Regular inspection and maintenance, use corrosion-resistant materials, and apply protective coatings	N/A	<a href="#">Link</a>
Dropped Tools	None	Implement dropped object prevention plan, secure tools at height, and train workers on procedures	<a href="#">3M Dropped Object Prevention Plan</a>	<a href="#">Link</a>
Improper Work Procedures	None	Conduct regular inspections, document inspections, and implement effective controls	<a href="#">OSHA Hazard Prevention</a>	<a href="#">Link</a>
High Workload and Time Pressure	None	Implement workload management strategies, provide adequate breaks, and monitor stress levels	<a href="#">Hazards Stress Management</a>	<a href="#">Link</a>
Distractive Environment	None	Implement environmental controls to minimize distractions, and provide training on focus techniques	N/A	<a href="#">Link</a>
Overconfidence and Imprecise Communication	None	Conduct training on communication skills, implement clear communication protocols, and monitor team interactions	N/A	<a href="#">Link</a>

Falls from Heights	None	Implement fall protection systems, conduct risk assessments, and provide training on working at heights	<a href="#">OSHA Fall Protection</a>	<a href="#">Link</a>
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**Failure mode analysis:**

Current control	Failure mode of the control	Effect of Failure	Cause of Failure	Recommended action
Written permits for the work activity	Permit not obtained or incorrect	Unauthorized work leading to safety hazards	Miscommunication or oversight in permit process	Implement a checklist and double-check permit requirements before work begins
Precautions, step warnings, Hold Points	Steps not followed or missed	Increased risk of arc flash or electrical shock	Human error or inadequate training	Conduct thorough training and enforce step-by-step verification
Personal Protective Equipment (PPE)	PPE not worn or inadequate	Severe injury from arc flash	Lack of awareness or improper PPE selection	Ensure PPE compliance through regular audits and provide training on PPE importance
Work instructions for information	Instructions not followed or misunderstood	Unsafe work conditions leading to accidents	Vague instructions or lack of clarity	Revise instructions for clarity and conduct pre-job briefings
ORNL subject area requirements	Non-compliance with safety standards	Increased risk of electrical hazards	Lack of understanding or awareness	Regularly review and update safety standards; conduct compliance checks
Discuss group/individual responsibilities	Roles not clearly defined	Confusion leading to unsafe practices	Poor communication or lack of leadership	Clearly define roles and responsibilities in pre-job meetings
Follow work instructions & safety procedures	Procedures not adhered to	Unsafe work environment	Complacency or lack of supervision	Implement strict adherence policies and conduct regular supervision
Availability/location of materials, tools, etc.	Tools/materials not available or misplaced	Delays and unsafe improvisation	Poor inventory management	Conduct inventory checks and ensure tool availability before work

Response if work cannot be performed as planned	Inadequate response to unforeseen issues	Unsafe conditions or delays	Lack of contingency planning	Develop and communicate contingency plans for unexpected scenarios
Potential error traps with the job	Error traps not identified or mitigated	Increased likelihood of accidents	Lack of foresight or experience	Conduct error trap analysis and implement mitigation strategies
Take a minute before: work start & leaving work area	Failure to pause and assess	Increased risk of oversight and accidents	Rushing or time pressure	Encourage a culture of mindfulness and safety checks before starting work
Follow F&O procedure F&O-ADM-022	Procedure not followed	Unsafe conditions during high voltage work	Lack of awareness or training	Provide training on F&O procedures and enforce compliance
Wear safety glasses, gloves, and sturdy footwear	PPE not worn or inadequate	Injury from electrical hazards	Complacency or lack of enforcement	Conduct PPE audits and enforce strict compliance
Wear hearing protection in high noise areas	Hearing protection not used	Hearing damage	Lack of awareness or enforcement	Regularly assess noise levels and enforce hearing protection use
Exposure Assessment	Assessment not conducted	Unidentified risks leading to unsafe conditions	Lack of resources or oversight	Schedule regular exposure assessments and document findings
Perform and Verify LO/TO	LO/TO not performed correctly	Risk of electrical shock or arc flash	Inadequate training or oversight	Conduct LO/TO training and verification checks
Inspection of electrical panels and wiring	Inspections not conducted or inadequate	Undetected faults leading to hazards	Lack of expertise or oversight	Implement regular inspection schedules and ensure qualified personnel conduct inspections