

Work scope details:

Title: XFMR Secondary Absence of Voltage Verification

Work Scope Summary: This work involves performing absence of voltage verification following the isolation of power transformers, specifically at the secondary terminals where arc flash hazards exceed HRC4. The objective is to ensure an electrically safe work condition is achieved before any further work is conducted.

Key Work Scope Components:

- Isolation of transformer secondary loads
- De-energization of the transformer with primary disconnect
- Use of non-contact voltage detectors and Cat IV voltmeter
- Application of appropriate personal protective equipment (PPE)
- Verification of absence of voltage at a safe distance

Relevant previous events and lessons learned:

Event Title	Event Summary	Lessons Learned	Reference Link
Electrical Shock Incident at XYZ Facility	A technician was shocked while verifying voltage on a transformer that was thought to be de-energized. The shock resulted in serious injuries.	Always verify the absence of voltage using multiple methods and ensure proper lockout/tagout procedures are followed.	N/A
Arc Flash Accident in Substation	An employee suffered burns due to an arc flash while working on energized equipment without proper PPE.	Ensure that all personnel are trained on arc flash hazards and that appropriate PPE is worn at all times.	N/A
Improper Use of Voltage Detectors	A voltage detector failed to indicate voltage presence, leading to an unsafe work condition.	Regularly inspect and test voltage detection equipment before use and ensure proper training on their operation.	N/A
Confined Space Entry Near Electrical Equipment	Workers entered a confined space without proper isolation, leading to exposure to live electrical parts.	Always conduct a thorough hazard assessment and ensure isolation before entering confined spaces.	N/A
Tool Failure During Electrical Work	A power tool malfunctioned during operation, causing injury to the user.	Implement regular maintenance and inspection protocols for all tools and equipment used in electrical work.	N/A

Missing Hazards:

Hazard	Missing or Inadequate Mitigation in Current Work Control Document	Recommended Mitigation for Revision	Reference Link	SBMS Link
Lack of verification of voltage detector functionality	Not addressed	Implement a requirement to test voltage detectors before and after use.	N/A	N/A
Inadequate PPE for high arc flash risk	Not addressed	Specify the use of 100 cal/cm ² rated flash suits and face shields for all personnel.	N/A	N/A
Potential for secondary back feed	Inadequate control measures	Ensure proper tagging and isolation procedures are followed to prevent back feed.	N/A	N/A
Insufficient training on electrical safety	Not addressed	Mandate training sessions on electrical safety and arc flash hazards for all involved personnel.	N/A	N/A
Inadequate communication of hazards	Vague guidance	Establish a clear communication protocol for hazard identification and mitigation measures.	N/A	N/A
Environmental hazards (temperature extremes)	Not addressed	Monitor and control temperature extremes in the work area, providing hydration and rest breaks as necessary.	N/A	N/A
Noise exposure during work	Not addressed	Conduct a noise assessment and provide hearing protection where necessary.	N/A	N/A
Slips, trips, and falls	Inadequate current mitigation	Ensure work areas are kept clean and free of hazards, and provide training on maintaining situational awareness.	N/A	N/A
Improper tool usage	Not addressed	Develop a checklist for tool inspection and proper usage training before work begins.	N/A	N/A
Time pressures leading to rushed work	Not addressed	Implement a work schedule that allows adequate time for all safety checks and procedures.	N/A	N/A

Failure mode analysis:

Current Control	Failure Mode of the Control	Effect of Failure	Cause of Failure	Recommended Action
Lockout/Tagout procedures	Permit not obtained or expired	Risk of electrical shock or arc flash	Lack of oversight in permit management	Implement a digital tracking system for permits to ensure timely renewals.
PPE requirements	PPE not used or inadequate	Increased risk of injury from electrical hazards	Lack of enforcement or awareness	Conduct regular audits to ensure compliance with PPE requirements.
Voltage detection protocols	Voltage detector fails to indicate voltage	Potential for serious injury or fatality	Equipment malfunction or lack of testing	Require routine testing and maintenance of voltage detection equipment.
Training programs	Inadequate training on electrical safety	Increased risk of accidents	Insufficient training resources or scheduling	Develop a comprehensive training schedule and materials for all personnel involved.
Communication protocols	Poor communication of hazards	Increased likelihood of accidents	Lack of established communication channels	Create a standardized communication plan for hazard reporting and updates.
Emergency response procedures	Emergency plan not followed	Delayed response in case of an incident	Lack of drills or training	Schedule regular emergency drills to ensure familiarity with response procedures.
Tool inspection protocols	Tools not inspected before use	Increased risk of tool failure	Inadequate inspection processes	Implement a mandatory pre-use inspection checklist for all tools.

Current Control	Failure Mode of the Control	Effect of Failure	Cause of Failure	Recommended Action
Work instructions	Instructions not followed or unclear	Increased risk of accidents	Vague or incomplete work instructions	Revise work instructions to ensure clarity and comprehensiveness.
Environmental controls	Inadequate controls for temperature extremes	Risk of heat stress or cold exposure	Lack of monitoring	Introduce temperature monitoring and provide appropriate breaks and hydration.
Hazard assessment	Incomplete hazard assessment	Unidentified risks during work	Lack of thorough review	Require a comprehensive hazard assessment to be completed before work begins.