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| **Employee Name:**  | **Employee Signature:**  |
| **Supervisor Name:**   | **Supervisor Signature:**  |
| **Date Assigned:**  | **>1000V Practical Date Due:**  |

**Completion of this qualification record indicates the individual has shown requisite level of knowledge and skills to safely assess hazards, plan jobs, and work on systems utilizing the appropriate safety precautions.**

*Prerequisites are required prior to completion of all other tasks.*

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| **Prerequisite Training** |
| **Training** | **Instructor Signature** | **Date Completed** |
| EIC Introductory Safety Training |  |  |
| EIC OSHA/NFPA Safety Training |  |  |
| Basic Electricity Training |  |  |

*Trainee shall thoroughly read and review the listed programs and systems. The trainee will sign and date on completion of the review.*

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| **EIC Policies, Procedures and Documentation Review** |
| **Topic** | **Trainee Signature** | **Date Completed** |
| EIC Safety Program |  |  |
| Document Storage and Locations |  |  |
| Electrical Drawing Storage and Locations |  |  |

*Level of knowledge Interviews are required to qualify an electrical worker by an approved qualifier. The qualifier’s signature is approval that the individual has demonstrated sufficient knowledge to use in risk assessments, job planning, and maintenance/troubleshooting as well as understand the limitations of knowledge and skill.*

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|  **Risk Assessment and Job Planning Procedure - Level of Knowledge Interviews** |
| **Topic** | **Qualifier Signature** | **Date Completed** |
| **The Three Elements of the Risk Assessment Procedure*** Hazard Identification
* Risk Assessment
* Risk control implementation using hierarchy of risk control methods
 |  |  |
| **Human Error Control*** Discuss the three types of performance modes and associated errors (rule, knowledge, skill)
* Discuss the different types of human performance tools to reduce these traps.
 |  |  |
| **Hierarchy of Risk Control Methods*** Elimination
* Substitution
* Engineering Controls
* Awareness
* Administrative Controls
* PPE
 |  |  |
| **Job Safety Planning and Pre-Job Briefing*** Requirements to complete a Job Safety Plan.
* Required information in a Job Safety Plan.
* Job Briefing requirements
 |  |  |

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| **Establishing an Electrically Safe Work Condition - Level of Knowledge Interviews** |
| **Topic** | **Qualifier Signature** | **Date Completed** |
| **Lockout Procedures - Planning*** Locating energy sources with documentation
* Identifying Exposed Personnel
* Responsibilities of the Person in Charge
* Complex vs Simple Lockouts
* Complex lockout requirements
 |  |  |
| **Lockout Procedures – Elements of Control** Discuss elements of control listed in Article 120 of the NFPA 70E and applications to the facility. |  |  |
| **8 Step Process for Establishing and Verifying an ESWC*** Using building, system, and manufacturer drawings and technical manuals to determine all sources of power.
* Visually verify breakers and disconnects
* Releasing/blocking stored energy of any type.
* Applying lockouts per documented procedures
* Using test equipment to test conductors de-energized.
 |  |  |
| **Special Requirements and Procedures*** Induced Voltages and equipment grounding
* Equipment with capacitors
* Power Electronic equipment such UPS, VFD, etc.
 |  |  |

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| **Instrumentation and Meters – Level of Knowledge / Hands On Training*****The various instruments and meters should be demonstrated and used as part of the interview when applicable and feasible*** |
| **Topic** | **Qualifier Signature** | **Date Completed** |
| Discuss various types of meters and their uses. * Multi-meter, Voltmeter, Ammeter, Oscilloscope, etc.
* Installed Meters vs Hand-held Meters
* Voltmeter Categories (I, II, III, IV)
 |  |  |
| Operation, verification, and limitations of the different meters. |  |  |
| Pre/post use inspection and calibration.  |  |  |

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| **Shock Hazard - Level of Knowledge Interviews** |
| **Task** | **Qualifier Signature** | **Date Completed** |
| **Shock Risk Assessment** * Three objectives of a shock risk assessment
* Implementing hierarchy of risk control to mitigate shock
* Additional requirements when PPE is required.
 |  |  |
| **Limited Approach Boundary*** Discuss how to determine the boundary distance.
* Requirements for approach by unqualified workers.
* Requirements for working near the boundary
* Requirements for entering the boundary
 |  |  |
| **Restrict Approach Boundary*** Discuss how to determine the boundary distance.
* Required qualifications for entering the boundary
* Required PPE for entering the boundary
 |  |  |
| **Shock Hazard Protective Equipment and Practices*** Objective of shock hazard protective equipment
* Glove Selection
* Clothing and footwear requirements
* Assessing the shock hazards of the job and selecting protective equipment and job practices
 |  |  |
| **Energized Work*** What qualifies as energized work. (establishing an ESWC, working in the vicinity or directly on conductors over 50V)
* Discuss when an Energized work permit is required. (Diagnostic testing vs repair work)
* Safe work practices when working on energized equipment.
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| **Arc Flash - Level of Knowledge Interviews** |
| **Topic** | **Qualifier****Signature** | **Date Completed** |
| **Arc Flash Risk Assessment*** Three objectives of the arc flash risk assessment
* Estimate of likelihood or severity.
* Additional requirements when PPE is required.
 |  |  |
| **Arc Flash Boundary*** Energy and risk at the boundary.
* Determination of boundary distance.
* Establishing and controlling the boundary
 |  |  |
| **Arc Flash PPE Selection** * Reading and interpreting the danger and warning labels
* EIC PPE requirements for different energy levels
* Purpose of arc flash PPE and the function of each item
* Donning, doffing, and caring for arc flash PPE
 |  |  |

*The practical is the final assessment where the individual can use their knowledge to safety plan and execute the job utilizing the necessary safety precautions. These include proper use of PPE, meters, tools, etc.*

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| **Practical** |
| **Task** | **Qualifier****Signature** | **Date Completed** |
| Perform Job Safety Planning and risk assessment procedure |  |  |
| Conduct a Job Safety Briefing  |  |  |
| Establish an electrically safe work condition that requires the use of a lockout procedure |  |  |
| Inspect and don both shock and arc flash PPE |  |  |

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| **1000V and Below System Specifics Level of Knowledge Interviews** |
| **Task** | **Qualifier****Signature** | **Date Completed** |
| **R-Panels, L-Panels** * System drawings, panels schedules, construction, panel assembly/disassembly and manufacturer documentation for R-Panels, L-Panels, and associated transformers T1-T5.
* Location of panels and important loads
	+ Fire Alarm, control power, etc.
* Circuit breaker construction, classifications, and operations
* Construction and operation of disconnect switches
 |  |  |
| **I-Line Switchboards*** Construction and operation of TX1, TX2, TX3, and TX4 switchboard
* Construction and operation of the I-Line switchboard feeder circuit breakers
* Construction and operation of the I-line switchboard load circuit breaker
* Types of overcurrent protection settings and adjustments.
 |  |  |
| **Control Cabinets*** Function and role of control circuits
* Function and role of power circuits
* Construction and operation of the following:
	+ DC Power Supplies
	+ Transformers
	+ Switches and Relays
	+ Relays
	+ Main and auxiliary contacts
	+ Motor Drives
* Types and operation of overcurrent protective devices
* Control cabinet entry requirements
* Complex lockout requirements
 |  |  |
| **Cooling Tower Systems** * System drawings, locations, and manufacturer information for panels, transformers, and loads
* Construction and operation of motor controllers and variable frequency drives (VFD)
	+ Safety precautions for motor controllers and VFDs
* Cooling tower system operations
 |  |  |
| **Main Hydraulic Unit*** System drawings, locations, and manufacturer information for installed system equipment
* Main Hydraulic Unit system operations
* Complex lockout requirements for main hydraulic unit cabinets
 |  |  |

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| **Above 1000V System Specifics Level of Knowledge Interviews** |
| **Task** | **Qualifier****Signature** | **Date Completed** |
| **Switchgear and Important Feeds*** Main Switchgear (MSG1)
	+ Building Power Feed
	+ Hydraulic Power Feed
* 15MW Test Bench / Test Bench 1
	+ Motor Drive (PA1)
	+ Test Rig Switchgear 1 (TRSG1)
	+ TEST RIG 1 Floor Disconnect (TRCB1)
* 7.5MW Test Bench / Test Bench 2
	+ 7.5MW Motor Drive (PA2)
	+ Test Rig Switchgear 2 (TRSG2)
	+ TEST RIG 2 Floor Disconnect (TRCB2)
* Grid Simulator Switchgear 1,2 (GSG1, GSG2)
	+ CTRLBUS2 and CTRLBUS3
	+ Power Amplifiers Units (PAU1-PAU4, PA3)
* Grid Simulator Switchgear 3 (GSG3)
	+ CTRLBUS1A and CTRLBUS1B
	+ Reactor Divider Room
 |  |  |
| **Transformers and Line Reactors**Discuss the construction, function, hazards and safety precautions* Utility Side Test Bench Transformers
	+ TU1A (23.9/3.2 kV) – 15MW Test Bench
	+ TU2 (23.9/3.2 kV) – 7.5MW Test Bench
	+ TU3A and TU3B (23.9/4.16 kV) - eGrid
* Simulation/Recirculation Transformers
	+ TS1A (3.2/23.9 kV) – 15MW Test Bench
	+ TS2 (3.2/23.9 kV) – 7.5 Test Bench
	+ TS3A and TS3B (4.16/23.9 kV) - eGrid
* Hydraulic Power Transformers
	+ TX2, TX3, TX4 (23.9/0.48 kV)
* Building Power Transformer
	+ TX1 (23.9/0.48 kV)
* Utility Side Reactors (RU1A, RU2)
* Simulation/Recirculation Side Reactors (RS1A, RS2)
 |  |  |
| **Harmonic Filters**Discuss the construction, function and hazards with associated safety precautions.* Grid Side Filter Unit 5.4 MVAR
* DUT1 Side Filter 5400 kVAR
* DUT2 Side Filter 3600 kVAR
 |  |  |
| **Medium Voltage Drives (WTDTF)** Discuss the construction, function and hazards with associated safety precautions.* 7.5 MW Drive System
* 15 MW Drive System
 |  |  |
| **Medium Voltage Drives (eGRID)**Discuss the construction, function and hazards with associated safety precautions.* Versabridge PAUs
 |  |  |
| **Instrumentation and Controls**Describe function and operation of the flowing:* SCADA Control and AcSELerator
* Control tower
* Current transformers
* Voltage transformers
* Schweitzer relays
	+ SEL-751A Feeder Protection Relay
	+ SEL-587Z High Impedance Differential Relay
	+ SEL-787 Transformer Protection Relay
	+ SEL-351 Protection System
 |  |  |
| **Circuit Breaker*** General Construction and Basic Operation
	+ air-insulated and solid-dielectric
* Local and Remote Operation with safety precautions
* Racking breakers
	+ purpose of different positions
	+ safety precautions for racking circuit breakers
 |  |  |
| **Job Planning and Risk Mitigation on MV Systems*** Approach to multi-source systems
* Shock and Arc Flash Hazards on >1kV Systems
* Test equipment for >1kV
* Establishing an ESWC on systems >1kV
* >1kV System test points
* Energized work restrictions on systems >1kV.
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| **Above 1000V System Practical** |
| **Task** | **Signature** | **Date Completed** |
| Perform Job Safety Planning and risk assessment procedure |  |  |
| Conduct a job safety briefing  |  |  |
| Establish an electrically safe work condition that requires the use of a lockout procedure |  |  |
| Check and don both shock and arc flash PPE |  |  |

**Revision History:**

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| --- | --- | --- | --- | --- |
| Revision | Date | Summary of change | Author | Approver |
| A | 1/17/2020 | Initial issue | Nancy LaFlair | J. Curtiss Fox |