

Hanford Site Electrical Safety Program

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
Hanford Field Office under Contract 89303320DEM000031



**P.O. Box 943
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Hanford Site Electrical Safety Program

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Hanford Mission Integration Solutions (HMIS)

Date Published
March 2026

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APPROVED
By Julia Killinger at 10:59 am, Mar 16, 2026

Release Approval

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REV. 5-2 CHANGE SUMMARY

Revision #	Section Changed	Change Details
5-2	6.0	Updated references to the EU site visit process throughout Sections 6.1-6.5 per CHG-0359-31, Rev. 1.

REV. 5-1 CHANGE SUMMARY

Revision #	Section Changed	Change Details
5-1	2.3	Updated title of form per CHG-0359-27.
5-1	7.1	Clarified audit interval language per CHG-0359-28.
5-1	App A	Updated definition of acronym per CHG-0359-27.

REV. 5 CHANGE SUMMARY

Revision #	Section Changed	Change Details
5	3.0	Removed former Section 3.8 about spotter training, since that is now covered in Section 6.0.
5	4.3 and 4.3.1	Updated section to include Restricted Approach Boundary per CIG-0359-24.
5	4.3.3.c	Updated section to align with NFPA 70E wording.
5	6.0	Complete rewrite of this section: <ul style="list-style-type: none"> • Streamlined process, making each section stand-alone based on the type of equipment and activity. • Blended requirements from multiple sources. • Enhanced requirements for mobile cranes, mobile equipment, and elevated work platforms. • Removed Appendix F since it is no longer needed.

DOE-0359, Rev. 5-2

Hanford Site Electrical Safety Program (HSESP)

Published Date: 03-16-2026

Effective Date: 04-13-2026

Revision #	Section Changed	Change Details
5	App A	Added Powered Industrial Trucks (PITs), which is used in Section 6.0. Revised Supervised Industrial Installations, per CHG-0359-024.
5	App C	Under Basic Experience Requirements, clarified which type of journey-level license is required, per CIG-0359-20. Under Basic Experience Requirements, changed number of hours of classroom training to 720 to align with state requirements, per CHG-0359-025.

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1.0 PURPOSE AND SCOPE

This document establishes the Hanford Site Electrical Safety Program (HSESP), herein called the Program, which provides the requirements for electrical safe work practices and electrical safety training. This program is intended to provide a workplace free from unplanned exposure to electrical hazards for all Hanford Site contractors, subcontractors, and vendors. This Program implements applicable requirements of the following:

- National Fire Protection Association (NFPA) 70, *National Electrical Code (NEC)*
- NFPA 70E-2018, *Standard for Electrical Safety in the Workplace*
- Code of Federal Regulations (CFR), Title 29, Occupational Safety and Health Administration (OSHA), 1910 Subpart S (29 CFR 1910), *Electrical*
- 29 CFR 1926, Subpart K, *Electrical*
- 29 CFR 1926, Subpart CC, *Cranes & Derricks in Construction*
- 29 CFR 1926, Subpart O, *Motor Vehicles, Motorized Equipment, and Marine Operations*
- 10 CFR Part 851, *Worker Safety and Health Program*
- American Society of Mechanical Engineers (ASME) B30.5, *Mobile and Locomotive Cranes*

NOTE: *This Program does not contain all requirements of the above documents. In the event of a conflict between this document and the requirements listed above, the conflict would be resolved by the HSESP committee per their charter.*

Definitions of terms specific to this Program are found in Appendix A.

For any discrepancies between this program and the Contractors Labor Agreement (Hanford Atomic Metal Trade Council (HAMTC), Hanford Site Stabilization Agreement (HSSA), etc.) the Labor Agreement applies.

1.1 Not Covered

This document does **not** cover any of the following:

- Lockout/Tagout activities: DOE-0336, *Hanford Site Lockout/Tagout Procedure* and HMIS-PRO-EU-066, *Electrical Utilities Lock and Tag Program*, provide requirements for lockout/tagout.
- Installations or work involving automotive, watercraft, and similar equipment.
- Installations under the exclusive control of Electrical Utilities (EU) for the purpose of metering, control, transformation, transmission, or distribution of electrical energy.

NOTE: *Installations used by the electric utility, such as office buildings, warehouses, garages, machine shops, and recreational buildings that are not an*

integral part of a generating plant, substation, or control center are not exempt from the requirements of DOE-0359.

- Telecommunications workers performing work under 29 CFR 1910.268, *Telecommunications*.

2.0 ROLES AND RESPONSIBILITIES

2.1 Hanford Mission Essential Services Contract (HMESC)

To administer the HSESP, the HMESC shall:

- Appoint an Electrical Safety Program Coordinator, responsible for:
 - Ensuring training courses are audited to validate they meet program requirements
 - Maintaining a current list of Authorities Having Jurisdiction (AHJs) for each participating contractor
 - Coordinating electrical safety activities and initiatives with Department of Energy (DOE) and other Hanford Site contractors
 - Ensuring that meeting summaries, interpretations, lessons learned, and other information related to electrical safety is effectively communicated
 - Ensuring an HSESP website is maintained that is accessible by all Hanford Site contractors for electrical safety information
- Document decisions/interpretations and recommendations by the HSESP Committee, the Hanford Electrical Codes Board (HECB), and the Hanford Workplace Electrical Safety Board (HWESB)
- Maintain two technical boards as the core of the HSESP, the HECB and the HWESB
- Provide administrative support for the HSESP Committee, the HECB, and the HWESB

2.2 Hanford Electrical Utilities

- Comply with the National Electrical Safety Code (NESC), Parts 1-3, and 29 CFR 1910.269, *Electric Power Generation, Transmission, and Distribution*.
- Participate in the Program by providing technical advice on matters relating to EU systems.

2.3 Prime Hanford Contractors

Each Prime Hanford Contractor shall ensure:

- The name(s) of the individual(s) appointed as AHJ, as defined in NFPA 70 and NFPA 70E, are submitted to DOE and the Electrical Safety Program Coordinator.
- Personnel (to the lowest subcontractor) who face a risk of electrical hazard are trained and qualified to perform the assigned work in accordance with this Program.
- Safe work practices as described in this Program are used by workers, including Non-Electrical Workers, who use portable electric tools and equipment to perform maintenance, construction, and demolition activities.
- Employees are complying with the safety-related work practices required by this Program through regular supervision or through inspections conducted on at least an annual basis.
- Electrical equipment and supporting equipment (e.g., light poles, power poles) are installed using appropriate technical standards and approved instructions and procedures.
- Electrically knowledgeable members of the HSESP Committee, HECB, and HWESB are appointed.
- Electrical Inspection Permits (EIPs) (A-6005-707) are obtained for all electrical system installations and modifications.
- NEC inspections are scheduled at inspection points designated in the EIP and for re-inspection of corrected violations.
- Program Audits are performed in accordance with Section 7.1, *Program Audits*.
- Electrical incidents are investigated and trended, and significant incidents are communicated with the other Hanford Site contractors and the HSESP Committee in a timely manner.

2.4 Hanford Site Electrical Safety Program (HSESP) Committee

The HSESP Committee shall be the collective interpretive authority for the HSESP, as per, Attachment 1, *Hanford Site Electrical Safety Program [HSESP] Committee Charter*.

2.5 Hanford Electrical Codes Board

The HECB shall provide:

- Technical support and advice to the NFPA 70 AHJ(s) and others when requested

- The opportunity for all Hanford Site projects, facilities, and contractors to be represented
- Periodic meetings to serve as open forums for discussion of issues presented by NEC Inspectors, the HSESP Committee, and other stakeholders
- Recommendations to the AHJ(s) on any disputes not resolved with the NEC Inspectors

2.6 Hanford Workplace Electrical Safety Board (HWESB)

The HWESB shall provide:

- Technical support and advice to the NFPA 70E AHJ(s)
- The opportunity for all Hanford Site projects, facilities, and contractors to be represented
- Periodic meetings to serve as open forums for discussion of issues presented by stakeholders
- Discussions of electrical events or trends across the DOE Complex

2.7 Authority Having Jurisdiction (AHJ)

The AHJ shall:

- Enforce and interpret all required documents stated in Section 1.0, *Purpose and Scope*, as they apply to this Program
- Document company specific AHJ decisions and interpretations

2.8 National Electrical Code (NEC) Inspectors

NEC Inspectors shall:

- Be independent from the work they inspect. They shall not inspect work for which they have direct line management, engineering, or construction responsibility
- Act as a field representative of the AHJ(s) to administer and enforce the NEC
- Maintain qualifications established in Section 3.7
- Issue EIPs (A-6005-707)
- Consult with designers and installers on NEC compliance issues
- Perform field inspections for installations and modifications of electrical systems and equipment
- Issue NEC inspection reports to the EIP holder
- Present disputed NEC inspection reports and issues to the company AHJ(s) for resolution

2.9 Project/Construction/Maintenance/Operations/Engineering Managers

Project/Construction/Maintenance/Operations/Engineering Managers shall ensure:

- Participation on the HECB and HWESB
- Safe work practices, as described in this Program and NFPA 70E, are used by workers under their direction, including Non-Electrical Workers
- Approved personal protective equipment (PPE) for electrical work is provided and used by workers who are exposed to electrical hazards
- Work assignments do not exceed personnel qualifications
- Personnel are trained to the requirements listed in Section 3.0, *Electrical Safety Training and Qualifications*

2.10 Supervisor/Foreman

Supervisor/Foreman shall:

- Ensure work is performed within the controls of the work document(s)
- Understand and follow the Electrical Risk Assessment (ERA) process
- Verify employees are qualified to perform the work assigned (See Section 3.0, *Electrical Safety Training and Qualifications*)
- Identify and communicate potentially unsafe electrical conditions

2.11 All Personnel

All personnel shall:

- Comply with applicable requirements of this Program
- Immediately report all non-static electrical shocks and be evaluated by a medical provider
- Evaluate static shocks on a case-by-case basis, or as requested by the worker, to determine if medical evaluation is necessary

3.0 ELECTRICAL SAFETY TRAINING AND QUALIFICATIONS

3.1 Electrical Safety Training

These training requirements shall apply to employees exposed to an electrical hazard and employees who supervise them, when the risk associated with that hazard is not reduced to a safe level by the applicable electrical installation requirements. Such employees shall be trained to understand the specific hazards associated with electrical energy. They shall be trained in safety-related work practices and procedural requirements, as necessary, to provide protection from the electrical

hazards associated with their respective job or task assignments. Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury. Personnel shall be trained and qualified to a level of proficiency consistent with their assigned tasks. The employer shall document that each employee has received all applicable Electrical Safety Training that the worker needs to perform assigned duties.

Consistent training is critical to successful implementation of the Program; it is recommended that training be provided by the Volpentest HAMMER Federal Training Center (HAMMER); however, contractors providing their own training shall meet the minimum requirements of the *Hanford Site Electrical Safety Program (HSESP) Course Descriptions, Objectives, and Training Requirements* (available on the HSESP website) and be reviewed and approved by the HSESP Committee. Individual training equivalencies, waivers, and extensions for HAMMER courses shall be reviewed, approved, and documented per HAMMER procedures. Facility-specific training equivalencies shall be reviewed, approved, and documented per the appropriate Hanford Site contractor training program.

3.2 Emergency Response Training

Contact Release. Employees exposed to shock hazards and those responsible for the safe release of victims from contact with energized electrical conductors or circuit parts shall be trained in methods of safe release. Refresher training shall occur annually.

First Aid, Emergency Response, and Resuscitation. Employees responsible for responding to medical emergencies shall be trained in first aid and emergency procedures, Cardiopulmonary Resuscitation (CPR), and the use of Automated External Defibrillator (AED). Training shall occur at a frequency that satisfies the requirements of the certifying body.

Training Verification. Employers shall verify at least annually that Emergency Response Training for each employee is current.

Documentation. The employer shall document that the required training has occurred.

3.3 Retraining

Retraining in safety-related work practices and applicable changes in this Program shall be performed and documented at intervals not to exceed three years. The employee shall receive additional training or retraining if any of the following conditions exist:

1. The supervision or annual inspection indicate the employee is not complying with the safety-related work practices.
2. New technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices different from those that the employee would normally use.

3. The employee's job duties change.

Prior to performing work, the employee needs to review tasks that are performed less often than once per year and any safety-related work practices not normally used by the employee during regular job duties.

3.4 Unqualified Persons

Unqualified persons shall be trained and familiar with any electrical safety-related practices necessary to perform their job safely. All unqualified persons shall receive electrical hazard awareness training (initial and refresher) through completion of the Electrical Safety module of Hanford General Employee Training (HGET).

Workers operating electrical hand tools, such as drills, grinders, etc., shall attend *Basic Electrical Safety Training*.

3.5 Qualified Person

A qualified person shall be trained and knowledgeable in the construction and operation of equipment or a specific work method and be trained to identify and avoid the electrical hazards that might be present with respect to the equipment or work method.

The qualified person shall be familiar with the proper use of the special precautionary techniques, applicable electrical policies and procedures, PPE, insulating and shielding materials, and insulated tools and test equipment that is required for their assigned duties.

A person can be considered qualified with respect to certain equipment and tasks but still be unqualified for others.

An employee who is undergoing on-the-job training for the purpose of obtaining the Knowledge, Skills, and Abilities (KSAs) necessary to be considered a qualified person, and in the course of such training has demonstrated the ability to perform the specific duties safely, and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those specific duties.

When an employee's assigned duties require the use of test instruments, the employee shall be trained to select an appropriate test instrument and shall demonstrate how to use a device to verify the absence of voltage, including interpreting indications provided by the device. The training shall ensure the employee understands all the limitations of each test instrument that is used for their assigned duties.

3.5.1 Electrical Risk Assessment Preparer

1. The ERA Preparer is a qualified person who is responsible for the completion of the ERA.

NOTE: *The ERA Preparer is prohibited from entering the Limited Approach Boundary (LAB) or Arc Flash Boundary (AFB), unless continuously escorted by an individual qualified under Section 3.6 and wearing appropriate PPE.*

2. The contractor is responsible for documenting that the ERA Preparer has demonstrated the ability to correctly complete and document the ERA.

NOTE: *Courses available to assist in training include: NFPA-70E, Standard for Electrical Safety in the Workplace, Hanford Site Electrical Safety Program Training, Capacitor Safety Training, Battery Safety Training, and Contact Release.*

3.5.2 Non-Electrical Worker

1. Non-Electrical Workers are employees who face a higher than normal risk of exposure to electrical hazards. This includes but is not limited to workers who may operate electrical disconnects or circuit breakers.
2. The employer shall ensure that Non-Electrical Workers demonstrate KSAs and meet all requirements to be classified as qualified persons for the specific task they have been assigned.

NOTE: *The Non-Electrical Worker is prohibited from entering the LAB or AFB, unless continuously escorted by an individual qualified under Section 3.6 and wearing appropriate PPE.*

NOTE: *Courses available to assist in training Non-Electrical Workers include: Basic Electrical Safety Training and Breaker Operation Electrical Safety.*

3.5.3 Instrument Specialist

The responsible company shall document that the following knowledge, experience, and training requirements are satisfied.

1. All newly hired instrument specialists shall be trained and qualified via a trade school program or equivalent military experience. See Appendix B for a list of the basic KSAs and experience requirements.
2. The employer shall document that each incumbent instrument specialist demonstrate KSAs to be classified as a qualified person for their assigned task(s). See Appendix B for a list of the basic KSAs.
3. Each employee shall demonstrate KSAs for all facility-specific equipment and tasks relevant to assigned duties that are not outlined in Appendix B.

4. Instrument Specialists who are permitted to work within the LAB or AFB of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall meet all the requirements of Section 3.6 for assigned duties.

A vendor under the direct oversight of an Instrument Specialist (qualified under Section 3.6) shall be considered a qualified person for the performance of their contracted duties.

NOTE: *Courses available to assist in training Instrument Specialist include: NFPA-70E, Standard for Electrical Safety in the Workplace, Hanford Site Electrical Safety Program Training, Capacitor Safety Training, Battery Safety Training, Contact Release, and First Aid, Emergency Response, and Resuscitation.*

3.5.4 Electrician

The responsible company shall document that the following knowledge, experience, and training requirements are satisfied:

1. All newly hired electricians shall have a general journey-level electrician state license or documented equivalency (e.g., military). See Appendix C for a list of the basic KSAs and equivalency requirements.
2. The employer shall document that each incumbent electrician demonstrate KSAs to be classified as a qualified person for their assigned task(s). See Appendix C for a list of the basic KSAs.
3. Each employee shall demonstrate KSAs for all facility-specific equipment and tasks relevant to assigned duties that are not outlined in Appendix C.
4. Electricians who are permitted to work within the LAB or AFB of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall meet all the requirements of Section 3.6 for assigned duties.
5. The employer shall ensure all electricians receive 24 hours per three-year cycle of the following continuing education:
 - At least eight (8) hours of NFPA 70 code update.
 - Four (4) hours on currently adopted Revised Code of Washington (RCW) 19.28 and related Washington Administrative Codes (WAC).
 - Twelve (12) hours of additional State-approved continuing education courses.
 - Courses should meet the State of Washington criteria for Continuing Education Units (CEUs) when possible.

A vendor under the direct oversight of an Electrician (individual qualified under Section 3.6) shall be considered a qualified person for the performance of their contracted duties.

NOTE: *Courses available to assist in training Electricians include: NFPA-70E, Standard for Electrical Safety in the Workplace, Hanford Site Electrical Safety Program Training, Capacitor Safety Training, Battery Safety Training, Contact Release, and First Aid, Emergency Response, and Resuscitation.*

3.5.5 Supervisor/Foreman

This includes, but is not limited to, first-line managers, Field Work Supervisors (FWSs), and foremen. They shall have at least the same level of Electrical Safety Training and Emergency Response Training as the workers they oversee or lead.

For supervisors responsible for instrument specialists or electricians who work within the LAB or AFB, the responsible company shall document that the following knowledge, experience, and training requirements are satisfied.

- Meet company-specific qualification requirements.
- Emergency response training listed in Section 3.2, *Emergency Response Training*.
- All requirements listed in Section 3.5, *Qualified Person*.
- Working knowledge of the NEC (applicable only to those who supervise electricians performing technical work). This working knowledge shall, at a minimum, be maintained every three (3) years through the following:
 - At least eight (8) hours of NFPA 70 code update.
 - Four (4) hours on currently adopted Revised Code of Washington (RCW) 19.28 and related Washington Administrative Codes (WAC).
- Supervisors entering the LAB or AFB of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall meet all the requirements of Section 3.6 for assigned duties.

3.6 Qualified Persons Entering the LAB or AFB

A qualified person (see Sections 3.5.3, 3.5.4, and 3.5.5) permitted to work within the LAB or AFB shall additionally be trained in all the following:

1. Skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment.
2. Skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts.
3. Approach distances specified in NFPA 70E Table 130.4(D) (a) and Table 130.4(D) (b) and the corresponding voltages to which the qualified person will be exposed.
4. Decision-making process necessary to be able to do the following:
 - a. Perform the job safety planning.
 - b. Identify electrical hazards (e.g., shock, arc flash).
 - c. Assess the associated risk.
 - d. Select the appropriate risk control methods from the hierarchy of controls.

3.7 NEC Inspector

1. NEC inspections shall be performed by designated NEC Inspectors who have been authorized by the AHJ to perform such inspections.
2. NEC Inspectors shall pass a nationally recognized test for general electrical inspectors and plan review inspectors. The International Association of Electrical Inspectors (IAEI) or the International Code Council (ICC) shall certify these tests.
3. NEC Inspectors shall have at least *one* of the following:
 - a. No less than four years of experience as a journey-level electrician installing and maintaining electrical equipment.
 - b. Two years electrical training in a college of electrical engineering of recognized standing and four years continuous practical electrical experience in installation work.
 - c. Four years of electrical training in a college of electrical engineering of recognized standing and two years continuous practical electrical experience in electrical installation work.
 - d. Approval and designation from the AHJ based upon years of experience in the electrical field.
4. NEC Inspectors shall complete NFPA 70E, *Standards for Electrical Safety*, with refresher training at intervals not to exceed three years.

5. NEC Inspectors shall remain cognizant of the latest status of the NEC via continued training and education.

3.8 Mobile Crane Operators and Crew Members

Training for crane operators and crew members working near overhead lines will be in accordance with DOE-RL-92-36, the *Hanford Site Hoisting and Rigging Manual (HSHRM)*.

3.9 Battery Training

Personnel who install, maintain, or otherwise work directly with batteries that present a chemical or electrical hazard (battery or battery banks operating over 50 volts or stored capacity exceeding 1 kWh) shall complete *Battery Safety Training*.

3.10 Capacitor Training

Qualified persons who install, examine, maintain, or remove capacitors or capacitor banks rated greater than the values below shall complete *Capacitor Safety Training*:

- 1 joule of stored energy at 100 volts up to 400 volts, or
- 0.25 joules of stored energy at 400 volts or greater

4.0 GENERAL REQUIREMENTS AND PRINCIPLES

4.1 Electrical Safe Work Practices

1. A risk assessment shall be performed for all work containing electrical hazard(s) in accordance with NFPA 70E and this Program. This assessment shall be documented on the ERA Form (A-6007-595) or Energized Electrical Work Permit (A-6005-704).
2. All electrical equipment, circuit conductors, and circuit parts operating at voltages equal to or greater than 50 volts shall be considered energized until placed in an electrically safe work condition in accordance with DOE-0336, *Hanford Site Lockout/Tagout Procedure* and/or HMIS-PRO-EU-066, *Electrical Utilities Lock and Tag Program*, as applicable.
3. Where there is not an accessible exposed point to take contact voltage measurements to determine the absence of voltage at work locations, planning considerations and documentation shall include approval of alternate methods of verification (e.g., proximity probes, non-contact probes, circuit tracers, current sensing probes).

EXCEPTION 1: *Adequately rated permanently installed mounted test device shall be permitted to be used to verify the absence of voltage of the conductors or circuit parts at the work location provided: (1) It is permanently mounted and installed in accordance with manufacturers' instructions; (2) Listed and labeled for the purpose of verifying the absence of voltage; (3) It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground; (4)*

The test device is verified as operating satisfactorily on any known source before and after verifying absence of voltage.

EXCEPTION 2: *On electrical systems over 1000 volts, noncontact test instruments shall be permitted to be used to test each phase conductor.*

4. Personnel may perform or supervise electrical work only to the level for which they have been trained and qualified in accordance with Section 3.0, *Electrical Safety Training and Qualifications*.
5. Alerting techniques such as safety signs, safety symbols, tags, barricades, or an attendant shall be used where necessary to warn employees about electrical hazards that might endanger them. Such signs and tags shall meet the requirements of applicable state, federal, or local codes and standards. If the attendant is required to be within the LAB or AFB, they shall be an individual qualified under Section 3.6 or continuously escorted by an individual qualified under Section 3.6 and wearing appropriate PPE.
6. Where work is performed on equipment that is de-energized and placed in an electrically safe work condition in a work area where look-alike equipment (other energized equipment that is similar in size, shape, and construction) exists, one of the alerting methods listed below shall be employed to prevent the employee from entering look-alike equipment:
 - a. Safety signs, safety symbols, and/or tags
 - b. Barricades (used to prevent or limit employee access)
 - c. Attendant(s)
7. Insulated tools and equipment shall be used when working inside the restricted approach boundary. Insulated tools shall be rated, designed, and constructed for the environment to be used and visibly inspected prior to each use. Insulated tools and equipment shall also be stored, maintained, and tested according to the manufacturer's instructions or industry standards.
8. Portable ladders shall have nonconductive side rails when used within the LAB or where the employee or ladder could contact exposed energized electrical conductors or circuit parts. Non-conductive ladders (i.e., fiberglass, wood) shall meet the requirements of applicable state, federal, or local codes and standards.
9. Electrical PPE and other protective equipment shall meet the requirements of Section 4.5, *Electrical PPE*.
10. All test instruments and associated test leads used to verify the absence or presence of voltage shall be maintained to assure functional integrity. The maintenance program shall include a functional verification. Test instruments shall be rated, approved, and designed for the environment of their intended use, and visually inspected for external damage before each use. All test instruments and associated equipment shall be used in accordance with any instructions

provided by the manufacturer. Damaged or defective equipment shall be removed from service.

4.2 Work Involving Electrical Hazards

All electrical hazards to which an employee may be exposed shall be put into an electrically safe work condition (except where energized work can be justified) in accordance with DOE-0336, *Hanford Site Lockout/Tagout Procedure* and/or HMIS-PRO-EU-066, *Electrical Utilities Lock and Tag Program*, as applicable, before an employee performs work if any of the following conditions exist:

- The employee is within the limited approach boundary.
- The employee interacts with equipment where conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists.

4.2.1 Process for Establishing and Verifying an Electrically Safe Work Condition

The process for establishing and verifying an electrically safe work condition shall be performed in the order presented in NFPA 70E Article 120.5, unless infeasible.

4.2.2 Operation of Electrical Equipment

Normal Operation of electrical equipment having an arc flash hazard shall be permitted by a qualified person(s) where a normal operating condition exists. A normal operating condition exists when all of the following conditions are satisfied:

- a. Equipment is properly installed.
- b. Equipment is properly maintained.
- c. The equipment is used in accordance with the instructions included in the listing and labeling and in accordance with manufacturer's instructions.
- d. The equipment doors are closed and secured.
- e. All equipment covers are in place and secured.
- f. There is no evidence of impending failure.

The Arc Flash Assessment shall consider both the likelihood of occurrence and severity to determine if additional protective measures are required and shall be used to determine when operation of the equipment will require the use of an Energized Electrical Work Permit (EEWP) (A-6005-704).

4.2.3 Perform Work with an Energized Electrical Work Permit

When working within the Restricted Approach Boundary (RAB) or the AFB of energized electrical conductors or circuit parts that are not placed in an electrically safe work condition, justification and authorization shall be documented on an approved EEWP and shall require senior management authorization as indicated below.

Examples of justification include:

- Increased or additional hazards
- Infeasibility

The EEWP shall be included in the work document (e.g., work package, technical procedure) when:

1. Work is performed within the restricted approach boundary.
2. The employee interacts with the equipment when conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists. See NFPA 70E Table 130.5(C), *Estimate of the Likelihood of Occurrence of an Arc Flash Incident for AC and DC Systems*.

For example, when equipment is in other than normal operating condition and the arc flash hazard cannot be reduced below 12 cal/cm² (e.g., via remote actuator, hot stick, etc.), then an EEWP is required for the operation.

For example, operating breakers, disconnects, or switchgear greater than or equal to 12 cal/cm² that are not in normal operating condition have an increased likelihood of injury and require an EEWP.

Operating breakers, disconnects, or switchgear that are not in normal operating condition and are less than 12 cal/cm² requires an ERA per Section 4.4.1.

4.2.4 Perform Work with Exemptions to an EEWP

Electrical work shall be permitted without an EEWP if a qualified person uses appropriate safe work practices and PPE under any of the following work conditions. Additionally, an ERA (A-6007-595) shall be completed prior to starting work.

1. Testing
2. Troubleshooting
3. Voltage and current measurement
4. Thermography, ultrasound, or visual inspection if the RAB is not crossed
5. Calibration/adjustment
6. Lockout/Tagout activities (e.g., Verification of Isolation Check and/or Safe-To-Work checks)
7. Working on the load side of Class 2 circuits
8. Removing/replacing electrical device covers and enclosure covers
9. Re-setting overload devices, removing/installing fuses, miscellaneous non-electrical tasks in electrical enclosures that cannot be de-energized and when the RAB will not be crossed
10. When a qualified person is installing temporary protective measures such as:
 - Voltage rated protective shields/barriers
 - Voltage rated rubber insulating equipment
 - Voltage rated plastic guard equipment
 - Physical or mechanical barriers (field fabricated) outside of the LAB

Use of temporary protective measures to prevent inadvertent contact with energized conductors or circuit parts shall have documentation of installation and removal. It is acceptable to allow temporary barriers to remain in place for the duration of the task with verification of adequacy by a qualified person each day when work is being performed.

11. When crossing the LAB only for visual inspection by a qualified person or an unqualified person continuously escorted by an individual qualified under Section 3.6 and the RAB will not be crossed.
12. When crossing the AFB only for visual inspection by an individual qualified under Section 3.6, or an unqualified person continuously escorted by an individual qualified under Section 3.6.

4.3 Working within the Limited Approach Boundary, Restricted Approach Boundary, or Arc Flash Boundary

1. Work within the LAB, RAB, or the AFB shall be performed using appropriate PPE. The workers shall be provided an electrical hazards brief by a Supervisor/Foreman.

EXCEPTION: *The contractor AHJ may provide exceptions for Hanford Patrol, Hanford Fire Department, and Security Technicians/Specialists to enter the LAB, for systems under their exclusive control, based on specialized training and an ERA that identifies the hazards involved and the associated controls.*

2. A shock risk assessment shall be completed and documented on the ERA (A-6007-595) to determine the voltage (AC and DC) to which personnel will be exposed, boundary requirements, and the PPE necessary to minimize the possibility of electric shock to personnel.

EXCEPTION: *An ERA is not required when the only energy source is less than 50 volts.*

3. An arc flash risk assessment shall be completed and documented to determine the AFB and the PPE that personnel within the AFB shall use. This assessment shall be documented on the ERA (A-6007-595).

EXCEPTION: *An ERA is not required when an EEWP is completed per Section 4.2.*

EXCEPTION: *An arc flash risk assessment is not required for the following:*

- *DC circuits less than 100 volts*
- *Single-phase circuits*
- *Three-phase circuits less than 240 volts and supplied by a single transformer (or equivalent) or generator, rated at less than 125 kVA.*

Two approved methods for determining the arc flash hazard are described below:

- a. Incident Energy Analysis (preferred method)

The incident energy exposure level shall be based on the working distance of the employee's face and chest areas from a prospective arc source for the specific task to be performed. Arc rated clothing and other PPE shall be used by the employee based on the incident energy exposure associated with the specific task. Recognizing that incident energy increases as the distance from the arc flash decreases, additional PPE shall be used for any parts of the body that are closer than the working distance at which the incident energy was determined.

The incident energy analysis shall take into consideration the characteristics of the overcurrent protective device and its fault clearing time, including its condition of maintenance. The incident energy analysis

shall be updated when changes occur in the electrical distribution system that could affect the results of the analysis. The incident energy analysis shall also be reviewed for accuracy at intervals not to exceed 5 years.

NFPA 70E Table 130.5(G) identifies the arc rated clothing and other PPE requirements and shall be permitted to be used with the incident energy analysis method of selecting arc flash PPE.

b. Arc Flash PPE Category Method

If an Incident Energy Analysis has not been performed, then NFPA 70E, Table 130.7(C)(15)(a,b,& c) may be used to determine the arc flash PPE category based on the specific task. When using the category method, ensure all the following limiting conditions are met:

- i. The available fault current at the specific work location does not exceed the parameters listed for the equipment.
 - ii. The clearing time for the protective device that isolates the fault does not exceed the parameters listed for the equipment.
4. If an incident energy analysis has been performed, and an arc flash hazard exists, the equipment likely to be worked on while energized shall be field marked prior to work being performed with a label containing the following information:
1. Nominal system voltage
 2. AFB
 3. At least one of the following:
 - Available incident energy and the corresponding working distance or the arc flash PPE category in Table 130.7(C)(15)(a) or Table 130.7(C)(15)(b) for equipment, but not both.
 - Minimum arc rating of clothing.
 - Site-specific level of PPE.

EXCEPTION: *In supervised industrial installations where conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system, the information required for labeling listed above shall be permitted to be documented in a manner that is readily available to the persons likely to perform examination, servicing, maintenance, and operation of the equipment while energized.*

Where the calculated incident energy is 40 cal/cm² or below, the label shall be an orange “WARNING” label; where the calculated incident energy exceeds 40 cal/cm², the label shall be a red “DANGER” label. See Appendix D, Figure D-4, *Incident Energy Labels*, for example labels.

5. When an unqualified person must cross the LAB, an individual qualified under Section 3.6 shall advise the unqualified person of the possible hazards and continuously escort the unqualified person(s) while inside the LAB. Under no circumstance shall the escorted unqualified person(s) be permitted to cross the RAB.
6. Under no circumstances shall an unqualified person(s) be permitted to cross the AFB without arc flash PPE and being continuously escorted by an individual qualified under Section 3.6.
7. At least two qualified persons (per Section 3.6) shall be assigned to any work occurring inside the AFB or the RAB of exposed parts operating at more than 300 volts.

A non-electrical worker qualified person working with an Electrician qualified person assigned as part of a Refrigeration Equipment Services (RES) Composite crew may fulfill the role of the second qualified person.

8. A qualified person (per Section 3.6) has the right to request an evaluation to determine if additional qualified person(s) are needed when performing a task that presents a risk of shock or arc flash hazard to ensure employee protection.
9. Conductive articles of jewelry and clothing (e.g., watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or metal frame glasses) shall not be worn within the RAB where they present an electrical contact hazard with exposed energized conductors or circuit parts.

4.4 Over Current Protective Devices

4.4.1 Operating Circuit Breakers, Electrical Disconnect Switches, and Similar Switchgear Equipment

1. Operation shall be performed by a qualified person.
2. Component operation requires completion of an ERA.

EXCEPTION: *An ERA is not required for:*

- DC circuits less than 100 volts
 - Single-phase circuits
 - Three-phase circuits rated less than 240 volts and supplied by a single transformer (or equivalent), or generator, rated at less than 125 kVA
3. Operation of breakers, disconnects, or switchgear that are not in normal operating condition and are greater than 12 cal/cm² requires an EEWP per Section 4.2.3.

4. Protective device operation shall be simulated for emergency preparedness drills.
5. During an actual emergency situation (e.g., fire or take cover), equipment shall be shut down by the most expedient means available (including operation by unqualified personnel). Recovery actions that include equipment restart shall follow established building/facility procedures and policies, and be performed by a qualified person.

4.4.2 Reclosing (Re-Energizing) Circuits After Protective Device Operation

After a circuit is de-energized by an over current protective device, the circuit shall not be manually re-energized until it has been determined by an Electrician (qualified person) that the equipment and circuit can be re-energized safely.

Over current protective devices may be, but are not limited to, fuses, circuit breakers, and overloads.

NOTE: See Section 5.1, Ground Fault Circuit Interrupters (GFCIs), for re-setting tripped GFCI receptacles/in-line GFCI devices.

4.5 Electrical Personal Protective Equipment (PPE)

1. Electrical PPE includes, but is not limited to, the equipment and clothing necessary to protect personnel performing electrical work from hazards involving electrical shock, arc flash, and any other electrical hazards that may be encountered. Ensure electrical PPE is compatible with other required PPE.
2. PPE shall conform to applicable State, Federal, or local codes and standards and be:
 - a. Tested in accordance with manufacturer's instructions and/or the applicable American National Standards Institute (ANSI) or American Society for Testing and Materials (ASTM) standard(s).
 - b. Maintained in a safe, clean, and reliable condition and in accordance with manufacturer's instructions.
 - c. Stored in a manner that protects against physical damage, moisture, dust, or other deteriorating agents.
 - d. Visually inspected before each use.
3. Electrical PPE and other protective equipment that has an expired testing date or fails visual or functional inspection shall be removed from service.
4. All personnel are to be provided, and shall use, PPE appropriate for the shock and arc flash hazards to which they are exposed. All parts of the body inside the AFB shall be protected.
5. Personnel shall wear hearing protection whenever working within the AFB.

6. Personnel shall be instructed in the proper use and maintenance of PPE prior to use.
7. Voltage rated rubber-insulating equipment shall be marked with the issue date. The equipment shall not be used if the testing interval listed in Table 1 has expired. Equipment may be returned to service after satisfactory re-testing is complete.
8. Electrical PPE shall be subject to periodic electrical tests with the maximum test intervals as identified in Table 1:

TABLE 1: TEST INTERVALS

Rubber Insulating Equipment	Testing Interval
Blankets	Before first issue; every 12 months thereafter
Covers	If insulating value is suspect
Gloves	Before first issue; every 6 months thereafter
Line hose	If insulating value is suspect
Sleeves	Before first issue; every 12 months thereafter

9. Voltage rated gloves, preferably with leather protectors, shall be used when working within the RAB or when there is a danger of injury from electric shock due to contact with energized electrical conductors or circuit parts.
 - a. The following inspection shall be performed prior to using gloves and immediately following any incident that is suspected of having caused damage to the gloves:
 - i. Check test date on gloves to verify it is within periodicity.
 - ii. Visually inspect for cracks, holes, tears, foreign substances, and other visible defects.
 - iii. Perform air leakage test on gloves.Gloves found with any defects that may affect its insulating properties shall be removed from service.
 - b. Voltage rated insulating sleeves shall also be used when there is an additional danger of arm injury from electric shock due to contact with energized electrical conductors or circuit parts.
 - c. Gloves exposed to chemicals, damaged, or requiring periodic testing, cleaning and sanitizing shall be returned to EU.

10. Personnel shall wear appropriate layers of arc-rated clothing that meets or exceeds the incident energy level specified on the ERA.

4.6 Electrical Equipment Listing, Labeling, and Approval Requirements

1. All electrical equipment installed or used on the Hanford Site shall be approved by the contractor appointed NFPA 70 AHJ. Electrical equipment shall be approved if it has been accepted, certified, listed, labeled, or otherwise determined to be safe by an OSHA Nationally Recognized Testing Laboratory (NRTL) (as indicated by an NRTL label applied by the manufacturer). If that criteria is not met, the AHJ shall use one of the two following methods:
 - a. If there is an Underwriters Laboratories (UL) standard for the piece of equipment; it shall be field evaluated and labeled by an OSHA recognized NRTL representative.
 - b. Inspection and/or testing shall be completed using the Hanford Site Non-NRTL Labeled Electrical Equipment AHJ Approval Form (A-6005-705), Hanford Site Non-NRTL Labeled Electrical Equipment Evaluation (A-6005-706) when required by the AHJ, and labeled using the AHJ Approval for Non-NRTL Equipment (BL-6004-154). For an image of the required tag, see Appendix D, *Authority Having Jurisdiction (AHJ) Approval for Non-Nationally Recognized Testing Laboratory (NRTL) Equipment Label*.

EXCEPTION 1: *Non-NRTL certified equipment that operates at less than 50 volts (such as cable assemblies, instruments, security systems, low voltage lighting, communication systems, etc.) may be approved by the AHJ using an informal method, if it is determined that an NRTL certified alternative is not readily available to meet the application.*

EXCEPTION 2: *Equipment connected to the load side of a Class 2 or 3 power supply when it has been determined that listed equipment for the intended use is not available, does not require AHJ approval prior to use.*

EXCEPTION 3: *Legacy equipment (in use prior to September 2003) and Non-NRTL equipment in use prior to the implementation of this Program (February 2013) may remain in service and does not require reevaluation, so long as it has not been modified, not found to be defective or damaged, and does not present a hazard to the workers.*

NOTE: See the [OSHA website](#) for a list of OSHA recognized NRTLs.

2. Equipment shall be suitable for its intended purpose and used in accordance with the manufacturer's instructions and any instructions or requirements of the NRTL listing or labeling.
3. All electrical multi-meters, including the external test leads, used on electrical equipment that operates at 50 volts or more shall be approved per Section 4.6.1. The standard multi-meter will be rated Category III or higher. Category II or

less rated test instruments shall be permitted only when no instrument with a higher rating is available for the purpose and it can be assured the instrument will not be used outside the limits of its category rating.

5.0 SPECIFIC REQUIREMENTS

5.1 Ground Fault Circuit Interrupters (GFCIs)

1. Ground Fault Circuit Interrupters (GFCIs) are for personnel protection to limit the severity of a shock to a non-injury level (less than 4 to 6 milliamps to ground). GFCIs do not eliminate shock.
2. GFCI protection for personnel shall be used when portable electric tools and equipment are used with temporary wiring methods including extension cord sets. This applies to portable tools and equipment connected to 125-volt single-phase 15, 20, or 30 amp receptacle outlets. (See Appendix E, *Acceptable and Unacceptable Combinations of Extension Cords and Power Strips*).
3. All 125-volt single-phase 15, 20, or 30 amp receptacle outlets not part of the permanent wiring shall be provided with GFCI protection.

EXCEPTION: *Surge protection devices and relocatable power taps used indoors for supplying office equipment (e.g., computers, monitors, printers) do not require GFCI protection.*

4. Cord(s) sets powered by other than 125-volt, single-phase, 15, 20, and 30 amp receptacles, not part of the permanent wiring, shall have either GFCI protection or be tested in accordance with the Assured Equipment Grounding Conductor Program (AEGCP), Section 5.2, *Assured Equipment Grounding*.
5. GFCI protection devices are not required where GFCI operation could interrupt power to critical systems (e.g., air monitoring equipment, egress lighting) and the requirements of Section 5.2, *Assured Equipment Grounding*, shall be met.
6. Portable electric equipment used in highly conductive work locations (such as those inundated with water or other conductive liquids) or in job locations where employees are likely to contact water or conductive liquids shall be listed and labeled for those applications, and GFCI protection for personnel shall also be used.
7. Permanently installed GFCI protection devices shall be tested in accordance with the manufacturer's instructions.
8. GFCI receptacles shall not be used unless they have been tested within the past month.
9. GFCI receptacles located in areas that are not accessible, unoccupied facilities under long-term surveillance or undergoing deactivation/demolition, or that would create a greater hazard, shall be tested per Section 5.1.7 prior to use.
10. Portable GFCIs shall be tested prior to use.

11. Portable GFCIs should be located closest to the source, although equipment configuration may require locating the GFCI device closer to the worker.
12. 125-volt GFCI receptacles/in-line GFCI devices that trip during use may be reset one time. If the GFCI trips a second time, do not reset it. Contact management.

NOTE: *For the purposes of this program, a portable GFCI is a factory assembled, listed, in-line device with a cord and attachment plug.*

5.2 Assured Equipment Grounding

1. All cord sets (including cords hardwired on one end) shall be provided GFCI protection or maintained through the AEGCP.

EXCEPTION: *This requirement does not apply to re-locatable power taps (RPTs) or surge protection devices (SPDs) when they are used in accordance with Section 5.4, Use of Extension Cords and Multiple Outlet Power Strips.*

2. Where a GFCI cannot be used (due to design or a power interruption[s] creating a greater hazard) for temporary wiring methods or extension cord sets providing power to supply portable electric tools and equipment that are used for construction, repair, maintenance, remodeling, and similar activities, a documented AEGCP shall be maintained and implemented through a work control document. The following requirements shall be met:
 - a. All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.
 - b. Each receptacle and attachment plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.
 - c. Testing shall be performed:
 - i. Before first use on site or if the inspection is not current
 - ii. When there is evidence of damage
 - iii. Before equipment is returned to service following any repairs
 - iv. Before equipment is used after any incident which may be reasonably suspected to have caused damage (e.g., when a cord set is run over)
 - v. Quarterly: cords shall not be used unless they have been inspected for the current quarter; inspections for the next quarter can occur during the last month of the current quarter.
 1. Quarterly inspection tags (See Appendix D, Figure D-3, *Quarterly Inspection Tag*, for examples of the required tag) shall be applied to the cord near the attachment plug in a visible location.

- d. Quarterly testing may be exempted by the NFPA 70 AHJ, in unoccupied areas, if testing will present a greater hazard to personnel (e.g., High Radiation Area, High Contamination Area, Confined Space).
- e. If testing could potentially cause equipment damage due to freezing temperatures, quarterly testing may be deferred by the NFPA 70 AHJ, until temperatures allow.

5.3 Cord-and-Plug-Connected Equipment and Flexible Cord Sets for Maintenance, Construction, and Demolition Activities

1. General Use

- a. Cord-and-plug-connected equipment and flexible cord sets shall be maintained in a safe working condition.
- b. The attachment cord connected to the equipment shall be protected from accidental damage at all times.
- c. Damaged or defective equipment shall be immediately removed from service, marked as out-of-service, and not used until a qualified worker performs repairs and necessary tests to render the equipment safe. Management shall be notified when equipment is removed from service.

2. User Inspection

Cord-and-plug-connected equipment and flexible cord sets used for maintenance, construction, and demolition activities shall be visually inspected prior to each use for external damage to ensure there are no:

- a. Breaks or cracks exposing energized conductors and circuit parts.
- b. Missing cover plates.
- c. Missing, loose, altered, or damaged cord, blades, or pins/prongs, etc.

EXCEPTION: *Cord-and-plug-connected equipment and flexible cord sets (extension cords) that remain connected once put in place and are not exposed to damage are not required to be visually inspected until they are relocated.*

5.4 Use of Extension Cords and Multiple Outlet Power Strips

1. To meet the requirements for use, manufactured extension cords and multi-tap adapters (splitters) shall:
 - a. Be inspected for damage prior to use. Damaged equipment shall not be used.
 - b. Not be used as a permanent substitute for the fixed wiring of a structure.
 - c. Have a current rating that is greater than the connected load. The minimum size shall be 14/3 American Wire Gauge (AWG). It is recommended for longer cords (100 feet or greater) that a minimum size of 12/3 AWG be used.
 - d. Not be connected in series (daisy-chained), unless specifically designed and approved for this use (See Appendix E, *Acceptable and Unacceptable Combinations of Extension Cords and Power Strips*).
 - e. Be unplugged and properly stored when not in use.
 - f. Not create a tripping hazard.
 - g. Be protected from damage; sharp corners and projections shall be avoided. Where passing through doorways or other pinch points, there shall be substantial protection provided to avoid damage.
2. Extension cords may be field-assembled by a qualified person (per Section 3.5.4), provided that:
 - a. Each component is compatible with the other components and is NRTL-listed for the purpose.
 - b. Correct wiring of the extension cord and continuity of the grounding conductor are verified.
 - c. The extension cord is durably marked to indicate the organization responsible for its assembly, the maximum allowable load in amps and watts, and whether or not it is suitable for outdoor use. See Appendix D, Figure D-2, *Field-Assembled Extension Cord Label*, for an example label.
3. Extension cords shall contain an equipment grounding conductor.
4. Extension cords must not be permanently fastened in place or attached in a manner that may damage the cords or restrict their movement.
5. Extension cords used outdoors shall be rated and labeled as suitable for outdoor use.
6. An extension cord may be plugged into a portable GFCI protective device less than six feet in length that is listed and labeled for its intended use.
7. Multi-tap adapters less than six feet in length are allowed to be used with extension cord sets if they are listed and labeled for their intended use.

8. Multiple outlet power strips, such as SPDs and Relocatable Power Taps (RPTs) may not be used outdoors or at construction sites or similar locations unless specifically listed and labeled for such use.

SPDs should only be used for electronic equipment such as computers and telecommunication devices. If there is any uncertainty about the proper use or application of SPDs or RPTs, contact a qualified person (per Section 3.5.4) or an Electrical Subject Matter Expert (SME).

All SPDs manufactured prior to 1996 shall be taken out of service and disposed of.

9. Multiple outlet power strips shall be connected only to permanently installed branch circuit receptacles. They shall not be connected (daisy-chained) to other power taps, surge suppressors, or to extension cords.

EXCEPTION: *Multiple outlet power strips may be connected to a single extension cord temporarily for testing, training, demonstrations, and similar purposes. This temporary configuration may not extend beyond one shift.*

10. Electrical loads such as space heaters, heat-generating devices (e.g., coffee pots), and large appliances (e.g., refrigerators, freezers, microwaves, etc.) shall not be connected to an RPT, unless pre-approved by the AHJ on a case-by-case basis.

5.5 Drilling, Excavations, and Blind Penetrations

1. This section addresses performing drilling, saw cutting and other blind penetrations greater than 1.5 inches, and excavations into surfaces containing concealed electrical conduits and cables.
2. Excavations shall be performed per the requirements of DOE-0344, *Hanford Site Excavating, Trenching and Shoring Procedure*.
3. If the presence and location of electrical circuits or conductors cannot be accurately identified and completely de-energized, appropriate mitigating controls shall be used for penetrations greater than 1.5 inches. At a minimum, the following steps are required prior to the start of work:
 - a. All applicable drawings and documentation shall be reviewed.
 - b. A Job Hazard Analysis (JHA) shall be completed.
 - c. A scan shall be performed if possible, prior to penetrating into concrete or masonry surfaces.
 - d. The location of conductors, cables, raceways, and equipment shall be identified and marked to the maximum extent possible.
 - e. Circuits or conductors shall be de-energized to the maximum extent possible and placed in an electrically safe work condition.

- f. Workers performing blind penetrations shall use appropriate voltage-rated gloves with protective outer leather gloves and nonconductive safety glasses with side shields.

5.6 Generators

5.6.1 General Requirements

1. Any connection or disconnection of cables at the generator output terminals, load side terminals of the generator output circuit breaker, or connections at the load end of the feeder when electrically connected to a generator require lockout/tagout in accordance with DOE-0336, *Hanford Site Lockout/Tagout Procedure*.
2. Cables shall be disconnected from the generator source output circuit breaker or output terminals when they are not terminated at the load end.
3. When portable or vehicle-mounted generators are used to supply electrical loads from a generator-supplied feeder, a grounding electrode conductor connection to an electrode in accordance with NFPA 70 Article 250 is required.
4. When manufacturer's instructions or equipment labeling require supplemental grounding, those instructions shall be followed.
5. Live parts of generators operating at more than 50 volts AC or DC to ground shall not be exposed to accidental contact where accessible to unqualified persons.

5.6.2 Portable Generators

1. Portable describes equipment that is easily carried by personnel from one location to another.
2. The frame of a portable generator is not required to be connected to a grounding electrode (unless required by the manufacturer's instructions) for a system supplied by the generator that meets both of the following conditions:
 - a. The generator supplies only equipment mounted on the generator, and/or cord-and-plug-connected equipment through receptacles mounted on the generator.
 - b. The normally non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are connected to the generator frame.

5.6.3 Vehicle Mounted Generators

1. Vehicle-mounted generators include generators that are mounted on a powered vehicle (excluding automotive vehicles) and generators that are supported by a wheeled trailer (including light plants or light towers).
2. The frame of a vehicle shall be required to be connected to a grounding electrode for a system supplied by a generator located on the vehicle, unless all of the following conditions are met:
 - a. The frame of the generator is bonded to the vehicle frame.
 - b. The generator supplies only equipment located on the vehicle or cord-and-plug-connected equipment through receptacles mounted on the vehicle, or both equipment located on the vehicle and cord-and-plug-connected equipment through receptacles mounted on the vehicle or on the generator.
 - c. The normally non-current-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are connected to the generator frame.
 - d. Not required by the manufacturers' instructions.
3. Initial energization of vehicle-mounted generators shall be accomplished via the *Generator Initial Start-Up Checklist (A-6005-436)*. Subsequent generator startups shall be accomplished via the *Generator Re-Start-Up Checklist (A-6005-437)*.

EXCEPTION: *This does not apply to single-phase 120/240 volt generators that supply only cord-and-plug-connected equipment that is connected to the generator's mounted receptacles.*
4. No arc flash hazard exists for a stand-alone generator not connected to any other electrical source where the generator has been visibly and audibly confirmed to be disabled. A shock hazard still exists until an electrically safe work condition is established, per DOE-0336, *Hanford Site Lockout/Tagout Program*.

5.7 Batteries and Battery Rooms

1. Energy exposure levels shall not exceed those identified in the following list unless appropriate controls are implemented:
 - AC: 50 volts and 5 milliamperes
 - DC: 50 volts
2. Prior to any work on battery systems operating at 50 volts or greater, an ERA shall be performed and documented to identify the chemical, electrical shock, and arc flash hazards, and assess the risks associated with the type of tasks to be performed.

3. Employees who are likely to perform installation, examination, servicing, maintenance or the operation of battery systems that exceed the energy thresholds shall complete Battery Safety Training.
4. The following protective equipment shall be available to employees performing any type of service on a battery with liquid electrolyte:
 - a. Goggles and face shield appropriate for the electrical hazard and chemical hazard
 - b. Gloves and aprons appropriate for the chemical hazards
 - c. Portable or stationary eyewash facilities and equipment within the work area that are capable of drenching or flushing of the eyes and body for the duration necessary to mitigate injury from the electrolyte hazard.

NOTE: Guidelines for the use and maintenance of eyewash facilities for vented batteries in nontelecom environments can be found in ANSI/ISEA Z358.1, American National Standard for Emergency Eye Wash and Shower Equipment.
 - d. Protective footwear
5. Employees performing any activity not involving the handling of electrolytes shall wear safety glasses.
6. Personnel shall not use electrically conductive tools or objects while working on any battery components.
7. Before making or breaking connections within a group of cells, open the battery system disconnecting means (if available) to minimize the possibility of arcing.

5.8 Capacitors

Implement the controls in this section for capacitive systems rated greater than the values below:

- 1 joule of stored energy at 100 volts up to 400 volts, or
 - 0.25 joules of stored energy at 400 volts or greater
1. Perform an ERA to identify and document electrical shock hazards, arc flash hazards, and assess the risks associated with the type of tasks to be performed.
 2. Access to capacitor areas shall be restricted until all capacitors have been discharged, shorted, and grounded or verified to be less than 50 volts.

NOTE: See discharge requirements in NFPA 70 Article 460.6 for 1000 volts nominal or under; or Article 460.28 for systems over 1000 volts nominal.
 3. Any residual charge from capacitors shall be removed by shorting the terminals before servicing or removing.
 4. Capacitors shall be discharged using an appropriately voltage rated shorting probe. If capacitors have been removed from the circuit or are being

transported, the terminals shall be continuously short circuited using no smaller than a #14 AWG bare conductor.

5. The discharge means shall be either permanently connected to the terminals of the capacitor bank or provided with automatic means of connecting it to the terminals of the capacitor bank on the removal of voltage from the line. Manual means of switching or connecting the discharge circuit shall not be used. Automatic discharge and grounding devices shall not be relied upon.
6. Shorting probes shall be inspected before each use.
7. Capacitor terminals shall be considered “charged” until the terminals are shorted or verified to be less than 50 volts.

5.9 National Electrical Code (NEC) Inspections

1. NEC Inspections are required for new electrical installations and modification of existing electrical installations to ensure compliance with the NEC.
NEC inspections are not required for modifications that remove electrical equipment.
2. NEC Inspections are not required for installation or replacement of electrical utilization equipment approved for connection to permanently installed receptacles with cord attachments, or for minor maintenance and repair work including like-for-like replacements, such as, but not limited to, switches, fuses, lamp sockets, receptacles, replacing worn cords, and tightening connections on a wiring device.
3. Electrical assemblies (e.g., Underwriter’s Laboratories (UL) 508A, *Industrial Control Panels*) that are listed and labeled by an NRTL are not required to be individually NEC inspected when being installed as a component of a system or facility that is subject to NEC inspection.
4. EIPs (A-6005-707) are required to be initiated prior to performing any electrical installations or modifications. EIPs are prepared to document the scope of the inspection, any corrections of deficiencies that were performed, and whether the work inspected is approved or not approved.
5. Block EIPs may be used to cover a specified boundary such as a managed building, facility, or area. Block EIPs shall be valid for no more than 12 months. The NEC Inspector shall evaluate the scope of work, and reserves the right to deny the use of a Block Permit and require an individual Permit to cover the scope of work.
6. An NEC inspection is required to energize an electrical service. The NEC Inspector shall document the inspection and approval of the electrical service on the NEC Service Inspection Label (BL-6002-745) (See Appendix D, Figure D-5, *National Electrical Code [NEC] Inspection Labels*) and shall attach the inspection label to the electrical service equipment.

7. An NEC inspection is required for non-service modifications. The NEC Inspector shall document the inspection and approval of an electrical modification. Attach the NEC Equipment Inspection Label (BL-6003-435) (See Appendix D, Figure D-5, *National Electrical Code [NEC] Inspection Labels*) to electrical equipment as applicable.
8. NEC Inspectors shall notify the requestor of non-compliant conditions following the inspection.
9. NEC Inspectors shall approve corrections of deficiencies.
10. Code compliance issues that the requestor and the NEC Inspector cannot resolve satisfactorily shall be referred to the contractor-appointed AHJ.
11. Design organizations should consider consulting with an NEC Inspector during the design of new facilities or modification of existing facilities to assure compliance with the NEC and to promote early identification of problems.

6.0 WORK ACTIVITIES THAT HAVE THE POTENTIAL TO BE WITHIN 20 FEET OF OVERHEAD LINES

Requirements for work activities near overhead power or communication lines are established in the below subsections according to the type of equipment or work activity involved. Each subsection contains section-specific definitions and requirements.

6.1 Mobile Cranes

This section provides requirements to perform work near power or communication lines when using a mobile crane.

6.1.1 Section-Specific Definitions

1. **Dedicated Spotter:** Spotters for Mobile Cranes (dedicated spotters) shall complete *Equipment Operation Near Powerlines* and *Advanced Rigging Techniques*. Spotters remain in continuous contact with the operator and have the sole responsibility to verify that the specified clearance is maintained.
2. **Work Zone:** Can be defined in one of two ways, as seen in Table 2.

TABLE 2: WORK ZONE DEFINED AND ILLUSTRATED

Definition	Illustration(s)
<p>a. Demarcating boundaries and prohibiting crane operation past those boundaries.</p>	
<p>b. The area 360 degrees around the crane, up to the crane's maximum working radius.</p>	

3. **Maximum Working Radius:** The distance from the center point of the crane to the furthest location that any part of the crane, load, or load line will be performing work over or is being assembled over. This is not to be confused with maximum boom reach while in a horizontal or vertical position.
4. **Transit:** Moving or transporting a crane from one jobsite to another.
5. **Travel:** A crane moving under its own power from one location to another on a jobsite.

6.1.2 Traveling or Transit Under or Near Power Lines With No Load

The employer shall ensure each of the following:

1. For both travel and transit, the boom/mast and boom/mast support system shall be sufficiently lowered to maintain the specified clearance outlined in Table 3. Consideration should be given to the effects of speed and terrain on crane movement.

TABLE 3: CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	Minimum Clearance Distance (feet)
Up to 0.75	4
Over .75 to 50	6
Over 50 to 345	10
Over 345 to 750	16
Over 750 to 1,000	20
Over 1,000	As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution

2. While traveling, if any part of the crane will get closer than 20 feet to the power line, a dedicated spotter who is in continuous contact with the operator shall be used. The dedicated spotter shall be positioned to accurately gauge the specified clearance distance, and when necessary, communicate directly and in a timely manner with the operator to ensure the specified clearance distance is maintained.

3. When traveling at night or in poor visibility conditions, the employer shall ensure that the power lines are illuminated or another means of identifying the location is used and a safe path of travel is identified.
4. Avoid contact with any overhead communication lines.

6.1.3 Planning and Operating Including Assembly/Disassembly

1. Operation of boom or load over energized electrical lines is prohibited.
2. Avoid contact with any overhead communication lines.
3. Operation below power lines is prohibited, unless it meets one of the following exceptions:
 - a. For situations where power lines have been de-energized and grounded: EU shall confirm (in person at the job site) that the power lines have been de-energized and visibly grounded at the worksite.
 - b. For cranes with non-extendable booms: With boom at true vertical, the equipment would be more than 20 feet below the plane of the power lines or more than the specified clearance distance below the plane of the power lines. See Figure 1 at the end of Section 6.1 for illustrations.
 - c. For cranes with articulating or extendable booms: The uppermost part of the equipment, with the boom in the fully extended position at true vertical, would be more than 20 feet below the plane of the power lines or more than the specified clearance distance below the plane of the power lines. See Figure 1 at the end of Section 6.1 for illustrations.
 - d. For Powered Industrial Trucks (PITs) and mobile equipment: Activities involving rigging to PITs or mobile equipment are permitted below power lines even when they have the capability of entering the specified clearance distance. See Section 6.2 for requirements about mobile equipment and Section 6.3 requirements about PITs.
4. The work planning team (this shall include the Designated Lead/Lift Director) shall ensure that the crane placement, configuration, work zone, load, and rigging accessories have been identified.
5. Determine if any part of the crane, load line, or load if operated up to the equipment's maximum working radius in the work zone could get closer than 20 feet to a power line. If so, the employer shall meet one of the following options:
 - a. De-energize and ground. EU shall confirm (in person at the job site) that the power lines have been de-energized and visibly

- grounded at the worksite. During the pre-job briefing, direct personnel to ensure neither equipment nor personnel come in contact with the de-energized power lines.
- b. Maintain specified clearances as documented during the EU site visit process.
6. To prevent encroachment when using the option in Section 6.1.3.5.b above, all the following requirements shall be met:
- a. Conduct a pre-job briefing with FWS, Designated Lead, operator, assembly/disassembly crew if applicable, and any other workers who will be in the work zone near overhead power lines.
 - b. Use nonconductive tag lines.
 - c. Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at least 20 feet from the power line or at a distance no closer than the specified clearance distance as defined by EU (if using the option in Section 6.1.3.5.b above). If the operator is unable to see the elevated warning lines, a dedicated spotter shall be used, in addition to implementing one of measures described under Section 6.1.3.6.d(ii) through (v) listed below.
 - d. Implement at least one of the following:
 - i. Dedicated spotter. A dedicated spotter shall be equipped with a visual aid to assist in identifying specified clearance distance. The spotter shall be positioned to accurately gauge the specified clearance distance, and when necessary, communicate directly in a timely manner with the operator to maintain the specified clearance distance.
 - ii. A proximity alarm set to give operator sufficient warning to maintain specified clearance distance.
 - iii. A device that automatically warns the operator when to stop movement.
 - iv. A device that automatically limits range of movement.
 - v. An insulating link/device installed at a point between the end of the load line and the load.

6.1.4 Planning and Operating Within the Specified Clearance of Energized Power Lines

When conducting crane operations within this section, all below listed requirements shall be included in a documented lift plan with all required signatures.

1. The employer determines that it is infeasible to do the work without breaching the specified clearance distance. The employer and EU determine it is infeasible to de-energize and ground the power line. The justification to perform the work energized shall be included in the documented lift plan and signed by the responsible senior manager (as designated by the specific contractor).
2. Before the operation takes place, the Designated Lead, together with a qualified representative of EU, shall visit the site and determine if the lift plan is the most feasible way to complete the operation and set the specified clearance distances.
3. A planning meeting with the employer, EU, Crane Operator, and Designated Lead/Lift Director shall be held to determine specific steps the documented lift plan will follow to prevent electrical contact.
4. At a minimum, the documented lift plan shall include the following requirements:
 - a. Conduct an onsite planning meeting. The FWS and Designated Lead shall conduct an onsite planning meeting with the operator and the other workers who will be in the work zone to review the location of the electric power lines.
 - b. Render automatic circuit reenergization device inoperative. If the power line is equipped with a device that automatically re-energizes the circuit in the event of a power line contact, this feature shall be made inoperative if the design of the device permits.
 - c. Identify and plan for a dedicated spotter. A dedicated spotter who is equipped with a visual aid shall assist in identifying specified clearance distance. They shall be positioned to accurately gauge the specified clearance distance, and when necessary, communicate directly and in a timely manner with the operator to maintain the specified clearance distance.
 - d. Provide an elevated warning line, or barricade, in view of the operator, equipped with flags or similar high-visibility markings.
 - e. Ensure all rigging to be used within the specified clearance is nonconductive. Plan measures to prevent exposing nonconductive rigging to moisture or contamination, since nonconductive material can become conductive when exposed.

- f. If possible, install an insulated link/device at a point between the end of the load line and load.
- g. Provide employees with properly rated voltage protection (such as voltage-rated insulating gloves) in addition to the installed link/device in Section 6.1.4.4.f above. Additional protection is not necessary for the crane operator located on the equipment, but all other employees who may come in contact with the crane, load line, or load shall be insulated or guarded from the crane, load line, or load through an additional means.
- h. Use the crane's installed device for automatically limiting range of movement, if available. If crane is equipped with a device that automatically limits range of movement, use the device to prevent any part of the crane, load line, or load from entering the established specified clearance distance.
- i. Use nonconductive tag lines. Plan measures to prevent exposing nonconductive tag lines to moisture or contamination, since nonconductive material can become conductive when exposed.
- j. Form a perimeter of nonconductive barricades at least 10 feet away from the crane to prevent unauthorized personnel from entering the crane's work area.
- k. Ensure that no one is permitted to touch the crane, load line, or load unless the Designated Lead/Lift Director indicates that it is safe to do so. If the crane is being operated remotely from the ground, use wireless controls to isolate the operator from the crane or insulating mats that insulate the operator from the ground.
- l. Ensure that only personnel essential to the operation are permitted to be in the work area of the crane and load.
- m. Ensure that the crane is grounded.
- n. Ensure that insulated barriers are installed, except where such devices are unavailable for the line voltages involved. The insulated barriers shall not be part of nor an attachment to the crane and shall not allow contact between the energized electric power line and the crane, load line, or load.

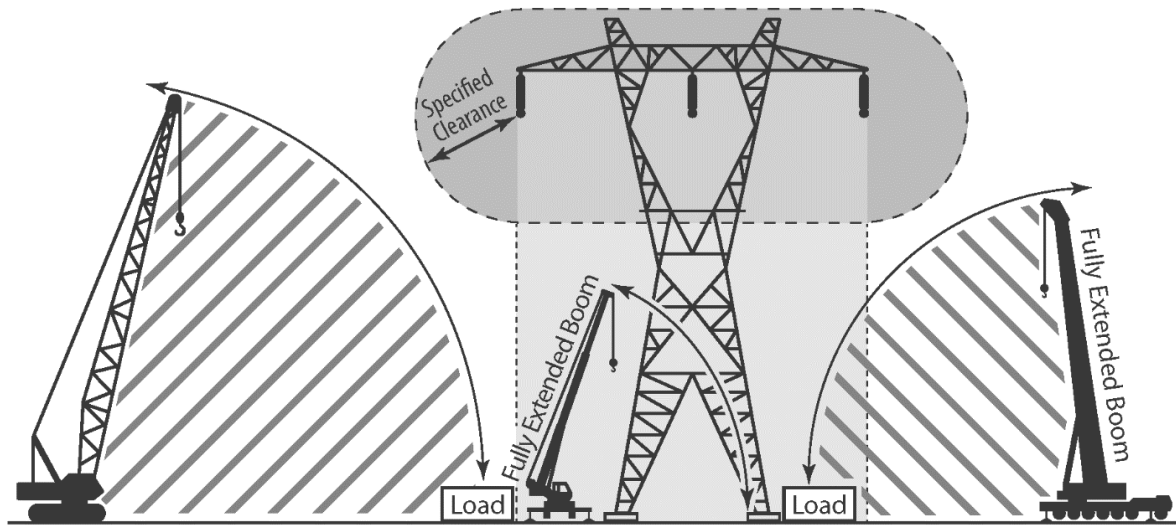
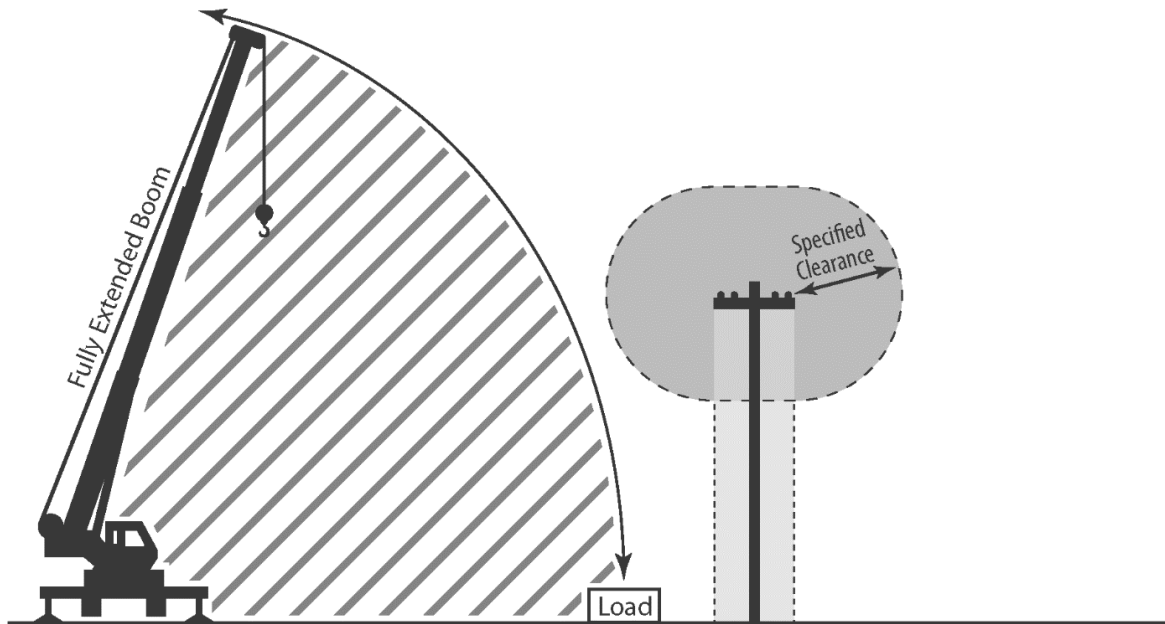


FIGURE 1: OPERATING CRANES NEAR ENERGIZED OVERHEAD POWER LINES

6.2 Mobile Equipment

This section provides requirements to perform work near power or communication lines using any type of mobile equipment on the Hanford Site.

Mobile equipment is prohibited from entering the specified clearance distance unless overhead lines are de-energized or guarded.

Mobile equipment suspending a load from rigging shall follow all requirements in Section 6.1, with two exceptions:

1. Dedicated spotter requirements shall be in accordance with Section 6.2.1.1.
2. Mobile equipment may perform lifts below power lines.

6.2.1 Section-Specific Definitions

1. **Dedicated Spotter:** Spotters for Mobile Equipment shall complete *Equipment Operation Near Powerlines* training.
2. **In Transit:** Mobile equipment moving under its own power with or without a load and having a combined height no greater than 14 feet while moving around the job site.
3. **Travel/Working:** Mobile equipment moving under its own power with or without a load within a specific job site.
4. **Work Zone:** Can be defined in one of two ways:
 - a. Demarcating work area boundaries (prohibiting any portion of the equipment from operating past those boundaries).
 - b. Measuring the area 360 degrees around the equipment's maximum working radius from all locations the equipment will work at or travel through on a specific job site.
5. **Maximum Working Radius:** The distance from the center point of the mobile equipment to the furthest location that any part of the equipment or load can reach, both horizontally and vertically.

6.2.2 Transit

Items of mobile equipment such as trucks, rollers, dozers, graders, backhoes, scrapers and any other equipment not capable of exceeding a height of 14 feet are considered to be in transit at all times.

Trucks (e.g., dump truck, garbage truck, Environmental Restoration Disposal Facility (ERDF) truck) are considered in transit when moving under their own power with the structure in its lowest possible position. If the truck is carrying a load, the combined height of the truck and load shall be no higher than 14 feet.

The employer shall ensure each of the following:

1. Any mobile equipment capable of having parts of its structure elevated near energized overhead lines shall be operated to maintain a clearance of 10 feet. If the mobile equipment is in transit with its structure lowered, the clearance may be reduced to 4 feet. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage. Consideration should be given to the effects of weather, speed, and terrain on the equipment's movement.
2. If equipment in transit is over 14 feet high on Hanford roads, use the Service Catalog to request an "Oversize/Overweight Load Authorization."
3. Avoid contact with any overhead communication lines.

6.2.3 Travel/Working

If any part of a piece of mobile equipment's work zone will be within 20 feet of overhead power lines, the following is required:

1. The work planning team consisting of the FWS, operator, EU, electrical engineering, and safety shall ensure that mobile equipment placement, configuration, work zone, load, and travel paths have been identified and evaluated for electrical hazards.
2. EU shall conduct a site visit in accordance with the EU site visit process. Equipment shall maintain specified clearances as documented during the EU site visit process. For overhead lines not under the control of EU, Hanford EU will assist the requesting organization in filling out the site visit form for the outside utility, but activities shall be coordinated with the utility owning the overhead lines.
3. The work planning team shall determine if any part of the mobile equipment or load, when the equipment is operated up to the equipment's maximum working radius in the work zone, could encroach on the minimum clearance distance of a power line.
4. If the equipment could encroach on the specified clearances, as documented during the EU site visit process, the employer shall choose one of the following options:
 - a. De-energize and ground overhead power lines. EU shall confirm (in person at the job site) that the power lines have been de-energized and visibly grounded at the work site. During the pre-job briefing, direct personnel to ensure neither equipment nor personnel come in contact with the de-energized power lines.
 - b. Maintain specified clearances as documented during the EU site visit process.

5. Avoid contact with any overhead communication lines.
6. To prevent encroachment when using the option in Section 6.2.3.4.b above, all the following requirements shall be met:
 - a. Conduct a pre-job briefing with FWS, operator, and any other workers who will be in the work zone near overhead power lines.
 - b. Call EU Dispatch (509) 373-2321 prior to the start of work and upon completion of the work each day.
 - c. Ensure operators whose equipment has the potential to enter the specified clearance distance have completed *Equipment Operation Near Powerlines* training.
 - d. Use a dedicated spotter whose sole duty is to verify that the specified clearance is maintained. The dedicated spotter shall be easily recognizable by the operator and be equipped with a visual aid to assist in identifying the specified clearance distance. The dedicated spotter shall be positioned to accurately gauge the specified clearance distance and communicate directly and in a timely manner with the operator.
 - e. Implement at least one of the following:
 - i. Install a physical barrier to prevent encroachment into the specified clearance.
 - ii. Ensure a Qualified Person installs an insulated barrier to prevent contact with the lines. Where the barriers are rated for the voltage of the line being guarded and are not a part of nor an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.
 - iii. Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at least 20 feet from the power lines or at a distance no closer than the specified clearance distance as defined by EU (if using the option in Section 6.2.3.4.b above).
 - iv. Have EU or utility owner personnel raise or relocate energized overhead lines to reduce the possibility of encroaching on the specified clearance.
 - f. If the mobile equipment becomes electrified, the operator shall try to immediately move the equipment away. At no point should the operator attempt to exit the mobile equipment unless staying in the equipment would compromise their safety.

6.3 Powered Industrial Trucks

This section provides requirements to perform work near power or communication lines using Powered Industrial Trucks (PITs) (commonly referred to as fork trucks or forklifts) on the Hanford site. The term PIT used below does not apply to cranes, elevating work platforms, or electrically insulated bucket trucks.

PITs are prohibited from entering the specified clearance distance unless overhead lines are de-energized or guarded.

PITs suspending a load from rigging shall follow all requirements in Section 6.1, with two exceptions:

1. Dedicated spotter requirements shall be in accordance with Section 6.3.1.1.
2. PITs may perform lifts below power lines.

6.3.1 Section-Specific Definitions

1. **Dedicated Spotter:** Spotters for PITs shall complete *Equipment Operation Near Powerlines* training.
2. **In Transit:** PITs are considered in transit when moving under their own power with the structure in its lowest possible position.

6.3.2 Transit

The employer shall ensure each of the following:

1. If the PIT is carrying a load, the combined height of the PIT and load shall be no higher than 14 feet.
2. Avoid contact with any overhead communication lines.
3. Ensure the PIT's structure or load while in transit maintains a specified clearance of 4 feet from overhead lines. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage. Consideration should be given to the effects of weather, speed, and terrain on the PIT's movement.
4. When operating a PIT below the specified clearance zone of overhead powerlines, the PIT and its load shall be kept as low as possible.
5. If a PIT is in transit on Hanford roads, and the combined height of the PIT and its load measure greater than 14 feet, use the Service Catalog to request an "Oversize/Overweight Load Authorization."
6. If a PIT and its load being over 14 feet high will be performing any operation within 20 feet of overhead power lines, an EU site visit in accordance with the EU site visit process is required, and the work is not considered in transit.

6.3.3 Working Within 20 Feet of Overhead Lines if PIT or Load Will be Operated Over 14 Feet in Height

1. EU shall conduct a site visit in accordance with the EU site visit process. Equipment shall maintain specified clearances as documented during the EU site visit process. For overhead lines not under the control of EU, Hanford EU will assist the requesting organization in filling out the site visit form for the outside utility, but activities shall be coordinated with the utility owning the overhead lines.
2. The PIT operator shall ensure that the PIT and its load maintain a specified clearance of 10 feet while moving around the work site. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.
3. If the PIT will be operated at greater than 14 feet height and is within 20 feet of overhead power lines, the employer shall choose one of the following options:
 - a. De-energize and ground overhead power lines. EU shall confirm (in person at the job site) that the power lines have been de-energized and visibly grounded at the work site. During the pre-job briefing, direct personnel to ensure neither equipment nor personnel come in contact with the de-energized power lines.
 - b. Maintain specified clearances as documented during the EU site visit process.
4. Avoid contact with any overhead communication lines.
5. To prevent encroachment when using the option in Section 6.3.3.3.b above, all the following requirements shall be met:
 - a. Conduct a pre-job briefing with FWS, operator, spotters, and any other workers who will be in the work zone.
 - b. Call EU Dispatch (509) 373-2321 prior to the start of work and upon completion of the work each day.
 - c. Use a dedicated spotter whose sole duty is to verify that the specified clearance is maintained. The dedicated spotter shall be easily recognizable by the operator and be equipped with a visual aid to assist in identifying the specified clearance distance. The dedicated spotter shall be positioned to accurately gauge the specified clearance distance and communicate directly and in a timely manner with the operator.
6. If the PIT becomes electrified, the operator shall immediately try to move the equipment away. At no point should the operator attempt to exit the PIT unless staying in the equipment would compromise their safety.

6.4 Elevating Work Platforms

This section provides requirements to perform work near power or communication lines using any type of Aerial Lift or Elevating Work Platform on the Hanford site, including scissor lifts. However, the term Elevating Work Platform does not apply to Mobile Scaffolds.

Elevating Work Platforms not capable of exceeding a height of 14 feet are considered to be in transit at all times.

Elevating Work Platforms are prohibited from entering the specified clearance distance unless overhead lines are de-energized or guarded or the platform is designed and approved for the voltages encountered and as a part of an approved work package.

6.4.1 Section-Specific Definitions

1. **Dedicated Spotter:** Spotters for Elevating Work Platforms shall complete *Equipment Operation Near Powerlines* training.
2. **In Transit:** Elevating Work Platform moving under its own power and having a height no greater than 14 feet while moving around the job site or between job sites.
3. **Work Zone:** Can be defined in one of two ways:
 - a. Demarcating work area boundaries and prohibiting any portion of the Elevating Work Platform from operating past those boundaries.
 - b. Measuring the area 360 degrees around the Elevating Work Platform's maximum working radius from all locations the Elevating Work Platform will work at or travel through on a specific job site.
4. **Working Distance:** The distance from the center point of the Elevating Work Platform to the furthest location that any part of the Elevating Work Platform would reach while performing work, both horizontally and vertically.
5. **Elevating Work Platform:** Any vehicle-mounted device, telescoping or articulating, or both, which is used to position personnel.

6.4.2 Transit

The employer shall ensure each of the following:

1. Ensure any Elevating Work Platform capable of having parts of its structure elevated near energized overhead lines shall be operated to maintain a clearance of 10 feet. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

Consideration should be given to the effects of weather, speed, and terrain on the Elevating Work Platform's movement.

2. If equipment is in transit on Hanford roads and measures greater than 14 feet in height, use the Service Catalog to request an "Oversize/Overweight Load Authorization."
3. Avoid contact with any overhead communication lines.

6.4.3 Working

If any part of an Elevating Work Platform's work zone will be within 20 feet of overhead power lines, the following are required:

1. The work planning team consisting of the FWS, operator, EU, electrical engineering, and safety shall ensure that Elevating Work Platform placement, configuration, work zone, and travel paths have been identified and evaluated for electrical hazards.
2. EU shall conduct a site visit in accordance with the EU site visit process. Equipment shall maintain specified clearances as documented during the EU site visit process. For overhead lines not under the control of EU, Hanford EU will assist the requesting organization with filling out the site visit form for the outside utility, but activities shall be coordinated with the utility owning the overhead lines.
3. The work planning team shall determine if any part of the Elevating Work Platform, when operated up to the Elevating Work Platform's working distance in the work zone, could encroach on the minimum clearance distance of a power line.
4. Avoid contact with any overhead communication lines.
5. If the Elevating Work Platform could encroach upon the minimum clearances during operations as documented during the EU site visit process, the employer shall choose one of the following options:
 - a. De-energize and ground overhead power lines. EU shall confirm (in person at the job site) that the power lines have been de-energized and visibly grounded at the work site. During the pre-job briefing, direct personnel to ensure the Elevating Work Platform, tools/equipment nor personnel come in contact with the de-energized power lines.
 - b. Maintain specified clearances as documented during the EU site visit process.
6. To prevent encroachment when using the option in Section 6.4.3.5.b above, all the following requirements shall be met:
 - a. Conduct a pre-job briefing with FWS, operator, spotters, and any other workers who will be in the work zone.

- b. Call EU Dispatch (509) 373-2321 prior to the start of work and upon completion of the work each day.
 - c. Use a dedicated spotter whose sole duty is to verify that the specified clearance is maintained. The dedicated spotter shall be easily recognizable by the operator and be equipped with a visual aid to assist in identifying the specified clearance distance. The dedicated spotter shall be positioned to accurately gauge the specified clearance distance and communicate directly and in a timely manner with the operator.
 - d. Implement at least one of the following:
 - i. Install a physical barrier to prevent encroachment into the specified clearance.
 - ii. Install an insulated barrier to prevent contact with the lines. Where the barriers are rated for the voltage of the line being guarded and are not a part of nor an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.
 - iii. Erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at least 20 feet from the power lines or at a distance no closer than the specified clearance distance as defined by EU (if using the option in Section 6.4.3.5.b above).
 - iv. Have EU or utility owner personnel raise or relocate energized overhead lines to reduce the possibility of encroaching on the specified clearance.
 - e. If the Elevating Work Platform is insulated for the voltage involved, and if the work is performed by a Qualified Person as defined in Section 3.5.4, the clearance (between the uninsulated portion of the Elevating Work Platform and the power line) may be reduced to the distance to the restricted approach boundary given in NFPA 70E Table 130.4(D)(a) or 130.4(D)(b).
 - f. For Elevating Work Platforms where workers standing on the ground shall contact the vehicle, mechanical equipment, or any of its attachments, workers shall use protective equipment rated for the voltage, or the Elevating Work Platform shall be located so that no uninsulated part of its structure can come closer to the line than permitted in the specified clearance outlined above.
7. Any Elevating Work Platform having parts of its structure elevated within the restricted approach boundary of energized overhead lines

shall be intentionally grounded or be insulated for the voltages present. Additional precautions, such as the use of barricades or insulation, shall be used to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

8. If the Elevating Work Platform becomes electrified, the operator shall immediately try to move the equipment away. At no point should the operator attempt to exit the Elevating Work Platform unless staying in the equipment would compromise their safety.

6.5 Personnel

This section provides guidance for anytime a worker has the capability to encroach on the specified clearance distance of overhead lines, outdoor premise wiring, or overhead communication lines. Activities affected include erecting/dismantling or working from scaffolding, working from ladders, or working from the ground or an elevated walking-working surface with material that has the capability to reach into the minimum clearance distance.

Under no circumstances is a worker or the item they are in contact with permitted to enter the specified clearance of overhead lines, outdoor premise wiring, or overhead communication lines.

Qualified Persons as defined in Section 3.5.4 are exempted from the following requirements when using insulated tools or equipment when performing electrical-related duties.

6.5.1 Section-Specific Definitions

1. **Dedicated Spotter:** Spotters for activities involving personnel working near power lines shall complete *Equipment Operation Near Powerlines* training.
2. **Minimum Clearance Distance:** 10-foot clearance from all overhead lines and outdoor premise wiring. If the voltage is higher than 50kv, the clearance shall be increased 4 inches for every 10kV over that voltage. For overhead communication lines, the clearance distance shall be to avoid contact.

6.5.2 Working

If any worker or an item the worker is in contact with has the physical capability to be within 20 feet of overhead lines, outdoor premise wiring, or overhead communication lines, the following are required:

1. The work planning team, consisting of the FWS, EU, electrical engineering, safety, and the workers performing the work shall ensure the work area has been identified and evaluated for electrical hazards.

2. EU shall conduct a site visit in accordance with the EU site visit process. Equipment shall maintain specified clearances as documented during the EU site visit process. For overhead lines not under the control of EU, Hanford EU may provide consultation, but activities shall be coordinated with the utility owning the overhead lines.
3. The work planning team shall determine if any part of the employee or an item the employee is in contact with could encroach on the minimum clearance distance of an electrical hazard.
4. If the employee, or any item the employee may come in contact with, could encroach on the specified clearance distance as documented during the EU site visit process, the employer shall choose one of the following:
 - a. De-energize and ground overhead lines and outdoor premise wiring. EU shall confirm (in person at the job site) that power lines have been de-energized and visibly grounded at the work site.
 - b. Maintain specified clearances as determined by EU and documented during the EU site visit process.
5. To prevent encroachment when using the option in Section 6.5.2.4.b above, all the additional requirements shall be followed:
 - a. Conduct a pre-job briefing with the FWS and workers who will be in the work zone near overhead power lines..
 - b. Call EU Dispatch (509) 373-2321 each day prior to the start of work and after completion of the work.
 - c. Use a dedicated spotter whose sole duty is to verify that the specified clearance is maintained. The dedicated spotter shall be easily recognizable by the workers and be equipped with a visual aid to assist in identifying the specified clearance distance. The dedicated spotter shall be positioned to accurately gauge the specified clearance distance and communicate directly and in a timely manner with the workers.
 - d. Implement at least one of the following:
 - i. Install an insulated barrier to prevent contact with power lines. Where the barriers are rated for the voltage of the line being guarded and are not a part of nor an attachment to a vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.
 - ii. Erect and maintain an elevated warning line, barricade, or line of signs in view of the workers at least 20 feet from any power lines or at a distance no closer than the

specified clearance distance as defined by EU (if using the option in Section 6.5.2.4.b above).

- iii. Have EU or utility owner raise or relocate energized overhead lines to reduce the possibility of encroaching on the specified clearance.

7.0 ADMINISTRATIVE REQUIREMENTS

7.1 Program Audits

The HSESP shall be assessed to help ensure that the principles and procedures of the Program are being followed. Program audits shall be conducted and documented every three years at a minimum. Field audits shall be conducted and documented at intervals not to exceed one year to ensure the HSESP requirements are being followed. Where the audit determines that the principles and procedures of the Program are not being followed, contractors shall take actions to correct any observations or findings. Deficiencies and findings shall be documented in accordance with the contractors' corrective action management system.

Issues concerning the HSESP that are identified through assessments and surveillance reports shall be forwarded to the HSESP Committee.

NOTE: Electrical Safety Program lockout/tagout activities are audited under DOE-0336, Hanford Site Lockout/Tagout Procedure.

7.2 Incident Investigations

Hanford contractors shall accomplish incident investigation requirements of NFPA 70E Section 110.1(J) through their occurrence reporting and corrective action management systems.

7.3 Recordkeeping

Records and documentation generated by the Program shall be processed and maintained in accordance with appropriate contractor policies.

8.0 REFERENCES

10 CFR 851, *Worker Safety and Health Program*

29 CFR 1910, Subpart S, *Electrical*

29 CFR 1926, Subpart K, *Electrical*

29 CFR 1926, Subpart CC, *Cranes & Derricks in Construction*

29 CFR 1926, Subpart O, *Motor Vehicles, Motorized Equipment, and Marine Operations*

American Society of Mechanical Engineers (ASME) B30.5, *Mobile and Locomotive Cranes*

American National Standards Institute (ANSI) Z358.1, *Emergency Shower and Eye Wash Station Requirements.*

American National Standards Institute (ANSI) Z535, *Series of Standards for Safety Signs and Tags.*

DOE-0336, *Hanford Site Lockout/Tagout Procedure*

DOE-HDBK-1092, DOE Handbook, *Electrical Safety*

DOE-RL-92-36, *Hanford Site Hoisting and Rigging Manual*

DOE-0344, *Hanford Site Excavating, Trenching, and Shoring Procedure*

DOE O 414.1, *Quality Assurance*, as amended

HMIS-PRO-EU-066, *Electrical Utilities Lock and Tag Program*

HMIS-STD-TQ-61018, *Electrical Safety Training Program Description*

IEEE 1584, *Guide for Performing Arc Flash Hazard Calculations*

NFPA 70, *National Electrical Code (NEC)*

NFPA 70E-2018, *Standard for Electrical Safety in the Workplace*

Revised Code of Washington (RCW) 19.28, *Electricians and Electrical Installations*

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APPENDIX A: DEFINITIONS & ACRONYMS

DEFINITIONS

Term	Definition
Arc Flash Hazard	A source of possible injury or damage to health associated with the release of energy caused by an electric arc.
Arc Flash Boundary (AFB)	When an arc flash hazard exists, an approach limit from an arc source at which incident energy equals 1.2 cal/cm ² (5 J/cm ²).
Battery System	Interconnected battery subsystems consisting of one or more storage batteries and battery chargers, and can include inverters, converters, and associated electrical equipment.
Blind Penetration	Activities including drilling, saw cutting greater than 1 ½ inches, and excavations into surfaces containing concealed electrical conduits and cables which may be accidentally contacted.
Cord Set (Extension Cord)	An insulated, flexible electric wire fitted with a plug at one end and one or more outlets on the other, typically used to plug in devices whose cords are not long enough to reach a wall outlet.
Electrical Hazard	A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, or arc blast injury. NOTE: <i>Class 2 power supplies, listed low voltage lighting systems, and similar sources operating at less than 50 volts are examples of circuits or systems that are not considered an electrical hazard.</i>
Electrically Safe Work Condition	A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to verify the absence of voltage (applicable verification of isolation checks and safe to work checks complete), and, if necessary, temporarily grounded for personnel protection.
Exposed (as applied to energized electrical conductors or circuit parts)	Capable of being inadvertently touched or approached nearer than a safe distance by a person; it is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.
Limited Approach Boundary (LAB)	An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.
Maintenance, Condition of	The state of the electrical equipment considering the manufacturer's instructions, manufacturer's recommendations, applicable industry codes and standards, and recommended practices.
Modification	Making any physical change to the electrical equipment installation, not to include like-for-like replacement.

Term	Definition
Multi-Tap Adapter	Typically a 3-outlet adapter used on the end of an extension cord.
Multiple Outlet Power Strips	Re-locatable Power Taps (RPTs) and Surge Protection Devices (SPDs).
Non-Electrical Workers	Non-Electrical Workers are employees who face a higher than normal risk of exposure to electrical hazards. This includes but is not limited to workers who may operate electrical disconnects or circuit breakers.
Normal Operating Condition	A normal operating condition exists where all of the following are satisfied: The equipment is properly installed, maintained, used in accordance with manufacturer's listing and labeling, doors are closed and secured, equipment covers are in place and secured, and there is no evidence of impending failure.
Overhead Line(s)	A wire, cable, or bundled conductors supported by messenger cables, with or without insulation, supported by insulators mounted on or hung from crossarms located near the tops of poles, towers, or other structures.
Qualified Person	One who has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received the applicable safety training to identify the hazards and reduce the associated risk.
Restricted Approach Boundary (RAB)	An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased likelihood of electric shock, due to electrical arc-over combined with inadvertent movement.
Risk	A combination of the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard.
Risk Assessment	An overall process that identifies hazards, estimates the likelihood of occurrence of injury or damage to health, estimates the potential severity of injury or damage to health, and determines if protective measures are required.
Supervised Industrial Installation	Where conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system and the risk assessment be readily available to the qualified worker likely to perform examination, servicing, maintenance, and operation of equipment prior to interacting with the electrical system.
Vendor	An offsite supplier of a product or service having specialized training and experience for a specific piece of equipment.
Working Distance	The distance between a person's face and chest area and a prospective arc source.

ACRONYMS

AED	Automated External Defibrillator
AEGCP	Assured Equipment Grounding Conductor Program
AFB	Arc Flash Boundary
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
BPA	Bonneville Power Administration
CEU	Continuing Education Units
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
DOE	U.S. Department of Energy
DL	Designated Lead
EEWP	Energized Electrical Work Permit
EU	Electrical Utilities
EIP	Electrical Inspection Permits
ERA	Electrical Risk Assessment
ERDF	Environmental Restoration Disposal Facility
GFCI	Ground Fault Circuit Interrupter
HAMMER	Volpentest HAMMER Federal Training Center
HECB	Hanford Electrical Codes Board
HGET	Hanford General Employee Training
HMESC	Hanford Mission Essential Services Contract
HSESP	Hanford Site Electrical Safety Program
HSSA	Hanford Site Stabilization Agreement

HWESB	Hanford Workplace Electrical Safety Board
IAEI	International Association of Electrical Inspectors
ICC	International Code Council
JHA	Job Hazard Analysis
KSAs	Knowledge, Skills, and Abilities
LAB	Limited Approach Boundary
NEC	National Electrical Code
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NRTL	Nationally Recognized Testing Laboratory
OSHA	Occupational Safety and Health Administration
PIT	Powered Industrial Truck
PPE	Personal Protective Equipment
RAB	Restricted Approach Boundary
RCW	Revised Code of Washington
RPT	Relocatable Power Tap
SME	Subject Matter Expert
SPD	Surge Protection Device
UL	Underwriters Laboratories
WAC	Washington Administrative Code

**APPENDIX B: BASIC KNOWLEDGE, SKILLS, AND ABILITIES (KSAs)
FOR INSTRUMENT SPECIALISTS**

An Instrument Specialist is a qualified person who installs, repairs, maintains, and adjusts indicating, recording, telemetering, and controlling instruments. They test equipment used to control and measure variables, such as pressure, flow, temperature, motion, force, and chemical composition while using precision instruments and hand tools where they may be exposed to unguarded electrical hazards. Instrument Specialists meeting the Basic Experience Requirements (below) are considered to have the following knowledge, skills and abilities (KSAs):

Knowledge Requirements as applicable for assigned tasks:

1. Knowledge of machines and tools, including their designs, uses, benefits, repair, and maintenance.
2. Knowledge of electric circuit boards, processors, chips, and computer hardware and software, including applications and programming.
3. Knowledge of equipment, tools, mechanical devices, and their uses to produce motion, light, power, technology, and other applications.
4. Knowledge of numbers, their operations, and interrelationships including arithmetic, algebra, geometry, calculus, statistics, and their applications.
5. Knowledge of design techniques, principles, tools and instruments involved in the production and use of precision technical plans, blueprints, drawings, and models.
6. Knowledge of electric theory and applications.

Skills Requirements as applicable for assigned tasks:

1. Repairing machines or systems using the needed tools.
2. Using scientific methods to solve problems.
3. Conducting tests to determine whether equipment, software, or procedures are operating as expected.
4. Determining what is causing an operating error and deciding what to do about it.
5. Watching gauges, dials, or other indicators to make sure a machine is working properly.
6. Determining the kind of tools and equipment needed to do a job.
7. Using mathematics to solve problems.
8. Installing equipment, machines, wiring, or programs to meet specifications.
9. Identifying the nature of problems.
10. Generating or adapting equipment and technology to serve user needs.
11. Inspecting and evaluating the quality of products.

12. Controlling operations of equipment or systems.
13. Using logic and analysis to identify the strengths and weaknesses of different approaches.
14. Performing routine maintenance and determining when and what kind of maintenance is needed.
15. Understanding written sentences and paragraphs in work related documents.

Ability Requirements as applicable for assigned tasks:

1. Inspect gauges, meters, and indicators to detect abnormal fluctuations or defects.
2. Test accuracy of meters, gauges, indicators, or other recording or controlling instruments to locate defective components and for conformance to standards.
3. Calculate adjust and calibrate instruments or scales, using hand tools, computer, or electronic devices.
4. Trace out and test electronic solid state components to locate defective parts, using test equipment, schematics, and manuals.
5. Install scales, equipment, or instruments, using blueprints and diagrams.
6. Adjust scales, gears, equipment, or fit of parts.
7. Disassemble malfunctioning instrument and repair or replace damaged or worn parts, using hand tools and power tools
8. Reassemble instrument or equipment, adjust parts, and replace components in the system.
9. Clean and lubricate part and instrument.
10. Cut or fabricate replacement parts for instruments.
11. Maintain record of repairs, calibration, test results, parts and components used, and inventory.
12. Prepare schematic drawings, sketches, or reports to demonstrate changes or alterations made in instruments or system.

Basic Experience Requirements:

The responsible company shall document and ensure that all Instrument Specialists are trained and qualified. Instrument Specialists shall meet one of the following criteria:

1. Completion of a technical school and a minimum of three years of industry experience.
2. Completion of an apprenticeship program with 8,100 documented hours in a recognized apprentice program and a minimum of three years of industry experience.
3. Five Years Industry experience in related responsibilities/job requirements.

4. Equivalent experience (e.g., military, industry) may be substituted for the 8,100 documented hours or any other industry experience requirements.
5. Hanford instrument specialists who are not trained and qualified via a trade school program or equivalent military experience are qualified to perform specific tasks through demonstrating knowledge, skills, and abilities relevant to their assigned duties.

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APPENDIX C: BASIC KNOWLEDGE, SKILLS, AND ABILITIES (KSAs) FOR ELECTRICIANS

A general journey-level electrician is a qualified person who installs and repairs electrical systems, apparatus, electronic, and electrical components of industrial machinery and equipment. They follow electrical code, manuals, schematic diagrams, blueprints, and other specifications while using hand tools, power tools, electrical and electronic test equipment to perform maintenance and repair on electrical equipment where they are exposed to unguarded electrical hazards. Through training and experience, the general journey-level electrician is considered to have the following knowledge, skills and abilities (KSAs):

Knowledge Requirements as applicable for assigned tasks:

1. Knowledge of design techniques, principles, tools and instruments involved in the production and use of precision technical plans, blueprints, drawings, and models.
2. Knowledge of equipment, tools, mechanical devices, and their uses to produce motion, light, power, technology, and other applications.
3. Knowledge of electric circuit boards, processors, chips, and computer hardware and software, including applications and programming.
4. Knowledge of materials, methods, and the appropriate tools to construct objects, structures, and buildings.
5. Knowledge of electric theory and applications.
6. Knowledge of machines and tools, including their designs, uses, benefits, repair, and maintenance.

Skills Requirements as applicable for assigned tasks:

1. Repairing machines or systems using the needed tools
2. Determining what is causing an operating error and deciding what to do about it
3. Installing equipment, machines, wiring, or programs to meet specifications
4. Performing routine maintenance and determining when and what kind of maintenance is needed
5. Inspecting and evaluating the quality of products
6. Conducting tests to determine whether equipment, software, or procedures are operating as expected
7. Determining the kind of tools and equipment needed to do a job
8. Identifying the nature of problems
9. Using mathematics to solve problems

10. Understanding written sentences and paragraphs in work related documents

Ability Requirements as applicable for assigned tasks:

1. Install electrical wiring, equipment, apparatus, and fixtures, using hand tools and power tools.
2. Maintain and repair or replace wiring, equipment and fixtures, using hand tools.
3. Plan layout and install electrical wiring, equipment and fixtures consistent with specifications and applicable electrical and construction codes.
4. Inspect systems and electrical parts to detect hazards, defects, and need for adjustments or repair.
5. Tests electrical systems and continuity of circuits in electrical wiring, equipment, and fixtures, using testing devices.
6. Diagnose malfunctioning systems, apparatus, and components, using test equipment and hand tools.
7. Ready and assemble electrical wiring, equipment and fixtures, using specifications and hand tools.
8. Prepare sketches of location of wiring and equipment or follows blueprints to determine location of equipment and conformance to safety codes.
9. Climb ladder to install, maintain or repair electrical wiring, equipment and fixtures.
10. Construct and fabricate parts, using hand tools and specifications.

Basic Experience Requirements:

The responsible company shall document and ensure that all Electricians are trained and qualified. Electricians shall meet one of the following criteria:

1. Possession of a general journey-level license, such as WAC EL01 or equivalent licenses from other states.
2. Completed 8,000 documented hours of electrical on-the-job training under the supervision of a journey-level electrician in light industrial, commercial, or construction and a minimum of 720 hours of classroom training.
3. Verified electrical experience (e.g., military, other State) may be substituted for a portion of the 8,000 documented hours and 720 hours of classroom training requirements.

APPENDIX D: LABELS AND TAGS

FIGURE D-1: AHJ APPROVAL FOR NON-NRTL EQUIPMENT LABELS

AHJ APPROVAL FOR NON-NRTL EQUIPMENT

AHJ Report No.: _____

Manufacturer: _____

Serial No.: _____

Evaluated By: (print/sign) Date:

BL-6004-154 (REV 2)

FIGURE D-2: FIELD-ASSEMBLED EXTENSION CORD LABEL

Company _____

Max ____ Amps Max ____ Watts

Suitable for outdoor use Yes No

FIGURE D-3: QUARTERLY INSPECTION TAG EXAMPLE



TABLE D-1: QUARTERLY INSPECTION TAG

Quarter	Months
First	January, February, March
Second	April, May, June
Third	July, August, September
Fourth	October, November, December

FIGURE D-4: INCIDENT ENERGY LABEL EXAMPLES

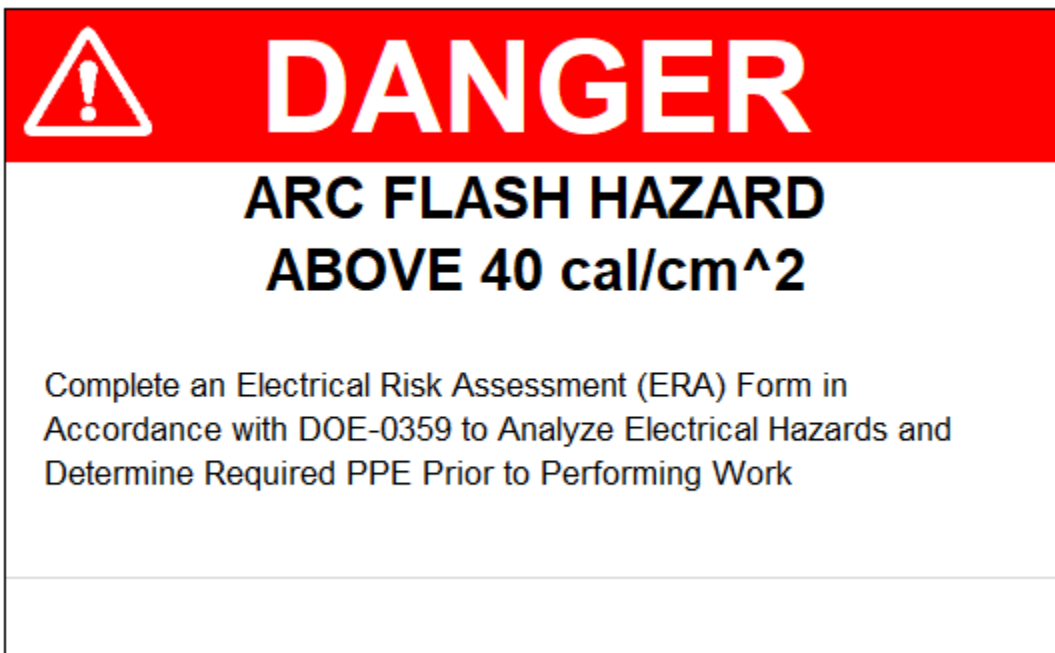
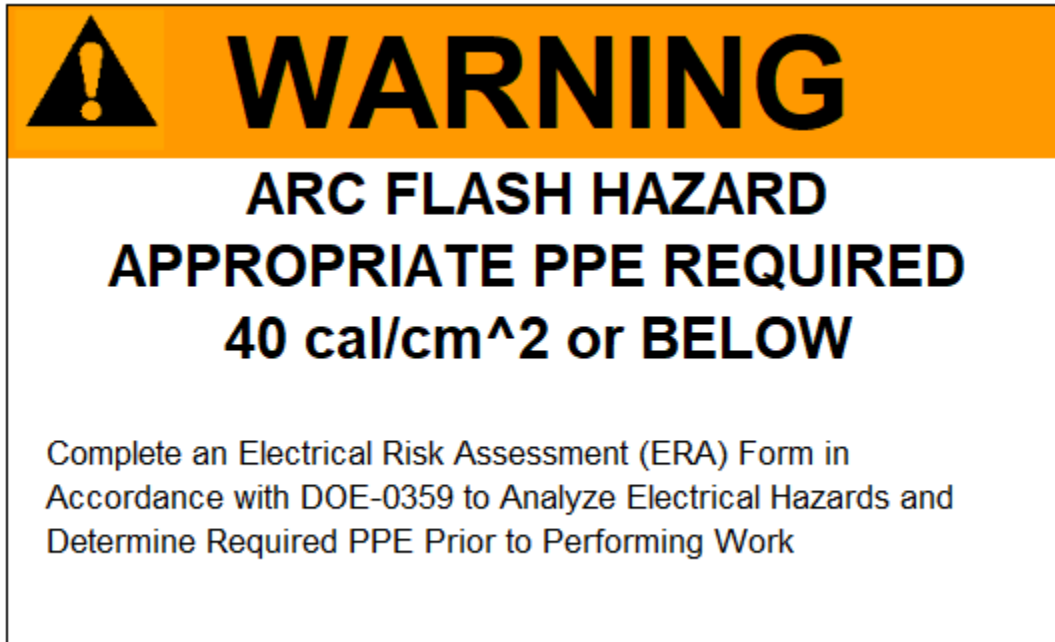



FIGURE D-4: INCIDENT ENERGY LABEL EXAMPLES
(CONTINUED)

	
WARNING	
ARC FLASH HAZARD	
APPROPRIATE PPE REQUIRED	
	<ol style="list-style-type: none">1. Voltage:2. Arc Flash Boundary:3. At least one of the following:<ul style="list-style-type: none">• Available incident energy and working distance, or the Arc Flash PPE Category for the equipment• Minimum arc rating of clothing• Site-specific level of PPE


	
DANGER	
ARC FLASH HAZARD	
ABOVE 40 cal/cm²	
	<ol style="list-style-type: none">1. Voltage:2. Arc Flash Boundary:3. At least one of the following:<ul style="list-style-type: none">• Available incident energy and working distance, or the Arc Flash PPE Category for the equipment• Minimum arc rating of clothing• Site-specific level of PPE

FIGURE D-5: NATIONAL ELECTRICAL CODE (NEC) INSPECTION LABELS

NEC EQUIPMENT INSPECTION

Authorization No. _____

Certification of Approval of Electrical Equipment
to be Energized.

Authorized Inspector Signature/Date

BL-6003-435 (REV 1)

NEC SERVICE INSPECTION

Authorization No. _____

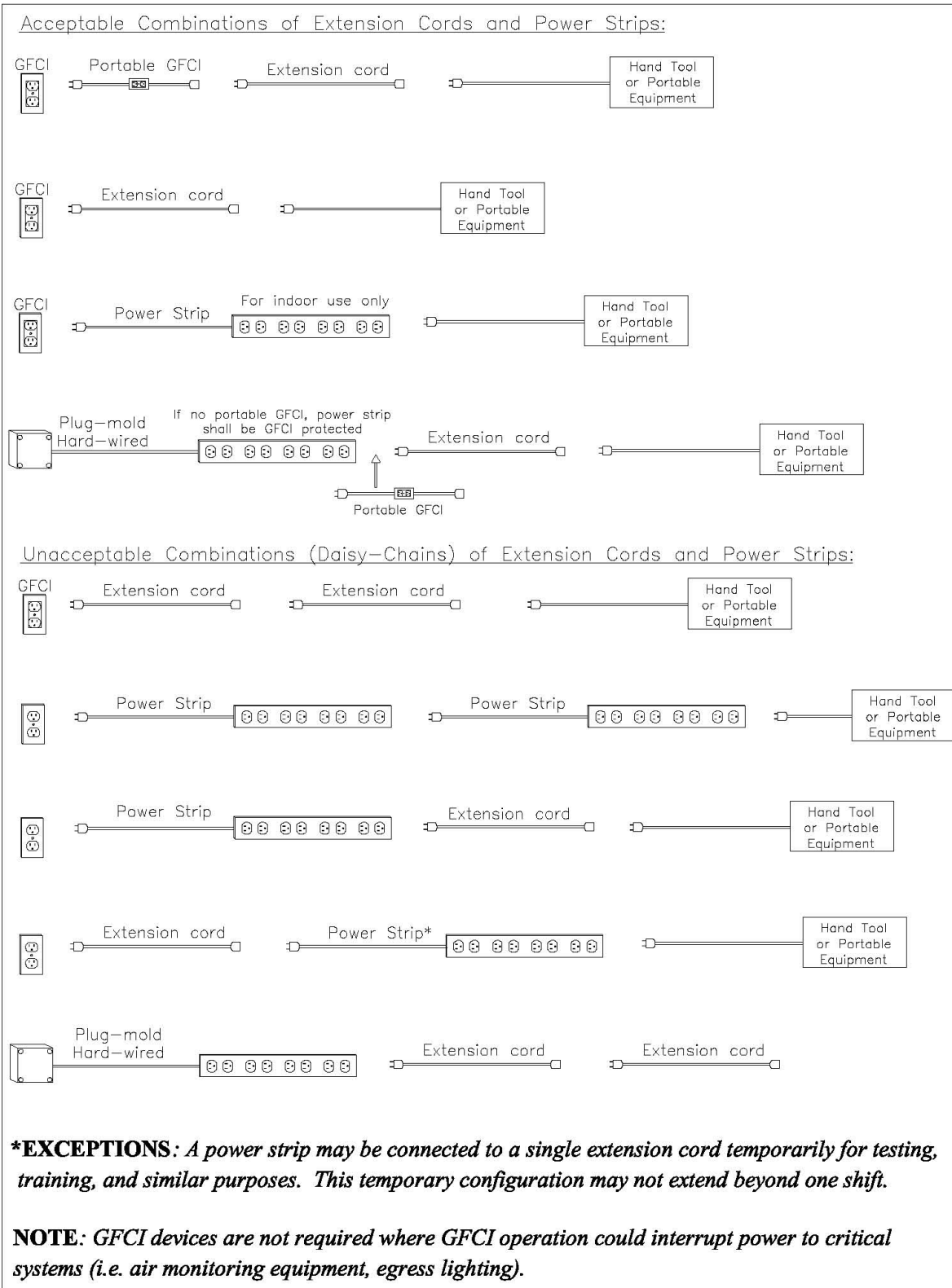
Certification of Approval of Electrical Service
to be Energized.

Authorized Inspector Signature/Date

BL-6002-745 (REV 1)

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APPENDIX E: ACCEPTABLE AND UNACCEPTABLE COMBINATIONS OF EXTENSION CORDS AND POWER STRIPS



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**ATTACHMENT 1: HANFORD SITE ELECTRICAL SAFETY PROGRAM (HSESP)
COMMITTEE CHARTER, REV. 2**

**HANFORD SITE ELECTRICAL SAFETY PROGRAM (HSESP)
COMMITTEE CHARTER, Rev. 2**

The Hanford Site Electrical Safety Program (HSESP) Committee is established to serve as the group providing consensus direction for the consistent administration and implementation of the HSESP, herein called the Program. The participating contractors and organizations are responsible for appointing representatives to the committee.

The Department of Energy Hanford Field Office (DOE-HFO) and affected Contractors acknowledge that a joint committee provides the best approach for implementing a consistent, effective, and compliant interpretation of requirements for the Program. The parties agree to cooperate in a teambuilding manner to ensure that the full intent of the Program is met and will be responsibly carried out by their respective organizations.

1.0 Mission

The mission of the HSESP Committee is to ensure consistent and standard application of the Program to promote and maintain a safe work environment. The Committee will achieve this consistent approach through sharing best practices, lessons learned, and taking advice and receiving input from the Hanford Workplace Electrical Safety Board (HWESB) and the Hanford Electrical Codes Board (HECB).

2.0 Committee Structure/Membership/Qualification

The Committee shall be comprised of two primary representatives each from the following prime contractors to the DOE at Hanford:

- 222-S Laboratory Contract
- Central Plateau Cleanup Contract (CPCC)
- Hanford Mission Essential Services Contract (HMESC)
- Integrated Tank Disposition Contract (ITDC)

One representative shall be the contractor's Technical Representative for the HSESP Program as determined by their contractor; the second representative shall be a Hanford Atomic Metal Trades Council (HAMTC) representative (as appointed by the HAMTC President or delegate).

In addition, one representative each from the following organizations shall be appointed to serve on the Committee:

- Central Washington Building and Construction Trades Council (CWB & CTC)
(as approved by the Union President or delegate)
- HAMTC
- Electrical Utilities (EU)

These representatives comprise the consensus decision-making membership. An alternate member shall be identified to serve during any absence of a primary representative. The alternate shall have the same authority as the primary representative in their absence.

A representative from Volpentest HAMMER Training and Education Center, Training Department (HAMMER) shall attend meetings as an advisory member to address matters pertaining to training. A representative of the Hanford Hoisting and Rigging Committee shall be invited to participate at each meeting as an advisory member.

A Committee member's length of duty may be indeterminate.

**HANFORD SITE ELECTRICAL SAFETY PROGRAM (HSESP)
COMMITTEE CHARTER, Rev. 2**

A chair and co-chair shall be elected by a simple majority of the voting membership of the Committee every two years. The chair and co-chair may be re-elected to their respective positions.

Meetings shall be open to others to observe and to give their organizations' impact, perspectives, and technical advice for consideration of the Committee; however, participation in consensus decisions resides solely with the Committee members described herein. The Committee has the authority to develop sub-committees and invite ad hoc participants as needed.

Representatives of DOE-HFO shall be invited to participate at each meeting as advisory members.

The HMESC shall provide a recording secretary for the Committee. The recording secretary is a position that provides administrative support to the chairperson. A facilitator shall be provided by the HMESC as requested by the Committee.

3.0 Functions of the HSESP Committee

The functions of the Committee shall be:

- Elect a chair and co-chair
- Assist the HMESC with the maintenance of the written Program
- Communicate and submit Program changes to DOE-HFO through the HMESC
- Maintain the Committee charter and review annually
- Review and verify that training is consistent and appropriately covers the content of the Program
- Develop lines of inquiry for contractor use during independent assessments
- Evaluate trends in performance and recommend actions for improvement
- Review electrical safety related events, issues, and lessons learned as appropriate
- Share electrical events or trends across the DOE Complex; compare Hanford to other sites in the DOE Complex
- Ensure distribution of lessons learned as necessary

**HANFORD SITE ELECTRICAL SAFETY PROGRAM (HSESP)
COMMITTEE CHARTER, Rev. 2**

- Maintain communication with the contractor working level committees and collaborate to resolve worker level issues, concerns, or events in a way that maintains site-wide consistency
 - Since the core function of a Site-Wide Safety Program is “worker protection,” it is imperative to have a structure that fosters and encourages input and feedback from the working level. Affected contractors will convene/attend a working level committee to discuss issues, concerns, or events that occur in the area of electrical safety within their organizations. These working level committees shall include equal representation of bargaining unit (as appointed by the bargaining unit president or delegate) and non-bargaining unit employees and ensure good communication up through each group’s representative(s) on the HSESP Committee.
- Evaluate and recommend resolution for issues/disputes pertaining to the Program
 - Issues shall not include any actions regarding applicable Collective Bargaining Agreements
- Recommend topics/information for communication to the workforce
- Provide Program status to the Senior Management Team (SMT) and DOE-HFO management when requested
- Maintain a current website on electrical safety for site-wide use
- Review and approve compliance guides developed by the HWESB and HECB

4.0 Roles and Responsibilities

4.1 Chair Roles and Responsibilities

- Schedule and conduct meetings
- Facilitate meetings in an orderly fashion
- Limit disruptions
- Ensure meeting agendas are prepared
- Ensure meeting summaries are documented
- Function as a point of contact and spokesperson for the Committee
- Interface with other site-wide safety program committees as necessary
- Ensure an action item list is maintained and members complete their assignments in a timely manner
- Coordinate assignments of sub-committee(s)
- Communicate with the SMT as needed

**HANFORD SITE ELECTRICAL SAFETY PROGRAM (HSESP)
COMMITTEE CHARTER, Rev. 2**

4.2 Co-Chair Roles and Responsibilities

- Act as the Chair when the Chair is absent
- Perform roles and responsibilities as delegated by the Chair

4.3 Member Roles and Responsibilities

- Provide the chairperson with the identity of an alternate Committee member who is designated as the organizational representative
- Attend and participate in meetings when scheduled or notify their alternate when unable to attend
 - Alternates are responsible to attend and participate in meetings when the primary cannot attend
 - If the primary and alternate are both unable to attend, the Chair shall be notified
- Foster communication between the Committee and affected organizations relative to issue identification, interpretations, and consensus resolution
- Maintain lines of communications between management, workers, and the HSESP Committee
- Assist management and safety personnel with electrical safety questions, assessments, incident investigations, critiques, fact finding meetings, and other electrical safety issues
- Distribute meeting summaries and other electrical safety information throughout represented project or contractor facilities. Provide printed copies to personnel who may not routinely use e-mail
- Communicate regularly with craft workers, supervisors, safety professionals, and management regarding electrical safety issues, concerns, and lessons learned
- Ensure that electrical safety questions, concerns, and requests for interpretations are brought to the appropriate technical board for discussion and resolution
- Promotes and coordinates electrical safety initiatives within the company
- Maintain a safety and requirements focus when addressing issues; avoid facility, craft, job function, or contractor biases when participating in discussions.
- Maintain current knowledge of the requirements of the Program
- Maintain working knowledge of appropriate electrical safety codes, standards, and procedures
- Attend periodic meetings of the Hanford Electrical Code Board (HECB) and/or Hanford Workplace Electrical Safety Board (HWESB)
- Research agenda topics in preparation for HECB and HWESB meeting discussions
- Participate in issue discussions representing respective organization

**HANFORD SITE ELECTRICAL SAFETY PROGRAM (HSESP)
COMMITTEE CHARTER, Rev. 2**

- Bring up issues or speak in discussions only after being recognized by the chairperson
- Listen respectfully and refrain from interrupting others
- Refrain from disruptive side conversations

5.0 Meetings

The Committee shall:

- Meet regularly as necessary, but no less than quarterly, via scheduled meetings
- Hold special meetings to address urgent or emerging issues
- Record and retain meeting minutes and action items, and distribute to the membership, alternates, and DOE-HFO
- Document and maintain record copies of decisions

6.0 Meeting Agenda

- The chairperson shall ensure an agenda is prepared for each meeting, using input from the membership, and forward a copy to all members, alternates, and DOE-HFO in advance of the meeting time and date
- Action items shall be assigned and tracked

7.0 Quorum

The Committee shall be considered to have a quorum when all Committee members, or their alternates, are present. Failure to reach consensus will be cause for an issue to elevate into a secondary phase of discussion and comment.

8.0 Secondary Phase of Discussion and Issue Resolution

Matters not agreed upon by the Committee through the initial consensus process shall be elevated to the secondary phase of discussion. If consensus cannot be reached by the Committee, the issue may be elevated to the SMT and/or DOE-HFO. The SMT shall provide a status of their resolution process to the Committee at scheduled meetings.

Hanford Site Electrical Safety Program (HSESP)

Published Date: 03-16-2026

Effective Date: 04-13-2026

HANFORD SITE ELECTRICAL SAFETY PROGRAM (HSESP)
COMMITTEE CHARTER, Rev. 2

ROBERT WILKINSON (Affiliate)
Digitally signed by ROBERT WILKINSON (Affiliate)
Date: 2025.05.19 05:16:13 -07'00'
Bob Wilkinson
President & Project Manager
Central Plateau Cleanup Company

RAYMOND GEIMER (Affiliate)
Digitally signed by RAYMOND GEIMER (Affiliate)
Date: 2025.05.19 09:44:07 -07'00'
Ray Geimer
General Manager
Navarro-ATL

AMY BASCHE (Affiliate)
Digitally signed by AMY BASCHE (Affiliate)
Date: 2025.05.15 12:20:04 -07'00'
Amy Basche
President & General Manager
Hanford Mission Integration Solutions

Phil Breidenbach
Digitally signed by Phil Breidenbach
Date: 2025.05.28 06:43:17 -07'00'
Carol Johnson
President & Program Manager
Hanford Tank Waste Operations & Closure


6-2-2025
Jeff McDaniel
President
Hanford Atomic Metal Trades Council

Nickolas A. Bumpaous
Digitally signed by Nickolas A. Bumpaous
DN: C=US, E=president@cwbcctc.org,
O=CWB&CTC, CN=Nickolas A. Bumpaous
Date: 2025.05.29 08:20:40-07'00'
Nickolas Bumpaous
President
Central Washington Building &
Construction Trades Council