

BONNEVILLE POWER ADMINISTRATION

Contractor Safety and Health Requirements for Prime and Subcontractors (CSHRPS)



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DOCUMENT TABLE

Template Description	Link
Safety Plan (SP) Template	Link
Safety Plan (SP) Template (Abbreviated)	Link
Fall Protection Plan Template	Link
Standard Lift Plan	Link
Critical Lift Plan	Link
Excavation and Trenching Plan Template	Link
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CHAPTER 1 – GENERAL REQUIREMENTS [AS APPLICABLE]

1. INTRODUCTION

The Contractor Safety and Health Requirements for Prime and Subcontractor's (CSHRPS) provides the safety and occupational health requirements for contracted work administered on behalf of the Bonneville Power Administrations (BPA).

The Contractor will furnish to each employee a workplace that is free from recognized hazards that are causing or likely to cause death or serious physical harm. The Contractor will comply with the regulations promulgated under the Occupational Safety and Health Act (OSHA) of 1970.

All Federal and State safety and health rules and regulations applicable to the contract work, as supplemented by BPA Work Standards, manufacturer instructions, and safety and health requirements stated below or elsewhere in the contract will be followed. Where more stringent safety and occupational health standards are set forth in these requirements, the more stringent will apply.

2. REFERENCES

- 2.1 Department of Labor Safety and Health Standards for Construction under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 et seq.);
- 2.2 [29 CFR 1926](#), Occupational Safety and Health Standards for Construction or equivalent OSHA State plan standards; and
- 2.3 [29 CFR 1910](#), Occupational Safety and Health Standards for General Industry or equivalent OSHA State plan standards.

3. PURPOSE

The purpose of the Contractor Safety and Health Requirements for Primes and Subcontractors (CSHRPS) is to ensure contracted work efforts assess, identify, control, and mitigate workplace hazards. Hazards are identified, assessed and control measures applied by following the traditional hierarchy of control; seek through elimination, engineering controls, and/or administrative controls and the issuance of Personal Protective Equipment (PPE), ensure a safe and healthful work environment to the workforce.

4. SCOPE

This document applies to contracts containing Bonneville Purchasing Instruction (BPI [15-13](#)), Contractor Safety and Health Requirements. Chapter 1, General Requirements apply to ALL work. Chapters 2 through 5 are specific to the nature of the work.

5. NOTIFICATION OF IMMINENT DANGER AND WORKERS RIGHT TO DECLINE WORK (BPA [15-12](#))

All workers, including contractors and Bonneville employees, are responsible for identifying and notifying other workers in the affected area of imminent danger at the site of work. Imminent danger is any condition or practice that poses a danger that could reasonably be expected to cause death or severe physical hardship before the imminence of such danger could be eliminated through normal procedures.

- 5.1 A contract worker has the right to ask, without reprisal, their onsite management and other workers to review safe work procedures and consider other alternatives before proceeding with a work procedure. Reprisal means any action taken against an employee in response to, or in revenge for, the employee having raised, in good faith, reasonable concerns about a safety and health aspect of the work required by the contract.

- 5.2 A contract worker has the right to decline to perform tasks, without reprisal, that will endanger the safety and health of themselves or of other workers.
- 5.3 The Contractor will establish procedures that allow workers to cease or decline work that may threaten the safety and health of the worker or other workers.

6. INCIDENT REPORTING/INVESTIGATION PROCESS ([1904.39](#))

All incidents and near-hits are reportable and will be communicated as they relate to; contract-related work, operations, or facilities for which this document is applicable and will be immediately reported to the Employer and/or the Supervisor.

- 6.1 For the purposes of this document, BPA defines Incident and Near Hit as:
 - 6.1.1 Incident. An unplanned event that results in or may have resulted in an injury or damage to property and suggests the failure of the Safety Management System.
 - 6.1.2 Near Hit. Incidents where no personal injury was sustained, but where, given a slight shift in time or position, an injury easily could have occurred.
- 6.2 The Contractor is responsible for reporting all incidents and near-hits to the Contracting Officer (CO), Contracting Officer's Representative (COR) and BPA Safety Organization within 24 hours. No Contractor may decline to accept a report of an incident from a subordinate.

Note: As discussed in the Electrical Contact protocol below, any incident involving electrical contact requires immediate communication to the Substation Operator or Dispatcher to ensure de-energization of the circuit.

- 6.3 For all Non-OSHA recordable incidents and near-hits, the Contractor will complete and file with the CO and COR, [BPA Form 6410.18e](#), Contractor's Report of Incident/Near-Hit within 5 calendar days of such an occurrence. The Contractor will submit applicable photographs and witness statements.
- 6.4 For all OSHA recordable incidents the Contractor will complete and file with the CO and COR, [BPA Form 6410.15e](#), Contractor's Report of Personal Injury, Illness or Property Damage Incident within 5 days of such an occurrence. The Contractor will submit applicable photographs and witness statements.
- 6.5 Any incident that has, or appears to have, any of the consequences listed below in subparagraph 6.6 will be reported within 1-hour of occurrence to the CO and COR. The report will then be assigned to a BPA Safety Manager for further action.
- 6.6 The below listed incidents will be investigated in-depth by both the Contractor and BPA in accordance with the OSHA requirements identified in 29 CFR 1960.29, Accident Investigation and in accordance with BPA guidance.

Investigations are conducted for the purpose of identifying direct and indirect causal factors and to recommend hazard control measures.

- 6.6.1 Fatality;
- 6.6.2 Permanent Total disabling injury/illness;
- 6.6.3 Permanent Partial disabling injury/illness;
- 6.6.4 One (1) or more persons hospitalized as inpatients as a result of a single occurrence;
- 6.6.5 Three (3) or more individuals become ill or have a medical condition that is suspected to be related to a site condition, or a hazardous or toxic agent on the site; or
- 6.6.6 BPA or Contractor aircraft missing or destroyed.
- 6.7 Contractors are responsible for notifying OSHA in accordance with [29 CFR 1904.39](#) within eight (8) hours when their employee(s) are fatally injured or one (1) or more persons are hospitalized as inpatients as a result of a single occurrence.
- 6.8 The Contractor is required to cooperatively work with BPA with respects to scene securement, access to records/files, and employees during the IA process. The Contractors accident report and BPA Incident Assessment Team (IAT) report will be due to the COR within 45 calendar days from the date of the incident.
- 6.9 Any incident type listed in paragraph 6.5 above, the Contractor will perform the following actions to support BPA's IAT:
 - 6.9.1 All workers will immediately stand-down and work will cease at the site;
 - 6.9.2 The Contractor will secure the scene from any changes until released, in writing, by the CO in consultation with the BPA Safety Organization;
 - 6.9.3 Ensure all witness statements are gathered and provided to the IAT upon request;
 - 6.9.4 The Contractor and their workers, and subcontractors, will fully cooperate with the IAT;
 - 6.9.5 Provide all worker training records and logs, within 5 business days of request;
 - 6.9.6 Provide a summary of any medical injuries, and any additional information on the workers' physical capabilities/readiness level to perform work.

7. DEVIATIONS

No contractor may deviate from the requirements associated with the CSHRPS without prior written approval from the BPA contracting office.

Proposed deviations to any part of the CSHRPS requirements will be submitted to the contracting office for BPA review and approval. Any considered deviation must provide an equal or greater level of protection and be substantiated with a Job Hazard Analysis (JHA) of the activity. Bonneville reserves the right to deny any deviations without explanation or cause.

8. SAFETY MANAGEMENT SYSTEMS (SMS)

Contractors will incorporate the tenets of a safety managements system, a collection of integrated management processes that is used to manage the control of risks associated with contractor management on an ongoing, real-time basis. For additional information, see American National Standards Institute (ANS) standard Z10.0, Occupational Health & Safety Management Systems.

9. SAFETY PLANS

Prior to the start of work, the Contractor will have prepared, BPA will have reviewed and accepted, and Contractor will implement the written Safety Plan (SP) for each contract or task order. All SPs will utilize the BPA-approved SP Template. Link to the Safety Plan template is found [here](#).

- 9.1 Based on the hazards and risks associated with the contract or task order, BPA may determine that an Abbreviated Safety Plan is acceptable.
- 9.2 The CO will notify the Contractor if the Abbreviated SP is an acceptable alternative for the contract or task order. Link to the abbreviated Safety Plan template is found [here](#).
- 9.3 The Contractor's written SP be submitted to BPA. The SP must have a completed review with no exception prior to mobilization. BPA will have 10 business days to review and respond. If the BPA Safety Organization determines the SP to be insufficient, they may stop the contractor's right to start any or all of the on-site work.
- 9.4 If BPA requests that the SP be revised and resubmitted following review, the revised portions will be highlighted or indicated with track changes when resubmitted. The BPA will have 3 business days to review and respond to the Contractor's revisions to the SP.
- 9.5 The Contractor will make the SP available to all workers at the job site. The SP will posted at the job site for the duration of the work. All workers must be familiar with its content. The SP will be available to BPA upon request.
- 9.6 The Contractor will ensure that their subcontractors, suppliers, and support personnel follow all safety and health requirements and that all personnel working on the project are knowledgeable of the content in the SP.
- 9.7 The Contractor will monitor applicability and update the SP onsite when/as conditions change and a final version provided to the COR during closeout.
- 9.8 Job Hazard Analysis ([OSHA 3071 – JHA](#)). BPA's Safety Plan template requires the Contractor to submit a detailed Safety Plan (SP). Contractors can use a formal JHA, JSA, AHA or other hazard analysis tool for job planning.

9.9 Emergency Communications. Contractor shall ensure all contract personnel are aware of BPA building and facility evacuation routes and procedures posted in common areas of the building.

9.9.1 The Contractor will ensure that field supervision maintains a reliable method of emergency communications from all right-of-way work areas in the event of accident or illness.

9.9.2 The Contractor will ensure that field supervision maintains reliable communications at all times with the BPA Clearance Holder when working under the protection of a Clearance or Hold Order.

10. EMERGENCY ACTION PLANNING ([1926.35](#))

As part of the SP submittal, Emergency Action Plans (EAP) are required. The emergency action plan will be in writing, kept at the workplace, and available to employees for their review. The plan will address those designated actions employers and employees will take to ensure employee safety from fire and other emergencies.

10.1 The Contractor will identify procedures for reporting a fire or other emergency, locate and provide directions to the nearest emergency medical facilities, identification of evacuation routes, assembly areas, and a procedure for accounting for all employees. This will include phone numbers for emergency services in the area.

10.2 BPA facilities have developed and maintain an Occupant Emergency Plan (OEP). Each occupant, including Contractors and Subcontractor(s) must be familiar with the OEP for their respective workplace.

11. PERSONAL PROTECTIVE EQUIPMENT [PPE] ([1926.28](#), [1926.95](#))

The Contractor is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions or where the need for using such equipment to reduce hazards to the employees.

11.1 Personal protective equipment for eyes, face, head, and extremities, protective clothing including reflective vests, respiratory devices, and protective shields and barriers, must be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of the hazard assessment process.

11.2 Yellow hard hats with company logo are restricted to workers who hold a BPA Qualified Electrical Worker Permit.

11.3 Qualified Line Clearance Tree Trimmers (QLCTT) will wear red hard hats.

11.4 All others will wear white hard hats.

11.5 Appropriate footwear that provides adequate support and protection to the foot, toes and ankles for the work being performed will be worn. Lace-up, over the ankle boots with rigid sole and heel meeting ASTM F-2413 with an EH rating will be worn in all work areas where

hard hats are required. Supervisors have the responsibility for ensuring that appropriate footwear is worn.

11.6 While BPA's minimum qualifications for protective footwear are identified above, specialized footwear, in accordance with standard industry practice and appropriate for the work being performed, will be worn at all times while executing the work tasks requiring specialized Personal Protective Equipment (PPE). Supervisors and workers have the responsibility of ensuring appropriate footwear is worn.

11.7 All workers performing the following work, or working in the following areas, of a substation will wear dielectric boots:

11.7.1 Contacting the ground grid;

11.7.2 Work in areas with standing water above the yard rock; and

11.7.3 Work in areas without yard rock when subgrade is wet and muddy, or it is raining.

11.8 Dielectric gloves are recommended if the ground grid will be repeatedly touched.

11.9 Reflective safety vests will be worn by all employees on the job site. The vests will be FR compliant, ANSI 107 FR, and Class 2 compliant.

11.10 While operating ATV's/UTV's, the Contractor will ensure that workers operating this equipment are properly trained and qualified if required, for the specific ATV/UTV. At a minimum, workers operating an ATV will wear a DOT approved helmet and protective eyewear, safety boots and gloves. State requirements for ATV/UTV operations will also be met, as applicable.

12. FATIGUE MANAGEMENT

For general construction activities, the Contractor will notify the COR should onsite activities require work beyond the standard 50-hour work week. A Fatigue Management Plan (FMP) will be completed by the Contractor as part of the SP whenever work hours:

12.1 Exceed 50-hours in a 7-day work week; or

12.2 Exceed 12-hours a day for more than 3 consecutive days.

12.3 Operators of equipment such as Load Handling Equipment (LHE), mobile construction equipment, electrical power systems, hydraulically operated equipment, and boats, will not be permitted to exceed 12-hours of duty time in a 24-hour period.

12.4 Operators of motor vehicles, while on duty, will not operate vehicles for a continuous period of more than 10-hours in any 24-hour period in accordance with Department of Transportation guidance. A minimum of 8 consecutive hours will be provided for rest in any 24-hour period.

12.5 The FMP will identify affected workers, management responsibility, training, and controls established at the work site:

12.5.1 Training will include symptoms of fatigue, habits and actions the worker may take to avoid fatigue, actions workers should take if they observe fatigue in a co-worker, and controls in place to prevent fatigue.

12.5.2 Controls for fatigue will include a discussion of driving to and from work and any possible mitigation of driving as a factor of fatigue.

12.5.3 Controls for fatigue may include work scheduling (limit number of consecutive night shifts), rotating jobs to prevent repetitive work, breaks at critical times in the work cycle, control of environmental factors (heat, cold, use of personal protective equipment), buddy check-in for individuals working alone, and alternate transportation for long commutes.

13. ELECTRICAL CONTACT PROTOCOL

BPA recognizes that electrical hazards in the workplace pose a significant risk of injury or death to employees. The requirements in this document support contractors responsibilities to be familiar with any OSHA, National Fire Protection Association (NFPA 70E), and National Electric Code (NEC) requirements to provide protection from electrical hazards in the workplace.

In cooperation with the four Regional Burn Centers located in the BPA operating area, the BPA Safety Organization has established a Sulfur Hexafluoride (SF₆) protocol to ensure that injured employees receive the best possible medical response to a SF₆ gas incident. Under arced conditions, the gas is known to convert from its pure state into hazardous arc byproducts. These arc byproducts are toxic and corrosive and may cause chemical burns and pulmonary edema. This information is provided because the employee could have been exposed to these hazardous arc byproducts and the Safety Data Sheet (SDS) for pure SF₆ gas may not address these potential exposure concerns.

13.1 Electrical contact is defined as any current flow through or across the employee's body or if any of the following is true:

13.1.1 Burns or wounds;

13.1.2 Interrupted or impaired breathing;

13.1.3 The employee is not able to let go of a circuit or equipment;

13.1.4 Any neurological problems, including but not limited to tremors, shaking, numbness, difficulty balancing, difficulty walking, confusion, disorientation, speech difficulties, vision problems, bladder problems, or headache;

13.1.5 Pain lasting greater than 5 minutes.

13.2 Following any electrical contact injury immediately call 911, Emergency Medical Services (EMS) and initiate First Aid. Do not transport the injured employee, unless the accident occurred in a remote location (discussed below).

13.3 As it relates to Electrical Work only - Notify the BPA Dispatcher and inform them of the location [e.g., County, Latitude/Longitude – if known];

13.4 In case of electrical shock, the worker is advised to contact one of the Electrical Burn Centers that specialize in electrical shock accidents.

Note: Information for contacting the Poison Control Center is provided based on the health hazards associated with the use of SF₆.

13.5 Treating physicians are required to consult with the closest Regional Burn Center regarding treatment recommendation related to these types of incidents.

13.5.1 Legacy/Emanuel Medical Center, Portland, OR, Telephone: (888) 598-4232

13.5.2 Harborview Medical Center, Seattle, WA, Telephone: (888) 731-4791

13.5.3 Eastern Idaho Regional Medical Center, Burn Center, Idaho Falls, ID, (855) 863- 9595

13.5.4 Intermountain Burn Center, Salt Lake City, UT, Telephone: (801) 581-2700

13.5.5 Poison Control Center (800) 222-1222

Immediately following your assessment, please update the BPA Safety Organization at (360) 418-2397. Hours of operation: Monday – Friday, 7 a.m. to 5 p.m. Please leave a voice message after normal business hours.

13.6 Remote Location Instructions. For work conducted in remote locations:

13.6.1 Supervisors will ensure that all employees are informed of procedures for summoning emergency medical services at their work locations.

13.6.2 While awaiting medical response, employees should stabilize and care for the injured (to the extent of their First Aid training). Do not attempt to move the injured person unless they are at risk of further injury from hazards at the scene or directed to do so by medical personnel.

13.6.3 Assist EMS personnel in arriving at the accident scene. If available, a crewmember may be sent to meet EMS at a main road crossing, intersection or landmark to have medical personnel follow them to the scene.

14. LIGHTNING WORK CURTAILMENT ([1926.35](#) and [1926.1431\(k\)\(8\)](#))

As part of the Contractor's written EAP, the Contractor will address lightning safety protocols for outdoor work. The lightning safety will address:

14.1 Work will be suspended and personnel will seek a safe haven during times that local or close-in lightning is within sight or sound, and remain in the clear for thirty minutes after the last flash of lightning is seen or thunder is heard;

14.2 Employees may return to work after the Supervisor assesses the work environment and deems that it is safe to do so.

14.3 For LHE operations, specifically as it relates to hoisting personnel, the Contractor will identify and address all environmental conditions including indications of dangerous weather conditions and determine if it safe for operations to continue.

15. LASER and FIBER OPTICS (1926.54)

As part of the non-ionizing standard, fiber optic safety can pose a considerable health risk to potentially exposed workers if the work task and/or workers are not properly controlled.

15.1 When working with fiber optics, the use of personal protective equipment is required to prevent injury. Critical to the safety when working with fiber optics, is the preparation and review of the Job Hazard Analysis. The use of Personal Protective Equipment (PPE) will be required to protect employees for the most recognizable hazard associated with fiber optic work (eye protection).

15.2 Fiber optics installation pose a risk associated with shards of fibers. These thin and very sharp fibers can puncture your skin, burying themselves deep enough to be difficult to pull out. Being transparent, they are difficult to see. In most parts of your body, they are merely a nuisance; however, infection and local irritation, must be addressed.

15.3 The use of chemicals associated with fiber optics, used to clean fiber, may require the use of hand protection. Consult Safety Data Sheets (SDS) for proper use of PPE.

16. JOB BRIEFINGS (1926.952)

As applicable to construction contracts, the Contractor will ensure that at least once per shift, work or operations to be performed during the work day or shift will be reviewed and discussed. Job briefings can significantly contribute to the prevention of accidents.

16.1 As part of their Safety Plan, the contractor will conduct and document job briefings each shift with safety as an integral part of the briefing. Copies of the job briefings and any other meeting notes will be provided to the COR or the onsite BPA representative. The notes will, at a minimum, show the date, time, and topics discussed, and attendees of each meeting, and will be retained for the duration of the project.

16.2 The job briefing will identify hazards at the job site, how said hazards will be mitigated and/or controlled and will be reflected in the SP and retained for the duration of the contract.

17. TEMPORARY TRAFFIC CONTROL (1926, Subpart G)

Where construction efforts require temporary traffic control measures, the SP will address the traffic control strategy. Where a DOT approved traffic control plan is required, a copy will be attached to the Safety Plan and will conform to the following:

17.1 The contractor is responsible to submit temporary traffic control plans to the authority having jurisdiction (e.g. State Department of Transportation) for approval. The contractor must receive approval from the authority having jurisdiction before the start of any work requiring

temporary traffic control. Guidance for the proper set-up of work zones are found in the Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD is referenced in 29 CFR 1926, Subpart G.

17.2 Flaggers will have in their possession an appropriate State certification card attesting to have completed the required training. During the day, flaggers should wear bright yellow, orange, or green clothing; and maintain the OSHA-recommended visual distance of 1,000 feet.

17.3 High-visibility apparel meeting, at a minimum the ANSI/ISEA 107, Class 3, will be worn by all flaggers.

18. BARRIERS AND GUARDS, NON-ELECTRICAL

Barriers and guards are required around all construction sites and all excavations, openings, floors or roofs, raised platforms, and for activities related to overhead work, restriction of access to defined areas and wherever it is necessary to warn employees against the potential of falling.

18.1 Environmentally contaminated areas will be guarded and identified by signage and may only be entered by persons who have been trained to protect themselves from the hazards.

19. SANITATION ([1926.25](#), [1926.51](#))

When not otherwise provided by BPA, Construction site sanitation will be provided.

19.1 Bathroom Facilities. Separate bathroom facilities are required for every 20 employees (or fewer) of each sex on a job site. Per the regulations, facilities will be provided for as follows:

Number of Employees	Number of Facilities required
20 or less	1
20 or more	1 toilet seat and 1 urinal per 40 workers
200 or more	1 toilet seat and 1 urinal per 50 workers

19.2 Drinking Water. Unless otherwise provided by BPA, the Contractor will provide an adequate supply of clean (potable) drinking water can be provided through plumbed drinking fountains or with clean portable containers.

Keys to proper implementation of these requirements are addressed in the OSHA [1926.51](#) requirements.

Note: Potable water means water that meets the standards for drinking purposes of the State or local authority having jurisdiction, or water that meets the quality standards prescribed by the U.S. Environmental Protection Agency (EPA), National Primary Drinking Water Regulations (40 CFR, Part 141).

19.3 Housekeeping. Job sites will be maintained to ensure the safety of the workplace, taking into consideration the nature of the work. Contractor housekeeping requirements are addressed in OSHA [1926.25](#).

20. SAFETY WATCHER

A Safety Watcher is a [Qualified Electrical Worker](#) who holds a BPA Electrical Worker Permit and who knows and understands the safety rules and the electrical hazards involved in specific work situations. Primarily, Safety Watchers are responsible for limiting the movement of personnel and/or equipment to prevent electrical contact incidents. They have the authority to halt the operation whenever any unsafe act or condition is Imminent.

The Contractor will utilize qualified Safety Watchers for the protection of workers and BPA facilities for the phases of the work where required by these specifications, law or regulations, or where it considers them necessary. See requirements for a [safety watcher](#) here.

21. HAZARD COMMUNICATIONS ([1926.59](#), [1910.1200](#))

Chemical hazards in the workplace can pose a wide-range of acute and long-term hazards to worker health and safety. Commonly referred to as HAZCOM, these requirements are designed to ensure that the workforce is properly informed about the chemical hazards they may encounter on the job site.

21.1 The HAZCOM requirements for the construction industry are identical to the requirements for general industry.

21.2 All employers must ensure that all workers on a job site are trained and informed, including sub-contractors and employees of other companies. The HAZCOM standard core requirements include:

21.2.1 Employers must have a written hazard communication plan that includes:

21.2.2 Information about all hazardous chemicals on the job site; and

21.2.3 A plan for controlling hazards and communicating them to all employees.

21.3 Employers must ensure that:

21.3.1 Hazardous chemicals are properly labeled and stored;

21.3.2 Safety Data Sheets (SDS) for each chemical are available to workers, maintained at the jobsite; and

21.3.3 Employees are trained on the hazards they may encounter and the proper methods for protecting themselves.

21.4 Contractors are required to develop a spill plan as part of their SP that addresses hazardous materials that are stored/used at the job site. The timely reporting of spills to the COR is critical to ensuring the BPA Project and/or District Environmental Representative may be notified. At a minimum, BPA requires the following:

21.4.1 All Contractor and Subcontractor work crews will utilize pumps, funnels, sorbents, or other spill prevention methods when dispensing or transferring chemicals and petroleum products.

21.4.2 All Contractor and Subcontractor work crews will have spill kits readily available during construction activities. Spill kits will be stocked and sized appropriately for types of spills that could occur.

21.4.3 The Contractor will provide training to employees on the type/sort of hazards employees might be required to address. The training program will address spill prevention, competencies required for different levels of response, site-specific response procedures, and management of contaminated media.

22. WALKING/WORKING SURFACES ([1926.501](#))

The employer must determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely.

22.1 Each employee on a walking/working surface (both horizontal and vertical surface) with an unprotected side or edge, which is 4 feet or more above a lower level, must be protected from falling by the use of a guardrail system, safety net system, or personal fall arrest system.

22.2 Each employee on a walking/working surface must be protected from tripping in or stepping into or through holes (including skylights) by covers.

23. FALL PROTECTION ([1926.502](#), [1926.503](#))

Employers must set up the work place to prevent employees from falling off overhead platforms, elevated work stations or into holes in the floor and walls.

BPA requires that fall protection be provided at elevations of 4 feet. In addition, OSHA requires that fall protection be provided when working over dangerous equipment and machinery, regardless of the fall distance.

23.1 The fall protection plan, submitted as part of the over-arching safety plan, must be prepared by a Qualified Person and developed specifically for the job site. A Fall Protection template is available at bpa.gov.

23.2 To prevent employees from being injured from falls, employers must:

23.2.1 Guard every floor hole into which a worker can accidentally walk (using a railing and toe-board or a floor hole cover).

23.2.2 Provide a guardrail and toe-board around every elevated open sided platform, floor or runway.

23.2.3 Regardless of height, if a worker can fall into or onto dangerous machines or equipment (such as a conveyor belt) employers must provide guardrails and toe-boards to prevent workers from falling and getting injured.

23.3 Other means of fall protection that may be required on certain jobs include safety harness and line, safety nets, stair railings and hand rails.

23.4 Contractors working at elevated locations more than 4 feet above the ground and utilizing fall protection PPE will wear an approved climbing style helmet attached with chinstrap.

23.5 Contractors working in an aerial lift or on platforms supported by lift equipment will wear approved Personal Protective Equipment (PPE) consisting of a full body harness and attached with either a self-retracting device or shock-absorbing lanyard. A means of rescue will be available to the aerial lift operator.

23.6 During work activities above 4 feet that requires fall protection PPE, Contractors will ensure that at least 2 qualified workers are present at the job site for rescue purposes. Contractors will develop a site-specific fall protection and rescue plan.

This plan must identify how workers will be protected from fall hazards. The rescue plan must identify how rescue of workers will be conducted. This includes the identification and verification of rescue service availability, rescue equipment selection, and Staging of rescue equipment and personnel.

23.7 Working Over or Near Water. Employees working over or near water, where the danger of drowning exists will wear U.S. Coast Guard-approved life jackets or buoyant work vests (e.g., rivers, piers, wharves, quay, walls, barges, watercraft, aerial lifts, crane-supported work platforms, etc.). If possible, use barriers to separate the worker from water hazard OR provide

U.S. Coast Guard approved personal flotation devices (PFD) and place ring buoys with at least 90 feet of line at each 200 feet of work area. Buoyant work vests or life preservers will be inspected for defects, which would alter their strength or buoyancy. At least one lifesaving skiff will be immediately available at locations where employees are working over or adjacent to water.

23.8 Training. The Contractor must provide a training program for each employee who might be exposed to fall hazards. The program must enable each employee to recognize the hazards of falling and will train each employee in the procedures to be followed in order to minimize these hazards.

Note. For Fall Protection, a Qualified Person is defined as – A person with a recognized degree or professional certification, having extensive, knowledge, training and experience in the fall protection and rescue field. One who is capable of designing, analyzing, evaluating and specifying fall protection and rescue systems.

24. SCAFFOLDING (1926.450 thru .452)

Critical to scaffolding safety is the requirement that Scaffolds will be designed by a Qualified Person (QP) and that a Competent Person (CP), as defined by OSHA as part of these regulations, will supervise the erection, dismantling, moving, and alteration of the scaffold system. The Contractor will ensure the following:

24.1 All scaffolding and scaffolding components will be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

24.2 All scaffolding will be equipped with toeboards, midrails, and guardrails.

24.3 All Scaffolding will be inspected daily by the designated/certified CP.

24.4 Access to scaffolding will be accomplished by way of stairwells and ladders. Climbing of the scaffolding is prohibited.

24.5 Each platform on all working levels will be fully planked or decked between the front uprights and the guardrail supports as defined in 29 CFR [1926.451\(b\)](#).

24.6 During the design/erection of scaffolding, the Contractor shall ensure the scaffolding or any part of the scaffolding system does not encroach on the MAD. See Section 47 for MAD tables.

25. POWERED PLATFORMS and AERIAL LIFTS ([1926.453](#))

An aerial lift is any vehicle-mounted device used to elevate/position personnel. Aerial lifts have replaced ladders and scaffolding on job sites due to their flexibility and mobility. They may be made of metal, fiberglass reinforced plastic, or other material.

25.1 Types of aerial lifts include, but are not limited to:

25.5.1 Extendable boom platforms,

25.5.2 Aerial ladders,

25.5.3 Articulating (jointed) boom platforms, and

25.5.4 Vertical towers.

25.2 Contractors must assess the job site to identify hazards in order to select the appropriate equipment for the task. Contractors who use aerial lifts must evaluate and implement effective controls that address fall protection, stabilization and positioning. Only trained/qualified workers will be allowed to use aerial lifts. Safe aerial lift use includes properly maintaining the equipment, following the manufacturer's instructions, providing training and PPE, and implementing safe work practices including the use of spotters for movement of the equipment.

26. MATERIALS HANDLING, STORAGE, USE and DISPOSAL ([1926.250](#))

Handling, storing, using and disposing of materials involve diverse operations such as hoisting steel with a crane, driving a truck loaded with materials, carrying bags or materials manually; and stacking palletized materials such as drums, barrels, and lumber.

26.1 All materials stored in tiers must be stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling or collapse.

26.2 Aisles and passageways must be kept clear to provide free and safe movement of material handling equipment or employees. Such areas will be kept in good repair.

26.3 Storage areas will be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when

necessary.

27. ENVIRONMENTAL HAZARDS AND CONTROL (1926.55)

Effective controls protect employees from workplace hazards; help avoid injuries, illnesses, and incidents; minimize or eliminate safety and health risks; and help employers provide workers with a safe and healthful work environment.

27.1 To effectively control and prevent environmental hazards, employers must:

- 27.1.1 Involve workers, who often have the best understanding of the conditions that create hazards and insights into how they can be controlled.
- 27.1.2 Identify and evaluate options for controlling hazards, using a “hierarchy of controls.”
- 27.1.3 Use a risk-based approach to guide the selection and implementation of controls, and implement controls accordingly.
- 27.1.4 Develop plans with measures to protect workers during emergencies and non-routine activities.
- 27.1.5 Evaluate the effectiveness of existing controls to determine whether they continue to provide protection, or whether different controls may be more effective.

28. MEDICAL SERVICES and FIRST AID (1926.50) (1910.269(b)(1)(i))

As it relates to construction activities, when performing work on, or associated with, exposed lines or equipment energized at 50 volts or more, persons with first aid training will be available as follows:

- 28.1 For field work involving 2 or more employees at a work location, at least 2 trained persons will be available. However, for line-clearance tree trimming performed by line-clearance tree trimmers who are not qualified employees, only one trained person need be available if all new employees are trained in first aid within 3 months of their hiring dates.
- 28.2 For fixed work locations such as substations, the number of trained persons available will be sufficient to ensure that each employee exposed to electric shock can be reached within 4 minutes by a trained person. However, where the existing number of employees is insufficient to meet this requirement (at a remote substation, for example), each employee at the work location will be a trained employee.
- 28.3 The employer must have adequate First Aid supplies readily available at the job site that meet the requirements of ANSI Z308.1, Minimum Requirements for Workplace First Aid Kits. First Aid supplies will be placed in weatherproof containers if the supplies could be exposed to the weather.
- 28.4 The placement of Automatic External Defibrillators (AEDs) is optional but highly recommended. The placement of AEDs on the job site will be preceded by an assessment of the time and distance to emergency medical services (EMS) and a justification for such equipment.

28.5 When an AED is on the job site, workers will be trained on the proper use and functionality of the AED. All classes will contain a hands-on component and cannot be taken online. Training will be on the same model and manufacturer of AED available in the work area. The certificate(s) will state the date of issue and length of validity.

28.6 When there is the potential to come in contact with blood or other potentially infectious materials (body tissue and fluids), employees must be protected from bloodborne pathogens. Employers must develop an exposure control plan to employees to accidental exposure.

29. COMPRESSED GAS and COMPRESSED GAS CYLINDERS (1926.350)

Compressed gas cylinders are common to construction sites. Their storage and use represent a hazard at the job site. Supervisors must ensure that employees are trained in the safe methods for storage, handling, and use of compressed gas cylinders.

29.1 Gas cylinder safety must include the following:

29.1.1 Accept only properly identified cylinders and do not rely on color codes.

29.1.2 Wear PPE appropriate for the hazard potential of the gas before beginning work.

29.1.3 If a cylinder valve is corroded, contact the vendor for handling/use instructions. If the cylinder is leaking, it must be immediately removed from the job site and isolated in a well-ventilated safe area. It may be necessary to contact trained emergency response personnel.

29.1.4 Segregate cylinders by hazard class while in storage.

29.1.5 Cylinders must be in an upright position and secured at all times, whether full or empty to prevent tip-over and incidental contact.

29.1.6 Cylinders must have the valve protection cap in place except when in use.

29.1.7 Pressure regulators and gauges must be compatible with the cylinder valves. The use of 'cheaters' (adapters) instead of the correct regulator and gauge is not acceptable.

30. LOAD HANDLING EQUIPMENT (1926.1400)

Cranes, derricks, hoists, power-operated equipment and associated rigging hardware are critical components of Load Handling Equipment (LHE). The requirements of this section apply to equipment used to hoist, lower and horizontally move a suspended load.

30.1 All LHE operations will be conducted in accordance with the manufacturers' instructions, procedures and recommendations applicable to the operational and maintenance functions of the LHE.

30.2 The following documentation will be immediately available at the job site for each LHE:

30.2.1 The manufacturer's operating manual, or equivalent, for the specific make, model, and serial number of the LHE.

- 30.2.2 Operating manuals for any attachment (e.g., Spreader beam) or accessories for which the LHE is equipped.
 - 30.2.3 The LHE load rating chart. This chart will be completely legible. It will also include the crane make and model and contain a complete range of the manufacturer's approved crane load ratings for all configurations for which the crane is designed.
 - 30.2.4 A crane logbook will be used to document inspections, operations, maintenance repairs, testing, and any unusual condition noted.
- 30.3 All LHE lifts will be planned and documented in accordance with the requirements in this document. All LHE lift planning will be communicated as part of the Job Hazard Analysis (JHA) process. The Standard Lift Plan (SLP) template is available at bpa.gov.
- 30.4 Critical Lifts are non-routine lifts requiring detailed planning and additional or unusual safety precautions. Critical lifts are defined as:
- 30.4.1 Load weight exceeds 75% of the crane's rated capacity for the configuration;
 - 30.4.2 The lift is occurring in an area where the crane or load has potential to encroach upon an established Minimum Approach Distance (MAD);
 - 30.4.3 The load will not be visible by the LHE operator for entirety of the travel path;
 - 30.4.4 The load will pass above railroad tracks, public highways, or public traveled roadways;
 - 30.4.5 The lift requires two or more cranes;
 - 30.4.6 The lift involves the hoisting of workers;
 - 30.4.7 The lift is occurring in an area where a controlled access zone is needed to ensure the lift zone is clear; or when The LHE Operator determines a Critical Lift Plan is needed
 - 30.4.8 The Critical Lift Plan (CLP) template is available at bpa.gov.
- 30.5 All rigging will be inspected as specified by the manufacturer, by a Competent Person (CP), before use on each shift as necessary to ensure that it is operational and functioning as designed.
- 30.6 Custom fabricated grabs, hooks, clamps, or other lifting equipment (e.g., spreader / lifting beams) will be designed by a Registered Professional Engineer (RPE), conspicuously marked to identify the Working Load Limit (WLL), and proof-tested prior to initial use, to 125% of the WLL.
- 30.7 Load lines will not be detached from a tower section until the section is adequately secured. Unless otherwise designated by the COR or the onsite BPA Representative. "Adequately secured" is defined as having 50% or more of the attaching bolts in place. Loads will not be released until all tower legs are secured. Line workers will not tie-off to unsecured tower

sections, and will not climb on to unsecured tower sections. These provisions will apply to all methods of tower erection.

30.8 Use of aerial lifts, manufactured hook ladders, platforms, or similar devices will be considered approved methods for clipping or dead ending conductor, and related work processes. Crawling over insulators (suspension or dead end) will not be considered an approved practice unless all of the following conditions are met:

30.8.1 Alternate means were impractical or created a greater hazard.

30.8.2 100% fall protection methods are used.

30.8.3 A written job hazard analysis will be completed by the Contractor showing that crawling over insulators is the safest or only practical way of completing a specific work task. Burden of proof would be on the Contractor in each specific case.

30.8.4 Climbing over dead end assemblies is permissible only after they have been completed and pinned in their final position.

30.9 For the safety of equipment operations, guy wires will be flagged before work commences. With respects to Vegetation Management work, all rigging or equipment used to control a tree's fall will be adequately anchored, sized and positioned to control the weight of the tree and positively control the direction of fall.

30.10 When using rigging to pull "leaners" over center, mechanical methods will be employed and sized appropriate to the weight and position of the tree. Rigging used for this methodology must be approved by the manufacturer for identified configurations.

30.11 In accordance with the manufacturer's requirements, LHE will not be operated when wind speeds at the site attain the maximum wind velocity based on the surface/load ratio recommendations. When wind speeds reach 20 mph, the Operator, Rigger, and Lift Supervisor will cease all operations, evaluate conditions and determine if the LHE operations are safe to allow activities to proceed. Determination to proceed will be documented in the Operator's logbook.

31. MACHINERY AND MACHINE GUARDING ([1926.300](#))

Machine guarding is designed to keep employees from having direct contact with the point of operation of a particular piece of equipment. Guards provide protection from shavings, flying shards, metal sparks, and rotating/moving parts. OSHA requires any machine part that could cause injury to be guarded.

31.1 Guard design will vary from machine and tool, however the most common types of machine guards are:

31.1.1 Fixed guards;

31.1.2 Interlocking guards;

31.1.3 Adjustable guards; and

31.1.4 Self-Adjusting guards.

31.2 When power tools are designed to accommodate guards, they will be equipped with such guards when in use.

31.3 Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment will be guarded if such parts are exposed to contact by employees or otherwise create a hazard.

32. HAND and POWER TOOLS ([1926.301](#), [1926.302](#))

Employees who use hand and power tools and who are exposed to the hazards of falling, flying, abrasive, and splashing objects, or exposed to harmful dust, fumes, mists, vapors, or gases must be provided with the particular personal equipment to protect them from the hazard.

32.1 The Contractor is responsible to follow the following requirements:

32.1.1 Keep all tools in good condition with regular maintenance.

32.1.2 Examine each tool for damage before use.

32.1.3 Operate according to the manufacturer's instructions.

32.1.4 Provide and use the proper PPE.

32.2 Ground-Fault Circuit Interrupter (GFCI) protection will be provided on all circuits serving portable electric hand tools or semi-portable electric power tools (e.g., brick saws, table saws). The GFCI will be calibrated to trip within a threshold values of 5 ma +/- 1 ma as specified in UL Standard 943. GFCI devices will be tested before initial use and before use after modification.

33. WELDING, CUTTING AND BRAZING ([1926.350](#) thru [1926.354](#))

Welding, cutting and brazing pose a unique combination of both health and safety hazards to employees.

33.1 Welders, cutters, and the Supervisor will be trained in the safe operation of their equipment, safe work practices, welding and cutting respiratory safety, and fire protection/prevention.

33.2 All welding equipment will be inspected prior to each use to ensure all required safety devices and additional equipment are in place and functioning in accordance with the manufacturer's requirements. Defective equipment will be removed from service, repaired or replaced, and re-inspected again before being placed back into service.

34. EXCAVATION and TRENCHING. ([1926.651](#))

For the purpose of clarification, OSHA defines an excavation as any man-made cut, cavity, trench, or depression created by removal of soil (earth). A trench is defined as a narrow excavation (in relationship to its length) made below the surface of the ground. The Contractor is responsible to:

34.1 Ensure the location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered

during excavation work, will be determined prior to opening an excavation.

34.2 Ensure a stairway, ladder, ramp or other safe means of egress is located in trench excavations that are **4 feet or more** in depth to require no more than 25 feet of lateral travel for employees. The use of metal ladders is prohibited in a substation yard. Contractors will be required to post a copy of the excavation permit at the job site. An excavation/trenching template is provided is available at bpa.gov.

34.3 No employee will be permitted underneath loads handled by lifting or digging equipment. Employees will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators must remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, to provide adequate protection for the operator during loading and unloading operations.

34.4 If an object in ground line is struck or encountered in or around a substation yard or control house immediately stop the activity. Do not investigate the object or line further but treat as an energized component until it can be proven otherwise. Contact the substation Operator or Chief Operator so that the situation can be made electrically safe. If an energized line, it can immediately create a situation where that line has an associated minimum approach distance which will not be violated.

35. CONCRETE and MASONRY ([1926.701](#))

In addition to general safety requirements for construction activities, it is important to recognize specific task hazards related to; concrete and masonry health hazards, injuries to the skin, eyes, and inhalation hazards.

35.1 To ensure the safety of concrete and masonry tasks, the Contractor must ensure that:

35.1.1 The Contractor protects employees from impalement when rebar is not capped or covered;

35.1.2 The Contractor provides a Limited Access Zone (LAZ) to limit number of workers in the danger zone where a masonry wall is under construction; and

35.1.3 The Contractor provide bracing to unsupported sections of masonry walls over 8 feet in height.

36. STEEL ERECTION ([1926.750](#))

This section provides the requirements to protect employees from the hazards associated with steel erection activities associated with the construction, alteration, and/or repair of single and multi-story buildings, bridges, and other structures where steel erection occurs.

36.1 Prior to beginning the erection of any steel structure, a Steel Erection Plan must be submitted as part of the Contractor's SP for review. The plan will include the identification of the site and project; and signed by the Qualified Person (QP) responsible for its preparation and modification.

36.2 Fall Protection requirements for all associated work covered in this document, unless otherwise specified.

36.3 Employees must not be permitted to work above or in positions to protruding reinforcing steel, fasteners, or other impalement hazards unless provisions have been made to control the hazard.

36.4 Employees must not be permitted to work under bundle material loads or other suspended loads. Rigging personnel responsible for securing loads to multiple-lift rigging assemblies and setting suspended structural components such as beams, trusses, and precast members are excluded from this requirement. In these activities, work controls will be used to minimize the time spent directly under loads.

37. PERMIT REQUIRED CONFINED SPACE ([1926.1204](#))

The Contractor will identify any required worker entry into a Permit Required Confined Space (PRCS) / Confined Space (CS) permit as defined by Federal OSHA Standards, [1926 Subpart AA](#), (Construction) and applicable State requirements or Industry standards. [BPA Form 5480.10a](#) is provided to the Contractor for their use.

37.1 The Contractor will evaluate and identify any PRCS/CS entry and demonstrate, through the preparation of the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry. The Contractor will review and post all entry permits at the point of entry into the space.

37.2 The Contractor will test for hazards before, and during, any worker entry into an identified PRCS and confined space.

37.3 The employer will retain each canceled entry permit for at least one year to facilitate the review of the permit-required confined space program required of this section. Any problems encountered during an entry operation will be noted on the pertinent permit so that appropriate revisions to the PRCS program can be made.

37.4 The employer will provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this section.

37.5 The employer is required to evaluate and address rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified.

37.6 To facilitate non-entry rescue, retrieval systems or methods will be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems will meet applicable regulations and standards.

37.7 Contractor will post the entry permit at the confined space entry portal during the entry operations.

38. BLASTING (1926.900)

All Contracted blasting activities must comply with the requirements in project construction specification, Section 31 23 16.29.

38.1 The Contractor will use the utmost care to prevent danger to life and to prevent damage to property beyond the blast area. Failure to observe necessary precautions will be grounds for suspending the work. The Contractor will take necessary measures such as blasting mats to prevent rocks and debris from being thrown onto cultivated pasture lands, recreational areas, and other sensitive areas.

38.2 The use of electric blasting caps is prohibited near energized power lines. Individual charges will be detonated by means of approved detonating safety fuse cords.

38.3 All exploders, fuses, and explosives will be transported, stored, and used in compliance with applicable laws and regulations, including those prescribed by local agencies.

38.4 Warning Lights: The Contractor will furnish and use a flashing high intensity warning light at each blasting site. The light will be placed where it will be visible from low flying aircraft in all directions. The light will be turned on about 5 minutes before, and remain on during the blasting. Each light will be enclosed in a red lens, produce one million candle power, be visible vertically and horizontally, and flash at about 80, but not more than 130 times a minute.

38.5 Fire Danger: The following will apply to blasting when a danger of fire is present:

38.5.1 The use of fuse and caps is prohibited.

38.5.2 The Contracting Officer may stop blasting during periods of high fire danger.

38.5.3 When the relative humidity is below 50 percent, a watchman will remain at each blasting site for at least one hour after blasting.

38.6 Contractors must ensure that adequate geotechnical investigations will precede all blasting operations to determine characteristics of the materials to be blasted. A copy of the blast report will be available upon request.

39. UTILITY LOCATES (1926.651)

Unless BPA performs locates at the site of work, utility locates will be the responsibility of the Contractor. Utility Locates will occur prior to any excavations, trenching or penetrations of building structures. This includes:

39.1 Underground utilities of all types;

39.2 Substation grounding grids (around the perimeter of and underneath substations);

39.3 Telecommunication tower grounding rings (buried beneath the towers);

39.4 Counterpoise (smaller ground mats located at the base of electrical transmission towers);

39.5 Utilities inside and below BPA facilities. This includes utilities concealed in floors, walls, ceilings, and crawl spaces.

40. EXTENSION CORDS, TOOLS, AND METALLIC CABLES ([1926.416](#))

When an extension cord is used in an energized switchyard, the cord's grounding box must be clamped to a solidly grounded fixture before the extension cord is connected to a switchyard receptacle. If a solidly grounded fixture is not available within 10 feet of the job site, the grounding box will be attached to a ground rod. When using double-insulated tools, work may be done within 25 feet of the grounding box.

40.1 Extension cords or other metallic cable (i.e., telephone or temporary power) used in a switchyard should not be laid parallel to high voltage bus or overhead circuits due to the possibility of high induced voltages. These cables will not be extended to locations off the substation ground mat unless a properly designed and installed ground mat extension or isolation is used.

40.2 Contractors will document their assured grounding inspection and marking, methods program with regards to the use of extension cords and metallic cables. This information will be available upon request.

41. BATTERIES AND CHARGING ([1926.441](#))

All battery work will be performed in accordance with the manufacturer instructions, and applicable Federal / State regulations.

41.1 The Contractor will ensure sufficient ventilation of gases from storage batteries to prevent the accumulation of explosive mixtures. Contractors are responsible for the atmospheric monitoring of the workspace to ensure hazardous atmospheres do not exist.

41.2 For safe battery handling operations, the following PPE will be made available to contract personnel:

41.2.1 Goggles and face shields appropriate to the chemical and electrical hazard;

41.2.2 Acid-resistant rubber gloves;

41.2.3 Protective rubber aprons and safety shoes; and

41.2.4 Lifting devices of adequate capacity, when required.

42. GROUNDING ([1926.962](#))

The Contractor is responsible for protecting workers from sources of power system energization. Grounding of lines or equipment may be required to accomplish this. Sources of energization include but are not limited to:

42.1 Electromagnetic or capacitive voltages coupled from adjacent energized lines or bus as well as electrostatic voltages from electrical charges carried by wind, dust, etc.;

42.2 Back feed through station service or potential transformers;

42.3 Remote lightning causing a fault on an adjacent circuit or a strike to the de-energized circuit.

Note: Portable protective grounds may not provide complete personal protection for close-in strikes. See Section 14 for lightning curtailment requirements.

42.4 Accidental energization from the power system, power lines or other energized high voltage equipment by accidental contact or accidental closing of an isolating device.

42.5 Trapped charges such as in capacitors or on transmission lines.

42.6 A grounding plan will be developed for all work that takes place entirely on or entirely off the ground grid to mitigate the hazards of transferred potential. If it is unavoidable for a work procedure to take place simultaneously on and off the grid (such as using a crane, pulling cable and directional boring work), the BPA Clearance Holder must review the specific methods used to mitigate the hazard(s) prior to starting this phase of work.

43. GROUNDING OF POWER/LIFT EQUIPMENT

When a vehicle is parked near energized high-voltage equipment, there can be a risk to a person of electric shock if contact is made between the vehicle and a grounded object. This is due to the capacitive charge that can build up on the vehicle.

43.1 If the vehicle is to be bonded to a grounded object to prevent capacitive charge build-up, personnel must avoid getting in series with the discharge circuit.

43.2 Manlifts, cranes, and other overhead lift equipment used where the possibility of accidental contact with normally energized high voltage parts exist, will be connected to the substation ground mat within energized switchyards or to a ground rod in other locations with a 2/0 copper ground lead. Multiple ground leads, attached to separate ground rods or mat connections, will be utilized on equipment in the same number that would be required for grounding the circuit(s).

43.3 Multiple ground leads, attached to separate ground rods or mat connections, will be utilized on equipment in the same number that would be required for grounding the circuits.

43.4 Ground Mat Connected Equipment: If the possibility of contact with normally energized high voltage parts does not exist, power/lift equipment will be grounded with a single 2/0 copper or static ground.

43.5 Equipment working within the MAD of cleared and grounded circuits will be at the same potential as the circuits that are being worked on. They will be bonded and tied to a common ground as required, to create an effective equipotential zone.

44. CONDUCTIVE DEVICES

Electrical shock hazards occur when sufficient electrical current is able to travel between two conductive surfaces through the body. While this typically occurs between an energized surface and the ground, it can occur between any two potentials. Contractors must ensure their employees are situationally aware of both the tools they are using and the working environment said tools are being introduced into.

44.1 Portable metal ladders are not permitted in energized facilities or communication sites or for use in any situation where there is danger of contact with energized lines or equipment.

44.2 Conductive objects such as metal tapes, surveyor chains, fish tapes, and center are not permitted to be used in energized facilities and may be considered on a case-by-case basis only when specifically approved by the Qualified Electrical Worker that holds a BPA Electrical Worker Permit and restrained by adequate methods, to prevent electrical contact in the event of slippage or breakage at any point.

45. ARC FLASH HAZARDS ([1926.960](#), [1926, Subpart V](#))

Contractors must protect employees from electric arcs and flames. Prior to the start of work the contractor must:

45.1 For additional information and/or clarification regarding Arc Flash, the Contractor may request support from BPA. In the absence of this support, the Contractor will follow NFPA 70E requirements.

45.2 The BPA Arc Flash Analysis studies, dated 2018 are provided to the Contractor and are available at bpa.gov.

45.3 Ensure employees wear appropriate PPE that will not melt, or ignite and continue to burn when exposed to flames or the estimated heat energy; and

45.4 Ensure that employees wear arc rated clothing and protective clothing and other PPE that has an arc rating greater than or equal to the available heat energy under certain conditions as required in [1926.960\(g\)\(2\)](#).

Exemption: The Contractor may request an exemption from requiring non-permitted persons to wear arc rated clothing during short-term duration work activities. Examples would be the delivery/removal of material or completing maintenance tasks on sanitary facilities. The work activities must be specified in detail in the Safety Plan with the Contractor ensuring that the activities by non-permitted persons will not result in an exposure to an arc event at or above 1.2 cal/cm². This must be followed in order to be granted an exemption.

45.5 Arc rated clothing will be required when unanticipated work activities require the contractor to bring in other non-permitted visitors to the job site. Unanticipated work activities would be all other work that does not fall under the short-term duration work activities described in the paragraph above. The Contractor will furnish their visitors with coveralls that have an 8 cal/cm² rating.

46. ELECTRICALLY SAFE WORK CONDITION

A state in which an electrical conductor or circuit part has been protected by the use of dielectric barriers to prevent contact by persons or conductive objects OR has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage and grounded/bonded if determined necessary.

46.1 The Contractor will use the BPA form [F 6410.42e](#), Contract Energized Electrical Work Permit (CEEWP), following instructions attached to the form. The exemption will not be considered

complete until reviewed and signed in accordance with the form requirements.

46.2 During the duration of the work covered by the CEEWP, the Contractor will prominently display the permit where it will be visible prior to entering the work zone.

46.3 If, during the course of the work, an unlabeled panel is discovered, the Contractor will:

46.3.1 Immediately follow temporary stop work guidance;

46.3.2 Notify the COR for consultation with a BPA Qualified Electrical Worker and/or BPA Engineering;

46.3.3 Proceed only after the calorie rating has been clearly identified and if applicable, the CEEWP has been updated;

46.4 If the incident energy (analysis) cannot be determined the panel(s) that are not labeled will be worked in an electrically safe work condition.

46.5 Clearly mark the Limited Approach Boundary (LAB) to protect unqualified/non-permitted persons who may be in the vicinity of work that involves a shock or arc flash hazard. Install necessary barriers or guards in the work in accordance with Chapter 2, Section 2.3, Barriers and Guards - Electrical.

47. MINIMUM APPROACH DISTANCE [MAD] ([1910.169](#), [1926.960](#))

In addition to the OSHA requirement identified in the above-linked regulations, BPA has established a standard level of acceptance.

47.1 The Contractor will not perform any work on energized BPA high voltage conductors or equipment and will not come within the MAD of energized lines or equipment except under the provisions of the Clearance with all conducting parts shorted and bonded together to a common ground.

47.2 Do not allow equipment, machinery, and vehicles traveling on BPA's right-of-way to come within 25 feet of any BPA transmission line structure or guy wires unless spotter are used to ensure safe work distances from structures.

47.3 Inside the fence – All conductors and equipment will be treated as energized unless the Contractor has been informed by the qualified BPA Clearance Holder at their job site that the line or equipment is de-energized and a clearance has been issued with all conducting parts shorted and bonded together to a common ground. These conditions will be met for the Contractor to perform their work.

47.4 Outside the fence – All line conductors and equipment located outside of a substation will be treated as energized unless the Contractor has been informed by a Qualified BPA Clearance Holder or Qualified Contractor Clearance Holder at their job site that the line or equipment is de-energized and a clearance has been issued with all conducting parts shorted and bonded together to a common ground. These conditions will be met for the Contractor to perform their work.

47.5 All overspray will be considered conductive. Wind and other conditions will be taken into account to ensure that the MAD is not violated by overspray or equipment (e.g., herbicide application/painting in a substation).

47.6 When work is to be performed within the MAD, including the installation and removal of barriers one of the following must be employed:

47.6.1 Approved barriers;

47.6.2 Use of live-line tools;

47.6.3 Clearance with all conducting parts shorted and bonded together to a common ground. See Section 42 for grounding requirements.

47.7 Conductive objects, such as insulator support hardware, which extend into the MAD, may be contacted outside the applicable MAD. However, such objects must have been installed with approved design standards and be fixed or limited in movement so that the designed clearances cannot be reduced.

47.8 Only persons qualified and trained to perform work safely on or in close proximity to energized lines and equipment will be allowed to work or operate equipment up to the applicable MAD tables.

47.9 The distances in the following tables meet the minimum requirements prescribed by OSHA [1910.269](#) and [1926.960](#). The “MAD Without Hold Order” column accounts for transient voltages that can be generated by automatic reclosing, whereas the “MAD With Hold Order” columns are for transient voltages that can occur at the job site even with automatic reclosing disabled. Table A, Table B, and Table C provide the AC MAD’s based on three elevation categories as listed in the heading of each table and will be applied based on the elevation of the job site. The referenced Work Standard is available upon request.

47.10 BPA MAD Tables only apply to BPA contracted work on BPA systems.

Note: The tables listed below are taken from the APM, dated 01 October 2021.

Table A – AC MAD for Qualified and Restricted Electrical Workers, Elevations 0’ to 3000’

Nominal System Voltage Phase to Phase (kV)	Phase-Ground MAD (1)		Phase-Phase MAD (1)
	MAD Without Hold Order & NO Tools	MAD With Hold Order for Tools	MAD With Hold Order for Tools
50 – 300 V	Avoid Contact		
301 – 750 V	1’-1”	1’-1”	(2)
751 V - 5 kV	2’-1”	2’-1”	(2)
15	2’-2”	2’-2”	(2)
34.5	2’-7”	2’-7”	(2)
69	3’-4”	3’-4”	(2)
115	3’-6”	3’-2”	4’-1”
138	4’-0”	3’-4”	4’-6”
161	3’-8”	3’-8”	5’-0”
230	6’-2”	4’-5”	6’-8”
287	5’-2”	4’-11”	7’-9”
345	5’-11”	5’-9”	9’-10”
500 (100” Design)	8’-8”	7’-6”	14’-6”
500 (All Others) (4)	9’-10”	7’-6”	14’-6”
500 Series Caps (3,4)	11’-3”	11’-11”	24’-1”

Table B – AC MAD for Qualified and Restricted Electrical Workers, Elevations 3001’ to 6000’

50 – 300 V	Avoid Contact		
301 – 750 V	1’-1”	1’-1”	(2)
751 V - 5 kV	2’-1”	2’-1”	(2)
15	2’-4”	2’-4”	(2)
34.5	2’-9”	2’-9”	(2)
69	3’-7”	3’-7”	(2)
115	3’-9”	3’-3”	4’-4”
138	4’-3”	3’-5”	4’-9”
161	3’-10”	3’-10”	5’-4”
230	6’-7”	4’-9”	7’-1”
287	5’-4”	5’-3”	8’-3”
345	6’-4”	6’-0”	10’-6”
500 (100” Design)	9’-3”	8’-0”	15’-7”
500 (All Others) (4)	10’-6”	8’-0”	15’-7”
500 Series Caps (3,4)	12’-0”	12’-9”	25’-11”

Table C – AC MAD for Elevations 6001’ to 9000’

50 – 300 V	Avoid Contact		
301 – 750 V	1'-1"	1'-1"	(2)
751 V - 5 kV	2'-1"	2'-1"	(2)
15	2'-6"	2'-6"	(2)
34.5	2'-11"	2'-11"	(2)
69	3'-9"	3'-9"	(2)
115	3'-11"	3'-5"	4'-8"
138	4'-5"	3'-8"	6'-6"
161	4'-0"	4'-0"	5'-7"
230	6'-11"	4'-11"	7'-5"
287	5'-7"	5'-5"	8'-8"
345	6'-8"	6'-4"	11'-1"
500 (100" Design)	9'-9"	8'-5"	16'-5"
500 (All Others) (4)	11'-0"	8'-5"	16'-5"
500 Series Caps (3,4)	12'-8"	13'-5"	27'-4"

Notes — Minimum Approach Distances — Special Conditions for AC and DC:

With verification of the actual substation bus height and location elevation the inadvertent movement factor (IMF) of 12 inches, included in MAD for worker motions, may be deducted at 115 kV and above to specifically allow vehicles in transit to safely pass under energized bus at those voltages. Equipment in transit (not being used to perform work) will have secured any moveable parts (i.e. buckets, forks, load lines, loads) that could reduce clearances.

“Avoid contact” is defined as any movement near an exposed energized conductor which could lead to contact whether it is intentional or not.

1. Barehand phase-to-ground and phase-to-phase MAD will include a deduction for any floating (i.e. insulated boom/bucket) or conductive objects in the air gap as prescribed in the BPA TRANSMISSION LINE MAINTENANCE STANDARD for BAREHAND WORK PRACTICES & PROCEDURES.
2. Line conductor spacing and substation bus spacing below 115 kV will not allow adequate MAD distances to be maintained for phase to phase live work.
3. If all of the series capacitors on a line are bypassed the MAD for series capacitors located mid-line may be the same as the MAD used for lines without series capacitors. The with and without hold order MAD is the same for lines with series capacitors in service.
4. For line end series capacitors connected adjacent to a 500 kV substation, the 500 kV MAD listed for “All Others” may be used for work on series capacitor equipment.

Table D – MAD With or Without Hold Order (ft.-in)

Table D - MAD With or Without Hold Order (ft.-in)	
Insulated Overhead Ground Wire	2'- 0"
Fiber Optic (OPGW)	2'- 0"
Energized Ground Wire (Airway lighting & PCS up to 14.4 kV)	2'- 6"
500 kV Bare - Segmented Ground Wire	3'- 9"

DC Minimum Approach Distances:

The DC MAD for Tools include a safety factor that permits the introduction of tools in the air gap to perform live-line work. The MAD stated as with and without Hold Order are the same since DC restarts (as opposed to AC reclose) do not create high system overvoltage’s after a fault. However, for all live-line work the DC terminal restart will be both blocked and disabled for worker protection. Deductions for floating and conducting objects for Pole – Pole MAD apply to DC clearances refer to Note #1 for AC MAD’s.

The MAD for the DC line and Celilo converter station will be based on the measured voltage at the Celilo converter terminals.

Table E – DC MAD for All Elevations

Celilo Converter DC MAD – Normal Pole-Pole (Bi-Pole)Operation			
Column 1: Pole – Ground		Column 2: Pole – Pole (See Note 1 for AC MAD)	
Celilo Terminal Voltage (kV dc)	MAD for Tools (ft.-in)	Celilo Terminal-Voltage (kV dc)	MAD for Tools (ft.-in)
440	8'-8"	880	12'-6"
520	10'-9"	1040	15'-3"
Celilo Converter DC MAD - Monopole Operation (Metallic or Ground Return Mode)			
Pole – Ground (kV dc) (1)		Pole – Pole (2)	
80 (Return Pole)	3'-4"	600	11'5"

For DC MAD (below 80 kV) use the distances from the AC MAD Tables corresponding to the same voltages. The AC MAD is more conservative due to larger transient overvoltage factors.

Table F – DC MAD for Batteries and All Other Circuits

Table F - DC MAD for Batteries and All Other Circuits	
Nominal Voltage (V dc)	
50 – 300 V	Avoid Contact
301 V –69 kV	Use AC MAD's

Minimum Approach Distances for Substation Entry Permit holders

Substation Entry Permit Holders approaching normally energized equipment shall not enter within the distances listed in Table G, either on foot or in a vehicle, unless given the following information by a person holding an Electrical Worker Permit:

- 1) Procedure for identifying energized equipment
- 2) All voltages present in the yard and how to identify the voltage level of specific equipment.
- 3) Minimum Approach Distance(s)
- 4) The hazards associated with violation of the Minimum Approach Distances.

Refer to Section 8.4 of the [Rules of Conduct Handbook](#).

Table G – MAD for Non-Permitted Persons – All Elevations

Nominal System Voltage (kV)	Phase-Ground (ft.-in)
Up to 345 kV	15'0"
Above 345 kV	20'0"
Energized Ground Wire (Airway lighting & PCS up to 14.4 kV)	15'0"
Insulated Overhead Ground Wire	10'0"
Fiber Optic Ground Wire (OPGW)	10'0"
500 kV Bare - Segmented Ground Wire	10'0"

MINIMUM APPROACH DISTANCE (MAD) FOR VEHICLES AND EQUIPMENT

Persons with Electrical Worker Permits may drive motor vehicles or operate mechanical equipment near energized facilities as long as the M-1 MADs are maintained.

Persons without an Electrical Worker Permit who do not meet specific requirements must have a Safety Watcher any time they are driving vehicles or operating mechanical equipment in an energized substation yard.

Table 1 – MAD for Vehicles and Equipment

Nominal Voltage (Phase-to-Phase)	Phase-to-Ground (ft.-in)
Up to 345 kV	15'-0"
500 kV AC	20'-0"
ALL DC Facilities	20'-0"
500 kV Bare-Segmented Ground Wire	3'-9"

Minimum Approach Distance (MAD) for Energized Conductors for Qualified Line Clearance Tree Trimmers.

A hold order is required when falling or removing danger trees if an electrical hazard (or a violation of the MAD) could result. The worker has the responsibility of determining hazard trees and the need for a hold order.

Table 2 – MAD from Energized Conductors for Qualified Line Clearance for Tree Trimmers

Nominal Voltage (Phase-to-Phase)	Phase-to-Ground (ft-in)
51 – 300 V	Avoid Contact
301 – 5k V	2'-1"
15 kV	2'-9"
34.5 kV	3'-5"
46 kV	3'-10"
69 kV	4'-9"
115 kV	5'-2"
138 kV	5'-11"
161 kV	6'-10"
230 kV	9'-0"
287 kV	11'-3"
345 kV	15'-0"
500 kV	21'-9"
<p>NOTE: MADs are adjusted for maximum elevation on BPA's system and exceed the values listed in in OSHA 1910.269(r) Tables R-7 and R-8. Refer to ANSI Z133.1-2012 and BPA WS-5-1 for additional information</p>	

48. LOCKOUT/TAGOUT – CONTROL OF HAZARDOUS ENERGY ([1926.417](#)) ([1910.147](#))

The Contractor will communicate and familiarize their workers and affected BPA employees with their respective LOTO locks, tags, devices and procedures.

48.1 The Contractor will ensure that no workers are exposed to injury from the unexpected startup or release of stored energy systems.

48.2 Contractors performing work on machinery or equipment where such hazards may exist will develop a LOTO program in accordance with this section as well as the following requirements:

48.2.1 29 CFR [1910.147](#), The Control of Hazardous Energy (Lockout/Tagout)

48.2.2 29 CFR [1926.417](#), Lockout and tagging of circuits, ANSI Z244.1, Control of Hazardous Energy Lockout/Tagout and Alternative Methods, and ANSI A10.44, LOTO for Construction.

48.3 The LOTO document will be submitted as part of the Contractor's SP submittal to the BPA representative, for their review and acceptance.

48.4 The Contractor will supply all required locks, tags, and devices required for locking out and tagging the machinery or equipment to be worked on.

CHAPTER 2 – WORK IN SUBSTATIONS, TELECOMMUNICATION SITES AND RELATED BPA FACILITIES

1. EMPLOYER RESPONSIBILITIES

The Contractor is required to provide Qualified Electrical Workers who have demonstrated skills and knowledge related to construction and operation of electrical equipment and installations and have received safety training to identify the hazards and reduce the associated risks. All work will be performed in accordance with 1910.269 for Electric Power, Generation, Transmission, and Distribution, as applicable.

2. REQUIRED COMMUNICATIONS PRIOR TO ENTERING SUBSTATIONS

Before entering a substation, Contractors must contact District Substation Operations prior to entry, prior to beginning work, and at the conclusion of the work. This discussion must include any special system conditions present at that substation which could affect employee safety. Refer to the Rules of Conduct Handbook, Appendix B for contact information.

3. SAFETY WATCHER

A Safety Watcher is a [Qualified Electrical Worker](#) who holds a BPA Electrical Worker Permit who knows and understands the safety rules and the electrical hazards involved in specific work situations and . Primarily, Safety Watchers are responsible for limiting the movement of personnel and/or equipment to prevent electrical contact incidents. They have the authority to halt the operation whenever any unsafe act or condition is imminent.

- 3.1 The Contractor will take adequate safety measures to protect its workers and others from induced voltages as well as direct contact. The Contractor will utilize qualified Safety Watchers for the protection of workers and BPA facilities for the phases of the work where required by these specifications, law or regulations, or where it considers them to be necessary. A Safety Watcher's primary responsibility is to limit the movement of personnel or equipment to prevent contact with energized overhead or underground electrical facilities.
- 3.2 A Safety Watcher for work in BPA energized substations must be a Qualified Electrical Worker that holds a BPA Electrical Worker Permit. A Qualified Electrical Worker can be an employee (or subcontract worker) of the contractor that holds a BPA Electrical Worker Permit.
- 3.3 A Safety Watcher for work on BPA transmission lines external to an energized BPA substation must be a Qualified Electrical Worker that holds a BPA Electrical Worker Permit or a qualified worker who holds a BPA Contractor Clearance Certification.
- 3.4 The requirements and process for obtaining and Electrical Worker Permit or a Contractor Clearance Certification are defined in the Rules of Conduct Handbook ([ROCH](#)).
- 3.5 No worker on a jobsite may act as a Safety Watcher if there is any possibility of being distracted from serving in the capacity of a Safety Watcher.
- 3.6 Each worker is responsible for asking for a Safety Watcher whenever one is required. A temporary stop work order will prevail in the event of conflicting judgement pending review of the safety plan and resolution by both the COR and the onsite BPA representative.

- 3.7 A Safety Watcher will position themselves in a suitable location and give their undivided attention to ensure that no action on the part of the worker(s) being watched can result in violation of the MAD applicable to workers being watched. There must be a definite understanding between the Safety Watcher and the person(s) being watched as to when the watching begins and ends. Safety Watchers, who must leave their assigned jobs, will first make sure that all worker(s) are in the clear and remain in the clear until the Safety Watcher returns or is replaced.
- 3.8 A Flame Resistant (FR) rated, high visibility vest (red or orange) will be worn by the assigned Safety Watcher for all work activities which require the continual presence and observation of a Safety Watcher. It may be worn when not performing the task of a Safety Watcher at the discretion of either the person in charge or the COR or the onsite BPA Representative in other situations requiring a Safety Watcher.
- 3.9 A Safety Watcher is required for Qualified Electrical Worker who hold a BPA issued Electrical Worker Permit under the following circumstances:
- 3.9.1 When a worker is climbing into, out of, or changing location in a substation structure containing circuits normally energized at 600 volts or more. This does not apply to circuits barricaded or located 15 feet or more from the structure for circuits at 345 kV or less, and 20 feet or more for circuits operating at more than 345 kV. Multiple bays will be considered one structure if workers can pass from one to the other without having to descend to the ground.
- 3.9.2 When inadvertent movement by a worker could result in violating the MAD as specified in tables above as applicable.
- 3.9.3 When operating or moving motor-driven equipment in the vicinity of high-voltage circuits and the possibility of accidental contact exists.
- 3.10 Safety Watchers for non-qualified electrical workers and workers holding a Substation Entry Permit will be required:
- 3.10.1 Whenever a Safety Watcher is required for Qualified Electrical Worker.
- 3.10.2 Whenever a Clearance is necessary for the accomplishment of the work.
- 3.10.3 When operating or moving motor-driven equipment in an energized substation yard, which are not guarded or barricaded to prevent violation of the MAD, indicated in Section 47, Table 1 – MAD for Vehicles and Equipment, of this chapter.
- 3.11 Work in energized substations and facilities may require one or more Safety Watchers and/or Escorts. As a part of the Safety Plan, the Contractor will provide a detailed plan for their use including the work areas and the number of safety watchers and/or escorts assigned that meet/exceed the requirements of the ROCH.

4. ELECTRICAL – GENERAL (1926, Subpart K, Subpart V)

Electrical safety has long been recognized by OSHA and other entities as a serious workplace hazard. Contractor's must ensure they take the requisite steps to protect employees exposed to the hazards of; electrical shock, electrocution, fires, and explosions.

- 4.1 Identification of Circuits. No work will be performed on any circuit until a Qualified Electrical Worker who holds an electrical work permit has established positive identification of all electrical circuits in the work area. Before work begins, a Qualified Electrical Worker/Person in charge will ascertain by inquiry, direct observation and by instruments, whether any part of an electric power circuit (exposed or concealed) is located such that the performance of work could bring any person, tool, or machine into physical or electrical contact with it. This verification procedure will be documented prior to work beginning.
- 4.2 Voltage Testing.
The Contractor will ensure that, unless a previously installed ground is present, employees test lines and equipment and verify the absence of nominal voltage before employees install any ground on those lines or that equipment.
- 4.3 If there is any indication that the circuit being tested is still energized at full line potential, the employee will:
 - 4.3.1 Not apply Portable Protective Grounds;
 - 4.3.2 Maintain Minimum Approach Distance;
 - 4.3.3 Recheck circuit identification;
 - 4.3.4 Notify dispatcher.
- 4.4 Attachment points of portable protective grounds and bonding jumpers will be made conductive by removing any paint or corrosion before attachments are made.
- 4.5 When Personal Protective Grounds (PPGs) are required, they will be installed as close to the work being performed as practical and properly secured in such a manner as not to be disturbed during the course of the work or come in contact with personnel.
- 4.6 Information related to Grounds, Portable Protective, Special Requirements is available at BPA.gov.
- 4.7 No disconnect switch, power circuit breaker, transformer, wave trap, fuse, or current limiting reactor will be part of the protective grounding circuit.

Note: Does not apply to a visible single-turn primary such as in a "donut" CT circuit.

- 4.8 Minimum Crew Size (PPGs):
 - 4.8.1 The minimum crew for installing PPGs will consist of 2 Qualified Electrical Workers, or 1 Qualified Electrical Worker and an electrical worker (electrical apprentice

or journey-level worker in training) who has been approved by both the Contractor's personnel responsible for directing the work task and the Qualified Electrical Worker involved.

4.8.2 The minimum crew for removing PPGs will consist of 1 Qualified Electrical Worker and 1 other worker.

4.9 Installing and Removing PPGs:

4.9.1 All PPGs will be installed and removed with approved live-line tools.

5. WORK PERMITS – ELECTRICAL ([1926.960](#))

A work permit is a written record that authorizes specific work, at a specific location, a specified period of time. Work permits are used for controlling and coordinating work to establish and maintain safe working conditions. For additional information, refer to the Clearance, Hold Order, and Work Permit Procedure for Contractors.

5.1 A work permit is formal permission to work on power system equipment and circuits that do not require a Clearance or Hold Order. A work permit does not provide electrical contact protection for personnel or permit the violation of applicable Minimum Approach Distances.

5.2 A work permit will only be issued to Contractors who hold an Electrical Worker Permit and are listed in the Permit Directory as an Approved Contractor Work Permit Holder.

5.3 Refer to CHOWPP document is available through your COR's for additional information.

6. GROUND GRID – SUBSTATIONS

Ground grids equalize the voltage within the grid or bond conductive objects in the immediate work area to minimize the potential between the objects in the immediate work area to minimize the potential between the objects and between each object and ground.

6.1 Workers will not "come between" cut sections of any substation ground grid conductor. Separated sections of the grid will only be connected after first being shunted using hot line (insulated) tools by a Qualified Electrical Worker.

6.2 All work will take place entirely on or entirely off the ground grid to avoid the hazards of transferred potential. If it is unavoidable for a work procedure to take place simultaneously on and off the grid (such as using a crane, pulling cable and directional boring), the COR or the onsite BPA Representative must be consulted for specific methods that would minimize the hazard.

6.3 For worker protection, the local BPA Substation Operator will be notified whenever any work is being performed on the ground grid.

7. REQUIREMENTS FOR WORKING ON EQUIPMENT UNDER THE PROTECTION OF A CLEARANCE

Note: Contractors are not allowed to hold a Clearance for work on equipment in a BPA Substation

7.1 BPA electrical workers will clear and tag the equipment. A Clearance will then be issued to the BPA Clearance Holder. The BPA Clearance Holder will:

- 7.1.1 Identify and communicate to the workers at the site the limits of the Clearance, the facilities included, and the status of ground switches within the Clearance before work begins;
- 7.1.2 Know the name(s) of other Clearance Holders and the type of work they are accomplishing when more than one Clearance is issued on the same line or equipment;
- 7.1.3 The Clearance Holder is responsible for directing the placement of the grounds;
- 7.1.4 Direct the installation of barriers or guards as necessary to prevent accidental contact with adjacent energized facilities before allowing work to begin in areas where such hazards exist;
- 7.1.5 Conveys any specific hazards associated with the work will be pointed out to the Contractor;
- 7.1.6 Remain at the job site while work or testing is being performed on equipment under a Clearance. "At the job site" means at the location where the work is being performed, but may not visually watch the work performed.

7.2 The contract workers working under the protection of a clearance will:

- 7.2.1 Know the limits of the Clearance, the facilities included, and the status of ground switches within the Clearance. The Contractor will verbally acknowledge to the Clearance Holder, the Clearance number, the time of issue, and the name of the Dispatcher or Substation Operator who issued the Clearance;
- 7.2.2 Know that all low-voltage isolating device air circuit breakers (ACB) that are the limits of the Clearance have been tested open before touching or coming within the applicable Minimum Approach Distance of normally energized electrical parts;
- 7.2.3 Install PPGs as directed by the BPA Clearance holder in consultation with the Contractor's Superintendent;
 - 7.2.3.1 Install barriers and guards as directed by the Clearance Holder;
 - 7.2.3.2 Utilize a Safety Watcher(s) when required;
 - 7.2.3.4 Cease work on equipment under a Clearance when the Clearance Holder is not at the job site.

7.3 BPA multiple grounding rules are provided on Doing Business with BPA.

7.4 Con-current clearance holder requirements will be implemented when two or more qualified electrical workers are issued clearances with the same clearance limits on a transmission line and/or its terminal equipment. This could include contract electrical crews working in conjunction with BPA electrical crews. The safety of our contractors and BPA employees has the highest priority during these times of integrated work and outages.

7.5 When Clearances Are Not Required:

7.5.1 New Construction: During the construction of new facilities, a Clearance is not required if power system equipment is not in place to provide a connection to the power system by the closing of an isolating device.

7.6 Return to Construction Status. Reconductoring of existing lines, removal and/or replacement of facilities, or for other similar type work. A Clearance is not required for this work providing that a letter requesting the work to be accomplished without a Clearance has been submitted to and approved in writing by the Manager of the Dispatching Office having jurisdiction over the equipment. Under the protection of a Clearance, the facilities will be separated from all possible sources of energization by the physical removal of the predefined circuit parts such as risers, wire spans, bus work, or other conductor, which completely separates the equipment from the power system.

8. HOLD ORDERS

The purpose of a Hold Order is to get personnel in the clear. Hold Orders are required:

8.1 While performing hot-line work.

8.2 While falling danger trees if an electrical hazard could result.

8.3 While installing or removing any conductor which crosses over or under normally energized high-voltage circuits. If the work cannot be accomplished under the protection of a Hold Order, a clearance will be obtained.

8.4 While removing or replacing hot-stick links on normally energized high-voltage facilities.

8.5 While proximity work is in progress during line construction.

8.6 While testing or washing insulators 'hot.'

8.7 While equipment is being operated near energized high-voltage facilities and there is the possibility of accidental contact or violation of the applicable MAD.

8.8 While performing approved bare-hand procedures.

8.9 While using the '500 kV All Others' MAD instead of the larger '500 kV Series Cap' MAD on 500 kV lines that have series capacitors installed, when capacitors are bypassed and isolated.

9. SWITCHES, ISOLATING DEVICES, ENERGIZED RESTRICTIONS ON

Work will not be performed on one part of a high voltage switch or disconnect if the remainder of the switch or disconnect is energized unless:

- 9.1 The MAD is not violated.
- 9.2 If the MAD will be violated during the course of the work, approved barriers will be installed.
- 9.3 Precautions are taken to assure that the switch cannot be operated until all work is completed. This means isolating devices open, rendered inoperable and tagged.

This does not prohibit connecting a bus or line to the de-energized end of a switch or disconnect if the above conditions are met.

10. COUPLING CAPACITORS AND BUSHING POTENTIAL DEVICES

Work in the base units of this equipment, other than tuning or voltage adjustments will be performed under the protection of a clearance.

11. CURRENT TRANSFORMER (CT) SECONDARY

Opening a current transformer (CT) secondary while the primary is energized will produce a high secondary voltage that may lead to serious injury or death. To safely control this hazard, the Contractor will properly install a CT secondary short circuit (also known as a bridge) prior to working on the CT secondary. Additionally, each applied CT secondary short will be properly tagged with "DANGER DO NOT REMOVE SHORT (BRIDGE)".

- 11.1 When work is to be performed on CT circuits that are normally in service, the Test and Energization Engineer (T&E) or BPA System Protection and Control (SPC) employee will lead the job briefing and approve any wiring work, including shorting, lifting, or landing wiring on CT terminal blocks.
- 11.2 Only Qualified Electrical Workers who have completed BPA's CT Safety Training within the last 3 years will perform work on CT secondary circuits, which are normally in service.
- 11.3 The job briefing shall cover all hazards and all CT secondary short locations.

CHAPTER 3 – WORK ON BPA RIGHT-OF-WAYS AND TOWERS

1. EMPLOYER RESPONSIBILITIES

The Contractor is required to provide Qualified Electrical Workers who have demonstrated skills and knowledge related to construction and operation of electrical equipment and installations and have received safety training to identify the hazards and reduce the associated risks. All work will be performed in accordance with 1910.268, Telecommunications work, as applicable.

For clearance holder requirements, see the Clearance, Hold Order, and Work Permit Procedure for Contractors (CHOWPP) document. Contact your COR for a copy of the CHOWPP document.

2. RADIO FREQUENCY EXPOSURE (1926.54) (1910.97) (1910.268) (IEEE C95.1)

Radio Frequency (RF) exposure can be harmful to workers within RF fields of high exposure levels. BPA has established a minimum safe working distance of 5 feet in all directions around structure-mounted transmitting antennas, to keep workers outside the RF field. Workers may be closer than the minimum safe working distance for a brief period of time, such as while climbing past an energized transmitting antenna. Workers may remain closer than the minimum safe working distance for extended periods of time only if using a personal RF Exposure Monitor, which alarms with respect to maximum permissible exposure levels. If the personal RF monitor signals an alarm for a level greater than the maximum permissible exposure level, the emitting antenna should be de-energized during the period of worker exposure, and in no case will the exposure exceed 6 minutes in any 15-minute period.

BPA structures at communications sites such as radio stations and substations may have antennas that may be energized without notice. A personal RF monitor will be worn at all times at these sites while working on the structure. Personnel should not assume that the area is without RF exposure. If the work required exceeds the maximum permissible exposure, the land mobile radio(s) and/or PCS/wireless equipment should be de-energized and tagged.

The 5-foot rule stated here is based on a system-wide average for most PCS/Cellular, HF, VHF, UHF, 700 MHz, and 800 MHz antennas on BPA communications structures (transmission towers, communications towers, buildings, poles). The minimum safe working distance for these antennas may be greater than or less than 5 feet. Any antenna that requires a minimum safe working distance greater than 5 feet will have a warning sign posted to indicate the safe working distance and listed in the BPA TLM database.

At ground level, workers should be at a safe distance from BPA structure-mounted transmitting antennas. However, broadcast antennas, radar antennas, and paging systems at foreign sites adjacent to BPA communications structures can emit RF energy that exceeds the maximum permissible exposure levels. For sites identified as having excessive exposure levels, a personal RF monitor must be worn at all times. If the personal RF monitor indicates excessive levels and work is thought to exceed 6 minutes in a 15-minute period, the worker will contact the foreign adjacent site owner and request a reduction in transmit power level while BPA work is in progress.

Vehicle-mounted transmitting antennas have a safe working distance of 2 feet (24 inches) while transmitting. The exposed metal parts of a vehicle-mounted transmitting antenna will never be touched while transmitting as it will produce a painful burn on bare skin.

3. MINIMUM CREW SIZE

When climbing structures, all work crews will have a minimum of 1 Qualified Electrical Worker and another electrical worker (electrical apprentice or journey-level worker in training) who has been

approved by both the Contractor's personnel responsible for directing the work task and the qualified line worker involved.

- 3.1 The minimum crew for installing PPGs will consist of 2 Qualified Electrical Workers, or one Qualified Electrical Worker and an electrical worker (electrical apprentice or journey-level worker in training) who has been approved by both the Contractor's personnel responsible for directing the work task and the Qualified Electrical Worker involved. When working on line structures, the required electrical workers must be in the structure and be assisted by adequate help on the ground.
- 3.2 When applying PPGs on transmission lines, the required electrical workers will be in the structure and/or an aerial lift device and be assisted by adequate help on the ground. These required electrical workers will work closely together observing each other testing for voltage and applying PPGs. Additional PPG sets may be installed on the same circuit and all sets may be removed by one Qualified Electrical Worker and one other worker;
- 3.3 Additional PPG sets may be installed on the same circuit and all sets may be removed by 1 qualified line worker and one other worker.
- 3.4 All other electrical work crews will have a minimum ratio of one Qualified Electrical Worker to one non-qualified worker. Crews not performing electrical work or aerial work (e.g., road crews) need not comply with this requirement.
- 3.5 A crew is defined as a group of workers performing a task at the same work location. A work location is defined as a specific tower site or conductor span between towers.
- 3.6 The Contractor will provide for prompt rescue of employees in the event of a fall or ensure that employees are able to self-rescue. [1926.502\(d\)\(20\)](#). See Chapter 1, Section 23 for additional Fall Protection requirements.

4. CLEARANCE, HOLD ORDER, AND WORK PERMIT PROCEDURE FOR CONTRACTORS

This procedure contains the rules and procedures to be followed by Clearance certified contract workers, when communicating the issuing/releasing of Clearances, Hold Orders, and Work Permits on BPA and Foreign Utility power systems.

A concurrent clearance meeting will be required prior to issuance of any outage when two or more qualified electrical workers are issued clearances with the same clearance limits on a line.

- 4.1 All permissible methods of communications will be addressed along with the work plans and locations of PPG's.
- 4.2 Site-specific safety plans for all parties will be shared.
- 4.3 Representatives for ALL on-site parties will be present.

Contact your COR for coordination.

5. ELECTRICAL—GENERAL (1926, [Subpart K](#), [Subpart V](#))

Electrical safety has long been recognized by OSHA and other entities as a serious workplace hazard. Contractor's must ensure they take the requisite steps to protect employees exposed to the hazards of; electrical shock, electrocution, fires, and explosions.

- 5.1 Identification of Circuits. No work will be performed on any circuit until a Qualified Electrical Worker who holds an electrical work permit has established positive identification of all electrical circuits in the work area. Before work begins, a Qualified Electrical Worker/Person in charge will ascertain by inquiry, direct observation and by instruments, whether any part of an electric power circuit (exposed or concealed) is located such that the performance of work could bring any person, tool, or machine into physical or electrical contact with it. This verification procedure will be documented prior to work beginning.
- 5.2 Voltage Testing.
The Contractor will ensure that, unless a previously installed ground is present, employees test lines and equipment and verify the absence of nominal voltage before employees install any ground on those lines or that equipment.
- 5.3 If there is any indication that the circuit being tested is still energized at full line potential, the employee will:
 - 5.3.1 Not apply Portable Protective Grounds;
 - 5.3.2 Maintain Minimum Approach Distance;
 - 5.3.3 Recheck circuit identification;
 - 5.3.4 Notify dispatcher.
- 5.4 Attachment points of portable protective grounds and bonding jumpers will be made conductive by removing any paint or corrosion before attachments are made.
- 5.5 When Personal Protective Grounds (PPGs) are required, they will be installed as close to the work being performed as practical and properly secured in such a manner as not to be disturbed during the course of the work or come in contact with personnel.
- 5.6 Information related to Grounds, Portable Protective, Special Requirements is available at BPA.gov.
- 5.7 No disconnect switch, power circuit breaker, transformer, wave trap, fuse, or current limiting reactor will be part of the protective grounding circuit.

Note: Does not apply to a visible single-turn primary such as in a “donut” CT circuit.

- 5.8 Minimum Crew Size (PPGs):
 - 5.8.1 The minimum crew for installing PPGs will consist of 2 Qualified Electrical Workers, or 1 Qualified Electrical Worker and an electrical worker (electrical apprentice or

journey-level worker in training) who has been approved by both the Contractor's personnel responsible for directing the work task and the Qualified Electrical Worker involved.

5.8.2 The minimum crew for removing PPGs will consist of 1 Qualified Electrical Worker and 1 other worker.

5.9 Installing and Removing PPGs:

5.9.1 All PPGs will be installed and removed with approved live-line tools.

5.10 Flammable liquids within 70 ft of conductors energized at voltages of 345 kV and higher will not be transferred from one metal container to another unless the two have been electrically bonded together to eliminate arcing.

6. HAND LINES AND ROPE USED IN ENERGIZED CORRIDORS

The Contractor will make every effort to ensure that hand lines and other rope used in energized corridors are maintained in as dry and clean a condition as possible in order to maintain a high resistance, dielectric condition. Hand lines and ropes will not be left in work positions overnight.

7. PROXIMITY OF EQUIPMENT, MACHINERY, AND VEHICLES TO TRANSMISSION LINE STRUCTURES

Equipment, machinery, and vehicles traveling on BPA's right-of-way will follow the MAD, Table 1, for any BPA transmission line structure or guy wires unless:

7.1 Guy wires have been flagged before work commences;

7.2 Spotters are used to ensure safe work distances from structures.

8. COUNTERPOISE

There may be buried counterpoise (a mini-ground mat) associated with the structures, and the Contractor will avoid cutting or damaging the counterpoise. Counterpoise may extend the full width of the ROW and hundreds of feet in any direction from the structures. Locates may be required to determine extents.

8.1 If the counterpoise is compromised in any way immediately notify the COR and onsite BPA Representative.

9. STRINGING OR REMOVING CONDUCTOR

Stringing includes all activities associated with the installation of the primary conductors onto the transmission line structures. These activities include the installation of conductor, ground wire, insulators, stringing sheaves (rollers or travelers), vibration dampeners, weights, suspension and dead-end hardware assemblies. Due to the critical nature and the hazards associated with this work, the Contractor will ensure a JHA has been prepared and ensure hazards addressed in their SP.

9.1 Prior to stringing operations a job briefing will be held setting forth the plan of operation and specifying the type of equipment to be used and portable protective grounding procedures to be followed.

9.2 All pulling and tensioning equipment will be isolated, insulated, or effectively grounded.

- 9.3 During stringing operations, each bare conductor, sub-conductor, and overhead ground conductor will be grounded at the first tower adjacent to both the tensioning and pulling setups:
- 9.3.1 These grounds will be left in place until conductor installation is completed;
 - 9.3.2 Such grounds will be removed as the last phase of aerial cleanup;
 - 9.3.3 Grounds will be placed and removed with a live-line tool.
- 9.4 Each conductor, sub-conductor, and overhead ground conductor will be grounded at all dead-end or catch-off points. Work on dead-end towers will require grounding on all de-energized lines.
- 9.5 A ground will be located at each side and within 10 feet of working areas where conductors, sub-conductors, or overhead ground conductors are being spliced at ground level. The two ends to be spliced will be bonded to each other.
- 9.6 All conductors, sub-conductors, and overhead ground conductors will be bonded to the tower at any isolated tower where it may be necessary to complete work on the transmission line.
- 9.7 Grounds may be removed as soon as the work is completed: Provided that the line is not left open circuited at the isolated tower at which work is being completed. (Grounds on an isolated line section will not be removed until jumpers are closed.)
- 9.8 Contractors stringing over energized lines will use tension stringing methods, guards, barriers, and/or other methods to positively prevent accidental contact with those lines. Contractors will make arrangements to obtain either a Clearance or a Hold Order when crossing over or under any line energized in excess of 600 volts. Contract workers who are required to take Clearances or Hold Orders on foreign utility lines, or obtain a foreign utility Clearance or Hold Order through the BPA Dispatcher (as a result of a foreign utility's policy) for such proximity work must first obtain a BPA Term Contractor Certification. Qualified applicants must pass a test administered by BPA's Substation Operations Group.

CHAPTER 4 – COMMERCIAL AVIATION SERVICES (CAS)

In addition to the requirements of Chapter 1, the following specific work requirements apply to all CAS at BPA.

1. GENERAL - APPLICABLE TO ALL CAS OPERATIONS

- 1.1 The Contractor has sole responsibility for the airworthiness, operation, and safety of the aircraft operations and the public during the conduct of operations.
- 1.2 An aircraft is defined by the FAA as a device that is used or intended to be used for flight in the air. A drone/UAS/UAV is classified as an aircraft by the FAA.
- 1.3 Small Unmanned Aircraft Systems (sUAS) (defined as those under 55 lbs) are the only type of unmanned system currently allowed to operate under contract at BPA. For a description of those items, from this section, that are not applicable to sUAS's, see the sUAS section in this chapter.
- 1.4 CAS contractor performing work under this contract must comply with all the applicable regulations contained in the Code of Federal Regulations (CFR) with particular emphasis on the Federal Aviation Administration (FAA) Title [14 CFR](#) and various sections of the Transportation [Title 49 CFR](#). This chapter will attempt to not repeat regulations/requirements already addressed in the CFR's but instead will augment those regulations with requirements specific to CAS operations at BPA. Additionally, BPA has made a declaration to the FAA that aircraft operations, for BPA, are civil aircraft and not public aircraft, at any time, while in service to BPA.
- 1.5 CAS Assessment/Audit. All CAS vendors must be vetted by the Department of Energy (DOE), through BPA's Aircraft Services, prior to the performance of any work on BPA's power system or property.
 - 1.5.1 An initial assessment, and thereafter every 2 years if a continuing need exists, will be made by the Aircraft Service Manager, their designee or DOE aviation consultant to ensure that the Contractor meets the qualifications for this contract.
 - 1.5.2 The assessment will be conducted by Bonneville Aircraft Services, their designee, or the DOE aviation consultant. The CAS vendor must provide access to, as applicable, the Contractor's, FAA Certificates/Ops Specs, General Operations Manual, Rotorcraft Load Combination Manual, General Maintenance Manual, Safety Management System document, aircraft maintenance and inspection records, pilot training records, and key management personnel.
 - 1.5.3 The DOE Office of Aviation Management will accept Contractors, on a case-by-case basis, which have been approved by the Department of Defense (DOD) and/or other Executive Agencies. Requests for this alternate acceptance method must be made through BPA Aircraft Services.
- 1.6 Aviation Job Hazard Analysis (JHA). The Contractor will submit, to the project contracting officer, an Aviation JHA for review by BPA's Aircraft Services at least 10 business days in advance of any proposed flight operations.
 - 1.6.1 This JHA will identify the projects associated Aviation Hazards, the risks associated with those hazards, the contractors proposed risk mitigation and the resulting risk after

mitigation.

1.6.2 The contractor will use BPA's [Aviation JHA template](#).

1.7 Flight Notification Requirements. To help mitigate the potential for mid-air collision with other BPA aircraft, when the aircraft operation requires flight within or along a BPA right-of-way the CAS Vendor must open and close a flight notification with BPA Aircraft Services, Monday – Friday, as detailed below. This notification will be completed at least 24 hours prior to the start of any flight operations. For flight operations being conducted over several days, one flight notification will suffice and is desired. For flight operations in one general location (Static Operations) a single route of flight encompassing the project location/s will suffice. For projects that encompasses multiple locations throughout the system, an attachment detailing these multiple locations will be provide to BPA Aircraft Services during the flight notification process.

These requirements do not relieve the Contractor from their responsibility to adhere to the vendor's own flight locating procedures.

1.7.1 Contact BPA Aircraft Services at (Preferred Method) Email: Aircraftsvrc@bpa.gov or Phone (503) 230-4100 at least 24 hours (M-F) prior to commencing flight operations;

1.7.2 Provide the following information below:

BPA CAS FLIGHT NOTIFICATION	
SUBJECT:	BPA CAS FLIGHT NOTIFICATION
CONTRACT NAME:	e.g. - N. Bonneville-Midway 230 Insulator replacement OR West Summer Lidar
CAS PROVIDER:	e.g. -ABC Aviation INC.
START:	e.g. - 01 JUL 2021
END:	e.g. - 30 AUG 2021
LOCATION:	e.g. – N. Bonneville-Midway 41/1 to 25/1 OR if the location involves numerous locations such as those of a LIDAR project or a project involving the replacement of numerous marker balls then attach an Excel spread sheet or other document showing the lines and general idea of work flow. e.g. West Summer Lidar locations attached and will be working North WA to Southern OR.
POINT OF CONTACT/S NAME AND PHONE #:	e.g. – Joe Smith Cell: (xxx) xxx-xxxx. (This Point of Contact/s should be available for the duration of the project.
Attachments	Attach Excel/Word document describing the project locations if required.

1.7.3 Upon completion of flight operations, contact BPA Aircraft Services at (Preferred Method) Email: Aircraftsvrc@bpa.gov or Phone (503) 230-4100 and inform them that fight operations are complete.

- 1.8 Quarterly Reporting. The Contractor is required to submit quarterly reports of flight hours, costs, and other relevant information listed below to the Bonneville Aircraft Service's Manager or designee via the contracts designated BPA Contracting Officer. This data is uploaded into Government Service Administration's (GSA) Federal Aviation Interactive Reporting System (FAIRS). BPA's Fiscal year starts on the 1st of October and the report dates are: January 15, April 15, July 15, and October 15. The report must, at a minimum, include:
- 1.8.1 Reporting Quarter, e.g. 1st Quarter FY 2021;
 - 1.8.2 Agreement Start date;
 - 1.8.3 Agreement End Date;
 - 1.8.4 Aircraft Manufacturer;
 - 1.8.5 Aircraft Model;
 - 1.8.6 Vendor Name;
 - 1.8.7 Vendor Location;
 - 1.8.8 Registration #;
 - 1.8.9 Costs;
 - 1.8.10 Flight Hours; and
 - 1.8.11 Mission Description.

Note: This reporting requirement is applicable to any aircraft operations by either the Contractor or their Subcontractor.

- 1.9 Safety Management. The Contractor will have implemented an Integrated Safety Management System/Safety Management System (ISMS/SMS), as specified in Chapter 1, which is subject to review by Bonneville Aircraft Services.
- 1.10 Reporting of Aircraft incidents and accidents. In addition to the incident reporting/investigation requirement of chapter 1 the Contractor will:
- 1.10.1 Comply with all applicable parts of the notification and reporting requirements in [49 CFR Part 830](#).
 - 1.10.2 Immediately notify the Bonneville Aircraft Services' Manager/Director of Operations, or Chief Pilot or designee (Phone (503) 230-4100) if while in service to BPA an aircraft accident, incident, or FAA violation occurs.
- 1.11 Flight Tracking. Aircraft equipped with position tracking devices will have the device functional during the times they are working for Bonneville, or on Bonneville property.
- 1.12 Fatigue Management. Contractor will have a fatigue management program in place and establish a flight and duty hour schedule meeting the following minimum requirement.

- 1.12.1 Maximum flight time will be limited to 8 hours in each 24 hour period; except that an exceedance of 8 hours flight time may be allowed by permission of the BPA Aircraft Services Manager to complete a specific mission or for an emergency flight;
 - 1.12.2 The pilot must have 10 hours of uninterrupted rest prior to beginning the next duty period in which flight operations will be conducted.
- 1.13 Drug and Alcohol Program. If an operator is conducting aerial work under 14 CFR Part 91 or only certified to operate under 14 CFR Part 133, then the company should have a company drug and alcohol program in place covering all pilots, mission crew and ground support personnel.
- 1.14 Weight and Balance. The Contractor must perform, and record, weight and balance calculations prior to flight to ensure that aircraft are within the manufacturers and FAA established weight and balance limitations for each operation, flight, or mission profile for which the aircraft are to be operated. Unless otherwise approved by the FAA, actual weights will be used for the weight and balance calculations.
- 1.15 Aircraft Maintenance Programs:
- 1.15.1 The Contractor will only provide aircraft maintained, airworthy and safe for the intended operation in accordance with an FAA maintenance and inspection regulations [14 CFR](#) Parts 21, 43, §91.409, 133 or the Contractor's FAA Part 133 Operations Specifications and/or 135, if Part 135 is applicable.
 - 1.15.2 The Contractor must provide aircraft that have completed an annual inspection and been approved for return to service in accordance with [14 CFR, Part 43](#), and the manufacturers approved inspection program or an FAA accepted/approved alternative method of inspection (e.g. AAIP, CAMP, AIP).
 - 1.15.3 The Contractor must comply with the mandatory replacement times, inspection intervals, and related procedures specified in the manufacturer's maintenance manual or instructions for continued airworthiness applicable to the make and model of aircraft, and additional equipment; or comply with the section or alternative inspection intervals and related procedures set forth in the operator's FAA approved maintenance program defined in 14 CFR Part 91.409 or if applicable the vendor's FAA Operations Specifications or International Aviation Authority's equivalent.
 - 1.15.4 Must comply with all applicable Airworthiness Directives to the make and model of aircraft and engines, and propellers.

2. AERIAL SURVEYS (14 CFR Part 91)

- 2.1 Aircraft supporting BPA construction/maintenance and/or Vegetation Management activities may be used for any of the following: aerial surveys, Light Detection and Ranging (LiDAR) data acquisition, and aerial photography. The personnel transported during these operations must be essential to or directly associated with the aircraft operation.
- 2.2 While [14 CFR Part 119](#) allows the carriage of personnel for "power line patrol" to be flown under 14 CFR Part 91, BPA does not allow this exception for BPA personnel. Any carriage of BPA personnel will be conducted in accordance with the passenger transport (14 CFR Part 135)

provisions listed in this chapter.

3. HELICOPTER – EXTERNAL LOAD WORK ([14 CFR Part 133](#))

3.1 External load work authorized. Helicopters supporting BPA construction/maintenance and/or Vegetation Management activities may be used for any of the following external load operations:

- 3.1.1 **Class A:** Is an external load that cannot move freely, cannot be jettisoned, and does not extend below the landing gear. An example of a Class A operation is the carriage of supplies in an approved cargo rack, bin or seat affixed to the exterior of the aircraft.
- 3.1.2 **Class B:** Is an external load, carried above or below the skids of the aircraft, which can be jettisoned and is lifted free of land and/or water by a cargo hook or winch. An example of a Class B operation is the placement of utility poles/insulators or tree cutting with an aerial saw.
- 3.1.3 **Class C:** Is an external load that can be jettisoned and a portion of the load remains in contact with land or water. Example of a Class C operation is the stringing of sock line for conductor/static replacement/install.
- 3.1.4 **Human External Cargo (HEC):** HEC operations are subsets of Class A and B operations. HEC is a person(s) that at some point in the operation is carried external to the helicopter.
 - 3.1.4.1 Examples of Class A HEC is platform work for installing bird diverters or marker balls.
 - 3.1.4.2 Examples of Class B HEC are ground/tower to tower transfers or marker ball installation.

In all cases, the person(s) being transported during these external load operations must be essential to the external load operations or a person who is necessary to accomplish the work activity.

3.2 Loads suspended from rotorcraft. ([1926.551](#))

Helicopters used for handling suspended loads will comply with the Federal Aviation Administration (FAA) regulations.

- 3.2.1 Before each day's operation, a briefing will be conducted to set forth the plan of operation for the pilot and ground personnel.
- 3.2.2 Loads will be properly rigged:
 - 3.2.2.1 Tag lines will be of a length that will not permit their being drawn up into the rotors.
 - 3.2.2.2 Pressed sleeve, swaged eyes, or equivalent means will be used for all suspended loads to prevent hand splices from spinning open or wire clamps from loosening.

- 3.2.3 All electrically operated cargo hooks will have an electrical activating device so design and installed as to prevent inadvertent operations
- 3.2.4 Cargo hooks will be equipped with an emergency mechanical control for releasing the load.
- 3.2.5 Cargo hooks will be tested prior to each day's operation to determine that the release functions properly, both electrically and mechanically.
- 3.2.6 Every practical precaution will be taken to provide for the protection of the employees from flying objects in the rotor downwash. All loose gear within 100 ft. of the place of lifting or depositing the load, and all other areas susceptible to rotor downwash, will be secured or removed.
- 3.2.7 The helicopter will be responsible for the size, weight, and manner in which loads are connected to the helicopter. If, for any reason, the helicopter pilot believes the lift cannot be made safely, the lift will not be made.
- 3.2.8 When employees are required to work under hovering craft, safe access will be provided for employees to reach the hoist line hook and engage or disengage cargo slings. Employees will not work under hovering craft except to hook, unhook, or position loads.
- 3.2.9 Static charge on the suspended load will be dissipated with a grounding device before ground personnel touch the suspended load, or protective gloves will be worn by all ground personnel touching the suspended load.
- 3.2.10 The weight of an external load will not exceed the rated capacity for the rotorcraft.
- 3.2.11 No unauthorized person will be allowed to approach within 50 ft of the helicopter when the rotor blades are running.
- 3.2.12 Constant and reliable communications between the pilot and a designated employee of the ground crew who acts as the signal person during loading and unloading, will be maintained. The signal person will be distinctly recognizable from other ground personnel. Hand signals used will be per ASME B30.12.
- 3.3 Electrical Training. Personnel associated with any external load operation will have received briefings or training on induced voltage hazards and other electrical hazards when working in a high voltage environment. The Contractor will provide training records documenting this training for review, upon request.
- 3.4 Maximum Winds. A maximum wind speed will be established by the Contractor and before the start of each project or lift, based on the effect of wind on the load and helicopter load capacity. Wind speed will be monitored and helicopter-lifting operations will cease when this limit is reached. It is strongly suggested that no helicopter external load operations be conducted in winds higher than 30 knots.

- 3.5 Tower sections/poles/cross arms. When helicopters are used to land tower sections or poles or cross arms, the following will apply:
- 3.5.1 When landing a tower section load in an elevated position, a positive guide and positioning system will be used. Fabricated temporary load carrying devices must be designed and stamped by a Professional Engineer and will be of sufficient strength to safely support the specific load calculated for each load placement. Working Load Limits must be posted and visible on all lifting devices;
 - 3.5.2 Qualified workers may work under a hovering helicopter only to guide and temporarily secure loads, and to attach or disengage load lines;
 - 3.5.3 Loads will not be released until all tower legs, pole or cross arms are secured. Line workers will not belt off to unsecured tower sections or cross arms, and will not climb on to unsecured tower sections, pole, or cross arms.
- 3.6 Congested Area Plan. When a congested area plan is required by FAR 133 the Contractor will be responsible for preparation and submittal for approval to the FAA in advance of the lift. A copy will be available to BPA Aircraft Services at their request.
- 3.7 Class C Stringing. In addition to the stringing provisions of Chapter 3, when performing any Class C stringing external load operations the CAS vendor will ensure that:
- 3.7.1 All puller-tensioners used for pulling line with a helicopter will be used in the free-wheel mode only and will have a braking system adequate to achieve tension necessary to maintain needed control of the line.
 - 3.7.2 If a breakaway device is used in conjunction with a helicopter line pull, the CAS vendor will ensure that:
 - 3.7.3 All personnel remain in the clear to protect them from any hazard in the event of an inadvertent breakaway;
 - 3.7.4 The breakaway device is inspected before each pull. If damage is suspected the device must be replaced;
- 3.8 Electrical Environment. In addition to the other provisions related to operations in the electrical environment stated in this document, when performing any Class B external load operations in the electrical environment, the CAS vendor will ensure that:
- 3.8.1 All long lines are non-conductive material and provide for an adequate aircraft clearance of 20 feet minimum from any infrastructure including towers, conductors, overhead ground wires or terrain features such as trees for the operation being conducted.
 - 3.8.2 When external load operations are conducted in the wire environment involving an interaction with workers, except for tower or pole placements, an electrically activated remote hook should not be used, due to the potential of induced voltage to the worker that may result in injury.
 - 3.8.3 Must be knowledgeable and familiar with the applicable guidance and hazards identified in the Helicopter Association International's Utilities, Patrol and

Construction Guide.

3.9 Minimum Approach Distance (MAD):

- 3.9.1 The CAS vendor will not perform any work on energized BPA high voltage conductors or equipment and will not come within the MAD of energized lines or equipment except under the provisions of a Work Clearance.
- 3.9.2 All conductors and equipment will be treated as energized unless the Contractor has been informed by a qualified BPA Clearance Holder at their job site that the line or equipment is de-energized and cleared for the Contractor to perform their work.

3.10 Daily Job Briefings:

- 3.10.1 In addition to the Job Briefing requirements listed in Chapter 1, the Contractor will conduct a daily job briefing each day with aviation safety as an integral part of the briefing. The Contractor will maintain written documentation of daily job briefings. These reports will be made available to BPA upon request. Each briefing will include the following:
 - 3.10.1.1 Identify the line(s), the line voltage, and the appropriate MAD;
 - 3.10.1.2 Identify the specific work methods that will be used to prevent a violation of the MAD by Contractor personnel on this project or release;
 - 3.10.1.3 Identify the qualified personnel needed to safely complete the work;
 - 3.10.1.4 Identify if a Clearance or Hold Order will be required to safely conduct the work on each specific release or project;
 - 3.10.1.5 Identify any other hazards recognized by the Contractor after an inspection of the work area and how those hazards will be mitigated or controlled;
 - 3.10.1.6 All required PPE will be inspected prior to use.

3.11 Communications:

- 3.11.1 The Contractor will ensure that field supervision maintains a reliable method of emergency communications from all right-of-way work areas in the event of accident or illness.
- 3.11.2 The Contractor will ensure that field supervision maintains reliable communications at all times with the BPA Clearance Holder when working under the protection of a Clearance or Hold Order.
- 3.11.3 The vendor will ensure during all Class A and B external load operations that all workers can communicate either by radio or combination of hand and head signals during the external load operation. Loss of communication or lack of understanding between the pilot and workers as to the meaning of the hand and head signals will require the work to stop, until effective communications are re-established.

3.12 Experience: Pilots must have 200 hours or more of vertical reference long line experience when operating in the wire environment;

4. PASSENGER TRANSPORT ([14 CFR Part 135](#))

All contracts pertaining to passenger transport, of BPA personnel, will be procured through BPA's Aircraft Service organization. Under no circumstances will a CAS operator, operating under the provisions of 14 CFR 91 or 133 permit BPA personnel to be transported via their aircraft.

5. SMALL UNMANNED AIRCRAFT SYSTEMS (sUAS) SERVICES – COMMERCIAL AVIATION SERVICES (sUAS)

5.1 The Contractor will comply with all provisions and restrictions listed under 14 CFR, Part 107.

5.2 All operations must remain outside of all MADs listed in this document.

5.3 Some sUAS operators can be considered non-CAS operators (those operators that have been contracted to provide a deliverable to BPA and the means by which they chose to provide that deliverable is not reasonably determined to require a sUAS). For example, an excavator providing weekly progress calculations using a sUAS and software processing instead of a measuring tape and theodolite. These types of operations do not have to meet the vetting and quarterly reporting requirements of this chapter.

5.4 The FAA does not require sUAS's to comply with current agency airworthiness standards or obtain aircraft certification, therefore sUAS's are excluded from the Maintenance/airworthiness standards of this chapter.

CHAPTER 5 – VEGETATION MANAGEMENT

In addition to the requirements of Chapter 1, the following specific work requirements apply.

1. DAILY JOB BRIEFINGS

1.1 The Contractor will conduct a daily job briefing each morning with safety as an integral part of the briefing. Job briefings will be held at the job site with additional briefings conducted when work situations changes, that may pose different or additional hazards to workers. The Contractor will maintain written documentation of daily job briefings, Contract Tailgate Meeting, or an equivalent form approved by BPA. These reports will be made available to BPA upon request. Each briefing will include the following:

- 1.1.1 Identify the line(s), the line voltage, and the appropriate MAD;
- 1.1.2 Identify any trees or brush on each project or release that if felled, could violate the MAD. Identify specific methods or tools that will be used to determine the potential for trees to fall within the MAD;
- 1.1.3 Identify the specific work methods that will be used to prevent a violation of the MAD by Contractor workers on this project or release;
- 1.1.4 Identify the qualified personnel needed to safely complete the work. All work conducted where an electrical hazard exists will be performed by qualified line clearance tree trimmers (QLCTT). Trainees will work under the direct supervision of a qualified line clearance tree trimmer;
- 1.1.5 Identify if a Clearance or Hold Order will be required to safely conduct the work on each specific release or project;
- 1.1.6 Identify any other hazards recognized by the Contractor after an inspection of the work area and how those hazards will be mitigated or controlled.

Note: This inspection and hazard analysis must be done by a QLCTT when an electrical hazard exists; all required PPE will be reviewed.

1.2 Large Scale Logging Operations. For large scale logging operations, such as clear-cutting timber associated with a BPA land sale, or clearing timber for a new/replacement transmission line, the Contractor will submit a SP to the BPA Safety Organization for review and comment.

2. MINIMUM QUALIFICATIONS FOR CONTRACTOR WORKERS

- 2.1 The pruning, trimming, repairing, maintaining, removing, treating, or clearing of trees or the cutting of brush that is within the MAD of electrical lines or equipment, specified is available at bpa.gov for performed by qualified line clearance tree trimmers.
- 2.2 The Contractor will ensure and be able to document that all QLCTTs working on this project or release meet the following minimum qualifications:
 - 2.2.1 Be certified as having completed a program consisting of both coursework and supervised on-the-job training under a recognized line clearance tree trimmer training program. This program will include at a minimum, the safety and training

requirements outlined in OSHA [1910.269\(r\)](#), ANSI Z133.1, *Safety Requirements for Arboricultural Operations*, and applicable State standards;

2.3 The Contractor will make available, upon request by the CO or authorized representative of the CO, documentation verifying worker qualifications.

2.4 Company Requirements:

2.4.1 Provide certificates and attestations to the BPA Contracting Officer annually, by January 1st of each year.

3. MINIMUM CREW SIZE – VEGETATION MANAGEMENT

3.1 When climbing, all work crews will have a minimum of one qualified worker and another electrical worker (electrical apprentice or journey-level worker in training) who has been approved by both the Contractor's personnel responsible for directing the work task and the qualified line worker involved.

3.2 When climbing any tree where any portion of the tree, work tools, or equipment can enter Zone B, a second Qualified Worker/QLCTT equipped with a second set of climbing tools will be available on the job.

3.3 When a qualified worker is climbing a tree and working above 12 feet in height, a second Qualified Worker equipped with a second set of climbing tools will be available on the job that is trained and knowledgeable in rescue methods. 3.4 When sagging from a structure (by transit or other), all crews will consist of one worker on the ground qualified in climbing rescue or one of the following:

3.3.1 A ground worker with radio contact with an onsite worker qualified in climbing rescue;

3.3.2 Continuous radio contact with an onsite worker qualified in climbing rescue; or

3.3.3 Visual contact with another worker qualified in climbing rescue.

4. TREE FALLING

4.1 The safety of the Contractor's workers and the public, and the integrity of the BPA system will be the Contractor's primary considerations when felling trees on energized right-of-ways. If a conflict or question arises over proper procedure, the safest, most stringent or most conservative interpretation will initially apply and the CO, COR or the onsite BPA Representative will be contacted to resolve the issue.

4.2 It is not acceptable to fall trees on BPA lines, equipment or structures whether they are energized or de-energized. All Zone A or B trees (See MAD Chapter 1, Section 46) will be directionally felled away from transmission lines and towers using methods appropriate to ensure the direction of fall.

4.3 Additional methods of mechanical control will be used to safely and positively control the direction of fall whenever:

- 4.3.1 Lodged trees are encountered. Domino falling is not an adequate method of positive control;
- 4.3.2 Wind or other conditions make directional falling dangerous or uncertain. Alternately, work will be temporarily suspended until conditions improve;
- 4.3.3 Decay, rot or other weak spots are present or suspected;
- 4.3.4 A clear falling path cannot be ensured.
- 4.4 A clear falling path will be assured or:
 - 4.4.1 The tree will be felled under the protection of a Clearance; or
 - 4.4.2 Positive control will be maintained by mechanical equipment; or
 - 4.4.3 The tree will be climbed and pieced out.
 - 4.4.4 A safe work zone and escape path will be established before a tree is felled.
- 4.5 Sufficient hinge wood will be left to hold the tree to the stump during its fall and to guide the intended direction of fall.

5. FLAMMABLE LIQUIDS

- 5.1 Cutters will not carry portable containers containing flammable liquids on their person.
- 5.2 All storage, handling, and use of flammable liquids will be in accordance with NFPA 30, NFPA 30A, or other applicable standards under the supervision of a qualified person.
- 5.3 All sources of ignition will be prohibited in areas where flammable liquids are stored, handled, and processed. Suitable "NO SMOKING, MATCHES, or OPEN FLAME" signs will be posted in all such areas.
- 5.4 Flammable liquids within 70 ft of conductors energized at voltages of 345 kV and higher will not be transferred from one metal container to another unless the two have been electrically bonded together to eliminate arcing.

6. COMMUNICATIONS

- 6.1 The Contractor will ensure that field supervision maintains reliable communications at all times with the BPA Clearance Holder when working under the protection of a Clearance or Hold Order.

7. MINIMUM APPROACH DISTANCE (MAD)

- 7.1 The Contractor will not perform any work on energized BPA high voltage conductors or equipment and will not come within the MAD of energized lines or equipment except under the provisions of a Work Clearance. In addition to these requirements, please refer to the MAD tables and information found in Chapter 1, Section 47.

- 7.2 All conductors and equipment will be treated as energized unless the Contractor has been informed by a qualified BPA Clearance Holder at their job site that the line or equipment is de-energized and cleared for the Contractor to perform their work.
- 7.3 When applying herbicide, all overspray will be considered conductive. Wind and other conditions will be taken into account to ensure that the MAD is not violated by overspray or equipment.