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Level 2 Program Requirements Document

Revision	Record of Issue/Revision	Affected Pages
2	Minor Revision/Periodic Review: Minor Revision/Periodic Review: Added Appendix A, *Regulatory Requirements Flow Down*, and associated step in 1.0, *Purpose*; grammatical changes as needed.	All

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CONTENTS

1.0 PURPOSE

1.1 This document establishes the Fluor-BWXT Portsmouth LLC (FBP) Electrical Utility Safety Program (EU) implemented at the Portsmouth Gaseous Diffusion Plant (PORTS).

1.2 The program provides requirements as well as safe work practices used by qualified utility workers performing work on the transmission and distribution (T&D) equipment.

1.3 This program also references other FBP site programs as it relates to work on the EU system.

1.4 This document implements applicable requirements from the following:

- 29 Code of Federal Regulations (CFR) 1910.269, *OSHA Electric Power Generation, Transmission, and Distribution*
- ANSI C2, *National Electric Safety Code* ® (NESC)

1.5 This document implements applicable regulatory requirements. They are listed in Appendix A, *Regulatory Requirements Flow Down*.

2.0 SCOPE AND APPLICABLITY

2.1 This Level 2 program requirement document applies to systems that are under the exclusive control of FBP for the operation and maintenance of the site T&D lines and equipment. This also covers:

- Related equipment for communication and metering of the electrical T&D systems
- Street and security lights that are supplied by distribution transformers
- Work on the FBP T&D system performed by sub-contractors and vendors

2.2 This program requirement document applies to all qualified workers performing any of the tasks allowed by this document.

Exceptions: The following work will be performed in accordance with FBP-OS-PRD-00001, *Electrical Safety*:

- Street and security fence lights that are facility supplied
- Premise wiring in substations and other facilities
- Other facilities not under the exclusive control of FBP EU

3.0 TRAINING AND QUALIFICATIONS

3.1 Qualified Employee

3.1.1 Specifically trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from other live parts
- The skills and techniques necessary to determine the nominal voltage of live parts
- The minimum approach distances specified in this document corresponding to the voltages to which the qualified employee will be exposed
- The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energize parts of electrical equipment

3.1.2 Supervisor also determines if employees need additional training such as:

- Lockout/Tagout (LOTO)
- National Fire Protection Association (NFPA) 70E Standard for Electrical Safety in the Workplace
- NESC
- FBP-OS-PRD-00001, *Electrical Safety*
- FBP-OS-PRD-00003, *Electrical Utility Safety Program*
- High voltage electrical training (every three years)
- First Aid/Cardiopulmonary Resuscitation (CPR)/Automatic External Defibrillator (AED) training
- Bucket truck or pole top rescue techniques

3.2 Qualified Switchyard Electrician

3.2.1 A Switchyard Electrician will demonstrate a knowledge of the following:

- FBP Power Operations and Switchyard Maintenance equipment numbering scheme and voltage designations
- Power Operations and Switchyard Maintenance’s switching procedures (recognizing irregularities, switching orders used for all switching, etc.)

- Series lighting system
- Be able to determine the correct class of rubber gloves to protect against electrical shock and the correct combination of arc rated clothing to protect against arc flash
- Understanding of waste streams and how they are handled
- Emergency/outage response actions

3.2.2 A Switchyard Electrician will demonstrate the ability to use and understand the following:

- Pole and distributions maps
- Switching diagrams

3.2.3 Switchyard Electrician will demonstrate an ability to perform the following as necessary for their assigned task:

- Transformer turns ratio (TTR), Alternating Current (AC)/Direct Current (DC) high potential testing, micro-ohm meter, high voltage meter, ammeter, battery impendence tester, and hot stick tester test equipment
- Oil (Polychlorinated Biphenyl [PCB], mineral, R temp, silicone, and FR3) handling, packaging, and spill response activities
- Power factor testing and analysis of results
- Troubleshooting and maintenance of station equipment (i.e., batteries, 345 Kilovolts (kV) breakers, Gas Circuit Breaker [GCB], and Oil Circuit Breaker [OCB]), 13.8 kV breakers (Air Circuit Breaker [ACB] and Vacuum Circuit Breaker [VCB]), air disconnect switches, station and distribution transformers, capacitors, and lightning arresters)
- Bucket truck and material handling equipment operation including passing On the Job Training (OJT)
- Overhaul and repair of transformers

3.2.4 Switchyard Electrician will demonstrate an ability to perform the following:

- Operate the meter test equipment operation
- Operate the relay test equipment
- Be able to understand and wire current transformers, potential transformer connections

- Operate the portable meter test equipment
- Troubleshooting skills related to metering, relays, and controls
- Be able to read meters
- Be able to perform equipment installation/modifications (bending conduit, pulling wire, etc.)

3.2.5 Switchyard Electrician will demonstrate a knowledge of the following:

- Be able to troubleshoot and analyze power quality
- Have a general understanding of the Supervisory Control and Data Acquisition (SCADA) system
- Possess general computer skills
- Understand and use applicable software

3.3 Qualified Power Operator

3.3.1 Power Operator will demonstrate a knowledge of the following:

- Basic communication skills
- Substation configuration
- Various relay functions and targets
- SCADA
- Operation/maintenance of substation equipment
- Basic meter operation
- Be able to determine the correct class of rubber gloves to protect against electrical shock and the correct combination of arc rated clothing to protect against arc flash

3.3.2 Power Operator will demonstrate the ability to perform the following:

- Read and understand electrical technical documentation
- Physically be able to perform switching, meter reading, and substation cleaning activities
- To receive switching orders and perform switching at the various substations/locations

- Operational checks with little or no supervision

3.4 NERC Certified Power Operations Supervisor

Power Operations Supervisor will have the North American Electric Reliability Corporation (NERC) qualification, completed all training required for a Power Operations Supervisor, as well as demonstrate a knowledge of the following:

- Equipment numbering scheme
- Substation relay functions
- SCADA alarms and associated alarm response
- Write/issue switching orders, use the mimic board for configuration control, and perform administrative duties required of a dispatcher (i.e., answer phones, maintain the dispatchers log, make required notifications, review Equipment Change Request [ECR], load shift reports, and submitting work requests for substation trouble reports)
- Read, understand, and use electrical one line and other essential drawings
- To use SCADA to perform switching functions, system monitoring, tagging, taking equipment in and out of service, and alarm acknowledgement
- To respond to outage recovery including directing crews during off shift outage recovery

3.5 Qualified Electronic Technician (SCADA Tech)

3.5.1 A SCADA Tech will demonstrate a knowledge of the following:

- Substation locations, equipment numbering schemes, normal system configuration, substation Remote Terminal Unit (RTU), and SCADA related drawings
- Be able to ascertain the correct class of rubber gloves to use and the correct combination of arc rated clothing to protect against arc hazard and minimum levels (as required)

3.5.2 A SCADA Tech will demonstrate the ability to perform the following:

- Troubleshoot, repair, and maintenance of RTU racks
- Troubleshoot, repair, and maintenance of SCADA equipment (i.e., servers, Uninterruptible Power Supply (UPS), and power supplies)
- To perform modifications on RTU/SCADA equipment as directed by SCADA engineer

3.6 Qualified Switchyard Supervisor

The Qualified Switchyard Supervisor shall perform the following:

- Have at least the same level of electrical safety training (e.g., NESC) as the workers they supervise
- Meet company specific qualification requirements
- Supervise/direct Qualified Employees conducting the technical aspects of T&D work (i.e., they shall have skills and knowledge related to the T&D system equipment and installations)
- Have knowledge of the Electrical Utility Administrative Procedures and Job Hazard Analysis (JHA)'s

3.7 Annual Training

3.7.1 Each supervisor that falls under the requirements of this program shall determine through regular supervision and inspections conducted on at least an annual basis that each employee under their direction is complying with the work practices outlined in this program.

3.7.2 Each employee that falls under the requirements of this program shall ensure they have supervisory documentation of their proficiency and it is completed on an annual basis.

4.0 PROGRAM RESPONSIBILITES

4.1 Electrical Utility (EU) Management

4.1.1 Ensure personnel follow established company and site safety programs/procedures.

4.1.2 EU electrical safety program will be in addition to the other established safety programs and specific to work on the FBP T&D systems.

4.1.3 Develop and maintain this program in conjunction with the FBP site Integrated Safety Management System (ISMS) safety program.

4.2 Electrical Worker Supervisor

4.2.1 Performs an initial pre-job briefing when releasing the Work Control Document (WCD) to the work crew.

4.2.2 Is responsible to ensure personnel read and follow the requirements of this document.

4.2.3 Is responsible to ensure crews wear the proper Personal Protective Equipment (PPE) as it relates to shock and arc flash hazards.

4.2.4 Ensure the crews inform Power Operations of equipment deficiencies, work status and presence in/out of the substations, and any line work relating to T&D systems.

4.3 Employee

4.3.1 When performing work on energized equipment, distractions and unnecessary communication will be avoided. Communication will be limited to the task at hand.

4.3.2 Report any hazardous or potentially hazardous conditions to the supervisor.

4.3.3 Do not throw or permit anything to be thrown from an elevated position, nor allow anything to be thrown from the ground to an elevated position unless the area below is controlled by signs, barricades or attendant.

4.3.4 Wear the appropriate PPE in accordance with the JHA and/or procedure.

5.0 PROGRAM DESCRIPTION

5.1 Job Briefings

5.1.1 Pre-Job Briefing

[1] The pre-job briefing shall communicate to the workers the work scope, hazards, and controls to safely perform the task.

[2] Energy source controls and personal protective equipment must also be discussed at pre-job briefings.

[3] The work package shall be reviewed as part of the pre-job briefing and made available to workers for reference while working in the field.

[4] Pre-job briefings must be conducted before work begins.

[5] A graded approach will be used by the supervisor to determine if an informal discussion or a formal, structured, and documented meeting is appropriate.

[6] After any change in work activity that is unique or different from the original scope of work, additional job briefings or reviews of briefings shall be completed.

[7] Refer to FBP-NSE-PRO-00002, *Pre-Job Briefing and Post-Job Review*, for additional information.

5.1.2 Safety Task Analysis (STA) Briefing

[1] The STA briefing shall be conducted as the last confirmation of readiness before performing work tasks.

[2] This ensures assigned employees have a complete understanding of the tasks to be completed.

[3] The following subjects will be covered:

- Work Methods
- Weather
- Emergency Response
- LOTO
- Site Conditions
- Assignments
- Equipment Configuration

[4] All continuing work should begin each day with a STA briefing.

[5] Work continuing on to the next shift also warrants a briefing.

[6] New personnel assigned to the work must also receive a STA briefing.

5.2 Lockout/Tagout and Clearance Procedures

EU utilizes FBP LOTO procedure, FBP-OS-PRO-00068, *Instructions for Lockout/Tagout*, to control hazardous energy and to de-energize lines and equipment for employee protection on the FBP sites T&D system.

5.3 Confined/Enclosed Spaces

NOTE

Enclosed spaces are classified as Confined Spaces in accordance with FBP-IH-PRO-00049, *Confined Space Program*.

5.3.1 Before entry into a Confined Space ensure the following has been done:

- Obtain a current FBP-IH-PRO-00049-F03, *Confined Space Identification and Evaluation*, form.
- Follow FBP-IH-PRO-00049, *Confined Space Program*.
- Current in required Confined Space Training.

5.3.2 Electric Utilities has access to a database inventory of confined spaces including location, size, hazards, and classification as permit-required or non-permit required.

5.3.3 The current inventory of confined spaces includes electrical vaults, oil circuit breakers, portable and stationary transformer oil tanks, and substation spreader rooms.

5.3.4 Confined Spaces are labeled in accordance with FBP-IH-PRO-00049, *Confined Space Program.*

5.4 Arc Flash Hazard Analysis

5.4.1 An assessment shall be performed to determine potential exposure to an electric arc for employees who work on or near energized lines, parts, or equipment.

5.4.2 Arc flash hazards may exist while working on or near the following systems that are under the exclusive control of EU:

- Overhead transmission/distribution lines including 345kV, 13.8kV and 2.4kV
- Outdoor Substations including 345kV and 13.8kV-.48kV
- Underground distribution systems including 2.4kV and 13.8kV
- Low voltage (below 600 volts [V]) systems including secondary terminals of transformers, metering enclosures, and premise wiring systems in substation facilities

Exception: During package walk downs, data gathering scenarios and non-intrusive work activities occurring outside the minimum approach boundary (listed in table 3), an arc flash hazard analysis shall not be required for opening transformer/switch station cabinets, entering substation rooms/yards, entering relay control cabinets (duplex panels), and opening underground vaults.

5.4.3 An arc flash hazard analysis shall be completed and documented to determine the arc flash hazard, protective clothing and PPE that personnel shall use when working on energized systems.

5.4.4 Three acceptable methods for performing an arc flash hazard analysis are described below.

[1] Arc Flash Hazard Calculations Using Institute of Electrical and Electronics Engineers (IEEE) 1584.

[a] This analysis involves specific calculations where power system parameters, including utility system impedance, line, cable, and transformer impedance are used to determine available three-phase fault currents on portions of the power system.

[b] From this data, arcing fault currents can be calculated, and based on clearing times of protective devices, incident energy (in calories per centimeter squared [cal/cm^2]) is calculated at the working distance.

[c] PPE shall be selected based on the incident energy calculations.

[d] This method is applicable to all three phase systems (enclosed or open lines) from 208V to 15kV.

[2] Use of NESC Table 410-2

[a] This method is used to determine the applicable clothing calorie rating based on a 15 inch working distance and an open air phase to ground fault (overhead lines).

[b] When using Table 410-2, the available single line to ground fault and maximum protective device clearing time are required.

[3] Use of NESC Table 410-1

This method is used to determine applicable clothing calorie rating based working on or near low voltage equipment (50V to 1000V), and is independent of available fault current and protective device clearing times.

5.4.5 Overhead Lines

[1] The arc flash hazard analysis for work on overhead lines may use the IEEE 1584 method (three phase fault) or the NESC Table 410-2 (single phase fault) method.

[2] Both methods require engineering analysis to determine available fault current and protective device clearing times.

NOTE

Ungrounded systems (some 2400V systems) will require IEEE 1584 calculations, since single line to ground faults do not exist.

5.4.6 Outdoor Substations

[1] The arc flash hazard analysis for work on overhead lines, switches, bus work, etc. in substation yards may use the IEEE 1584 method (three phase fault) or the NESC Table 410-2 (single phase fault) method.

[2] Both methods require engineering analysis to determine available fault current and protective device clearing times.

5.4.7 Underground Distribution Systems

[1] Faults on 2.4kV and 13.8kV underground systems typically will be represented as faults in enclosed equipment, and as such NESC Table 410-2 is not applicable.

[2] Arc Flash Hazard analysis for these systems should be based on IEEE 1584 equations.

5.4.8 Low Voltage Systems

[1] Arc Flash Hazard Analysis for low voltage systems should be based on IEEE 1584 equations.

[2] PPE shall be selected based on working distance and calculated incident energy.

[3] If an Incident Energy Analysis has not or cannot be performed, NESC Table 410-1 may be used to determine the calorie rating.

[4] 250 VDC Battery Systems:

No arc flash hazards exist on Electrical Utility DC 250 volt systems.

5.5 Personal Protective Equipment

5.5.1 General Requirements

[1] Electrical PPE includes, but is not limited to, the equipment and clothing necessary to protect personnel performing electrical work from hazards involving electrical shock and arc flash and any other electrical hazards that may be encountered.

[2] This section addresses PPE needed to safely perform electrical T&D operations, construction, and maintenance.

NOTE

PPE for non-electrical hazards (e.g., battery acid) shall also be considered.

[3] Electrical PPE and other protective equipment that has an expired testing date or fails visual or functional inspection shall be removed from service.

[4] PPE shall be:

- Maintained in a safe, reliable condition
- Stored in a manner that protects against physical damage, moisture, dust, or other deteriorating agents
- Regular inspections are necessary to prevent the use of defective personal protective equipment on the job
- Each worker must inspect protective equipment and clothing prior to use
- All items must be suitable for their intended use and in good working condition

- Periodically inspected or tested in accordance with manufacturer's instructions and/or the applicable American National Standards Institute (ANSI) or American Society for Testing and Materials (ASTM) standard(s)

[5] All personnel are to be provided and shall use PPE appropriate for potential shock or arc flash hazards to which they may be exposed.

[6] All parts of the body inside the arc flash protection boundary shall be protected.

[7] Personnel shall be instructed in the proper use and maintenance of PPE prior to use.

5.5.2 Minimum Personal Protective Equipment

5.5.3 Rubber Protective Equipment

[1] General

[a] Protective equipment shall not be used at voltages in excess of that for which the manufacturer recommends.

[b] No protective equipment shall be modified, altered, or used for purposes other than those for which it is designed unless the manufacturer has provided written instructions for such modification, alteration, or use.

[c] Before being placed in service, rubber protective equipment (gloves and blankets) shall be uniquely identified.

[d] Test records and assignment shall be documented.

[e] Rubber protective equipment shall not be vulcanized or patched.

[f] Rubber protective equipment shall be dielectrically tested and marked with the test date.

[g] Rubber protective equipment shall be protected from damage.

[h] No equipment shall be stored in a manner which could cause damage to the rubber equipment or goods.

[i] Voltage rated rubber-insulating equipment shall be marked with the expiration date.

[j] Voltage rated rubber PPE shall be subject to periodic electrical tests with the maximum test intervals as identified in Table 2, *Rubber PPE Inspection Intervals*:

Table 2 – Rubber PPE Inspection Intervals	
Type of Equipment	**Test Frequency**
Rubber insulating covers	Upon indication that insulating value is suspect
Rubber insulating blanket	Before first issue and every 12 months thereafter
Rubber insulating gloves	Before first issue and every 6 months thereafter. Employees may request testing more frequently based on use.
Rubber insulating sleeves	Before first issue and every 12 months thereafter

[2] Rubber Gloves

Approved rubber gloves and carrying bag shall be provided to each employee who works with or is exposed to energized parts.

[3] Inspection of Rubber Gloves

NOTE

Extra care is needed in the visual examination of the glove and in the avoidance of handling sharp objects.

[a] Before using rubber gloves, give each glove an air test to detect cuts and weak spots.

[b] This is accomplished by rolling up the glove tightly beginning at the gauntlet end.

[c] Listen and feel for air escaping through the palm, thumb, or fingers.

[d] Gloves that show weak spots or air leakage must be destroyed.

[e] It is recommended that one or more fingers of a defective glove be immediately cut off to ensure no other worker inadvertently uses the glove.

[4] Care of Rubber Gloves

[a] When not in use, rubber gloves must be carried in glove bags.

[b] When in use, take the following precautions:

- Rubber gloves must be washed when tested in accordance with ASTM standard and kept free from embedded foreign matter.

- Powder specifically designed for protective rubber gloves can be used after washing rubber gloves to avoid skin irritation and to prevent the rubber from sticking together.

[c] Protector gloves must be worn over insulating gloves.

[d] Rubber glove protectors must not be used as work gloves.

Exception: Protector gloves need not be used with Class 0 gloves, under limited-use conditions, where small equipment and parts manipulation necessitate unusually high finger dexterity. When used without protector gloves, the gloves shall be taken from service until electrically tested.

[5] Other Rubber Protective Equipment

[a] Sleeves must be tested and inspected before use.

[b] Line hoses shall not be doubled on themselves at any time.

[c] All blankets must be wiped clean and rolled, not folded, before being stored in the container or box.

5.5.4 Non-Rubber Goods

[1] No protective equipment or material other than rubber shall be used unless it provides equal or better (dielectric) electrical and mechanical protection than rubber protective equipment.

[2] Manufacturer's data or other data can be used to demonstrate that such non-rubber protective equipment provides equal or better electrical and mechanical protection than approved rubber equipment.

[3] Protective line equipment of material other than rubber shall be kept clean and visually inspected before each use.

5.5.5 PPE for Arc Flash Protection

[1] The effective arc rating of the arc-rated clothing shall not be less than the incident energy at the working location.

[2] All arc rated garments shall meet the requirements of and be labeled in accordance with ASTM F1506, *Standard Specification for Flame Resistant Textile Materials for Wearing Apparel for use by Electrical Workers Exposed to Momentary Electric Arc and Related Thermal Hazards*.

[3] Clothing made from acetate, nylon, polyester, or polypropylene shall not be worn in the arc flash protection boundary unless arc rated. Examples of such articles may include traffic non rated vests.

[4] When calculated incident energy exceeds 40 cal/cm^2 and de-energizing is not feasible, alternate work methods and controls shall be documented and have management authorizations.

NOTE

Assessments performed to determine potential exposure to an electric arc consider the affected employee's assigned tasks and/or work activities.

A clothing system (multiple layers) that includes an outer layer of flame resistant material and an inner layer of non-flame resistant natural fiber material has been shown to block more heat than a single layer. The effect of the combination of these multiple layers may be referred to as the effective arc rating (e.g., Energy of Break Open Threshold [EBT] and Arc Thermal Performance Value [ATPV]).

Engineering controls can be utilized to reduce arc energy levels and work practices can be utilized to reduce exposure levels.

Exception: If the clothing or clothing system required by this program has the potential to create additional or greater hazards than the possible exposure to the heat energy of the electric arc, then clothing or a clothing system with an effective arc rating less than that required by this program may be worn. This decision will be documented and approved by Management, Engineering, and Occupational Safety & Health with concurrence from the Work Crew.

5.6 Live-line Tools

5.6.1 Testing and Maintenance

[1] Live line tools shall be tested and maintained in accordance with EU preventative maintenance work plan.

[2] New tools must be tested prior to use.

5.6.2 Use

[1] Each live-line tool shall be wiped clean and visually inspected for defects before use each day.

[2] If any defect or contamination that could adversely affect the insulating qualities or mechanical integrity of the live-line tool is present after wiping, the tool shall be removed from service and examined and tested according to this section before being returned to service.

[3] Live-line tools and rope shall be stored and maintained and used in such a manner as to prevent damage.

[4] Live-line tools and ropes shall not be used for purposes other than line work.

5.6.3 Rope

[1] Rope shall be inspected before each use and, if unsafe (for example, because of damage or defect), may not be used.

[2] Rope shall be stored away from cutting edges and sharp tools.

[3] Rope contact with corrosive chemicals, gas, and oil shall be avoided.

[4] When stored, rope shall be coiled and piled or shall be suspended so that air can circulate through the coils.

[5] A rope that is wet, that is contaminated to the extent that its insulating capacity is impaired, or that is otherwise not considered to be insulated for the voltage involved may not be used near exposed energized lines.

5.7 Safe Energized Work Practices

5.7.1 The following documents the hazard analysis that EU performs whenever work is planned and specifically when a decision is made to work on electrical systems energized.

5.7.2 The work scope is walked down with a team to determine the work place hazards, the necessary job controls, and the required support needed.

5.7.3 The team normally consists of the craft that will perform the work, planning, and operations.

5.7.4 The team determines the best and safest method to perform the work.

5.7.5 The control of energy for de-energized work will utilize FBP-OS-PRO-00068.

5.7.6 The decision for working energized will be documented in the work instructions.

5.7.7 Different variables are considered to determine the appropriate work method with employee safety paramount.

5.7.8 In addition to employee safety, the magnitude of switching operations, customer outage, and configuration limitations are some of the variables that are evaluated.

5.7.9 Switching evolutions can expose workers to a higher degree of hazards than the actual work on energized circuits.

5.7.10 There may be loads that are essential that cannot readily be taken out of service.

5.7.11 Displacement of facility personnel, processes, or even crucial experiments that cannot be stopped often influence the decision to performing work energized.

5.7.12 At certain times of the year (winter/summer) during peak loading, reconfiguring lines to provide a cleared area has the potential of placing lines and equipment near their maximum design capacity.

5.7.13 Each of these variables needs to be evaluated when deciding on which method to use.

5.7.14 Safe energized work practice is a specific way of performing work differing from work performed on de-energized and grounded systems.

5.7.15 The following are specific areas where adjustments are made in normal work practices.

- Arc flash rated clothing and boundaries are used per arc flash hazard analysis
- Voltage rated live line tools including periodic testing, pre-use inspection, and maintenance.
- Knowledge of and maintaining approach distances
- Crew sizes and designated employee as safety watch
- Use of voltage rated barriers (line, arm, and pole covers)
- Use of voltage rated PPE (rubber gloves, blankets, and mats)

5.8 Working On or Near Exposed Energized Parts

5.8.1 This section applies to work on exposed live parts, or near enough to them, to expose the employee to any hazard they present. Parts of electric circuits that are guarded or isolated are not considered as “exposed”.

5.8.2 General

[1] Only qualified employees may work on or with exposed energized lines or parts of equipment.

[2] Only qualified employees may work in areas containing unguarded, un-insulated energized lines or parts of equipment operating at 50 volts or more.

[3] Electric lines and equipment shall be considered and treated as energized unless the requirements of Subsection 5.2, *Lockout/Tagout and Clearance Procedures*, are met.

5.8.3 Minimum approach distances

[1] No employee shall approach or take any conductive object closer to exposed energized parts than set forth in the Table 3, *AC Live Work Minimum Approach Distance*, unless:

[2] The employee is insulated from the energized part. Electrical protective equipment insulated for the voltage involved such as tools, rubber gloves, or rubber gloves with sleeves shall be considered effective insulation for the employee from the energized line or part being worked on.

OR

[3] The energized part is insulated from the employee and from any other conductive object at a different potential.

Table 3 – AC LIVE WORK MINIMUM APPROACH DISTANCE				
	Distance to Employee			
Voltage in Kilovolts	Phase to Ground		Phase to Phase	
Phase to phase*	(meters [m])	(foot-inches [ft-in])	(m)	(ft-in)
0 to 0.050	Not specified		Not specified	
0-051 to 0.300	Avoid contact		Avoid contact	
0.301 to 0.750	0.31	1-0	0.31	1-0
0.751 to 15	0.65	2-2	0.67	2-3
15.1 to 36.0	0.77	2-7	0.86	2-10
36.1 to 46.0	0.84	2-9	0.96	3-2
46.1 to 72.5	1.00	3-3	1.2	3-11
72.6 to 121	0.95	3-2	1.29	4-3
138 to 145	1.09	3-7	1.5	4-11
161 to 169	1.22	4-0	1.71	5-8
230 to 242	1.59	5-3	2.27	7-6
345 to 362	2.59	8-6	3.8	12-6
500 to 550	3.42	11-3	5.5	18-1
765 to 800	4.53	14-11	7.91	26-0

* For single-phase systems, use the highest voltage available.

NOTE

The clear live-line tool distance shall equal or exceed the values for the indicated voltage ranges.

5.8.4 Initial Determination (Worksite Hazard Evaluation)

[1] Before beginning work, an evaluation shall be performed to identify all hazardous conditions.

[2] This evaluation shall include the general location, energized circuit parts, support structures, and associated equipment.

[3] No work shall be performed on energized lines or parts until the voltage of such equipment and lines is determined.

5.8.5 Working Position

[1] Employees should avoid working on equipment or lines in any position from which a shock or slip will tend to bring the body toward exposed parts at a potential different than the employee's body.

[2] Work should, therefore, generally be done from below, rather than from above.

5.8.6 Making Connections

[1] In connecting de-energized equipment or lines to an energized circuit by means of a conducting wire or device, employees should first attach the wire to the de-energized part.

[2] When disconnecting, the source end should be removed first.

[3] Loose conductors should be kept away from exposed energized parts.

5.8.7 Hot sticks are used while working on energized distribution lines and equipment when it provides greater protection and increases distance from equipment with arc flash potential.

5.8.8 Rubber protective gloves shall only be used on 5,000 volts or less between phases.

Exception: When metal clad switch gear or pad mounted switches have been isolated and tested de-energized, voltage rated rubber protective gloves can be used during the installation of equipment grounds.

5.8.9 When using the rubber glove-work method, voltage rated insulating sleeves must be worn in addition to rubber gloves for voltages greater than 300 volts.

Exception: Sleeves are not required under the following conditions:

>300-750 Volts	>750-5000 Volts
• No other exposed live parts are within the minimum approach boundary **OR**	• If exposed parts are covered with insulating protective equipment
• When exposed parts are guarded to extent feasible and insulated tools are used	

5.8.10 When one part of a high voltage switch or disconnect is energized the remainder of the switch or disconnect shall be considered energized unless approved barriers are in place.

5.8.11 These barriers will prevent employees from coming in direct contact with the energized parts.

5.8.12 Conductor support tools such as link sticks, strain carriers, and insulator cradles may be used provided the clear insulation is at least as long as the insulator string or the minimum distance specified in Table 3, *AC Live Work Minimum Approach Distance*, for the operating voltage.

5.8.13 Apparel

- ONLY arc rated apparel shall be worn when working on or near energized electrical equipment (e.g., non arc rated vests must be removed). Refer to Table 4, *Arc Flash/Blast PPE*.
- When work is performed within reaching distance of exposed energized parts each employee must remove all exposed conductive articles such as badges, keys, rings, wrist watches/bands, or phones.
- Shirts or coveralls must have full length sleeves that are rolled down.
- Dielectric footwear shall be worn when conducting pole switching operations.

NOTE

Requirements of this table are in addition to the minimum PPE per Step 5.6.2.

Table 4 – ARC FLASH/BLAST PPE

Cal/cm2	Clothing Description	Additional PPE
1-7	AR shirt/pants rated for the cal/cm^2	Leather or rubber gloves
8-24	AR shirt/pants, FR coveralls rated for the cal/cm^2	Leather or rubber gloves, arc rated face shield/balaclava or hood
25-40	AR shirt/pants, or multi-layer flash suit rated for the cal/cm^2	Leather or rubber gloves, arc rated face shield/balaclava or hood
>40	Find alternate means, UNSAFE	

5.8.14 Fuse Handling

[1] When fuses must be installed or removed with one or both terminals energized at more than 300 V or with exposed parts energized at more than 50V, tools or gloves rated for the voltage are used.

[2] When expulsion-type fuses are installed with one or both terminals energized at more than 300V, each employee wears eye protection, uses a tool rated for the voltage, and is clear of the exhaust path of the fuse barrel.

5.8.15 Covered (Non-Insulated) Conductors

The hazards of exposed live parts also apply when work is performed in the proximity of covered (non-insulated) wires such as Hendrix cable.

5.8.16 Noncurrent-Carrying Metal Parts

Noncurrent-carrying metal parts of equipment or devices such as transformer cases and circuit breaker housings, shall be treated as energized at the highest voltage to which they are exposed unless the installation has been evaluated and determined that these parts are grounded before work is performed.

5.8.17 Opening Circuits Under Load

Devices used to open circuits under load conditions shall be designated to interrupt the current involved.

5.9 Grounding for the Protection of Employees

5.9.1 This section applies to the grounding of transmission and distribution lines and equipment for the purpose of protecting employees.

5.9.2 Step 5.9.5 of this section also applies to the protective grounding of other equipment as required elsewhere in this section.

5.9.3 General

[1] For the employee to work lines or equipment as de-energized, the lines or equipment shall be de-energized under the provisions of Subsection 5.2 and shall be grounded as specified in Step 5.9.3 through Step 5.9.10 of this section.

[2] However, if management such as the High Hazards Review Board can demonstrate that installation of a ground is impracticable or that the conditions resulting from the installation of a ground would present greater hazards than working without grounds, the lines and equipment may be treated as de-energized provided all of the following conditions are met:

- The lines and equipment have been de-energized under the provisions of Subsection 5.2.
- There is no possibility of contact with another energized source. Covers will be installed on energized lines and personnel will wear rubber gloves when installing and tying in conductors (i.e., single phase or three phase taps).
- The hazard of induced voltage is not present.

5.9.4 Equipotential Zone/Bracket Grounding

Temporary protective grounds shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to hazardous differences in electrical potential.

5.9.5 Protective Grounding Equipment

[1] Protective grounding equipment shall be capable of conducting the maximum fault current that could flow at the point of grounding for the time necessary to clear the fault.

[2] This equipment shall have an amp capacity greater than or equal to that of No. 2 American Wire Gauge (AWG) copper.

[3] Grounding jumpers shall have approved ferrules and grounding clamps that provide mechanical support for jumper cables independent of the electrical connection.

[4] Protective grounds shall have an impedance low enough to cause immediate operation of protective devices in case of accidental energizing of the lines or equipment.

5.9.6 Testing

[1] Before any ground is installed, lines and equipment shall be tested and found absent of nominal voltage unless a previously installed ground is present.

[2] Inspections before use:

- Grounding equipment shall be visually inspected.
- All mechanical connections shall be checked for tightness.

[3] Ground surface cleaning:

The surface where grounds are to be attached shall be clean before the grounding clamps are installed.

Exception: Use self-cleaning clamps.

5.9.7 Order of Connection

When a ground is to be attached to a line or to equipment, the ground-end connection shall be attached first, and then the other end shall be attached by means of a live-line tool.

5.9.8 Order of Removal

When a ground is to be removed, the grounding device shall be removed from the line or equipment using a live-line tool before the ground-end connection is removed.

5.9.9 Additional Precautions

When work is performed on a cable at a location remote from the cable terminal, the cable may not be grounded at the cable terminal if there is a possibility of hazardous transfer of potential should a fault occur.

5.9.10 Removal of Grounds for Test

[1] Grounds may be removed temporarily during tests.

[2] During the test procedure, each employee must use insulating equipment and be isolated from any hazards involved.

[3] Additional measures may be necessary to protect each exposed employee in case the previously grounded lines and equipment become energized.

[4] After testing is complete, grounds shall be applied.

5.9.11 Conductor Separation

In cases where the conductor separation at any pole or structure is so great as to make it impractical to apply shorts on all conductors and where only one conductor is to be worked on, only that conductor which is to be worked on needs to be grounded.

5.9.12 Ground Personnel

In cases where ground rods or pole grounds are utilized for personal protective grounding, personnel working on the ground should maintain sufficient distance from such equipment or utilize other approved procedures designed to prevent "touch and step potential" hazards.

5.10 Power Cable Grounding

5.10.1 A capacitance charge can remain in the high voltage cables after it has been disconnected from the circuit and a static-type arc can occur when grounds are applied to such cables.

5.10.2 When work is to be done on cables or equipment of a high-voltage underground system, precautions to prevent back-feed shall be taken.

5.10.3 This shall include either isolating or grounding of the secondary conductors.

5.10.4 High-voltage cables shall be tested and proven de-energized at each work location (e.g., grounded cable, spike, approved hot cutters, and touch ground with a hot stick as a last option).

5.10.5 A tested cable shall be allowed sufficient time to decay below 5kV and then a ground shall be applied for the equivalent test time.

5.11 Overhead Lines

5.11.1 This section provides additional requirements for work performed on or near overhead lines and equipment.

5.11.2 General

[1] Before elevated structures and adjacent structures such as poles or towers of the adjacent supporting poles, structures, and conductor supporting hardware are subjected to such stresses as climbing or the installation or removal of equipment may impose, the qualified employee shall ascertain that the structures are capable of sustaining the additional or unbalanced stresses.

[2] If the pole or other structure cannot withstand the loads which will be imposed, it shall be braced or otherwise supported so as to prevent failure.

[3] A visual inspection and hammer test will be done by a qualified person prior to climbing wood poles.

[4] When a pole is set, moved, or removed near an exposed energized overhead conductor:

- Overhead lines shall be covered with insulated protective material to prevent incidental contact with overhead lines.
- Employees wear insulating protective gloves or use suitable means where voltages may exceed ratings of gloves while handling poles where conductors energized at potentials above 750 volts can be contacted.
- No employee shall contact the pole with un-insulated parts of his or her body.
- Contact with trucks or other equipment that is being used to set, move, or remove poles in or in the vicinity of energized lines shall be avoided by employees standing on the ground or in contact with grounded objects unless employees are wearing suitable protective equipment.

[5] To protect employees from falling into holes into which poles are to be placed, the holes shall be attended by employees or physically guarded whenever anyone is working nearby.

5.11.3 Installing and Removing Overhead Lines

The following provisions apply to the installation and removal of overhead conductors or cable:

[1] The tension stringing method, barriers, or other equivalent measures shall be used to minimize the possibility that conductors and cables being installed or removed will contact energized power lines or equipment.

[2] When conductors are being strung in or removed, they shall be kept under positive control and adequate radio communication used.

[3] The protective measures for mechanical equipment shall also be provided for conductors, cables, and pulling and tensioning equipment when the conductor or cable is being installed or removed close enough to energized conductors that any of the following failures could energize the pulling or tensioning equipment or the wire or cable being installed or removed:

- Failure of the pulling or tensioning equipment
- Failure of the wire or cable being pulled

OR

- Failure of the previously installed lines or equipment

[4] When conductors being installed or removed cross over energized conductors in excess of 600 V, rope nets or guard structures must be installed unless provision is made to isolate or insulate the worker or the energized conductor.

[5] Where the design of the circuit-interrupting devices protecting the lines so permits, the automatic-reclosing feature of these devices must be made inoperative. In addition, the line being strung must be grounded on either side of the crossover or considered and worked as energized.

[6] Before lines are installed parallel to existing energized lines, the approximate voltage to be induced in the new lines must be determined, or work shall proceed on the assumption that the induced voltage is hazardous.

[7] Unless the qualified employee can demonstrate that the lines being installed are not subject to the induction of a hazardous voltage or unless the lines are treated as energized, the following requirements also apply:

- Each bare conductor shall be grounded in increments so that no point along the conductor is more than 2 miles (3.22 km) from a ground.
- The grounds required in this section shall be left in place until the conductor installation is completed between dead ends.
- If employees are working on bare conductors, grounds shall also be installed at each location where these employees are working, and grounds shall be installed at all open dead-end or catch-off points or the next adjacent structure.
- If two bare conductors are to be spliced, the conductors shall be bonded and grounded before being spliced.

[8] Reel handling equipment including pulling and tensioning devices, shall be in safe operating condition and shall be leveled and aligned.

[9] Load ratings of stringing lines, pulling lines, conductor grips, load-bearing hardware and accessories, rigging, and hoists may not be exceeded.

[10] Each pull must be snubbed or dead ended at both ends before subsequent pulls.

[11] Pulling lines and accessories shall be inspected prior to each use and replaced or repaired when damaged or when there is a reasonable basis to doubt the dependability of such lines or accessories.

[12] Conductor grips may not be used on wire rope unless the grip is specifically designed for this application.

[13] Reliable communication through two-way radios or other equivalent means, shall be maintained between the reel tender and the pulling rig operator.

[14] The pulling rig may only be operated when it is safe to do so as determined by the lead worker.

NOTE

Examples of unsafe conditions include employees in locations prohibited by Step 5.11.3[15] of this section, conductor and pulling line hang-ups, and slipping of the conductor grip.

[15] While the conductor or pulling line is being pulled (in motion) with a power-driven device, employees are not permitted directly under overhead operations or on the cross arm except as necessary to guide the stringing sock or board over or through the stringing sheave.

[16] Live-line bare-hand work is prohibited.

[17] When winches, trucks, or tractors are being used to raise poles, materials, to pull in wires, and to pull slack or in any other operation, there shall be an operator at the controls unless the machinery or process is stopped.

[18] Lead workers shall designate an employee to give signals when required at pre-job briefing.

[19] Employees shall not crawl over insulator strings but shall use a platform or other approved device to work from when making dead ends or doing other work beyond strings of insulators at such distance that they cannot reach the work from the pole or fixture.

[20] While working on the platform or other device, they shall be secured with safety straps or a rope to prevent falling.

[21] The provision of this subsection does not apply to extra high voltage bundle conductors when the use of such equipment may produce additional hazard.

[22] Climbing over dead end assemblies is permissible only after they have been completed and pinned in the final position.

5.11.4 Towers and Structures

The following requirements apply to work performed on towers or other structures which support overhead lines.

- No employee shall work under a tower or structure while work is in progress except where it can be demonstrated that such a working position is necessary to assist employees working above.
- Tag lines or other similar devices shall be used to maintain control of tower sections being raised or positioned unless it can be demonstrated that the use of such devices would create a greater hazard.
- The load line may not be detached from a member or section until the load is safely secured.
- No one must be permitted to remain in the footing while equipment is being spotted for placement.
- A designated employee must be utilized to determine that required clearance is maintained in moving equipment under or near energized lines.
- All conductors, sub conductors, and overhead ground conductors must be bonded to the tower at any isolated tower where it may be necessary to complete work on the transmission line.
- A transmission clipping crew shall have a minimum of two structures clipped in between the crew and the conductor being sagged.

5.11.5 Patrolling Overhead Lines

[1] While patrolling overhead lines at night and operating a motor vehicle, there shall be two qualified employees.

[2] If repair to line or equipment is found to be of such nature as to require two line workers, work shall not proceed until additional help has been obtained provided that in cases of emergency where delay would increase the danger to life, limb, or substantial property, then one employee may clear the hazard without assistance.

5.11.6 Adverse Weather Conditions

Except during emergency restoration procedures, work shall be discontinued when adverse weather conditions would make the work hazardous in spite of the work practices required by this section.

6.0 DEFINITIONS/ACRONYMS

6.1 Definitions

A. **Affected employee** — An employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under LOTO or whose job requires them to work in an area in which such servicing or maintenance is being performed.

B. **Apprentice** — an employee who is being trained to be journeyman level.

C. **Arc Flash Hazard** — A dangerous condition associated with the possible release of energy caused by an electric arc.

D. **Arc Flash Hazard Analysis —** A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc flash protection boundary, and the appropriate levels of PPE.

E. **Arc Rating** — The value attributed to materials that describe their performance to exposure to an electrical arc discharge. The arc rating is expressed in calories per centimeter squared (cal/cm^2) and is derived from the determined value of the arc thermal performance value (ATPV) or energy of break open threshold (EBT) (should a material system exhibit a break-open response below the ATPV value)

F. **Arc Flash Protection Boundary** — When an arc flash hazard exists, an approach limit a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur.

G. **Attendant** — An employee assigned to remain immediately outside the entrance to an enclosed or other space to render assistance as needed to employees inside the space.

H. **Barricade** — A physical obstruction such as tapes, cones, or A-frame type wood or metal structures intended to provide a warning about and to limit access to a hazardous area.

I. **Barrier** — A physical obstruction which is intended to prevent contact with energized lines or equipment or to prevent unauthorized access to a work area.

J. **Bond** — The electrical interconnection of conductive parts designed to maintain a common electrical potential.

K. **Bus** — A conductor or a group of conductors that serve as a common connection for two or more circuits.

L. **Cable** — A conductor with insulation or a stranded conductor with or without insulation and other coverings (single-conductor cable), or a combination of conductors insulated from one another (multiple-conductor cable).

M. **Circuit** — A conductor or system of conductors through which an electric current is intended to flow.

N. **Clearance (between objects)** — The clear distance between two objects measured surface to surface.

O. **Clearance (for work)** — Authorization to perform specified work or permission to enter a restricted area.

P. **Conductor** — A material, usually in the form of a wire, cable, or bus bar, used for carrying an electric current.

Q. **Confined Space** — A space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work
- Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry)
- Is not designed for continuous employee occupancy

R. **Current carrying part** — A conducting part intended to be connected in an electric circuit to a source of voltage. Noncurrent-carrying parts are those not intended to be so connected.

S. **De-energized** — Free from any electrical connection to a source of potential difference and from electric charge; not having a potential difference from that of the earth.

T. **Designated employee/person** — An employee/person who is designated to perform specific duties under the terms of this section and who is knowledgeable in the construction and operation of the equipment and the hazards involved.

U. **Electric line truck** — Any vehicle used to transport employees, tools, and material, which serves as a traveling workshop for electric power line construction and maintenance work. It may be equipped with a boom and auxiliary equipment for setting poles, digging holes, and elevating material and/or workers.

V. **Emergency** — An unforeseen occurrence endangering life, limb, or property.

W. **Enclosed** — Surrounded by a case, cage, fence, or otherwise which will protect the contained equipment and prevent accidental contact of a person with live parts.

X. **Energized (alive, live)** — Electrically connected to a source of potential difference or electrically charged so as to have a potential significantly different from that of earth in the vicinity.

Y. Energy source — Any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, or other energy source that could cause injury to personnel.

Z. Equipment (electric) — A general term including material, fittings, devices, appliances, fixtures, apparatus, and the like used as part of or in connection with an electrical installation.

AA. Exposed — Not isolated or guarded.

BB. Fault current — The current that flows in an electrical system because of a defect in the circuit induced accidentally or otherwise.

CC. Flame Resistant — The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition with or without subsequent removal of the ignition source.

DD. Ground — A conducting connection, whether intentional or accidental, between an electric circuit or equipment and the earth or to some conducting body that serves in place of the earth.

EE. Grounded — Connected to earth or to some conducting body that serves in place of the earth.

FF. Grounded system — A system of conductors in which at least one conductor or point (usually the middle wire, neutral point of transformer, or generator windings) is intentionally grounded either solidly or through a current-limiting device (not a current-interrupting device).

NOTE

Wires which are insulated but not otherwise protected are not considered as guarded.

GG. Guarded — Covered, fenced, enclosed, or otherwise protected by means of suitable covers or casings, barrier rails, screens, mats, or platforms designed to prevent the possibility, under normal conditions, of dangerous approach or accidental contact by persons or objects.

HH. Incident Energy — The amount of energy impressed on a surface, a certain distance from the source, and generated during an electrical arc event. One of the units used to measure incident energy is calories per centimeter squared (cal/cm^2).

NOTE

When any object is said to be insulated, it's understood to be insulated for the conditions to which it's normally subjected. Otherwise, it's, within the purpose of this section, un-insulated.

II. Insulated — Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.

JJ. Insulation (cable) — That which is relied upon to insulate the conductor from other conductors or conducting parts or from ground.

KK. Isolated — An object that isn't readily accessible to persons unless special means of access are used.

LL. Minimum Approach Distance — The closest distance an employee is permitted to approach an energized or a grounded object.

MM. Pole — Any device used to support a power distribution or transmission line. The pole may be made of any substance including wood, concrete, and metal and is usually cylindrical in shape and comparatively slender. It is the upright standard to which is affixed part of the power distribution and transmission line system as defined in this chapter.

NN. Protective Devices — Devices such as rubber gloves, rubber blankets, line hose, rubber boots, or other insulating devices which are specifically designed for the protection of employees.

OO. Qualified person or qualified employee — A person who is familiar with the construction of or operation of such lines and/or equipment that concerns their position and who is fully aware of the hazards connected therewith, or, one who has passed a journeyman status examination for the particular branch of the electrical trades with which he/she may be connected.

PP. Rubber — Any goods, equipment, or tool made out of either natural or synthetic rubber.

QQ. Switch — A device for opening and closing or for changing the connection of a circuit. In these rules, a switch is understood to be manually operable unless otherwise stated.

RR. Tag — A system or method of identifying circuits, systems, or equipment for the purpose of alerting employees and others that the circuit, system, or equipment is being worked on.

SS. Utility — An organization responsible for the installation, operation, or maintenance of electric supply or communications systems.

TT. Vault — An enclosure, above or below ground, which personnel may enter and which is used for the purpose of installing, operating, or maintaining equipment or cable.

UU. Voltage (V) — The effective Root Mean Square (rms) potential difference between any two conductors or between a conductor and ground. Voltages are expressed in nominal values unless otherwise indicated. The nominal voltage of a system or circuit is the value assigned to a system or circuit of a given voltage class for the purpose of convenient designation. The operating voltage of the system may vary above or below this value.

6.2 Acronyms

A. **ASTM** — American Society for Testing and Materials

B. **ATPV** — Arc Thermal Performance Value

C. **cal/cm2** — Calories per centimeter squared

D. **EU** — Electrical Utility

E. **IEEE** — Institute of Electrical and Electronics Engineers

F. **kV** — Kilovolt

G. **NESC** — National Electrical Safety Code

H. **OJT** — On the Job Training

I. **RTU** — Remote Terminal Unit

J. **SCADA** — Supervisory Control and Data Acquisition

K. **T&D** — Transmission & Distribution

7.0 REFERENCES

A. ANSI Z308.1-2003, *Minimum Requirements for Workplace First Aid Kits*

B. FBP-EM-PDD-00001, *AED Program Description Document*

C. FBP-EM-PRO-00026, *Employee Response to Severe Weather*

D. FBP-IH-PRO-00049, *Confined Space Program*

E. FBP-NSE-PRO-00002, *Pre-Job Briefing and Post-Job Review*

F. FBP-OS-PRD-00001, *Electrical Safety*

G. FBP-OS-PRO-00068, *Instructions for Lockout/Tagout*

H. *IEEE – Institute of Electrical and Electronics Engineers 1584*

I. *NESC – National Electrical Safety Code*

Appendix A
REGULATORY REQUIREMENTS FLOW DOWN

10 CFR 851, *Worker Safety and Health Program*