UPF JOB HAZARD ANALYSIS – ELECTRICIAN JHA

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JHA NO.:	**JHA-00558**	**REV:**	**2**	**ISSUE DATE:**	**09/30/2022**
JHA TITLE:	**ELECTRICIAN JHA**	**WORK PACKAGE NUMBER:**		**SPECIFIC LOCATION:**	**N/A**

WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Receiving Additional Training and Retraining	Additional Training	**Arc Flash, Shock** ➢ Ensure employee receives additional training if they are introduced to new equipment, technology, or changes in procedures which differ from normal use. ➢ Ensure employee receives additional training if job related duties change from normal duties. ➢ Ensure classroom or on-the-job training, or a combination of the two are performed. ➢ Ensure Electrical Safety Training Documentation is to be retained for the duration of employment after proficiency is demonstrated. ➢ Ensure all applicable training and qualifications are completed, current, and up to date prior to performing work/task on conductors, circuit parts, or equipment.
Receiving Additional Training and Retraining	Retraining	**Arc Flash, Shock** ➢ Employee is retrained if they are not complying with safety-related work practices. ➢ Employee is retrained if they are expected to perform a task that is **performed less that once a year**. ➢ Employee is retrained if they need to review safety-related work practices not normally used during regular job duties. ➢ Ensure classroom or on-the-job training, or a combination of the two are performed.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure Electrical Safety Training Documentation is to be retained for the duration of employment after proficiency is demonstrated. ➢ Ensure all applicable retraining and re-qualifications are completed, current, and up to date prior to performing work/task on conductors, circuit parts, or equipment.
Equipment Labeling	Labeling	**Arc Flash, Shock** ➢ Ensure electrical equipment including switch-boards, panelboards, industrial control panels, meter socket enclosures, motor control centers other than those in dwelling units are examined, adjusted, serviced, or have maintenance performed while energized have labels containing the following information: (1) Nominal System Voltage (2) Arc Flash Boundary (3) The label should also include: (a) available incident energy and associated work distances or arc flash PPE category for the equipment, but not both. (b) minimum arc rating of clothing (c) site-specific level of PPE ➢ Ensure documentation of the method of calculating data is included on the label. ➢ It is the responsibility of the owner of the electrical equipment for documentation, installation, and maintenance of label.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure that labeling is reviewed for accuracy **not to exceed 5 years** and if upon review or if changes render the label inaccurate that the label is updated to include these changes.
Utilizing Alerting Techniques	Safety Sign and Tags	**Arc Flash, Shock** ➢ Ensure safety signs, safety symbols, and tags are uses when necessary to warn employees electrical hazards which could put them in danger. ➢ Verify signs and tags meet applicable requirements state, federal, local/regional codes and standards.
Utilizing Alerting Techniques	Barricades	**Arc Flash, Shock** ➢ Verify safety signs are utilized in conjunction with barricades to limit or prevent employee access to work/task area containing energized electrical conductors or circuit parts. ➢ Ensure if the barricade would increase likelihood of exposure to electrical hazards that they are not utilized. ➢ Ensure barricades are no closer than the LAB given for Shock Protection Approach Boundaries to exposed energized electrical conductors or circuit parts for the related voltage. ➢ Verify that boundaries are not placed closer than the AFB where it is greater than the LAB.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Utilizing Alerting Techniques	Attendants	**Arc Flash, Shock** ➢ Ensure if safety signs and barricades do not provide sufficient warning/protection from electrical hazards, that an attendant is utilized to warn/protect employees. ➢ Ensure manual signaling and alerting are performed by attendant to keep employees outside out of work/task areas where they could be exposed to electrical hazards.
Working with Batteries & Battery Rooms	Access to Energized Battery Enclosures or Rooms	**Arc Flash, Chemical, Shock, Eye Damage, Skin Damage, Burns, Inhalation of Metals, Being Struck by components, Arc Blast** ➢ Prohibit access to unauthorized employees. ➢ Ensure battery room or enclosure is only accessible by Authorized Personnel appointed by Person in Charge of the premises prohibiting access to unauthorized personnel. ➢ Ensure proper illumination is provided to enable employees to perform work safely. ➢ Ensure warning signs or labels are posted for the following: series connections, parallel connections, charging methodology, temperature/thermal, charge status, DC distribution cable size/length, and prospective short circuit current. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater. ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working with Batteries & Battery Rooms	Ensuring Proper Ventilation Exists	**Explosive Mixtures** ➢ Prohibit access to unauthorized personnel. ➢ Ensure a battery/battery room risk assessment is performed. ➢ Ensure proper illumination is provided to enable employees to perform work safely. ➢ Ensure warning signs or labels are posted for the following: series connections, parallel connections, charging methodology, temperature/thermal, charge status, DC distribution cable size/length, and prospective short circuit current. ➢ Perform examinations and maintenance to prevent explosive mixtures in forced or natural ventilation systems. ➢ Perform regular maintenance and functional testing of detection and alarm systems. ➢ Verify battery ventilation system openings are unobstructed. ➢ Inspect Cell Flame Arresters for proper installation or unobstructed ventilation replaced in accordance with manufacturer's instructions.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working with Batteries & Battery Rooms	Avoiding Arc Flash Hazards	**Eye Damage, Skin Damage, Burns, Inhalation of Metals, Being Struck by components, Arc Blast** ➢ Prohibit access to unauthorized personnel. ➢ Ensure a battery/battery room risk assessment is performed. ➢ Ensure proper illumination is provided to enable employees to perform work safely. ➢ Ensure no conductive objects are worn (e.g. jewelry) while working on battery systems. ➢ Ensure warning signs or labels are posted for the following: series connections, parallel connections, charging methodology, temperature/thermal, charge status, DC distribution cable size/length, and prospective short circuit current. ➢ Ensure battery terminals and electrical conductors are kept clear of unintended contact from tools, test equipment, containers, or other foreign objects. ➢ Verify tools and equipment are insulated for maximum working voltage.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Utilize non-sparking tools when Battery Risk Assessment indicates additional hazards associated with the task to be performed. ➢ Utilize the proper PPE for battery arc flash hazard(s). The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working with Batteries & Battery Rooms	Avoiding Chemical Hazards	**Eye Damage, Chemical Burn causing skin damage from electrolyte exposure, Explosive Gas** ➢ Prohibit access to unauthorized personnel. ➢ Ensure a battery/battery room risk assessment is performed. ➢ Verify an Eye Wash and Body Wash Apparatus is readily available, maintained, and in operable condition and the nearest location prior to starting job/task. ➢ Ensure proper illumination is provided to enable employees to perform work safely.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure the proper PPE is utilized for the chemical hazard (e.g. safety glasses, goggles). ➢ Prohibit any open flames or smoking. ➢ Utilize the proper PPE for battery chemical hazard(s). The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working with Batteries & Battery Rooms	Avoiding Electrical Shock Hazards	**Shock** ➢ Prohibit access to unauthorized personnel. ➢ Ensure a battery/battery room risk assessment is performed. ➢ Ensure proper illumination is provided to enable employees to perform work safely. ➢ Ensure warning signs or labels are posted for the following: series connections, parallel connections, charging methodology, temperature/thermal, charge status, DC distribution cable size/length, and prospective short circuit current.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Utilize the proper PPE for the electrical hazard. ➢ Ensure no conductive clothing is worn. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Entering Shock Protection Boundaries with exposed Energized Electrical Conductors or Circuit Parts	Entering a Limited Approach Boundary (LAB) while Energized	**Arc Flash, Shock** ➢ Ensure Unqualified Person(s) are not allowed in the LAB without being advised of possible hazards, while also being continuously escorted by Qualified Electrical Persons. ➢ Ensure applicable limits of approach are followed in accordance with NFPA 70E standards. ➢ If any Unqualified Person(s) are working inside the LAB that a combination of Alerting Methods/Techniques applied: (1) Safety, Signs, and Tags (2) Barricades

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		(3) Attendants The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Entering Shock Protection Boundaries with exposed Energized Electrical Conductors or Circuit Parts	Entering a Restricted Approach Boundary (RAB) while Energized	**Arc Flash, Shock** ➢ Ensure Unqualified Person(s) are not allowed to cross into the RAB. ➢ Ensure applicable limits of approach are followed in accordance with NFPA 70E standards. ➢ If any Qualified Electrical Person(s) need to approach or take a conductive object into the RAB they must be insulated or guarded from energized electrical conductors or circuit parts operating at 50 volts or above. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.***

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		CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater. ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Maintenance of Electrical Equipment and Systems	Electrical Equipment and System Maintenance	**Arc Flash, Shock** ➢ Prior to maintenance and operation of any electrical equipment or system ensure that any training and qualifications required to perform work task have been completed and documented. ➢ Prior to starting work task ensure all associated and applicable risk assessments and permits are completed to ensure UPF processes and procedures are being followed for safe work practices and to establish electrically safe working conditions. ➢ Ensure at all covers or safeguards that are removed from equipment for maintenance are replaced once the activity is completed and prior to returning to service. ➢ Ensure proper PPE and tools are utilized for maintenance and operation. ➢ Ensure any required specialized tools, unusual PPE, or other equipment utilized for maintenance or operation are utilized in accordance with UPF processes,

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		procedures, and in accordance with manufacturer's instructions and in accordance with NFPA 70E standards. ➢ Ensure up-to-date schematics, diagrams, drawings are utilized, using a questioning attitude and stop authority if equipment or system does not align with provided information. ➢ Ensure all maintenance of electrical equipment and systems is conducted, performed, and completed in accordance with manufacturer's instructions following all applicable NFPA 70E requirements. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.*** ***CFN-1325, UPF, Construction Power Electrical Equipment Maintenance Record.***
Maintenance of Electrical Equipment and Systems	Substations, Switchgear Assemblies, Switchboards,	**Arc Flash, Shock** ➢ Ensure enclosures be kept free of material(s) that could potentially expose personnel to electrical hazards.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
	Panelboards, Motor Control Centers (MCC), and Disconnect Switch Maintenance	➢ Ensure area enclosures, including fences, physical protection, enclosures, or other protective means utilized to prevent unauthorized access or unintentional contact with energized conductors or circuit parts are properly maintained in accordance with manufacturer's instructions while utilizing NFPA 70E standards. ➢ Ensure conductors, including current carrying conductors (buses, switches, disconnects, joints, and terminations), and bracing are properly maintained in accordance with manufacturer's instructions while utilizing NFPA 70E standards. ➢ Ensure the insulation integrity is maintained to support the associated voltages impressed in accordance with manufacturer's instructions while utilizing NFPA 70E standards. ➢ Ensure protective devices are maintained to adequately withstand or interrupt the available fault current in accordance with manufacturer's instructions while utilizing NFPA 70E standards. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		CFN-1325, UPF, Construction Power Electrical Equipment Maintenance Record.
Maintenance of Electrical Equipment and Systems	Premises Wiring Maintenance	**Arch Flash, Shock** ➢ Ensure covers for wiring system components are in place with all associated hardware, and that there are no unprotected openings. ➢ Ensure open wiring protection location or barrier is maintained to prevent unintentional contact. ➢ Ensure raceways and cable trays are maintained to provide physical protection and support conductors. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.*** ***CFN-1325, UPF, Construction Power Electrical Equipment Maintenance Record.***
Maintenance of Electrical	Controller Equipment Maintenance	**Arc Flash, Shock** ➢ Ensure controller equipment is maintained, including equipment that governs starting/stopping, direction of motion, acceleration, speed, protection from

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Equipment and Systems		rotating equipment, and other power utilization apparatus which are in the workplace. ➢ Ensure controller equipment maintenance provides protection and control circuitry guarding to prevent unintentional contact and prevent electrical or mechanical hazards. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.*** ***CFN-1325, UPF, Construction Power Electrical Equipment Maintenance Record.***
Maintenance of Electrical Equipment and Systems	Fuses and Circuit Breaker Maintenance	**Arc Flash, Shock** ➢ Ensure there are no breaks or cracks in fuse cases, ferrules, and insulators. ➢ Ensure fuse clips are maintained to provide adequate contact with fuses. ➢ Ensure current limiting and non-current limiting fuse holders are not altered or modified to fit fuses from each other for which they are not designed. ➢ Ensure molded-case circuit breakers are maintained to ensure that they are free from cracks in cases and cracked or broken operating handles.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure circuit breaker testing after electrical faults are inspected and tested in accordance with manufacturer's instructions. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.*** ***CFN-1325, UPF, Construction Power Electrical Equipment Maintenance Record.***
Maintenance of Electrical Equipment and Systems	Rotating Equipment Maintenance	**Arc Flash, Shock** ➢ Ensure terminal chambers, enclosures, and terminal boxes are maintained to safeguard from unintentional contact with any exposed energized conductors, circuit parts, and other electrical hazards. ➢ Ensure guards, barriers, and access plates are maintained to prevent personnel from coming into contact with moving or energized parts. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.***

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Maintenance of Electrical Equipment and Systems	Portable Electric Tools and Equipment Maintenance	**Arc Flash, Shock** ➢ Ensure attachment plugs, receptacles, cover plates, and cord connectors for portable electric tools and equipment are maintained in accordance with manufacturer's instruction and the following criteria: (1) There are no breaks, damage, or cracks exposing energized conductors and circuit parts. (2) There are no missing cover plates (3) Terminations have no stray strands or loose terminals. (4) There is not any missing, loose, altered, or damaged blades, pins, or contacts. (5) Polarity is correct. The following may apply according to the scope of work/task: ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		CFN-1325, UPF, Construction Power Electrical Equipment Maintenance Record.
Maintenance of Electrical Equipment and Systems	Personal Safety and Protective Equipment Maintenance	**Arch Flash, Shock** ➢ Ensure personal safety and protective equipment are to be maintained in accordance with manufacturer's instruction and in a safe working condition, which includes, but is not limited to the following; (1) Grounding Equipment (2) Hot Sticks (3) Rubber Gloves, sleeves, and leather protectors (4) Test Instruments (5) Blanket and similar insulating equipment (6) Insulating mats and similar insulating equipment (7) Protective barriers (8) Electrical circuit breaker rack-out devices (9) Portable lighting units (10) Temporary protective grounding equipment (11) Dielectric footwear (12) Protective Clothing (13) Bypass jumpers (14) Insulated and insulated hand tools

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure personal safety and protective equipment is properly maintained by performing visual inspections prior to use and thereafter **not to exceed 1 year**, unless specified otherwise by applicable state, federal, or local codes and standards. ➢ Ensure personal safety and protective equipment is properly maintained to ensure protection of personnel by ensuring the insulating capability has been retained by performing testing prior to initial use and thereafter **not to exceed 3 years**.
Utilizing Other Protective Equipment	Insulated Tools and Equipment (Fuse Handling Equipment, Ropes and Handlines, Portable Ladders)	**Arc Flash, Shock** ➢ Prior to each use inspect insulated tools and equipment for damage to insulation that could limit the tool from performing the desired function or increase the risk for an incident. ➢ Verify insulated tools are constructed, designed, and rated for the voltages and environments in which they are utilized. ➢ Ensure Fuse Handling Equipment is rated for circuit voltage and utilized to remove or install a fuse when terminals are energized. ➢ Ensure Ropes and Handlines utilized within LAB are non-conductive. ➢ Verify Fiberglass-Reinforced Plastic Rods utilized for live-line tools meet all applicable codes standards for electrical installation requirements.

UPF JOB HAZARD ANALYSIS – ELECTRICIAN JHA

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure Portable Ladders have non-conductive side rails when used inside LAB or when there is potential to contact energized equipment, conductors, or circuit parts. ➢ Ensure all other protective equipment is installed, utilized, and maintained in accordance with applicable NFPA 70E requirements. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Utilizing Other Protective Equipment	Barriers (Rubber Insulating Equipment, Voltage Rated Plastic Guard Equipment, Physical or Mechanical Barriers)	**Arc Flash, Shock** ➢ Ensure barriers are in place to prevent unintentional contact with exposed energized electrical conductors or circuit parts operating at greater than 50 volts when work/task is within the RAB. ➢ Ensure barriers are in supported to remain in place to prevent unintentional contact by a person, tool, or equipment.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure rubber insulating equipment is properly rated for the voltage and meets all applicable state, federal, or local codes/standards to prevent unintentional contact with energized conductors and circuit parts. ➢ Ensure voltage rated plastic guard equipment is properly rated for the voltage and meets all applicable state, federal, or local codes/standards to prevent unintentional contact with energized conductors, circuit parts, and equipment to protect employees, or to keep material from contact with ground. ➢ Ensure physical or mechanical barriers are installed no closer than the RAB and that while the barrier(s) are being installed that the approach boundary distances are maintained in accordance to applicable tables or placed into and electrically safe work condition. ➢ Ensure all other protective equipment is installed, utilized, and maintained in accordance with applicable NFPA 70E requirements. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Establishing an Electrically Safe Work Condition	Equipment Operating at or greater than 50 volts	**Arc Flash, Shock** ➢ Ensure any energized electrical conductors or circuit parts operating at or greater than 50 volts are placed into an electrically safe work condition prior to an employee starting any work/task inside the LAB. (1) The employee is inside the LAB (2) The employee interacts with equipment where conductors or circuit part, while not exposed, increases the potential of injury from an arc flash hazard. ➢ Ensure an electrically safe working condition is achieved when required and applicable in accordance with NFPA 70E Standards. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Establishing a Lockout / Tagout (LOTO) Program	LOTO Principles	**Arc Flash, Shock** ➢ Ensure the Electrical Safety Program establishes, documents, and implements a LOTO Program. ➢ Ensure the Electrical Safety Program prevents direct or indirect exposure from sources of electrical energy. ➢ Verify the developed LOTO procedure is based on existing electrical equipment and systems and uses suitable documentation including up-to-date drawings and diagrams. ➢ Ensure procedure meets or exceeds the requirements of applicable codes, standards, and regulations for LOTO for any electrical sources. ➢ Ensure the control of energy is done in a manner to minimize any employee exposure to electrical hazards. ➢ Ensure any electrical circuit interlock operation will not result in energizing the circuit which is being worked on by using applicable up-to-date documentation, drawings, and diagrams. ➢ Ensure LOTO devices are unique and readily identifiable as LOTO devices. ➢ Ensure all applicable and related procedures are coordinated related to electrical energy control are fully addressed on a site basis and coordinated with procedures for the control of other hazardous energy.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure the same or similar LOTO devices used for control of hazardous energy sources such as hydraulic, mechanical, pneumatic, and thermal are utilized for no other purpose. The following may apply according to the scope of work/task: ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Establishing a Lockout / Tagout (LOTO) Program	LOTO Procedures	**Arc Flash, Shock** ➢ Verify employer maintains a copy of the LOTO procedure and that the procedure is available to all employees. ➢ Ensure the LOTO procedure includes planning, up-to-date single-line drawings or effective means to identify all sources of energy, exposed persons and PPE required for work/task, and the person in charge their responsibility for LOTO. ➢ Verify the type of LOTO procedure to be utilized, the elements of control being utilized, who will perform the switching, and where and how to de-energize the load including the release of any stored electrical or mechanical energy. ➢ Ensure the LOTO procedure identifies how to verify the circuit is de-energized, the person who is responsible for ensuring the work/task is complete, and the person responsible for coordination between affected employees, other craft, or any other performance work/tasks on multiple work/tasks.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Verify the LOTO procedure identifies that the equipment under a LOTO cannot be restarted utilizing motor controls, push-buttons, selector switches, and electrical interlocks. ➢ Ensure the LOTO procedure establishes and includes guidelines for testing and use of testing instruments, such as type to be utilized, required PPE, and person verifying on known voltage source before and after use, boundary of electrically safe work conditions, the “test before touch” for every exposed conductor or circuit part(s) in a defined boundary , the requirements for retest for absence of voltage based on condition changes or unattended job location, and any planning to verify when there is no accessible exposed point to take voltage measurements. ➢ Verify grounding installation requirements, keeping in mind that the grounding needs or requirements may be covered in other work rules as is permitted. ➢ Ensure the LOTO procedure includes a method to transfer responsibility for LOTO to another person or person in charge when work/task extends beyond one shift. ➢ Ensure the LOTO procedure establishes coordination between other jobs or tasks including related jobs or tasks, and at remote locations and the person responsible for this coordination.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure the procedure identifies the process to account for all persons and affected employees who could be potentially exposed to hazardous energy during the LOTO process. ➢ Ensure the LOTO procedure identifies when and where lockout applies, and when and where tagout applies. ➢ Ensure the LOTO procedure identifies when a lockout (e.g. physical lock to prohibit operation of disconnecting means) cannot be applied to an existing disconnecting means, that the disconnecting means utilized (e.g. tagout) will not be used as the only means to place the circuit in an electrically safe work condition. ➢ Ensure the LOTO procedure identifies that when a lock/lockout cannot be applied based on equipment design, that a tagout is permitted when at least one additional safety measure is applied, and the procedure establishes responsibilities and accountability for each person who potentially could be exposed to electrical hazards. ➢ Ensure the LOTO procedure identifies the details of the process on how to remove locks or tags when the individual installing the LOTO is unavailable, attempts have been made to locate the LOTO installer have been made, and ensuring the LOTO installer is informed prior to returning to work/task.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure the LOTO procedure identifies the release for return to service detailing the proper steps to take when the work/task requiring the LOTO has been completed. ➢ Ensure the LOTO procedure identifies clear steps, individual responsibilities, and when the work/task can be interrupted temporarily for testing or positioning equipment then the identical steps for return to service. The following may apply according to the scope of work/task: ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Performing Electrical Energized Work	Equipment Operating at less than 50 volts	**Arc Flash, Shock** ➢ Any equipment operating at less than 50 volts can be worked on energized after careful consideration and a determination is made that the energy source and the worker are not in an increased likelihood to receive electrical burns or cause an explosion due to electric arcs. ➢ Ensure all work on equipment operating at less than 50 volts should be performed in accordance with NFPA 70E standards. The following may apply according to the scope of work/task:

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form. ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Performing Electrical Energized Work	Equipment Operating at more than 50 volts	**Arc Flash, Shock** ➢ Any equipment operating at greater than 50 volts must be de-energized before working within the LAB and where increased likelihood of injury from exposure to arc flash hazards exist. ➢ Only exceptions are that de-energizing introduces additional hazards/increased risk or is infeasible due to equipment design/operational limitations. ➢ Ensure all work on equipment operating at more than 50 volts should be performed in accordance with NFPA 70E standards. ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form is required for this work/task.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process is required for work/task.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Exemptions to Energized Electrical Work Permit	Exemptions to Work Permit	**Arc Flash, Shock** ➢ Ensure the appropriate safe work practices and PPE are utilized by the Qualified Electrical Person (QEP) for the following work/tasks performed without an EEWP: (1) Testing, troubleshooting, voltage measuring (2) Thermography, ultrasound, visual inspection in which RAB is not crossed. (3) Access to and egress from an area with energized electrical equipment if no electrical work is performed and RAB is not crossed. (4) General housekeeping and miscellaneous non-electrical tasks if the RAB is not crossed. ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form is required for this work/task.***
Utilizing Personal Protective Equipment (PPE)	PPE	**Arc Flash, Shock, Eye Damage, Hearing Loss, Burns, Equipment Damage** ➢ Ensure PPE worn for protective clothing from arc and shock hazards is arc-rated, allows for movement and visibility, is loose fitting, covers all parts of the body, including any exposed flammable apparel, while not interfering with work/task. ➢ Ensure PPE for head, face, neck, and chin protection/protective equipment is nonconductive and worn properly when a danger of head injury from electrical

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		shock or burns from energized electrical conductors, circuit parts, electric arcs/flashes, or any flying objects related to an electrical explosion. ➢ Ensure PPE for the eyes is worn when a danger for injury from electrical arcs, flashes, or from flying objects as a result of an electrical explosion exists. ➢ Ensure hearing protection is worn when inside of the Arc Flash Boundary (AFB). ➢ Ensure arc-rated clothing is properly rated and worn for body protection when there is the possibility of an arc flash above the threshold incident energy level for a second degree burn (1.2 cal/cm^2 (5J/cm^2) ensuring under layers are not meltable fibers, and outer layers worn over arc-rated clothing are made of arc-rated material (e.g. jackets, high visibility apparel). ➢ Ensure hand and arm protection is properly rated and worn appropriately when there is a danger of hand injury from electrical shock or arc flash burn due to contact with energized electrical conductors or circuit parts, while ensuring proper maintenance and use, and periodic electrical tests are performed in accordance with state, federal, and local codes/standards. ➢ Ensure dielectric insulated foot protection is utilized against step and touch potential. ➢ Ensure arc flash suits can be easily and rapidly removed, suitable for arc flash exposure, and that if exterior air is supplied that the equipment utilized is protected by arc-rated materials or constructed of nonmelting/nonflammable materials.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure employees adhere to all PPE clothing material characteristic requirements, exclude all apparel not permitted, and follow proper care and maintenance of arc-rated clothing/flash suits in accordance with state, federal, and local codes/standards. ➢ Ensure all PPE is donned, utilized, doffed, maintained, stored, tested, and replaced in accordance with applicable NFPA 70E requirements.
Utilizing Personal Protective Equipment (PPE)	Arc Flash PPE Selection Methods	**Arc Flash, Shock, Eye Damage, Hearing Loss, Burns, Equipment Damage** ➢ Ensure either the incident energy analysis method or the arch flash PPE category method are utilized in accordance with NFPA 70E, but that both are not used on the same piece of equipment. ➢ Ensure the results of the incident energy analysis are not used to select an arc flash PPE category. ➢ Ensure arc flash selection methods are utilized in accordance with NFPA 70E Standards. ➢ Ensure the Incident Energy Analysis Method is the project preferred method. An Incident Energy Analysis will be used for the following: **Alternating Current Equipment** 1) Power Systems with greater than the estimated maximum fault clearing times. 2) Power Systems width longer than the maximum fault clearing times.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		3)Less than the minimum working distance. **Direct Current Equipment** 1) Power Systems with greater than the estimated maximum fault clearing times. 2) Power Systems width longer than the maximum arc duration. 3)Less than the minimum working distance.
Performing a Risk Assessment	Risk Assessment Procedure	**Arc Flash, Burns, Chemical, Fire, Shock, Thermal** ➢ Ensure the risk assessment procedure included in the electrical safety program addresses exposure to electrical hazards and identifies process to be utilized prior to work/task is started and will identify hazards, assess risks, and will implement risk control in accordance with NFPA 70E. ➢ Ensure arc flash hazard and shock hazard risk assessment aspects are included in the risk assessment procedure. ➢ Ensure the risk assessment procedure addresses the potential for human error, the negative consequences on people, processes, the work environment, and equipment which is related to electrical hazards for the work/task. ➢ Verify the amount of personnel required to perform work/task safely, any additional training or equipment that those personnel should have (e.g. electrical emergency response, contact release. other protective equipment).

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure the preventative and protective risk control methods included in the hierarchy of risk control methods are utilized according to the following hierarchy: (1) Elimination (2) Substitution (3) Engineering Controls (4) Awareness (5) Administrative Controls (6) PPE ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form is required for this work/task.***
Responding to an Electrical Emergency Response	Automated External Defibrillator (AED)	**Arc Flash, Shock, Bloodborne Pathogens (BBP)** ➢ Prior to entry to assess area/situation use Human Performance (HU) Tools (i.e. situational awareness, self-check) to determine if the location is safe to enter. ➢ Prior to entry contact the Operations Center requesting for EMS and a Qualified Electrical Person (QEP) to de-energize prior to entering the area. ➢ Prior to contact Universal Precautions should be utilized to prevent contact with bloodborne pathogens including blood or other potentially infectious material (OPIM).

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure you do not use an AED on a conductive surface, in moving vehicles, in direct contact with water or fluids, or on someone under 8 years old or under 90 pounds. ➢ Ensure AED's are not used around flammable materials, do not wipe the victim's chest with alcohol, and do not use on someone with nitroglycerine or other patches without removing. ➢ Ensure employees responsible for responding to medical emergencies utilize AED's in accordance with training and certification received from certifying body. ➢ Ensure AED retraining/training occurs **<u>annually</u>**. ***All electrical incidents, whether or not an injury results, shall be reported to the Operations Center (865) 574-7172 in order to initiate the investigation process.***
Responding to an Electrical Emergency Response	Cardiopulmonary Resuscitation (CPR)	**Arc Flash, Shock, Bloodborne Pathogens (BBP)** ➢ Prior to entry to assess the area/situation using Human Performance (HU) Tools (i.e. situational awareness, self-check) to determine if the location is safe to enter. ➢ Prior to entry contact the Operations Center requesting for EMS and a Qualified Electrical Person (QEP) to de-energize prior to entering the area.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Prior to contact Universal Precautions should be utilized to prevent contact with bloodborne pathogens including blood or other potentially infectious material (OPIM). ➢ Ensure employees responsible for responding to medical emergencies utilize CPR in accordance with training and certification received from certifying body. ➢ Ensure CPR retraining/training occurs **annually**. ***All electrical incidents, whether or not an injury results, shall be reported to the Operations Center (865) 574-7172 in order to initiate the investigation process.***
Responding to an Electrical Emergency Response	First Aid (FA)	**Arc Flash, Shock, Bloodborne Pathogens (BBP)** ➢ Prior to entry to assess the area/situation using Human Performance (HU) Tools (i.e. situational awareness, self-check) to determine if the location is safe to enter. ➢ Prior to entry contact the Operations Center requesting for EMS and a Qualified Electrical Person (QEP) to de-energize prior to entering the area. ➢ Prior to contact Universal Precautions should be utilized to prevent contact with bloodborne pathogens including blood or other potentially infectious material (OPIM). ➢ Ensure employees responsible for responding to medical emergencies utilize FA in accordance with training and certification received from certifying body.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure FA retraining/training occurs **annually**. ***All electrical incidents, whether or not an injury results, shall be reported to the Operations Center (865) 574-7172 in order to initiate the investigation process.***
Responding to an Electrical Emergency Response	Contact Release	**Arc Flash, Shock,** ➢ Prior to entry assess the area/situation using Human Performance (HU) Tools (i.e. situational awareness, self-check) to determine if it is safe to enter. ➢ Prior to entry contact the Operations Center requesting for EMS and a Qualified Electrical Person (QEP) to de-energize prior to entering the area. ➢ Ensure that Contact Release is performed utilizing a rescue hook or non-conductive materials to remove victim from the hazardous area if properly trained to do so safely. ➢ Ensure the appropriate PPE is worn in accordance with NFPA 70E. ➢ Ensure Contact Release retraining/training occurs **annually**. ***All electrical incidents, whether or not an injury results, shall be reported to the Operations Center (865) 574-7172 in order to initiate the investigation process.***
Utilizing Test Instruments and	Performing Testing	**Arc Flash, Shock**

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Equipment on Energized Electrical Systems		➢ Ensure equipment and accessories are properly rated for circuits and equipment, that are approved for the purpose, and in accordance with manufacturer's instructions. ➢ Utilizing equipment and accessories that are designed for the environment in which they are utilized, being visually inspected to ensure functional integrity and properly repaired prior to each use, and verified on a known source before and after an absence of voltage test. ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form is required for this work task.***
Utilizing Test Instruments and Equipment on Energized Electrical Systems	Performing Troubleshooting	**Arc Flash, Shock** ➢ Ensure equipment and accessories are properly rated for circuits and equipment, that are approved for the purpose, and in accordance with manufacturer's instructions. ➢ Ensure equipment and accessories that are designed for the environment in which they are utilized, being visually inspected to ensure functional integrity and properly repaired prior to each use, and verified on a known source before and after an absence of voltage test.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form is required for this work/task.
Utilizing Test Instruments and Equipment on Energized Electrical Systems	Performing Voltage Measuring	**Arc Flash, Shock** ➢ Ensure equipment and accessories that are properly rated for circuits and equipment, that are approved for the purpose, and in accordance with manufacturer's instructions. ➢ Ensure equipment and accessories that are designed for the environment in which they are utilized, being visually inspected to ensure functional integrity and properly repaired prior to each use, and verified on a known source before and after an absence of voltage test. ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form is required for this work/task.***
Utilizing Safety Grounding Equipment	Inspection	**Arc Flash, Shock** ➢ Prior to use inspect for cuts in protective sheath and damage to conductors. ➢ Prior to use inspect clamp and connector strain relief devices for tightness. ➢ Prior to use inspect initially and at intervals **not to exceed 1 year**. The following may apply according to the scope of work/task:

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form. ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Utilizing Safety Grounding Equipment	Testing	**Arc Flash, Shock** ➢ Ensure if Safety Grounding Equipment is repaired or modified it must be tested properly before being returned to service. ➢ Ensure testing of the Temporary Protective Grounding Equipment is performed as service conditions require it. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Utilizing Safety Grounding Equipment	Grounding and Testing Devices	**Arc Flash, Shock** ➢ Ensure grounding and testing devices are stored properly in a clean and dry area and properly inspected and tested before being utilized. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working with Capacitors	Stored Energy in Capacitors	**Arc Flash, Shock, Thermal, Reoccurrence of Stored Electrical Energy** ➢ Ensure the appropriate controls are in place and are applied according to the capacitor(s) stored energy hazard threshold. ➢ Ensure the labeling and hazard warning label includes maximum stored voltage and stored energy. ➢ Ensure all manufacturer's instructions and NFPA 70E standards are used in accordance with working with capacitors. ➢ Ensure capacitors are installed, maintained, and serviced in accordance with NFPA 70 Article 460 National Electrical Code (NEC).

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure Appropriate Controls for Capacitor(s) are applied when hazard thresholds are exceeded: (1) Less than 100 volts and greater than 100 joules of stored energy. (2) Greater than or equal to 100 volts and greater than 1.0 joule of stored energy. (3) Greater than or equal to 400 volts and greater than 0.25 joules of stored energy The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working with Capacitors	Appropriate Controls for Capacitors	**Arc Flash, Shock, Thermal, Reoccurrence of Stored Electrical Energy** ➢ Ensure employees are familiar, trained to specific hazards and controls to work safely on electrical equipment with capacitor(s) following safety-related work practices. ➢ Ensure the risk assessment covers electrical equipment with capacitors and has indicated the appropriate PPE to account for capacitor(s) voltage/stored energy,

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		thermal, shock, arc flash & blast, and take additional protective measures to provide an electrically safe working condition. ➢ Ensure the risk assessment includes a test and grounding method is applied to appropriately ground, bleed, and discharge capacitor(s)in which the appropriate controls are put in place to control the electrical hazard. ➢ Ensure the risk assessment is utilized to develop a written discharge procedure captures required steps to place equipment in an electrically safe working condition which includes the following: (1) Information about the stored energy available. (2) How long to wait after de-energizing before opening enclosure, taking into account the duration of discharge? (3) How to test for absence of voltage? (4) What to do if there is stored energy potential? (5) A sequence of operations to discharge and place in an electrically safe work condition. (6) How to utilize grounding sticks to safely discharge capacitors when applicable? ➢ Ensure any work with or on capacitors follows safe work practices, and establishes and verifies electrically safe working conditions in accordance with NFPA 70E, Standard for Electrical Safety in the Workplace.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure capacitors are installed, maintained, and serviced in accordance with NFPA 70 Article 460 National Electrical Code (NEC). The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working with Generators	Generator Inspection	**Arc Flash, Shock, Thermal, Fire** ➢ Ensure generators are provided with a nameplate including manufacturer's name, rated frequency, number of phases, rating in kilowatts or kilovolt amperes, normal volts and amperes corresponding to the rating, the rated revolutions per minute, and the rated ambient temperature/temperature rise. ➢ Ensure generators rated at more than 15 kW provide the power factor, subtransient and transient impedances, insulation system class, and time rating also must be provided on the nameplate. ➢ Ensure generators are equipped with disconnect(s) and are lockable in the open position to ensure that all protective devices and control apparatus can be

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		disconnected entirely from the circuits supplied by the generator, with the exception of the following: (1) They are portable cord and plug connected generators. (2) The driving means for the generator can be readily shut down, rendered incapable of restarting, and is lockable in the off position or the generator is not arranged to operate in parallel with another generator/source of voltage. ➢ Ensure any work with or on Generators follows safe work practices, and establishes and verifies electrically safe working conditions in accordance with NFPA 70E, Standard for Electrical Safety in the Workplace. ➢ Ensure generators are installed, maintained, and serviced in accordance with NFPA 70 Article 445 National Electric Code (NEC). The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Working with Transformers	Transformers and Transformer Vaults	**Arc Flash, Shock** ➢ Ensure transformers are installed, maintained, and serviced in accordance with NFPA 70 Article 450 National Electric Code (NEC). The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Working around Look-Alike Systems	Look-Alike Equipment	**Arc Flash, Shock** ➢ Ensure when working on de-energized equipment that is placed in an electrically safe condition in a work area that includes equipment of a similar size, shape, and construction that alerting techniques (e.g. safety sign and tags, barricades, attendants) are employed to prevent the employee from entering look-alike equipment. ➢ Ensure when working on de-energized equipment that is placed in an electrically safe condition in a work area where look-alike equipment is present that all applicable labeling is accurate, up-to-date drawings and diagrams are a match to the work/task location, and the relationship between electrical sources and equipment are established prior to working on look-alike equipment.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
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Meeting Auditing Requirements	Electrical Safety Program (ESP) Audit	**Arc Flash, Shock** ➢ Ensure the ESP is audited to verify the principles and procedures are in compliance with the NFPA 70E standards, which is **not to exceed 3 years**. ➢ Ensure applicable items of non-compliance from the ESP Audit that indicate either principle or procedure revisions are required that the appropriate revisions are made. ➢ Ensure items of non-compliance are documented and addressed by way of briefings, training/retraining, and process/procedure revisions. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.***

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		CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater. ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Meeting Auditing Requirements	Field Work Audit (FWA)	**Arc Flash, Shock** ➢ Ensure Field Work is audited to determine if the principles and procedures are being followed in accordance with the NFPA 70E standards which is **not to exceed 1 year**. ➢ Ensure the applicable findings from the FWA that indicate either training or procedure revisions are required that the appropriate revisions are made. ➢ Ensure indications of principles and procedures not being followed are documented and addressed by way of briefings, training/retraining, and process/procedure revisions. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Meeting Auditing Requirements	Lockout / Tagout (LOTO) Program and Procedure Audit	**Arc Flash, Shock** ➢ Ensure the LOTO Program and Procedure is audited by a Qualified Electrical Person (QEP) to verify the program and procedures are in compliance with the NFPA 70E standards, which is **not to exceed 1 year**. ➢ Ensure the LOTO Program and Procedure Audit includes at least one LOTO in progress. ➢ Ensure the LOTO Program and Procedure Audit is designed to identify the following deficiencies: (1) LOTO program or procedure revisions (2) LOTO training (3) LOTO procedure execution (4) documentation ➢ Ensure items of non-compliance are documented and addressed by way of briefings, training/retraining, and program/procedure revisions. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.
Utilizing Hand/Power Tools and Equipment	Proper Use of Hand/Power Tools and Equipment	**Improper Use, Shock, Flying Particles. Laceration, Abrasion** ➢ Ensure tools and equipment are operated properly in accordance with manufacturer instructions. ➢ Ensure tools and equipment are visually inspected for damages or missing parts prior to use. ➢ Ensure all guards/safeguards are properly installed and in place, which are free of any damages, missing parts, or modifications. ➢ Prior to use check electrical cords for defects (if equipped). Corded tools must be operated in conjunction with ground fault circuit interrupter (GFCI). ➢ Prior to use, check electrical cords for defects (if equipped). Corded tools must be operated in conjunction with ground fault circuit interrupter (GFCI). ➢ Ensure standard 120-volt extension cords and 208-volt (single-phase twist lock) extension cords are permitted to be plugged in/unplugged by trade/craft persons after shedding the load (e.g., turning off the welder, tool, or heater.) ➢ Ensure only TPQEP plug in, unplug, or route 480 V cord sets. ➢ Ensure only TPQEP operate or reset any breakers on temporary power - power distribution equipment (e.g. panel boards).

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure safety glasses w/side shields that meet ANSI Z87 requirements are worn at a minimum when utilizing power tools. ➢ Ensure electrical cords are unplugged and batteries are removed for power tools when changing out tooling (e.g. bits, blades). ➢ Prior to performing job/task ensure that proper body positioning has been established to perform the job/task safely and prevent accidental contact with debris or equipment, this may include the use of other protective equipment. The following may apply according to the scope of work/task: ***ML-SH-801768-A002, UPF Eye and Face Protection List***.
Grinding Activities	Grinding Metal	**Flying Particles, Grinding Wheel Failure, Loss of Control, Burn, Fire, Ingestion, Inhalation** ➢ Ensure the grinding wheel is rated for higher revolutions per minute (RPM) than the grinder. ➢ Ensure the guard is installed properly and is in place on the grinder. ➢ Ensure both tool handles are utilized to maneuver the grinder. ➢ Ensure a shirt, jacket, or equivalent is worn that meets the requirements of Hazard Risk Category 2 (in accordance with NFPA 2112). ➢ Ensure pants/trousers made from heavier materials (e.g., heavy cotton, denim) are worn that overlap footwear to prevent spatter from entering.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure clothing is worn that is free from pockets, hoods, or cuffs that can trap sparks or slag, keeping sleeves and collars buttoned, or that pockets are covered or equipped with closeable flaps (e.g. welding jacket, welding sleeves). ➢ Ensure if job/task is not in a designated hot work area that the Permit Authorizing Individual (PAI) for a Hot Work Permit is contacted for a permit and that the requirements are followed. ➢ Ensure good personal hygiene techniques such as washing your hands before drinking, eating, or smoking when grinding is performed on paint/primers. ➢ Prior to grinding ensure that either a shrouded grinder attached with local exhaust ventilation system (tool/equipment connected to a vacuum with a HEPA filter) is utilized or that when ventilation is not feasible, at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure if a local exhaust ventilation requirement cannot be met, install danger barricade tape with completed danger signs or tags around the grinding activity to adequately protect adjacent personnel. The following may apply according to the scope of work/task: ***ML-SH-801768-A002, UPF Eye and Face Protection List.***
Working with Welding and	Welding and Thermal Cutting	**Inhalation, Burns, Flying Particles, Arc Flash Burn, Shock, Fire, Ingestion** ➢ Ensure where welding is planned in the open, all coatings shall be stripped back a distance of a minimum of **two (2) inches** from the area of heat application.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Thermal Cutting Equipment		This distance shall be increased to a minimum of **four (4) inches** where welding or thermal cutting is planned in a confined space. The area of heat application means the surface area that the flame or arc contacts and any adjacent surface whose temperature may be appreciably raised by heat transfer. ➢ Ensure a shirt, jacket, or equivalent is worn that meets the requirements of Hazard Risk Category 2 (in accordance with NFPA 2112). ➢ Ensure pants/trousers are worn that are made from heavier materials (e.g., heavy cotton, denim) that overlap footwear to prevent spatter from entering. ➢ Ensure clothing is worn that is free from pockets, hoods, or cuffs that can trap sparks or slag, keeping sleeves and collars buttoned, or that pockets are covered or equipped with closeable flaps (e.g. welding jacket, welding sleeves). ➢ Ensure body protection requirements for awkward or confined hot work positions (e.g., prone, crouching) include Hazard Risk Category 2 pants, trousers, or leggings. ➢ Ensure leather cape sleeves or shoulder covers made of leather or flame-resistant material are required while performing hot work in an overhead configuration if applicable based on job/task. ➢ Ensure an additional evaluation of hot work PPE will be performed during the hot work permit process and pre-job STARRT briefing. ➢ Ensure heat resistant gloves with extended/gauntlet cuff are worn as listed on ML-SH-801768-A003, UPF Glove Matrix.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure welding screens or other guards or barriers are installed around the welding area or when these are not feasible utilize other means (i.e. signs, spotters, etc.) to adequately notify and protect adjacent personnel. ➢ Prior to use inspect all welding leads and cables for damage. ➢ Ensure cords and leads are protected from damage by properly routing overhead and/or out of walkways or travel paths; utilize insulated hooks, straps, or zip-ties to secure them. Do not route over sharp corners or edges that can cause damage. ➢ Ensure standard 120-volt extension cords and 208-volt (single-phase twist lock) extension cords are permitted to be plugged in/unplugged by trade/craft persons after shedding the load (e.g., turning off the welder, tool, or heater.) ➢ Ensure only TPQEP plug in, unplug, or route 480 V cord sets. ➢ Ensure only TPQEP operate or reset any breakers on temporary power - power distribution equipment (e.g. panel boards). ➢ Ensure if job/task is not in a designated hot work area that the Permit Authorizing Individual (PAI) for a Hot Work Permit is contacted for a permit and that the requirements are followed. ➢ Ensure good personal hygiene techniques such as washing your hands before drinking, eating, or smoking when grinding is performed on paint/primers. The following may apply according to the scope of work/task: ***ML-SH-801768-A002, UPF Eye and Face Protection List.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Working with Welding and Thermal Cutting Equipment	Material Fit-up and Tack Welding	**Arc Flash Burn** ➢ Ensure support personnel in the immediate area (e.g. direct work face, weld screened area, aerial lift platform/basket) assisting with the weld/hot work activities (i.e., tacking supports) must wear PPE appropriate to the hazard (e.g. gloves, category 2 weld shirt/jacket, shaded glasses, face shield, etc.). The assigned PPE is to protect workers from secondary hazards created by the activity (e.g., sparks, slag, weld arc, flying debris) and is not intended to protect personnel directly watching the weld process.
Working with Welding and Thermal Cutting Equipment	Shielded Metal Arc Welding (SMAW) on Carbon Steel (Stick Welding)	**Inhalation** ➢ Ensure when working **outdoors** to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area. ➢ Ensure when ventilation is not feasible, at a minimum, a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure when working indoors or in enclosed areas to Provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) OR discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area.

UPF JOB HAZARD ANALYSIS – ELECTRICIAN JHA

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JHA NO.:	**JHA-00558**	**REV:**	**2**	**ISSUE DATE:**	**09/30/2022**
JHA TITLE:	**ELECTRICIAN JHA**	**WORK PACKAGE NUMBER:**		**SPECIFIC LOCATION:**	**N/A**

WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL

- Ensure when local exhaust ventilation is not feasible, establish means of adequate general/mechanical ventilation AND at a minimum, use a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required.
- Ensure if local exhaust ventilation requirement cannot be met, install danger barricade tape with completed danger signs or tags around the welding activity to adequately protect adjacent personnel.
-

Arc Flash (SMAW on Carbon Steel)

Wear safety glasses and a welding hood with a lens shade as follows:

Electrode Size - in. (mm)	**Arc Current (Amperes)**	**Minimum Protective Shade**	**Suggested* Shade No. (Comfort)**
Less than 3/32 (2.4)	Less than 60	7	10 (*)
3/32 - 5/32 (2.4 - 4.0)	60 - 160	8	10
5/32 - 1/4 (4.0 - 6.4)	160 - 250	10	12
More than 1/4 (6.4)	250 - 550	11	14

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Working with Welding and Thermal Cutting Equipment	Flux Cored Arc Welding (FCAW) on Carbon Steel	**Inhalation** ➢ Ensure when working outdoors to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor OR discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area or establish means of adequate general/mechanical ventilation and at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ When working indoors or in enclosed Areas to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area and at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure if local exhaust ventilation requirement cannot be met, install danger barricade tape with completed danger signs or tags around the welding activity to adequately protect adjacent personnel. ➢ **Arc Flash (FCAW on Carbon Steel)** Wear safety glasses and a welding hood with a lens shade as follows:

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL

Arc Current (Amperes)	Minimum Protective Shade	Suggested* Shade No. (Comfort)
Less than 60	7	-
60 - 160	10	11
160 - 250	10	12
250 - 500	10	14

Working with Welding and Thermal Cutting Equipment	Gas Tungsten Arc Welding (GTAW) Tungsten Inert Gas (TIG) on Carbon Steel	**Inhalation** ➢ Ensure when working outdoors to provide adequate natural ventilation, no additional controls are required. ➢ Ensure when working indoors that adequate general/mechanical ventilation is utilized, no additional controls required. ➢ Ensure when working in enclosed or confined areas to contact IH for additional and specific controls for the conditions at hand. **Arc Flash (GTAW ~ TIG on Carbon Steel)** Wear safety glasses and a welding hood with a lens shade as follows:

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL

Arc Current (Amperes)	Minimum Protective Shade	Suggested* Shade No. (Comfort)
Less than 50	8	10
50 - 150	8	12
150 - 500	10	14

Working with Welding and Thermal Cutting Equipment	Plasma Arc Cutting of Carbon Steel	**Inhalation** ➢ Ensure when working outdoors to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area or provide adequate general/mechanical ventilation. ➢ Ensure when ventilation is not feasible, at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure if local exhaust ventilation requirement cannot be met, install danger barricade tape with completed danger signs or tags around the cutting activity. ➢ Ensure when working indoors or in enclosed areas that local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area WHEN local exhaust ventilation is not feasible, at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required and provide adequate general/mechanical ventilation. **Arc Flash (Plasma Arc Cutting on Carbon Steel)** Wear safety glasses and a welding hood with a lens shade as follows:
Working with Welding and	Torch Cutting of Carbon Steel	**Arc Flash, Inhalation**

Arc Current (Amperes)	**Minimum Protective Shade**	**Suggested* Shade No. (Comfort)**
Less than 20	4	4
20 - 40	5	5
40 - 60	6	6
60 - 80	8	8
80 - 300	8	9
300 - 400	9	12
400 - 800	10	14

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Thermal Cutting Equipment		➢ Ensure safety glasses and a face shield are worn with a filter lens of five (5) or greater. ➢ Ensure when working outdoors to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area or provide adequate general/mechanical ventilation. ➢ Ensure when ventilation is not feasible, at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure if the local exhaust ventilation requirement cannot be met, install danger barricade tape with completed danger signs or tags around the cutting activity to adequately protect adjacent personnel. ➢ Ensure when working indoors or in enclosed areas to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work Area When local exhaust ventilation is not feasible, at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required and provide adequate general/mechanical ventilation.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Working with Welding and Thermal Cutting Equipment	Welding or Thermal Cutting of Galvanized Coated Steel	**Fume Generation** ➢ Ensure all galvanized coatings are stripped back to the extent possible from the area of heat application. ➢ Ensure where possible, use non-heat generating cutting methods (e.g., portaband). ➢ Ensure when working outdoors to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area OR provide adequate general/mechanical ventilation. ➢ When ventilation is not feasible, at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure if local exhaust ventilation requirement cannot be met, install danger barricade tape with completed danger signs or tags around the welding activity to adequately protect adjacent personnel. ➢ Ensure when working indoors and in enclosed areas to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) or discharge exhaust air outdoors to a location that does not affect other workers or allow exhaust air to be drawn back into the work area.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Working with Welding and Thermal Cutting Equipment	Nelson Stud Welding Machine	**Arc Flash** ➢ Ensure a filter lens of three (3) or greater is utilized. ➢ Ensure safety glasses or goggles are worn with a face shield.
Working with Welding and Thermal Cutting Equipment	Gas Tungsten Arc Welding(GTAW) Orbital Welding on Stainless Steel, Hastelloys and Inconels	**Hexavalent Chromium, Inhalation** ➢ Ensure welding residue and debris are removed from work clothing using a HEPA filtered vacuum prior to leaving the work area for scheduled breaks and at the end of the work shift. ➢ Ensure the welding work area is cleaned using a HEPA vacuum or a method to minimize dust generation (e.g., wet the debris or use floor sweep) at the termination of the welding activity. ➢ Ensure when working **outdoors** to provide adequate natural ventilation, no additional controls are required. ➢ Ensure when working **indoors** that adequate general/mechanical ventilation is utilized, no additional controls required. ➢ Ensure when working in **enclosed** or **confined areas** to contact IH for additional and specific controls for the conditions at hand. **Arc Flash (GTAW ~ Orbital Welding on Stainless Steel, Hastelloys and Inconels)** Wear safety glasses and a welding hood with a lens shade as follows:

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL

Arc Current (Amperes)	**Minimum Protective Shade**	**Suggested* Shade No. (Comfort)**
Less than 50	8	10
50 - 150	8	12
150 - 500	10	14

Working with Welding and Thermal Cutting Equipment	Gas Metal Arc Welding (GMAW)/Metal Inert Gas (MIG) on Stainless Steel and Carbon Steel	**Arc Flash, Hexavalent Chromium** ➢ Ensure welding residue and debris are removed from work clothing using a HEPA filtered vacuum prior to leaving the work area for scheduled breaks and at the end of the work shift. ➢ Ensure the welding work area is cleaned using a HEPA vacuum or a method to minimize dust generation (e.g., wet the debris or use floor sweep) at the termination of the welding activity. ➢ Ensure when working **outdoors** to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) and at a minimum, a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure when local exhaust ventilation is not feasible, provide adequate general/mechanical ventilation and at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL

- Ensure when working indoors or in enclosed areas that local exhaust ventilation with a capacity of 10 linear feet per minute per welder/operator and with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) and at a minimum, a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required.
- Ensure danger barricade tape with completed danger signs or tags is installed around the welding activity to adequately protect adjacent personnel.

Arc Flash (GMAW ~ MIG on Stainless Steel)

Wear safety glasses and a welding hood with a lens shade as follows:

Arc Current (Amperes)	**Minimum Protective Shade**	**Suggested* Shade No. (Comfort)**
Less than 60	7	-
60 - 160	10	11
160 - 250	10	12
250 - 500	10	14

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Working with Welding and Thermal Cutting Equipment	Plasma Arc Cutting of Stainless Steel Hastelloys, and Inconels	**Arc Flash, Hexavalent Chromium, Inhalation** ➢ Ensure plasma arc cutting residue and debris is removed from work clothing using a HEPA vacuum prior to leaving the work area for scheduled breaks and at the end of the work shift. ➢ Ensure the plasma arc cutting work area is cleaned with a HEPA vacuum or a method to minimize dust generation (e.g. wet the debris or use floor sweep) at the termination of the welding activity. ➢ Ensure to provide local exhaust ventilation with a capacity of 100 linear feet per minute per welder/operator with an inline high efficiency particulate air (HEPA) filter (i.e., fume extractor) and at a minimum a half-face Air Purifying Respirator (APF 10) with a HEPA/P 100 filter is required. ➢ Ensure when local exhaust ventilation is ineffective or not feasible, wear a PAPR (i.e. Adflo and L-905SG helmet) AND provide adequate general/mechanical ventilation. ➢ Ensure danger barricade tape with completed danger signs or tags are installed around the welding activity to adequately protect adjacent personnel. **Arc Flash (Plasma Arc Cutting of Stainless Steel, Hastelloys, and Inconels)** Wear safety glasses and a welding hood with a lens shade as follows:

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL

Arc Current (Amperes)	**Minimum Protective Shade**	**Suggested* Shade No. (Comfort)**
Less than 20	4	4
20 - 40	5	5
40 - 60	6	6
60 - 80	8	8
80 - 300	8	9
300 - 400	9	12
400 - 800	10	14

Working with Welding and Thermal Cutting Equipment	Exothermic Welding (Cad Welding)	**Arch Flash, Fire, Explosion, Burns, Inhalation** ➢ Ensure if job/task is not in a designated hot work area that the Permit Authorizing Individual (PAI) for a Hot Work Permit is contacted for a permit and that the requirements are followed. ➢ Verify where storage near the point of use is necessary, to maintain Cad Welding at least ten (10) feet away from the point of use and limited to a supply necessary for one workday. Use an approved flammable material storage cabinet, keep the area dry and the cabinet locked.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure CAD Weld exothermic weld molds are dried thoroughly before igniting the charge and provided with a cover. When the charge has been ignited, the operator will move at least ten (10) feet from the charge. ➢ Ensure containers for the starting material are closed tightly immediately after each use. ➢ Ensure smoking is not permitted in areas where Cad Welding material is being used or stored. ➢ Ensure a shirt, jacket, or equivalent is worn that meets the requirements of Hazard Risk Category 2 (in accordance with NFPA 2112). ➢ Ensure pants/trousers made from heavier materials are worn (e.g., heavy cotton, denim) that overlap footwear to prevent spatter from entering. ➢ Ensure clothing is worn that is free from pockets, hoods, or cuffs that can trap sparks or slag, keeping sleeves and collars buttoned, or that pockets are covered or equipped with closeable flaps (e.g. welding jacket, welding sleeves). ➢ Ensure when using a hand striker, wear safety glasses or goggles and a face shield with a filter lens of three (3) or greater. ➢ Ensure that where CAD Welding is planned in the open, all coatings in way of the Cad Welding shall be stripped back a minimum of two (2) inches from the area of heat application. This distance shall be increased to a minimum of four (4) inches where CAD Welding is planned in an enclosed or confined space. The area of heat application means the surface area that the flame or arc contacts and any adjacent surface whose temperature may be appreciably raised by heat transfer.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure when working outdoors to provide adequate natural ventilation. Maintain body position away from the generated fumes and use a remote striker when feasible. ➢ Ensure when working indoors to contact IH to determine exposure assessment prior to commencing work and to identify applicable work controls.
Loading and Unloading Material From Trailers and Trucks	Loading / Unloading Material	**Slip/Trip, Crush** ➢ Ensure a secured ladder that extends **three (3) feet above** the trailer/truck deck to access the trailer/truck deck utilized. ➢ Ensure adequate walkways are provided whenever possible when loading material or equipment to provide access for connecting rigging equipment and unloading material. ➢ Ensure climbing on/over material on trailer/truck decks and beds is avoided. ➢ Ensure the proper equipment for loading material (e.g., fork lift, crane, etc.) is chosen for the job/task. ➢ Prior to job/task pre plan the loading sequence and spacing for material. ➢ Inspect cribbing and dunnage for damage and ensure it is properly secured. ➢ Ensure the load is secured prior to truck/trailer movement. ➢ Ensure when loading multiple small materials (e.g., hangers, small pipe spools, etc.), these materials will be placed onto a pallet and banded or shrink wrapped to the pallet or placed within a container so that container can be properly secured to the vehicle. ➢ Inspect for shifted loads, stored energy or loose items prior to unloading.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Loading and Unloading Material From Trailers and Trucks	Use of a Fork Lift	**Loss of Control of Material, Tipping Loads, Crushing Injuries, Falling Material** ➢ Ensure no modifications, unless approved by the superintendent, will be made to vendor crates, containers, or pallets while moving or handling by a forklift or crane. ➢ Validate the approximate weight of the load using the crate or container information, packing slips, or visual inspection. ➢ Ensure both forks easily support the load during transport. ➢ Ensure the operator will use spotter(s) that are capable of directing equipment during material/equipment handling activities. This includes identifying and controlling other associated hazards such as; maintaining adequate clearance between the material/equipment and fork clearance, being aware of fork lift blind spots, and maintaining communications with the operator. Additional spotters will be used to move equipment through congested areas. ➢ Ensure a designated spotter(s) will be used to prevent personnel from entering the opposite side of the area where material is being loaded/unloaded OR install a Caution barricade with tag.
Loading and Unloading Material From Trailers and Trucks	Use of Crane, Hoisting, and Rigging	**Loss of Control of Material** ➢ Ensure when unlashing material check for stability prior to releasing lashing/straps. ➢ Ensure a sleever bar or similar to loosen main load straps is utilized. ➢ Ensure tag lines are utilized to maneuver suspended loads.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure hands are kept off material to the best extent possible.
Drilling into Concrete	Drilling into Concrete	**Inhalation of Concrete Dust/Silica Exposure** ➢ Ensure wet methods are utilized with continuous water supply or Use drill equipped with commercially available shroud or cowling with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. ➢ Ensure a HEPA-filtered vacuum is utilized when cleaning holes. ➢ Ensure HEPA Collected silica dust is placed in designated special waste management areas as generated.
Work at Heights (Life Critical Activity)	Working at Heights	**Fall to Elevation Below, Dropped Objects** ➢ Ensure personnel working near a side, hole, or edge that is **6 ft. or greater** to the lower level are protected by a primary fall prevention system (e.g., guardrails, floor covers, scaffold). Provide danger signs or tags on the guardrail system or at the access gate reading "Danger- 100% Fall Protection Required Beyond This Point". ➢ Ensure all employees working beyond the primary fall prevention system must use a personal fall arrest system (PFAS) or fall restraint system. The General Foreman/Superintendent responsible for the work must evaluate the activity

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		utilizing **CFN-1323**, Elevated Work Risk Assessment. The risk assessment will include the following: (1) Be performed in the work area and focused on a specific work task. (2) Review alternate means to accomplish the task without the need for secondary fall protection systems. (3) Review anchorage points and associated equipment required for a proper PFAS. (4) Be approved by the responsible Supervisor, ES&H Representative, and GF/Superintendent (initiator) prior to starting the work task. (5) The completed and approved risk assessment shall be attached/posted with the STARRT Card for the task. (6) Be re-evaluated and voided if the work configuration changes beyond the original configuration. (7) Returned to ES&H when the activity is complete or the assessment is voided. (8) Employees required to use a PFAS will have successfully completed Fall Protection and Prevention Safety Training. (9) Verify adequate tie-off/anchorage points are present within the work area. ES&H and Engineering review/approval may be required. (10) Personnel shall inspect fall protection systems prior to use. (11) Tool lanyards shall be securely affixed to all tools/devices per the manufacturer's instructions and attached to the user or a secondary anchor point (depending on the weight/type of tool).

UPF JOB HAZARD ANALYSIS – ELECTRICIAN JHA

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		(12) Materials and small tools shall be placed in an approved material/canvas bag for use at elevation or hoisting. (13) Limit the quantity of tools/materials at elevation to that amount essential for the work shift. (14) Barricades shall be established to restrict nonessential personnel from entering overhead work areas. Authorized personnel working within the established barricade boundaries shall remain clear of the line-of-fire during the overhead movement of materials and equipment. (15) A minimum requirement of one foot out for every two feet up should be maintained for an overhead hazard barricade boundary. Additional countermeasures shall be implemented and documented on the STARRT Card when this minimum requirement is not feasible because of site conditions or restrictions
Work at Heights (Life Critical Activity)	Scaffold Use	**Fall to Elevation Below** ➢ Prior to access/entry onto a scaffold there must be a documented and tagged daily inspection. Inspect the scaffold prior to use, looking for holes in the platform, missing handrails and other potential hazards. ➢ Ensure access/entry onto a red-tagged scaffold permitted to only authorized scaffold builders and they must wear required fall protection. ➢ Ensure 100% tie-off or fall protection is worn prior to access/entry onto a yellow-tagged scaffold.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Work at Heights (Life Critical Activity)	Hoist Area with Fall Hazard Greater Than Six (6) Feet	**Fall to Elevation Below** ➢ Ensure all employees working between the unprotected edge and the guardrail system are required to use a personal fall restraint system rigged to prevent the employee from leaning past the unprotected edge of the walking/working surface (Hoist Area). Note: A hoist area is an area in which materials, equipment, or supplies are raised or lowered by means of chain/rope hoist, cranes, derricks, overhead cranes, gantry cranes, or similar lifting devices
Work at Heights (Life Critical Activity)	Completed Roof Structure with Unprotected Side or Edge	**Fall to Elevation Below** ➢ Ensure personnel working near an unprotected side or edge that is **6 ft. or greater** than the lower level will install a guardrail system. Provide DANGER signs or tags on the guardrail system or at the access gate. The danger signs or tags will have the following information: “Danger- 100% Fall Protection Required Beyond This Point”. ➢ Ensure all employees working between the guardrail system and the unprotected edge are required to use a PFAS or fall restraint system. Install a Warning Line System **fifteen (15) feet** from the roof edge using the following requirements: (1) Ensure warning lines made of rope (other than red, yellow, or a combined of yellow and magenta), wire, or chain Use stanchions are utilized to support the warning line capable of resisting a force of at least **sixteen**

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		(16) pounds applied horizontally against the stanchion thirty (30) inches above the walking/working surface. Attach flags to the warning line at approximate six (6) foot intervals made of high visibility material. (2) Ensure the warning line is supported such that the rope, wire, or chain (including sag) is not less than thirty- four (34) inches or more than thirty-nine (39) inches above the walking/ working surface. (3) Ensure all employees working between the warning line and the roof edge are required to use a personal fall arrest system or a fall restraint system.
Work at Heights (Life Critical Activity)	Creating a Floor/Wall Opening or Hole (with greater than six (6) foot fall hazard)	**Fall to Elevation Below** Activities performed by personnel creating a floor hole or modifying existing walking/working surfaces (deemed safe for use via primary fall prevention measures) shall be controlled through a **Walking/Working surface Modification Permit, UCN-23432**. Activities covered by this process include: (1) Removal of permanent and temporary floor/hole covers that protect an opening 12 inches or more in a walking working surface that could create a fall hazard of 6 feet or greater. (2) Removal of permanent or temporary wall opening covers that protect an opening 30 inches high and at least 18 inches wide that could create a fall hazard of 6 feet or greater. (3) Removal of a guardrail on permanent or temporary structures approved for personnel access.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		(4) Removal of grating, steel plate, or other decking material on a walking working surface approved for personnel access. (5) Only those crafts that are specifically trained to perform such work (e.g., structural steel ironworkers, carpenters) will be allowed to remove/replace the cover/grating/floor plate/handrail. (6) A standard guardrail system shall be installed around any potential opening that presents a fall hazard. All access points to the area shall be equipped with a swing gate or equivalent and properly marked (Danger – Fall Protection Required beyond This Point). (7) PFAS must be provided and used by those working inside the barricaded area. (8) Walking/working surfaces below the work area shall be evaluated for dropped objects or other hazards to personnel below. As necessary, the area(s) below the work area shall be barricaded to prevent access, protecting personnel from exposure to dropped objects. (9) When reinstalling covers/grating/floor plate/handrail, the Supervisor shall verify that all material has been completely re-installed, correctly positioned, and properly fastened/secured.
Use Of Aerial Lifts (Scissor and Boom) (Life Critical Activity)	Aerial Lift Use (Scissor and Boom)	**Contact with Surrounding Structure, Equipment, or Commodities, Falls, Inadvertent Movement, Shock** ➢ Prior to operation/movement the operator will ensure adequate clearance is obtained between the lift and structures, equipment, and/or commodities.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure the operator and/or supervisor perform a pre-work walk down and determine the need for a spotter(s) when conditions similar to the following are encountered: (1) Area blind spots exist (2) Obstructions exist in the path of planned travel (e.g., clutter, other equipment, other activities) (3) Obstructions exist when raising or lowering the lift (4) Aerial lift tip over potential ➢ Ensure supervision and ES&H are contacted prior to operating an aerial lift on uneven surfaces or for other concerns related to operating the aerial lift safely (e.g., abrupt edges, holes, tight spots, soft surfaces). ➢ Ensure employees/personnel riding or working from any aerial lift must wear an approved safety harness securely connected with a personal fall limiter **(6ft SRL)** to the lift anchorage point at all times. ➢ Ensure inadvertent lift/platform control activation/operation is prevented by engaging the Emergency Stop switch when the lift is not in motion. ➢ Ensure electrical equipment/cables and components are always treat as if they are energized. Any electrical components obstructing the operation of an aerial lift must be removed, properly protected, or managed with the use of a spotter. ➢ Ensure standard 120-volt extension cords and 208-volt (single-phase twist lock) extension cords are permitted to be plugged in/unplugged by trade/craft persons after shedding the load (e.g., turning off the welder, tool, or heater.) ➢ Ensure only TPQEP plug in, unplug, or route 480 V cord sets.

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		➢ Ensure only TPQEP operate or reset any breakers on temporary power - power distribution equipment (e.g. panel boards).
Manual Material Handling	Manual Material Handling Use	**Muscle Strains, Sprains, Pinch Points, Crush, Struck-By** ➢ Verify to understand safe lifting/operating limits during manual material handling, refer to **OT-SH-801768-A128, UPF Ergonomics Lifting Guidelines**. ➢ Prior to conducting repetitive manual material handling, contact an ESH Representative for evaluation. ➢ Prior to unloading inspect for shifted loads, stored energy, or loose items. ➢ Ensure hands and arms are kept clear when stacking material. ➢ Ensure sharp edges a remove/protect with “softeners” prior to lifting.
Hoisting and Rigging (Life Critical Activity)	Hoisting and Rigging	**Loss of Control of Material, Medium Lift, and Heavy or Critical Lift** ➢ Ensure a qualified rigger/person in charge (PIC) shall be responsible for rigging loads. ➢ Prior to use inspect all rigging equipment and verify it is rated for the load's weight and rigging configuration. Verify that the tags are current. ➢ Ensure areas are identified and to restrict access where hoisting and rigging occur. Ensure the load travel path is clear. Ensure hoisting of materials over occupied equipment or personnel does not occur. ➢ Ensure an initial lift is performed to allow for load settling, and adjust rigging as necessary.

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		➢ Ensure the rigging crew attaches non-conductive tag lines to the load to safely control the load. Ensure multiple tag lines of sufficient length are used to control the load. Ensure long-reach tools and push-pull sticks are utilized to assist with controlling the load. ➢ Ensure to stay at arm's length from the exterior of the load during movement. Ensure that hands are kept off material until below shoulder height and to the extent possible. ➢ Ensure personnel performing rigging operations do not place any part of the body under a suspended load. ➢ Ensure the rigging/hoisting of permanent plant hangers, pipe spools, valves, blinds, etc., are physically secured prior to leaving the material unattended. Ensure that the means of securing are welding, rigging, lashing, clamping hardware, or other approved means by Piping/Rig. ➢ Ensure two workers are utilized to install and uninstall all heavy overhead rigging (greater than 35 lbs.). Ensure approved tethering tie off restraints or alternate dropped object prevention controls are utilized where necessary. This also requires approval from a General Foreman. ➢ Ensure the Safety Task Analysis and Risk Reduction Talk/Job Hazard Analysis Program (STARRT/JHA) Process is completed. ➢ Ensure all Riggers and Bellmen will be a part of the steel erector crew STARRT job briefing/meeting at the start of shift. ➢ Ensure the Connectors clear all the rigging clear up hooks while lowering or raising the hoist line.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure eyes are never taken off the load and rigging while load line is in motion. ➢ Ensure all Connectors and Riggers have Sub Part R training. ➢ Verify applicable training is completed through union hall training centers. ➢ Ensure operators and riggers clearly communicate when loads are ready to hoist and release. ➢ Ensure hoisting or rigging is not permitted in high speed mode until and all clear has been given. ➢ Prior to beginning operations, the operator, signal person, must contact each other and agree on the voice signals that will be used. Once the voice signals are agreed upon, these workers need not meet again to discuss voice signals unless another worker is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed. ➢ Verify each voice signal must contain the following three elements, given in the following order: function (such as hoist, boom, etc.), direction; distance and/or speed; function, stop command. ➢ Ensure for a Medium Lift, Heavy Lift, or Critical Lift that the requirements of the lift plan/data sheet are followed properly.
Working Near Overhead Utilities	Overhead Utilities	**Shock** Heavy equipment operations near or under power lines must maintain a minimum clearance distance of: (1) 30 feet for lines up to 25kV (2) 50 feet for lines over 25kV

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure work is prohibited beyond the boundary unless the line has been de-energized or insulated. ➢ Ensure spotters are utilized to help maintain proper clearance from overhead utilities. Ensure the spotter is positioned to effectively gauge the clearance distance and be in direct communication with operator (e.g., verbal, radio).
Working On/Near Roadways	Roadways	**Struck by Vehicles/Equipment** ➢ Ensure safety barriers and DOT traffic signs will be installed to protect workers and warn vehicles of worker presence. ➢ Ensure substantial physical protection measures capable of withstanding vehicle impact (e.g., concrete barriers, earthen barriers) for personnel who are involved with directing/guiding vehicles on roadways with posted speed limits in excess of 20 miles per hour are provided. ➢ Ensure all road closures are **coordinated with Y12 PSS** and **follow the UPF Traffic Plan** for the site.
Rebar Embed and Commodities Installation	Rebar Mat Fabrication (Horizontal)	**Trip/Fall, Pinch Points, Impalement/Puncture** ➢ Ensure when rebar spacing is greater than eight (8) inches to install plywood walkways or wire mesh (or equivalent) in the work area. ➢ Ensure only Ironworker crew members and essential personnel (e.g., Superintendent, QC, FE) that are required to support rebar assembly and installation, as directed by the Responsible Superintendent, are allowed to walk rebar prior to the installation of walk platforms.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure fingers and hands are kept away from pinch points. Ensure sleever bars (or similar) to are utilized to separate material and be aware of hand positioning. ➢ Ensure approved caps or equivalent are placed over exposed ends of rebar. Ensure sharp wire tie ends are bent over. ➢ Ensure when working around or reaching into areas with sharp/exposed edges wear durable long sleeve shirts or use cut/puncture resistant sleeves for added protection.
Removal of Fireproofing	Cementitious Fireproofing (via non-powered tools)	**Environmental Waste, Inhalation Hazard (Cementitious Fireproofing)** ➢ Ensure removed fireproofing chips, dust or filings by appropriate means (i.e., vacuum, etc.) are collected. Ensure this material is placed debris in clear bags and seal with zip tie, duct tape, or knots and transport to the appropriate Special Waste Staging Area (for silica containing waste). ➢ Ensure a “wet method” is utilized when applicable, which consists of wetting down the cementitious fireproofing with water to reduce the generation of dust.
Removal of Fireproofing	Intumescent Fireproofing (via powered tools)	**Environmental Waste, Inhalation Hazard (Intumescent Fireproofing)** ➢ Ensure removed fireproofing chips, dust or filings by appropriate means (i.e., vacuum, etc.) are collected. Ensure this material is placed debris in clear bags and seal with zip tie, duct tape, or knots and transport to the appropriate Special Waste Staging Area (for silica containing waste). ➢ Ensure **intumescent fireproofing** is only removed using an oscillating multi-tool and/or chisel (hand-held or powered). Ensure an oscillating cutting tool (i.e.,

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		Dremel) and a dust collection shroud connected to a vacuum should be used to score the material surface. ➢ Ensure where intumescent fireproofing is being removed for the purposes of planned welding, all **intumescent fireproof coatings** will be stripped back a distance of four (4) inches from the area of heat application. Ensure the area of heat application means the surface area that the flame or arc contacts and any adjacent surface whose surface temperature may be appreciably raised by heat transfer.
Excavation Activities (Life Critical Activity)	Excavations	**Cave in, Contact with Underground Commodity, Vehicle/Personnel Falling into an Excavation** ➢ Ensure the excavation permit is followed. ➢ Ensure protective measures (i.e., sloping, benching, trench boxes) are installed in all excavations **over four (4) feet in depth**. ➢ Ensure that excavation hazards are controlled through the completion and use of an excavation permit per **CFN-1030, Site Excavation Notification**. Ensure form **CFN-1031, Daily Excavation/Trench Safety Report**, is used to track day to day changes to the excavation area as well as access to the area. ➢ Ensure the requirements of the excavation permit are followed with regards to potholing near existing utilities. ➢ Ensure excavations and trenches are appropriately identified with signs, warnings, and barricades.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure excavation barricades, made of semi-permanent material (i.e., temporary "orange" fencing), must be installed six (6) feet from the edge of an excavation whenever possible. Ensure if the six (6) feet cannot be maintained, then a fixed hard barricade system must be installed. ➢ Ensure excavations across or next to a roadway requires the use of barriers including semi-permanent concrete vehicle barriers (CVB) or orange Jersey barriers, and will include roadway signs or equivalent to alert vehicle traffic when personnel are working in or adjacent to the roadway.
Excavation Activities (Life Critical Activity)	Entering an Excavation (Performing other work inside an excavation)	**Cave in, Contact with Underground Commodity** ➢ Ensure protective measures (i.e., sloping, benching, trench boxes) are installed in all excavations over **four (4) feet** in depth. ➢ Ensure excavation hazards are controlled through the completion and use of an excavation permit per **CFN-1030, Site Excavation Notification**. Ensure form **CFN-1031, Daily Excavation/Trench Safety Report**, is used to track day to day changes to the excavation area as well as access to the area. ➢ Ensure the requirements of the excavation permit with regards to potholing near existing utilities. ➢ Ensure excavations and trenches are appropriately identified with signs, warnings, and barricades. ➢ Ensure excavation barricades, made of semi-permanent material (i.e., temporary "orange" fencing), are installed **six (6) feet** from the edge of an excavation

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		whenever possible. Ensure if the **six (6) feet** cannot be maintained, then a fixed hard barricade system must be installed. ➢ Ensure excavations across or next to a roadway requires the use of barriers including semi-permanent concrete vehicle barriers (CVB) or orange Jersey barriers, and will include roadway signs or equivalent to alert vehicle traffic when personnel are working in or adjacent to the roadway.
Excavation Activities (Life Critical Activity)	Entering an Excavation	**Cave in, Hazardous Atmosphere** ➢ Verify and review the **CFN-1031 Daily Excavation/Trench Safety Report** completed by the Competent Person and inspect the area to verify safe entry into excavation boundary. ➢ Ensure only established excavation access points and walkways are utilized. ➢ Verify the work being performed does not create a hazardous atmosphere (e.g., shielded welding, use of gas-powered equipment). Contact Industrial Hygiene for further evaluation.
Excavation Activities (Life Critical Activity)	Backfill	**Crush, Hazardous Atmosphere** ➢ Ensure when using the jumping jack compactor or pneumatic pogo stick compactor metatarsal guards are required. ➢ Verify the equipment in use does not create a hazardous atmosphere. Contact Industrial Hygiene for further evaluation.

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Work in a Confined Space (Life Critical Activity)	Entering Confined Space	**Engulfment, Entrapment, Hazardous Atmosphere, Limited Access/Egress** ➢ Ensure job/task is performed in accordance with **Y73-95-802, Confined Space Entry Program**. ➢ Verify and review **UCN-23272, Classification of Potential Confined Spaces**, and compare conditions to current configuration of area and space. ➢ Ensure the requirements identified in **UCN-23273, Confined Space Entry Evaluation/Permit** are followed.
Installation of Electrical Cable and Wire	Power Tugger Assisted Installation of Electrical Cable	**Potential Energy Release** ➢ Ensure cable pulling rope, sheaves, rollers and attachments are rated for greater tension (load) than the expected sustained tension (load) generated during the cable pulling process and located properly to facilitate a safe installation. Ensure all anchor points are verified to withstand the expected pulling force generated. ➢ Ensure properly sized and rated cable reel jack-stands, rollers and spindle are used. ➢ Ensure rollers, sheaves, etc., are mounted in such a manner that damage to surrounding equipment, cable, etc., is eliminated. ➢ Ensure personnel with communications equipment are placed at locations to monitor and assist in cable pulling activities. ➢ Ensure personnel are positioned in such a manner to eliminate line of fire or pinch point concerns in the event of equipment failure.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Installation/Removal of Electrical Equipment, Cables, and Accessories	Electrical Equipment, Cables, and Accessories	**Shock** ➢ Ensure power is isolated, performing a live dead live test to any equipment, devices and cable/conductors. ➢ Ensure LOTO is applied and verified prior to accessing existing Electrical equipment and accessories. ➢ Ensure the required independent zero energy verification is always performed. ➢ Ensure Arc Flash PPE is worn where exposure exists. ➢ Ensure site installations comply with applicable processes, procedures, and regulations in accordance with **NFPA 70E, Standard for Electrical Safety in the Workplace**. ➢ Ensure cables and leads are installed with the minimum 7’ clearance above floor level. ➢ Ensure cables are installed on insulated non-conductive manufactured supports (e.g., “S” Hooks). ➢ Ensure electrical equipment has the required safe access/egress clearance to disconnecting means: (1) 36” to 120/208-volt (2) 42” to 480-volt ➢ Ensure standard 120-volt extension cords and 208-volt (single-phase twist lock) extension cords are permitted to be plugged in/unplugged by trade/craft persons after shedding the load (e.g., turning off the welder, tool, or heater.)

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure all TP 480 V service cabling, attachments, and equipment are to be handled, moved/removed, or relocated only by Temporary Power/TPQEP. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Maintenance of Electrical Equipment and Accessories	Performing Maintenance of Electrical Equipment and Accessories	**Electrical Shock** ➢ Ensure equipment is visually inspected, has current inspection tags and the proper ID labels attached prior to commencing work. ➢ Ensure electrical equipment has the required safe access/egress clearance to disconnecting means: (1) 36” to 120/208-volt (2) 42” to 480-volt ➢ Ensure the appropriate LOTO is applied and verified to control hazardous energy prior to job/task. ➢ Ensure equipment/devices connected to a power source are tested with the appropriate meter/test equipment and PPE per **NFPA 70E, Standard for Electrical Safety in the Workplace**, utilizing the live-dead-live testing method, prior to commencing with maintenance/testing.

UPF JOB HAZARD ANALYSIS – ELECTRICIAN JHA

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JHA NO.:	**JHA-00558**	**REV:**	**2**	**ISSUE DATE:**	**09/30/2022**
JHA TITLE:	**ELECTRICIAN JHA**	**WORK PACKAGE NUMBER:**		**SPECIFIC LOCATION:**	**N/A**

WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure equipment and cables are protected from damage and exposure. ➢ Verify GFI protection by testing the Ground Fault Circuit Interrupter. ➢ Ensure standard 120-volt extension cords and 208-volt (single-phase twist lock) extension cords are permitted to be plugged in/unplugged by trade/craft persons after shedding the load (e.g., turning off the welder, tool, or heater.) ➢ Ensure all TP 480 V service cabling, attachments, and equipment are to be handled, moved/removed, or relocated only by Temporary Power/TPQEP. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Maintenance of Electrical Equipment and Accessories	Removing Cable Tray Rungs	**Crush, Laceration** ➢ Ensure the removal and replacement of a cable tray section is the preferred method when electrical cable tray rung damage has been discovered or reported and/or rungs need to be removed for other reasons (spacing, interference, etc.). ➢ Ensure if removal of the entire section of cable tray is not possible, the following steps detail the preferred method to remove the damaged rungs:

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		(1) Follow PPE requirements outlined in UPF Project Electrician **JHA-00558** for grinding and welding activities. (2) If cable tray is installed at elevation, secure the damaged rung to prevent accidental displacement. (3) Ensure an approved and authorized UPF Hot Work Permit (**CFN-1139**) is in place prior to commencing the hot work activity. (4) Use an end (pencil) grinder to remove the tack welds securing each end of the rung to the cable tray. (5) Remove the damaged rung from the cable tray. (6) Use a file to smooth any sharp or jagged edges on the rung and cable tray. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Lockout/Tagout (LOTO) Activities	Lockout/Tagout (LOTO)	**Release of Hazardous Energy** ➢ Ensure any tag and/or lock installed for the safety of personnel are never removed and/or tampered with.

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JHA TITLE:	**ELECTRICIAN JHA**	**WORK PACKAGE NUMBER:**		**SPECIFIC LOCATION:**	**N/A**

WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
(Life Critical Activity)		➢ Prior to work, lock and tag machinery, systems, equipment, components, and/or systems may contain any type of stored energy. ➢ Ensure all residual/stored energy is identified and eliminated prior to any job/task in accordance with **NFPA 70E, Standard for Electrical Safety in the Workplace**. ➢ Ensure the authorized lockout/tagout (LO/TO) permit is signed, as required in accordance with process/procedures, prior to job/task. ➢ Ensure work on any machinery, system, or equipment covered by LO/TO process/procedures is not permitted or performed without the proper approval/authorization or the applicable training. ➢ Ensure any machinery, equipment, or system devices covered by any type of a LO/TO or restricted-use tagging permit is never manipulated without authorization and/or if not in accordance with process/procedures. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.*** ***CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater.*** ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Lockout/Tagout (LOTO) Activities (Life Critical Activity)	Perform Zero-Energy Checks	**Shock** ➢ Ensure all panels and circuit breakers are easily identifiable with applicable signage and warning labels per **NPFA 70E, Standard for Electrical Safety in the Workplace**. ➢ Ensure only qualified electrical person(s) will perform zero-energy checks using approved and applicable testing equipment. ➢ Ensure appropriately rated arc flash PPE will be utilized as indicated on the arc flash label from the engineering calculations onto the risk assessment, utilizing either the incident energy analysis method or arc flash category method, not both. ➢ Ensure all electrical equipment is inspected prior to use, and that any damaged equipment is removed from service and appropriately tagged for determination of repair/replacement. ➢ Ensure insulating gloves are rated appropriately for the electrical hazard of the job/task, tested prior to each use, and properly maintained in accordance with **NFPA 70E, Standard for Electrical Safety in the Workplace**. ➢ Verify entrance and egress routes are kept clear at all times. The following may apply according to the scope of work/task: ***CFN-1317, UPF Electrical Hazard Risk Assessment & Testing Form.***

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JHA TITLE:	**ELECTRICIAN JHA**	**WORK PACKAGE NUMBER:**		**SPECIFIC LOCATION:**	**N/A**

WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		CFN-1232, UPF Energized Electrical Work Permit (EEWP) is required for this work/task if energized and 50 volts or greater. ***Y17-95-64-801, UPF Energy Isolation Management (EIM) - Lockout/Tagout (LOTO) process.***
Stripping of Electrical Conductors	Stripping of Electrical Conductors	Laceration ➢ Ensure an approved wire stripping tool is utilized. ➢ Ensure an approved, fixed blade knife shall be used when a wire stripping tool is infeasible. The use of a fixed blade knife requires the review and approval of the Superintendent and an ES&H Representative.
Noise and Vibration Producing Equipment and Activities	Noise Levels Between Eighty-Five (85) and Ninety-Nine (99) dBA	**Noise (85dBA to 99dBA)** ➢ Ensure reference **ML-SH-801768-A011 Sound Levels of Common Construction Power Tools**, is utilized. ➢ Ensure that approved single hearing protection devices with a minimum **NRR of 21** are properly worn. ➢ Ensure caution sign, or caution barricade tape with caution signs or tags requiring hearing protection on the barricade are installed to establish the eighty-five **(85 dBA)** boundary around the work area. ➢ Ensure Industrial Hygiene is contacted to evaluate noise levels for new/changed work activities or when working in enclosed areas.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Noise and Vibration Producing Equipment and Activities	Noise Levels over One-Hundred (100) dBA	**Noise (Over 100dBA)** ➢ Ensure reference **ML-SH-801768-A011 Sound Levels of Common Construction Power Tools**, is utilized. ➢ Tools identified as potentially creating noise levels **(over 100dBA)** include, but are not limited to the following: (1) Air Arc Gouging (2) Blow Wand Clean-Up (3) Bush Hammering Concrete (4) Pneumatic Impact Bolt-Up (5) Powder Actuated Fastening Q-Deck (6) Vacuum Truck/Trailer Use ➢ Ensure at a minimum, wear single hearing protection devices with **NRR of 33** (i.e. red, white and blue foam earbuds) AND ear muffs are utilized. ➢ Ensure IH or an ES&H Representative are contacted if the anticipated noise levels are greater than **(114dBA)** prior to engaging in the activity. ➢ Ensure additional trained and qualified employees/personnel and or job rotation are utilized to reduce the time of exposure. Ensure when performing activities in enclosed spaces such as enclosed cells, pits, vaults or other similar spaces that may adversely affect the noise levels or where multiple noise sources are present to contact ES&H for further evaluation. ➢ Ensure danger barricade tape with danger signs or tags to identify the one hundred **(100 dBA)** boundary area are installed and in place prior to job/task.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Ensure IH is contacted to evaluate noise levels for new/changed work activities or when working in enclosed areas.
Noise and Vibration Producing Equipment and Activities	Vibration Producing Equipment	**Vibration** ➢ Equipment considered Vibration Producing Equipment and Activities include, but are not limited to the following: (1) walk-behind scabbler (2) demolition drills/hammer (3) impact drills (4) concrete saws ➢ Ensure the trigger-time limits listed in **ML-SH-801768-A008 Power Tools Hand-Arm Vibration Levels**, are not exceeded. Ensure these limits are cumulative over the course of a work shift. Ensure IH is contacted if you are using several different power tools continuously within the work shift. ➢ Ensure breaks from the source of the vibration are taken every hour and perform a different task or rotate with a coworker. ➢ Ensure tools are inspected prior use to ensure that they have been properly maintained and repaired to avoid increased vibration caused by faults or general wear. ➢ Ensure over-gripping or forcing a tool or work-piece more than is necessary is avoided. ➢ Ensure good blood circulation by keeping warm/dry, dressing appropriately, and massaging/exercising the fingers during work breaks.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Working with Chemical Substances	Working with Chemical Substances	**Contact with Chemicals (absorption, inhalation, ingestion, asphyxiation), Disposal of Hazardous Waste in Satellite Accumulation Area, Disposal of Recyclable Hazardous Wastes** ➢ Ensure IH or ES&H Representative are contacted if **UCN-23353 SDS Evaluation Form** is not completed for the specific chemical/product that you are working with. ➢ Ensure **UCN-23353** and the Safety Data Sheet (SDS) of the chemical/product are reviewed prior to starting the job/task. ➢ Ensure the assigned work controls specified in the SDS Evaluation Form are followed. ➢ Ensure waste products are disposed of in an established Satellite Accumulation Area (e.g., epoxy paints and PVC cements). ➢ Ensure waste products are disposed of in an established recycling container (e.g., paint markers and aerosol cans).
Site/Grounds Maintenance	Road/Ground Maintenance, Material Stockpiling, Waste/Spoils Maintenance	**Contact with Underground Utilities** ➢ Ensure work areas are inspected and surveyed to identify underground utilities. Ensure materials over areas with known underground utilities where the ground covering can be removed over time by the work process (e.g., rock stockpile or concrete waste area) are not stockpiled.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Site/Grounds Maintenance	General housekeeping, landscaping, wetlands maintenance, etc.	**Biological, Poison Plants (i.e. poison ivy, oak, and sumac, etc.), Venomous wildlife (i.e. snakes) and insects (i.e. wasps, hornets, fire ants), Vector-borne diseases (i.e. Lyme Disease)** ➢ Ensure notifications are made to the applicable Supervisor and UPF Medical Provider of any known allergies and carry all necessary medications/treatments (i.e. EpiPen) when needed. ➢ Ensure durable long sleeve shirts, durable full length pants, boots, and gloves are worn. ➢ Ensure after use, clean tools with rubbing alcohol (isopropanol or isopropyl alcohol) or soap and lots of water. Ensure that disposable gloves are worn to prevent contact with Urushiol as it can remain active on the surface of objects for up to 5 years. ➢ Ensure contact with all wildlife and insects is avoided and report any sighting to applicable Supervisor. ➢ Prior to use Inspect or shake out any clothing, shoes, towels, or equipment. ➢ Ensure tall grasses are trimmed or eliminated from around outdoor work areas and keep those areas clean and neat. ➢ Ensure an inspection is completed to check skin and clothes for ticks daily. ➢ Ensure after working outdoors that showering/bathing is performed as soon as possible. ➢ Ensure work clothes are washed and dried in a hot dryer to kill any ticks.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
Covid-19 environmental cleaning and disinfection	General Disinfecting	**Contact with Chemicals (absorption, inhalation, ingestion)** ➢ Ensure an IH or ES&H Representative is contacted if **UCN-23353 SDS Evaluation Form** is not completed for the specific chemical/product that you are working with. ➢ Ensure **UCN-23353** and the Safety Data Sheet (SDS) of the chemical/product are reviewed prior to starting the job/task. ➢ Ensure the assigned work controls specified in the SDS Evaluation Form are followed.
Covid-19 environmental cleaning and disinfection	Electrostatic Spraying	**Contact with Clorox, Total 360 (absorption, inhalation, ingestion), Shock** ➢ Ensure an Electrostatic Sprayer is utilized in well ventilated areas. ➢ Ensure the immediate treatment area (~10 feet) is restricted to only authorized personnel during treatment. ➢ Ensure surfaces are disinfected at approximately 2-4 feet away and always stay out of the aerosol generating visible spray. ➢ Ensure Latex or Nitrile disposable gloves are worn. ➢ Ensure Mono-goggles or a face shield are worn. ➢ Ensure at a minimum a half-face **Air Purifying Respirator (APF 10)** with a **P100 filter** is required when fogging with **Clorox 360**. Note: Respiratory Protection is not required when using the **Hypochlorous Acid Disinfectant Solution**. ➢ Ensure hands are washed with soap/water or hand sanitizer (60-95% alcohol) is utilized after disinfecting activities.

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WORK ACTIVITY	SUB WORK ACTIVITY	HAZARD/CONTROL
		➢ Prior to use, check electrical cords and equipment for defects (if equipped). Ensure that corded tools are operated in conjunction with ground fault circuit interrupter (GFCI).

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JHA TITLE:	**ELECTRICIAN JHA**	**WORK PACKAGE NUMBER:**	**TEMP**	**SPECIFIC LOCATION:**	**N/A**
Ensure a new corresponding CFN-1251, *UPF Construction Attendance Sheet*, is signed and inserted in the CWP to document JHA briefing.					
PREPARER:		**Jonathan King** Printed Name/Signature		09/23/22 Date	
APPROVALS:					
PROJECT SUPERINTENDENT:		**Matt Schmid** Printed Name/Signature		09/23/22 Date	
ES&H:		**Kieran Kelly** Printed Name/Signature		09/23/22 Date	
SITE MANAGER: (COI-CM-801768-A087)		**Steve Solberg** Printed Name/Signature		09/23/22 Date	