THE NATION'S URANIUM PROCESSING FACILITY

UPF JOB HAZARD ANALYSIS

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JHA NO.:	**JHA-00740**	**REV:**	**0**	**ISSUE DATE:**	**5-1-24**
JHA TITLE:	**Electrical Testing**	**WORK PACKAGE NUMBER:**	**N/A**	**SPECIFIC LOCATION:**	**N/A**

Activity	Sub-Activity	Hazard	Control
Forms, Permits, and Templates	Forms, Permits, and Templates	Missing Work Control Document	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*
			· Y17-95-64-842, *UPF Construction Electrical Testing*
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 than 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
			· Ensure Electrical Safety Training Documentation is to be retained for the duration of employment after proficiency is demonstrated

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Activity	Sub-Activity	Hazard	Control
			· 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:
			o Nominal System Voltage
			o Arc Flash Boundary
			· The label should also include:
			o Available incident energy and associated work distances or arc flash PPE category for the equipment, but not both
			o Minimum arc rating of clothing
			o 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
			· Ensure 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 Methods	Safety Sign and Tags Techniques	Arc Flash Shock	· Ensure safety signs, safety symbols, and tags are used 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
	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

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Activity	Sub-Activity	Hazard	Control
Utilizing Alerting Methods		Arc Flash Shock	· 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
			o Verify that boundaries are not placed closer than the AFB where it is greater than the LAB
Utilizing Alerting Methods	Attendants		· 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 an attendant to keep employees out of work/task areas where they could be exposed to electrical hazards.
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 will be applied:
			o Safety, Signs, and Tags
			o Barricades
			· Attendants
Entering Shock Protection Boundaries with exposed Energized Electrical Conductors	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
			o If any Qualified Electrical Person(s) permitted 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.

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Activity	**Sub-Activity**	**Hazard**	**Control**		
or Circuit Parts					
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		
			o The employee is inside the LAB		
			o 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		
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		
Utilizing Personal Protective Equipment (PPE)	PPE	Arc Flash Shock Eye Damage Hearing Loss Burns	· 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 shock or burns from energized electrical conductors, circuit parts, electric arcs/flashes, or any flying objects related to an electrical explosion		

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Activity	Sub-Activity	Hazard	Control
		Equipment Damage	· Ensure no conductive objects are worn (e.g. jewelry) while working on potentially energized systems
			· 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/cm2 (5 J/cm2) 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
			· 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	Arc Flash PPE Selection Methods	Arc Flash Shock	· Ensure either the incident energy analysis method or the arc flash PPE category method are utilized in accordance with NFPA 70E, but that both are not used on the same piece of equipment

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Activity	Sub-Activity	Hazard	Control
Equipment (PPE)		Eye Damage Hearing Loss Burns Equipment Damage	· 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:
			o Alternating Current Equipment
			· Power Systems with greater than the estimated maximum fault clearing times
			· Power Systems with longer than the maximum fault clearing times
			· Less than the minimum working distance
			o Direct Current Equipment
			· Power Systems with greater than the estimated maximum fault clearing times
			· Power Systems width longer than the maximum arc duration
			· 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

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Activity	Sub-Activity	Hazard	Control
			· 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)
			· Ensure the preventative and protective risk control methods included in the hierarchy of risk control methods are utilized according to the following hierarchy:
			o Elimination
			o Substitution
			o Engineering Controls
			o Awareness
			o Administrative Controls
			o PPE
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)
			· 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 annually

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Activity	Sub-Activity	Hazard	Control
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
			· Prior to contact Universal Precautions should be utilized to prevent contact with blood borne 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
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
			· Ensure FA retraining/training occurs annually
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 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

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Activity	Sub-Activity	Hazard	Control
			· Ensure Contact Release retraining/training occurs annually
Stripping of Electrical Conductors	Stripping of Electrical Conductors	Laceration	· Use an approved wire stripping tool
			· 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
Utilizing Test Instruments and Equipment on Energized Electrical Systems	Performing Testing	Arc Flash Shock	· Ensure equipment and accessories are properly rated for circuits and equipment, approved for the intended purpose, designed for the environment in which they are utilized, and used in accordance with manufacturer's instructions
			· Ensure equipment and accessories are visually inspected to ensure functional integrity, and if needed properly repaired or replaced prior to each use
			· Verify equipment for proper functionality on a proving unit or known source of voltage before and after performing testing
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, approved for the intended purpose, designed for the environment in which they are utilized, and used in accordance with manufacturer's instructions
			· Ensure equipment and accessories are visually inspected to ensure functional integrity, and if needed properly repaired or replaced prior to each use
			· Verify equipment for proper functionality on a proving unit or known source of voltage before and after performing troubleshooting
Utilizing Test Instruments and Equipment on	Performing Voltage Measuring	Arc Flash Shock	· Ensure equipment and accessories are properly rated for circuits and equipment, approved for the intended purpose, designed for the environment in which they are utilized, and used in accordance with manufacturer's instructions
			· Ensure equipment and accessories are visually inspected to ensure functional integrity, and if needed properly repaired or replaced prior to each use

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Activity	**Sub-Activity**	**Hazard**	**Control**		
Energized Electrical Systems			· Verify equipment for proper functionality on a proving unit or known source of voltage before and after performing voltage measuring		
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 once installed		
Utilizing Safety Grounding Equipment	Testing Grounding Equipment	Arc Flash Shock	· Ensure if Safety Grounding Equipment is repaired or modified it must be tested properly before being returned to service		
			o Ensure testing of the Temporary Protective Grounding Equipment is performed as service conditions require it		
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		

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Ensure a new corresponding CFN-1251, *UPF Construction Attendance Sheet*, is signed and inserted in the CWP to document JHA briefing.		
PREPARER:	Nicholas Prewitt Printed Name/Signature	05/01/24 Date
APPROVAL:		
ES&H:	Anton Panev Printed Name/Signature	05/01/24 Date
SITE MANAGER: (DOA-CM-801768-A214)	Alex Carlson Printed Name/Signature	05/01/24 Date