resolute
Forest Products

Calhoun Operations

Electrical Safety Policy

Effective: November 2, 2016

1.0 PURPOSE

The purpose of this procedure is to provide guidance to individual Resolute Forest Products Employees on developing and implementing safe work practices requirements to prevent injury due to exposure to electrical hazards. Specific practices are to be consistent with the degree of hazard present including, but not limited to, electric shock, falls due to shock, thermal burns, arc flash burns, and arc blast.

2.0 SCOPE

This procedure addresses electrical safety related work practices, safety-related maintenance requirements, and other administrative controls for employee workplaces that are necessary for the practical safeguarding of employees relative to the hazards associated with electrical energy during activities such as the installation, inspection, operation, maintenance, and demolition of electric conductors, electric equipment, signaling and communications conductors and equipment, and raceways. This procedure also includes safe work practices for employees performing other work activities that can expose them to electrical hazards.

This procedure applies to all work performed at Calhoun Resolute Forest Products involving electrical hazards to which someone may be exposed for:

1) work performed on or near un-insulated, un-guarded, energized conductors or circuit parts that involves activities inside the Limited Approach Boundary and/or the Arc Flash Boundary, or
2) work involving an interaction with equipment where conductors or circuit parts are not exposed, but an increased risk of injury from an exposure to arc flash exists.

This procedure applies to all Resolute Forest Products site personnel, temporary employees and contractors who could face the risk of exposure to electrical hazards.

All information contained in this procedure is based on the premise that the existing conditions related to the equipment and installation are such that the installation:

1) was specified and designed correctly based on the application requirements and in accordance with applicable codes and standards, and
2) was installed in accordance with applicable codes, standards and manufacturer's requirements, and
3) has been correctly operated and maintained since its installation in accordance with applicable codes, standards, and manufacturer's requirements.

Given these to be true, it can be reasonably expected that the equipment will function as intended and without incident, which is the basis for the information in the procedure. This procedure is further based on the premise that should any of these conditions prove to be false or absent, the information contained herein cannot be applied as stated.

3.0 REFERENCES

- NFPA 70E–2015, *Standard for Electrical Safety in the Workplace*
- NFPA 70-2014, National Electrical Code

- OSHA Standards
- Applicable codes and standards of local authorities at individual sites

4.0 DEFINITIONS

- Affected Employee – an employee whose job requires him/her to operate or use machine or equipment on which servicing or maintenance is being performed under lockout and /or tag out, or whose job requires him/her to work in an areas in which such servicing or maintenance is being performed.

- Authorized Employee – an employee who locks out or tags out machines or equipment in order to perform a service or maintenance on the machine or equipment.

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

- Arc Rating – The value attributed to materials that describes their performance to exposure to an electrical arc discharge. The arc rating is expressed in cal/cm^2 and is derived from the determined value of the arc thermal performance value (ATPV) or energy of breakopen threshold (EBT) (should a material system exhibit a breakopen response below the ATPV value). Arc rating is reported as either ATPV or EBT, whichever is the lower value.

- Balaclava (Sock Hood) - An arc-rated hood that protects the neck and head except for the facial area of the eyes and nose.

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

  Note: A second degree burn is possible by an exposure of unprotected skin to an electric arc flash above the incident energy level of 1.2 cal/cm^2 (5 J/cm^2).

- Boundary, Limited Approach - An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.

- Boundary, Restricted Approach - An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased likelihood of electric shock, due to electrical arc-over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.

- Conductive (Humid or Wet) Locations - Work areas in which electrical equipment, tools, cords, or personnel are, or could be in contact with moisture or other conductive fluids or materials.

- Conductive Materials - Materials capable of carrying an electrical current, including insulated materials rated less than the working voltage.

- Cord and Plug Connected Equipment - Equipment that is electrically powered through a receptacle and plug such as portable, electrically operated tools, appliances, extension cords, GFCI devices, etc.

- "Daisy Chaining" - The connecting together of more than one multi-outlet cord to form a continuous link for the purpose of increasing the number of available outlets or the available length of cord.

- Diagnostics – routine tasks performed utilizing standard testing equipment and troubleshooting procedures by Qualified Persons.

- Disconnecting Means - A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

- Electrical Hazard - A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

- Electrical Protective Clothing and Equipment (PPE) - Clothing and equipment that is designed and manufactured for protection against exposure to electrical hazards, for the specific body part to be protected and the specific hazards to which the employee may be exposed.

- Electrically Safe Work Condition – A state in which the conductors or circuit parts to be worked on or near has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if deemed necessary.

- Energized Components - Electrical equipment or circuits that have not been placed in an electrically safe work condition.

- Energized Electrical Diagnostic Work - Any work to be done on or near un-insulated, un-guarded, energized conductors or circuit parts that involves normal testing and troubleshooting or minor routine maintenance activities such as making a voltage measurement, resetting an overload circuit, or replacing a plug-in control relay or control fuse, while being performed by Qualified Persons using proper safe work practices and PPE.

- Energized Electrical Repair Work - Any work to be done on or near un-insulated, un-guarded, energized conductors or circuit parts that involves circuit part repair or replacement activities, as opposed to testing and troubleshooting activities, while being performed by Qualified Persons using proper safe work practices and PPE. Although there may be specific examples otherwise, in general, these circuit part repair and replacement activities would include work not intended by the manufacturer to be done while the circuit is energized. Some examples would include:

    - replacement of a circuit breaker in an MCC bucket while energized,
    - bus or cable "hot taps" or modification while energized,
    - work on de-energized conductors in an electrical equipment cell adjacent to exposed energized circuit parts such that people are within the arc flash and/or shock boundaries.

- Energy Isolating Device - A mechanical device that physically prevents the transmission or release of energy such as manually operated electrical circuit breakers and disconnect switches.

- Exposed Energized Electrical Conductors or Circuit Parts - Electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated, and are capable of being inadvertently touched or approached nearer than a safe distance.

- Ground-Fault Circuit Interrupter (GFCI) - A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA.

- Grounding Conductor - A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes that is not intended to carry current under normal conditions.

- Hazard - A source of possible injury or damage to health.

- Hazardous - Involving exposure to at least one hazard.

- Incident Energy. The amount of thermal energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. Incident energy is typically expressed in calories per square centimeter (cal/cm^2).

- Incident Energy Analysis. A component of an arc flash risk assessment used to predict the incident energy of an arc flash for a specified set of conditions.

- Local Electrical Safety Implementation Team - A group of individuals trained in electrical safe work practices, and that are responsible for the development and implementation of an electrical safety program at an individual site.

- Lockout - The placement of a locking device on an energy isolating device in accordance with equipment and installation specific procedures, ensuring that the equipment it controls cannot be operated until the locking device is removed.

- Lockout Device - A device that utilizes a positive means (i.e. a key lock) to secure an energy isolating device in a safe position. The locks used must be unique and consistent throughout the site, and used for lockout purposes only. There should be only one key for personal lock sets.

- Off (Left) Hand Rule - A work procedure for safely operating an electrical disconnecting device such as a circuit breaker or disconnect switch. Procedure steps are as follows:

    - Stand on the non-hinge side of the disconnecting device, normally the right side (not in front of the enclosure)
    - Grasp the disconnect operating handle with your LEFT hand if facing the disconnect, (RIGHT hand if facing away from the disconnect).
    - Turn your body and face away from the disconnect.
    - Close your eyes.
    - Take a deep breath and hold it.
    - Operate the disconnect operating handle.

- Neutral Conductor - The conductor connected to the neutral point of an electrical system that is intended to carry current under normal conditions.

- Non-Conductive (Dry) Locations - Work areas in which electrical equipment, tools, cords, or personnel are not, or could not be in contact with moisture or other conductive fluids or materials.

- Qualified Person. One who has demonstrated skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify and avoid the hazards involved.

- Qualified Engineer - A person(s) who understands the theory, operation, and safety hazards of the electrical equipment and work involved, and who has the training and experience to direct, advise or provide information for safe work execution.

- Risk. A combination of the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard.

- Risk Assessment. An overall process that identifies hazards, estimates the potential severity of injury or damage to health, estimates the likelihood of occurrence of injury or damage to health, and determines if protective measures are required.

  NOTE: As used in this standard, an arc flash risk assessment and a shock risk assessment are types of risk assessments.

- Shock Hazard - A dangerous condition associated with the possible release of energy caused by contact or approach to energized electrical conductors or circuit parts.

- Special Operating Conditions - Areas, installation methods, equipment, work practices, equipment condition, operational history, etc. unique to the site that have the potential to present safety hazards to personnel, that would not be encountered at other similar facilities.

- Step Potential - A ground potential gradient difference that can cause current flow from foot to foot through the body.

- Strain Relief -Devices that are required to protect a flexible cord and conductors from damage due to flexing at the exit point from the rigid hardware or electrical fitting on portable cord and plug connected equipment and tools.

- Switch, Isolating - A switch intended for isolating an electric circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.

- Touch Potential - A ground potential gradient difference that can cause current flow from hand to hand, hand to foot, or another path, other than foot to foot, through the body.

- Tagout - The placement of a warning tag on an energy isolating device to indicate that the energy isolating device may not be operated until the tag is removed. This tag must communicate the identity of the person who is responsible for the placement of the tag and the reason for the application of the tag.

- Unqualified Person. A person who is not a qualified person.

- Working Near (live parts) – Any activity inside the Limited Approach Boundary.

- Working On (live parts) – Intentionally coming in contact with energized electrical conductors or circuit parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment (PPE) a person is wearing.

NOTE: are two categories of "working on": Diagnostic (testing) is taking readings or measurements of electrical equipment with approved test equipment that does not require making any physical change to the equipment; repair is any physical alteration of electrical equipment (such as making or tightening connections, removing or replacing components, etc.).

5.0 RESPONSIBILITIES

- Operations Management at the site are responsible for developing and implementing an overall equipment specific Electrical Safe Work Procedures (ESP), shall be developed at each site and will be consistent with the requirements of this procedure, and any additional requirements from local authorities that may exist.

- Employees at the site are responsible for being knowledgeable of, and for compliance with the requirements of the site specific electric safe work procedures.

- Operations Management at the site are responsible for establishing a Local Electrical Safety Implementation Team to lead the development and ensure implementation of the site ESP requirements. The team shall receive training on this policy, the site ESP requirements, and any applicable codes and standards.

- Operations Management at the site are responsible for ensuring compliance with the ESP requirements. Measurement of compliance shall include periodic assessments of both the ESP administrative systems and of physical site conditions and activities.

- Management at each site is responsible for keeping this document current with OSHA, NEC, and NFPA 70E, ASTM, ANSI and other applicable standards and requirements, and ensure training content is developed and administered initially and for any relevant changes

- Safety & Health resources used at each site shall provide technical/regulatory guidance for the location. Resources needed specific to electrical safety requirements that are not available at the site shall be secured from other sources as required.

- Individuals having responsibility for specifying electrical equipment each site shall:

    - specify equipment compliant with applicable codes and standards

    - incorporate advances in technology that result in safety improvements to minimize electrical hazard potential (i.e. IEC Touch Proof components, polycarbonate barriers, remote racking devices, GFCI's, arc flash reduction measures, etc.).

    - use the Risk Assessment process at each phase of the job or project, ensuring that options chosen and choices made in the course of electrical equipment design, selection, installation and operation will serve to eliminate risk, reduce frequency of exposure, reduce magnitude or severity of exposure, enable the ability to achieve an electrically safe work condition, and otherwise serve to enhance the effectiveness of the safety related work practices contained in the NFPA 70E standards.

    - make every effort to reduce the resulting electrical arc flash incident energies, regardless of the level, and electrical shock hazards at the equipment to the lowest possible levels, including their elimination all together.

- Qualified Persons shall protect others associated with work in progress and shall perform electrical tasks per training and authorization. Unqualified Persons shall follow instructions from Qualified Persons

- Engineers serving each site shall assure that the arc flash hazards analysis is reviewed and revised, or is reaffirmed as still applicable and correct, as required whenever:

  1) the internal electrical power distribution system is modified, or there are changes in the available fault current from the outside utility source,
  2) when codes, standards or policies related to determining arc flash energy change, or
  3) at a frequency not to exceed five years, whichever is sooner.

- Operations Management in each area is responsible for proper maintenance of the electrical equipment in accordance with manufacturer's recommendations and consensus standards. Proper maintenance of electrical equipment is required to ensure proper operation and condition. An effective electrical safety program is dependent upon proper operation and condition of electrical equipment. Without proper equipment maintenance, many of the protective procedures and methods derived from this ESP would be invalid, and would provide incorrect guidance and direction to employees.

6.0 PROCEDURE

6.1 General Requirements

6.1.1 Sufficient illumination shall be provided to ensure "Qualified Persons" can avoid exposed live components. Proper illumination levels shall be consistent with OSHA Standards.

6.1.2 Employees shall not be allowed to work within boundaries that expose them to electrical hazards if their alertness is impaired due to illness, fatigue, etc. Employees shall remain alert to changes in job scope that may result in different or additional hazards.

6.1.3 Employees shall be alert to changes in job scope that may result in different or additional hazards. A Safe Work Permit (SWP) will be required for each assigned task. If there is a change of condition the safe work permit must be revised.

6.1.4 Alerting methods shall be used for work involving an installation of multiple pieces of similar or identical equipment, sometimes referred to as "look alike" equipment. These alerting methods shall be effective in identifying the electrical hazards, and in establishing proper awareness among the Qualified Persons performing the work, relating to being sure the correct piece of equipment is addressed. Alerting methods include but are not limited to:

- Safety signs, symbols, or tags (Arc Flash Labels)
- Barriers, barricades, or guards
- Numerical Identification of specific equipment
- Attendants
- Job Briefings, Risk Assessment review
- Review of single-line drawings, circuit schematic diagrams, and equipment layout plans
- Review of the electrical LO/TO procedure prior to beginning work, including verification of:
  - the equipment being worked on
  - the disconnecting means for the circuit feeding the equipment
  - the possibility for backfeeds, any paralleling potential, or other sources of energization

- absence of voltage
- application of personal protective grounds if necessary.

6.1.5 Employees shall not blindly reach into spaces that may contain exposed energized conductors or work where their view is obstructed.

6.1.6 Where there is evidence a piece of equipment presents an electrical hazard to personnel, that piece of equipment shall be de-energized unless the employer can demonstrate de-energizing would result in additional hazards or increased risk, or is infeasible due to equipment design or operational limitations. In those cases, employees shall be protected from the hazards by suitable barricades or other alerting methods necessary for safety.

6.1.7 Any conductive material and/or equipment in contact with any part of a Qualified Person's body shall be handled in a manner that will prevent contacting exposed energized conductors or circuit components. Tools must be of non-conductive materials, and Arc Flash protection provided per NFPA 70E.

6.1.8 Portable ladders used where an individual or the ladder could come in contact with exposed energized components shall be of nonconductive materials including side rails.

6.1.9 Conductive apparel is prohibited from being worn by Qualified Personnel who are, or may be exposed to an electrical hazard. Such apparel includes conductive watches, necklaces, rings, eyeglasses, exposed metal parts in shoes, unusually large belt buckles, non-job related exposed metallic objects in pockets, body piercing, etc. Every effort will be made to minimize the use of tools having exposed metallic parts.

6.1.10 Doors, hinged panels, and the like shall be secured to prevent swinging into an employee and causing the employee to contact exposed energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists if movement of the door, hinged panel, and is likely to create a hazard.

6.1.11 Electrical rooms, or electrical control working spaces shall not be used for storage. These spaces shall be kept clear to permit safe operation and maintenance of electrical equipment. Nothing should be stored within 3 feet of electrical panels.

6.1.12 Housekeeping duties shall not be performed unless adequate safeguards (e.g. insulating equipment or barriers) are provided where live components present an electrical contact hazard.

6.1.13 Only Qualified Persons may bypass electrical safety interlocks, at lowest attainable risk, while performing maintenance tasks on equipment. The interlock system shall be returned to its normal operational condition when the task is completed.

NOTE: Examples of electrical safety interlocks include enclosure door interlocks that prevent energizing equipment when the enclosure door is open, "permissive" interlocks that prevent energizing equipment until it is ready to be put into operation, and "disconnecting" device operating key interlocks, that prevent operation without a key to release the handle.

6.1.14 All devices in the circuit that are used to de-energize and permit lockout/tagout of circuit parts shall have appropriate marking and /or labeling to identify its function in the circuit.

6.1.15 Single line drawings and schematic diagrams shall be maintained to accurately represent field conditions.

6.1.16 Overcurrent protection of circuits and conductors shall not be modified, even on a temporary basis, beyond what is permitted by applicable portions of electrical codes and standards dealing with overcurrent protection.

6.1.17 When arc flash energy exceeds 40 cal/cm^2 at the normal working distance, and the work to be done is such that arc flash PPE is required, the equipment shall be de-energized before working within the Arc Flash Boundary. Work may be performed, however, on such equipment if methods are used to increase the working distance such that the employee would not be exposed to arc flash hazards exceeding 40 cal/cm^2 should an arc flash event occur. Examples of these methods would include the use of remote racking devices, remote operating devices, cable operated circuit breaker operators, circuit test points wired to a remote terminal strip, etc.

6.1.18 When energized electrical work related to maintenance and replacement activities is done on equipment where the arc flash energy exceeds 8 cal/cm^2 at the working distance, and that operates at 300 volts or more, at least one additional person shall be present. This additional person must be trained in emergency procedures, including but not limited to CPR and basic first aid, and be in direct contact with someone trained in electrical emergency procedures, to immediately respond and assist in the event of an incident.

6.1.19 Location(s) of all underground electric power feeders shall be properly documented and available for review anytime excavation work is done. Qualified Persons shall review and approve any excavation work done near underground electric power feeders. This includes review and sign off on the Excavation Permit. Where a reasonable possibility exists for contacting any electrical lines or equipment, necessary steps shall be taken to identify the location of electrical lines or equipment, and Risk Assessment shall be performed to determine appropriate safe work practices to be used during the excavation. This may include "Pot Hole" techniques. If necessary, the circuit shall be de-energized during the time the excavation work is in progress. Also, if necessary a Qualified Person shall be present during the excavation work. One method of insuring this requirement is met is through the use of an Excavation Permit Process, including the identification of use of non-conductive tools, hand digging using insulated gloves as applicable. An example of an acceptable Excavation Permit can be found in Attachment I (Note: Calhoun Mill uses an Excavation Permit Process).

6.2 Risk Assessment / Job Hazards Analysis

6.2.1 Prior to beginning any electrical work, a Risk Assessment / JSA shall be performed for each activity that has the potential for personnel to be exposed to injury due to electrical hazards. The analysis shall be performed for work involving both AC and DC systems, and shall include methods to:

- Identify hazards
- Assess risks
- Implement risk control according to a hierarchy of controls
  1. Elimination
  2. Substitution
  3. Engineering controls
  4. Awareness
  5. Administrative controls
  6. PPE

6.2.3 A Risk Assessment shall include, at a minimum the following, for both AC and DC systems:

- analysis of potential electric shock hazards
- determination of the electric shock protection boundaries
- the shock protection clothing and equipment required
- analysis of potential arc flash hazards
- determination of the arc flash boundary
- the arc flash energy level at a stated working distance
- the arc flash protective clothing and equipment required
- any special precautions
- energy source controls
- description of the safe work practices to be used
- determination of any other electrical protective clothing or equipment required
- means used to restrict access by Unqualified Persons
- determination of any job-specific hazards
- determination of the need for application of adequately rated personal protective ground sets
- information contained on the Energized Electrical Work Permit (if one is required)

An example of an acceptable Risk Assessment, is completed first, providing the necessary information for the Job Safety Analysis (JSA). Example form is in Attachment II.

6.2.4 The Risk Assessment results shall be communicated to those who could be exposed to the hazards prior to beginning work. A brief discussion is satisfactory if the work is routine and the employee can be expected to recognize and avoid the hazards. A more extensive discussion is required if the work is complicated, particularly hazardous or the employee cannot be expected to recognize and avoid the hazards. Additional discussions shall be held if changes that might affect safety occur during the course of the work.

6.2.5 The documentation requirements for Risk Assessments conducted shall be determined by the complexity of the job and the level of risk to employees.

6.2.6 Electrical hazards warning labels shall be placed on equipment that is likely to require examination, adjustment, servicing, or maintenance, at all points of the electrical system where personnel could be exposed to such hazards. This warning label shall indicate, at a minimum the:

- highest voltage present and the safe approach distances for shock protection
- arc flash hazard at a stated working distance, and the arc flash boundary
- minimum personal protective clothing and equipment needed
- circuit identification date the arc flash hazards analysis was conducted

The method of analysis and the data used in determining the information on the labels shall be documented. Where the review of the arc flash hazard risk assessment identifies a change that renders the label inaccurate, the label shall be updated.

6.2.7 An example of an acceptable electrical hazards warning label is in Attachment III.

6.3 Training

6.3.1 All employees, supervisors, temporary employees, and/or contractors whose work, or the work of those they supervise has the potential for exposure to electrical hazards, must be trained and

approved by Operations management to be Qualified for the specific electrical hazards and tasks involved before they are exposed to such hazards.

6.3.2 Qualified Persons shall be trained in, and be familiar with, the skills and techniques necessary to determine potential safety hazards from work on or near electrical conductors, equipment, and circuit parts, ways to eliminate or avoid the hazards, proper electrical protective clothing and equipment and proper safe work practices to be used

6.3.3 Because of the variety of hazards, job tasks, experience, and expertise of individuals exposed to electrical hazards, training required for a specific individual to be considered Qualified for specific tasks will vary. It is possible, and in fact likely, that individuals trained and considered Qualified for some tasks are Unqualified for others. Training received shall be specific to the job tasks and the electrical hazards present.

6.3.4 New or reassigned employees shall be trained or retrained as appropriate for their new assignment. Training must be at least annually.

6.3.5 General assignment personnel do not require this training if their work, or the work of those they supervise does not expose them to electrical hazards.

6.3.6 Operations Management at each site shall determine appropriate training based on the degree of hazard and risk to an employee.

6.3.7 All employees exposed to an electrical hazard when the risk associated with that hazard is not reduced to a safe level by the applicable electrical installation requirements shall receive training in the following, appropriate for their job tasks and hazards present, prior to beginning work and not to exceed every two years thereafter: hazards associated with electricity

- the relationship between electrical hazards and possible injury
- safe work practices required to prevent injury due to electrical hazards
- performance of a job Risk Assessment

6.3.8 Qualified Persons shall, at a minimum, have the following additionally trained in the following:

- skills and techniques necessary to distinguish energized parts from other parts
- skills and techniques necessary to determine the nominal voltage of exposed live components
- safe approach distances, and the corresponding voltages which a person is exposed
- proper use of precautionary techniques, insulating and shielding materials, and insulated tools
- proper selection and use of electrical personal protective clothing and equipment, and electrical test equipment
- determine the arc flash and shock hazards
- **NFPA 70E – current edition**
- Relevant incidents and/or issues/lessons learned
- Site-specific electrical hazards (Special Operating Conditions)
- Decision-making process necessary to be able to:
  - Perform the job safety planning
  - Identify electrical hazards
  - Assess the associated risk
  - Select the appropriate risk control methods from the hierarchy of controls identified in the Risk Assessment

6.3.9 An employee shall receive additional training (or retraining) if any of the following conditions exist:

- supervision or annual inspections indicate an employee is not complying with ESP requirements
- new technology, new types of equipment, change of conditions, or changes in procedures which necessitate the use of safety-related work practices that are different from those that the employee would normally use.
- there are tasks involved that are performed less than once per year

Retraining shall be performed at intervals not to exceed every two years.

6.3.10 Emergency Response Training

Employees exposed to shock hazards shall be trained in methods of safe release of victims from contact with exposed energized electrical conductors or circuit parts. Refresher training shall occur **annually.**

First Aid, Emergency Response, and Resuscitation.

- Employees responsible for responding to medical emergencies shall be trained in:
  - first aid and emergency procedures.
  - cardiopulmonary resuscitation (CPR) - refresher training shall occur annually
  - use of an automated external defibrillator (AED) if an employer's emergency response plan includes the use of this device - refresher training shall occur annually.

Employers shall verify at least annually that required emergency procedures training is current and is properly documented.

6.3.11 All Qualified Personnel who use electrical test equipment shall receive training on the equipment selection, application and use. Unqualified personnel are not allowed to use electrical test equipment that may expose them to electrical hazards.

6.3.12 An Electrical Safety Training Plan shall be developed for the site. The Plan shall include identification of participants, duration, frequency, course content, and documentation methods. The training frequency shall be adequate to ensure continuous understanding and awareness of the requirements. An example of a Training Plan is in Attachment IV.

6.3.13 Employees undergoing on-the-job training to become a Qualified Person shall be allowed to only perform duties up to the level of their training and shall be under the supervision of a Qualified Person.

6.3.14 Employees shall validate understanding and ability through a hands-on skills demonstration performed at the site(s). The demonstration shall include performance of job tasks that are typical to those they would normally encounter through their day-to-day activities. An example of an acceptable Hands-on Skills Demonstration form is in Attachment V.

6.3.15 Training related to the electrical safety program shall be properly documented. Documentation shall contain the content of the training, employee's name(s), name and qualifications of the trainer and dates of the training.

6.3.16 Each Operational Department shall develop and implement local procedures that provide detailed requirements relating to electrical safety training that are appropriate for the equipment and tasks at the facility, including Lock Out or safe work instruction Electrical Packets.

6.4 Contractors, Outside Service, and other non- Resolute Forest Products personnel

6.4.1 The previous level of electrical safety training for contractors, outside service, and other non-Resolute Forest Products personnel shall be evaluated before they are brought on site to determine whether or not this training is acceptable for the work to be done.

6.4.2 Contractors, outside service, and other non- Resolute Forest Products personnel shall:

- be provided an orientation in Resolute Forest Products specific electrical safety requirements, any special operating conditions and site specific hazards once they are brought on site
- ensure each of their employees are instructed in the hazards communicated by Resolute Forest Products in addition to basic electrical training required
- ensure all employees follow the site ESP requirements

6.4.3 Resolute Forest Products employees shall report any observed violations to the contract employer immediately. They shall then notify their supervisor who shall determine and take appropriate action to remove the hazard and correct the violation.

6.4.4 Contractors, outside service, and other non- Resolute Forest Products personnel shall inform Resolute Forest Products of:

- any unique hazards presented by the work
- Interruption of Load Circuits
- any unanticipated hazards found during the work execution not already communicated
- measures taken by the contractor to correct violations identified by Resolute Forest Products

There shall be a documented meeting between the Resolute Forest Products representative and the contract employer.

6.5 Work on De-energized Equipment or Components

6.5.1 Energized components to which an employee may be exposed shall be de-energized before the employee works on or near them, unless de-energizing introduces additional hazards or increased risk, or is infeasible due to equipment design or operational limitations.

6.5.2 The circuit shall be considered energized, until it is placed in an Electrically Safe Work Condition. Use of control devices or interlock circuits is not an acceptable method of lockout/tagout.

6.5.3 The process of establishing an Electrically Safe Work Condition shall include:

- determination of all sources of energy
- review of all drawings, diagrams and circuit identification tags, labels and interruption of load current
- interruption of load circuits
- opening of all disconnecting and isolating devices
- visual verification of opening where possible
- application of lockout and tag out devices
- use of an adequately rated voltage detector to verify absence of voltage by checking both phase-to-phase and phase-to-ground.

- application of personal protective grounding devices where appropriate

6.5.4 Load-rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions. Other means such as cable connections not of the load-break type, fuses, terminal plugs and cable splice connections are not to be used except in an emergency.

6.5.5 The cause of a protective device operation due to a fault condition (i.e. short circuit, phase to phase fault, phase to ground fault, etc.) shall be identified and corrected by a Qualified Person before a circuit is re-energized. Where it is determined that the protective device operation was caused by an overload rather than a fault condition, examination of the circuit shall not be required before the circuit is reenergized.

6.5.6 Over-current protection of circuits shall not be modified, even temporarily beyond the installation design requirements without the approval of a Qualified Engineer.

6.5.7 Live components operating at 50 volts and below need not be de-energized as long as there is no exposure to electrical burns or to explosion due to electric arcs.

NOTE: Shock hazards are significantly reduced if the circuit voltage is less than 50 volts. However, caution should still be exercised because under certain conditions, such as wet locations, circuits operating under 50 volts can pose a shock hazard. All such instances should be evaluated by a Qualified Engineer.

6.6 Electrical Lockout/Tagout and Try

6.6.1 Execution of all lockout/tag out procedures involving electrical energy isolating devices, where the potential exists for exposure to electrical hazards, shall be performed only by Electrically Qualified Persons, while wearing appropriate PPE and utilizing proper electrical safety related work practices.

6.6.2 Appropriate diagrammatic drawings, tags, labels, signs, etc. shall be reviewed by persons involved in the lockout/tagout to identify all disconnecting devices.

6.6.3 Each person who could be exposed directly or indirectly to a source of electrical energy shall be involved in the lockout/tagout and try process.

6.6.3 Other work activity shall be reviewed to identify where and how other affected employees may be exposed to electrical hazards. Electrical lockout/tagout events shall be coordinated, with other work procedures as applicable, to control additional energy sources.

6.6.4 An adequately rated voltage detector shall be used by Qualified Personnel to test the circuit to verify absence of voltage. Test equipment used shall be verified operational on a known source of voltage prior to, and immediately following the test.

6.6.5 Low voltage (up to 1000 volts) non-contact voltage detection devices, normally used for testing and troubleshooting activities, are not acceptable for use to verify absence of voltage for the purpose of establishing an Electrically Safe Work Condition. In these cases, only properly rated contact multimeters are acceptable.

6.6.6 When required, proper grounding conductors and/or devices shall be installed on phase conductors and/or circuit parts and shall be applied so that those involved are working between grounds.

6.6.7 Temporary Protective Grounding Equipment used shall be:

- rated for the available fault duty
- have an impedance low enough to cause immediate operation of protective devices
- visually inspected prior to each use
- suitable for the conductor shape, size, material, etc.

6.6.8 Each Operations site, shall develop and implement local procedures that provide detailed requirements and work instructions, relating to electrical lockout/tagout and try, that are specific for the equipment and tasks at the facility. This shall include, as applicable, equipment disconnect is placed in the off position, the Ethernet generates a signal to the Distribution Control System, (DCS) indicating the equipment disconnect is in the off position. The operator will verify equipment is disabled at the remote start / stop switch within the operating unit Distribution Control System (DCS). A Qualified Person, at the equipment location, verifies power is no longer present, using a contact voltage meter. After confirming a safe energy state, the qualified person requests, the control operator to jog the equipment (try) in order to confirm zero energy, and qualified person concludes with locking and tagging out the applicable energizing source. Due some equipment delays, the control operator must allow sufficient start time to ramp up the equipment to start during the "jog" process. The DCS should not be used alone to provide an Electrically Safe Work Condition. All equipment must be de-energized, locked, tagged and tested to ensure Electrically Safe prior to beginning work.

6.7 Work on Energized Equipment or Components

6.7.1 If electrical conductors and/or circuit parts are not placed in an Electrically Safe Work Condition, the work involved shall be considered energized electrical work and shall be performed by written permit only. The permit shall include:

- a description of the work
- justification by the requester for not de-energizing
- a description of safe work practices to be used
- results of a shock and arc flash analysis
- safe approach shock and arc flash boundaries
- personal protective clothing and equipment to be used
- means to restrict Unqualified Persons
- evidence of a completed job briefing
- approval from Senior Operation Manager, Department Manager, or appropriate members of management.

Exceptions: (i.e., examples of energized electrical work not requiring a permit)

- Normal testing and troubleshooting activities such as voltage testing and diagnostic tasks on electrical equipment performed by Qualified Persons using appropriate safe electrical work practices and PPE
- Minor routine work such as removing fuses performed by Qualified Persons using appropriate safe electrical work practices and PPE
- Routine operations on equipment that is intended by the manufacturer to be done while energized, when performed by a qualified person wearing appropriate PPE and using proper safe work practices as approved by Operations Management and documented on the applicable Safe Work Permit.

6.7.2 Personnel performing work on or near exposed energized conductors or circuit parts shall meet all training requirements for Qualified Persons.

6.7.3 Each Operations Department, shall determine which job(s) require an Energized Electrical Work Permit and which do not prior to performing the work. This determination shall be based on a Risk Assessment of the work involved that includes considerations such as the specific equipment type, operation and construction, equipment and work conditions, personnel skills and abilities, operational history and risk to personnel.

6.7.4 When performing work on energized circuits, work practices appropriate for the hazards involved (i.e. use of insulated tools, appropriate personal protective equipment, use of barriers, etc.) shall be used to protect employees from contact with energized parts directly with any part of their body, or indirectly through some other conductive object.

6.7.5 Voltage rated insulated tools and/or insulated handling equipment shall be used while working near exposed energized conductors or circuit components.

6.7.6 Insulated tools shall be

- rated for the voltages on which they are used
- designed and constructed for the environment to which they are exposed and the manner in which they are used, and
- inspected prior to each use.
- Tested as required by manufacturer

6.7.7 Work practices shall be suitable for the work conditions, voltage level, and arc flash potential of the circuit.

6.7.8 A shock risk assessment shall determine the voltage to which personnel will be exposed, the boundary requirements, and the PPE necessary in order to minimize the possibility of electric shock to personnel.

6.7.9 The shock protection boundaries identified as limited approach boundary and restricted approach boundary shall be applicable where approaching personnel are exposed to energized electrical conductors or circuit parts.

6.7.10 An arc flash risk assessment shall be performed and shall determine if an arc flash hazard exists. If an arc flash hazard exists, the risk assessment shall determine:

- appropriate safety-related work practices
- the arc flash boundary
- the PPE to be used within the arc flash boundary

6.7.11 An example of an Energized Electrical Permit form is in Attachment VII.

6.8 Special Operating Conditions

6.8.1 A listing of Special Operating Conditions (such as UPS installations, Solar Cell systems, Fuel Cell systems, Standby and Emergency Generator systems, open conductor/bus systems, underground and overhead conductors, age of the equipment, electrically classified hazardous locations, unique work practices, etc.) shall be developed for the site(s). These Special Operating Conditions, and the hazards they present, shall be communicated to potentially affected people through the site specific training and orientation.

6.8.2 Where electrically classified hazardous areas exist, only explosion-proof electrical equipment shall be used that is in compliance with the appropriate codes and regulations regarding classified areas, unless otherwise allowed by appropriate codes and regulations. If explosion-proof equipment is not used, special documented alternative prevention measures as allowed by appropriate codes and regulations regarding classified areas shall be taken to control hazardous conditions (work permit, enclosure purging, etc.).

6.8.3 If work is to be performed near overhead power lines that could present an electrical hazard, the lines shall be de-energized and grounded, or other safe work practices shall be used based upon a documented Risk Assessment before work begins.

6.8.4 Overhead Power Lines

If work is to be performed near overhead power lines that could present an electrical hazard, the lines shall be de-energized and grounded, or other safe work practices shall be used based on a Risk Assessment before work begins.

A Qualified Person shall determine if overhead lines are insulated for the operating voltage, covered with a material not considered acceptable as insulation for the operating voltage, or are bare, uncovered and un-insulated. Lines that are covered with a material not considered acceptable as insulation for the operating voltage shall be considered bare, un-insulated conductors, and appropriate protective measures shall be taken.

Appropriate safe approach distances for Qualified and Unqualified Personnel shall be maintained while there is a risk of exposure to electrical hazards.

6.8.5 Underground Electrical Lines and Equipment

Before excavation starts where there exists a reasonable possibility of contacting electrical lines or equipment, the employer shall take the necessary steps identify and mark the location of the electrical lines or equipment. When it has been determined that a reasonable possibility of contacting electrical lines or equipment exists, appropriate safe work practices and PPE shall be used during the excavation. If necessary, a Qualified Person shall be present during the excavation.

The Resolute Excavation Permit process must be used to ensure appropriate measures are taken to protect personnel. When used, example of Excavation Permit form is found in Appendix I.

6.8.6 Cutting or Drilling

Before cutting or drilling into equipment, floors, walls, or structural elements where a likelihood of contacting energized electrical lines or parts exists, the employer shall perform a risk assessment to:

- Identify and mark the location of conductors, cables, raceways, or equipment
- Create an electrically safe work condition
- Identify safe work practices and PPE to be used

6.8.7 Any person working in a congested space containing exposed energized components shall use protective shields, barriers, or insulating materials and/or insulated tools, as necessary to avoid inadvertent contact.

6.8.8 Doors, hinged panels, and other covers or other enclosure parts shall be kept secured as intended and as supplied by the manufacturer to prevent the risk of an individual contacting an exposed energized component.

6.9 Electrical Plug and Cord Connected Equipment

6.9.1 Plug and cord connected equipment and tools used shall meet applicable codes and standards and shall be purchased per the Resolute – *Plug and Cord Connected Equipment and Tool – in the Electrical Safety Equipment* purchasing specification.

6.9.2 Plug and cord connected equipment shall not be used as a substitute for fixed wiring.

6.9.3 All flexible or extension cords shall contain an equipment grounding conductor.

6.9.4 The flexible electric cord connected to electrically operated portable equipment (such as drills, saws, electric impact wrenches, portable heaters, etc.) shall not be used for raising or lowering the equipment.

6.9.5 The use of household or office type cords/power strips is not permitted to be used in industrial environments. "Daisy-chaining" multiple power strips together for the purpose of increasing the number of outlets and/or the length of cord is prohibited.

6.9.6 Strain relief devices are required to protect from internal cord and conductor damage due to flexing at the exit point from the rigid hardware or electrical fitting on the equipment.

6.9.7 Portable equipment shall be used in accordance with the manufacturer's instructions and safety warnings.

6.9.8 While it is recognized that some conditions may require that work involving electrically operated tools and equipment be done in conductive or wet locations, every effort shall be made to avoid using equipment in wet locations. Where an alternative is available, use tools and equipment powered from a power source such as batteries, air, hydraulics, etc. that does not pose an electrical hazard, and will still perform the task to be done.

6.9.9 Plug and cord connected equipment used in conductive (humid or wet) locations shall be specifically, approved for the use by the manufacturer, and shall be connected to a GFCI controlled outlet or service.

6.9.10 When used, the GFCI device shall be connected directly into the electrical supply, followed by the extension cord (if used) and then to the portable electric equipment or tool.

6.9.11 All portable electrically operated equipment or tools shall be grounded before use except for:

- two wire, double insulated tools, used with a GFCI
- test equipment such as oscilloscopes that must be used in the ungrounded state
- household appliances (clocks, radios, lamps, etc,) with two wire cords and plugs used in dry locations.

6.9.12 The attachment plug shall not be altered in order to allow use with a receptacle for which it was not intended. Adapters that interrupt the continuity of the equipment grounding conductor shall not be used.

6.9.13 During construction or maintenance activities, all 120V single phase 15, 20, or 30 amp power sources shall be GFCI protected.

6.9.14 Ground fault protection for personnel using other receptacles not covered above, shall be provided through the use of a listed GFCI device, or through an Assured Equipment Ground Conductor Program in accordance with the most current edition of the National Electrical Code.

> **NOTE**: GFCI's protect personnel against potential life threatening injuries resulting from simultaneous contact between the line conductor and ground while in contact with a grounded surface. They do NOT provide protection against injuries from simultaneous contact between the line conductor and the neutral conductor. Protection against injury from contact between line conductor and neutral conductor can be provided by using proper safe work practices to avoid contact (i.e. tool testing, insulated gloves, proper work procedures, etc.).

6.9.15 Portable electrically operated equipment, tools, cords, etc. shall be visually inspected for damage or hazardous conditions prior to each use.

6.9.16 GFCI devices used with electrically operated cord and plug connected equipment shall be periodically tested as per manufacturer's recommendations and that testing documented.

6.9.17 Those performing such tests shall be trained, and the training properly documented.

6.9.18 Operations has procedures that provide detailed requirements relating to inspection and testing of electrical plug and cord connected tools and equipment that are appropriate for the equipment and tasks at the facility.

6.9.19 Stationary plug and cord connected equipment (such as personal computers, water coolers, household appliances, etc.), that are installed such that the cord and plug are not subject to physical damage during normal use, need not be inspected or tested except when they are initially installed, relocated or repaired.

6.9.20 Portable plug and cord connected equipment and tools shall be repaired by Qualified Personnel only. Those persons shall be trained in the safe repair and in the electrical hazards involved with this equipment.

6.9.21 If there is a defect or evidence of damage or improper operation, the item shall be removed from service until necessary repairs and tests to render the equipment safe have been made, or the item is replaced.

6.10 The Use of Electrical Test Instruments and Equipment

6.10.1 Electrical test instruments and equipment used shall meet applicable codes and standards and shall be purchased per the Resolute – Electrical Test Instrument and Equipment in the *Electrical Safety Equipment* purchasing specification.

6.10.2 Only Qualified Persons shall perform testing work on electric circuits or equipment where an electrical hazard exists.

6.10.3 Test instruments and equipment and their accessories shall have appropriate voltage and overvoltage category ratings for the circuits to which they will be connected and shall be

designed for the environment where used. Voltage ratings shall be either 600 volts or 1000 volts. Overvoltage categories shall be either Cat III or Cat IV.

6.10.4 Test instruments and equipment and their accessories shall be visually inspected for defects or damage before each use, and periodically tested as appropriate for proper operation.

6.10.5 If there is a defect or evidence of damage or improper operation, the item shall be tagged "Caution Do Not Use" and removed from service until necessary repairs and tests to render the equipment safe have been made, or the item is replaced.

6.10.6 Non-Contact voltage devices are not acceptable for use to verify absence of voltage to establish an Electrical Safe Work condition. Only a contact voltage meters are acceptable for use when verifying "zero energy state".

6.11 Electrical Personal Protective Clothing and Equipment (PPE)

6.11.1 Employees exposed to electrical hazards shall select and use personal protective clothing and equipment appropriate for the hazards and the particular body parts involved. Electrical personal protective clothing and equipment shall be selected and used in accordance with a Risk Assessment, NFPA 70E-2015 (or latest addition).

6.11.2 Electrical personal protective clothing and equipment shall be inspected prior to each use and periodically tested per applicable codes and standards. If there is a defect or evidence the equipment is in an unsafe condition, it shall be removed from service and destroyed or otherwise rendered unusable.

6.11.3 Operations Electrical Maintenance Manager shall develop and implement procedures that provide requirements relating to inspection and testing of electrical personal protective clothing and equipment, as recommended by the manufacturer.

6.11.4 Personal protective clothing and equipment shall not be changed, altered or modified in any way from its original manufactured condition.

6.11.5 Personal protective clothing and equipment used shall meet the requirements of applicable codes and standards and shall be purchased per the Resolute - *Electrical Safety Equipment* purchasing specification.

6.11.6 In those areas where required, hard hats that comply with ANSI Z89.1 shall be used.

6.11.7 Safety glasses used by Qualified Personnel must be non-metallic, plastic encapsulated or otherwise electrically non-conductive, and shall comply with ANSI Z87.1.

6.11.8 Heavy duty leather work shoes classified as Electrical Hazard footwear (Type EH), compliant with ASTM F2413 are required for use by Qualified Personnel.

6.11.9 Use of semi-conductive shoes by Qualified Personnel is prohibited. Such shoes are designed and used to eliminate the buildup of static electricity during work on electronic equipment that is sensitive to static discharge. Other means, such as grounding of personnel through wristlets, may be used in lieu of semi-conductive footwear, with concurrence from Operations Management.

6.11.10 Heavy duty leather gloves, or arc rated gloves, shall be worn where no shock hazard exists and where required for arc flash protection. Where a shock hazard exists, or both shock and arc flash hazards exist, proper voltage rated rubber gloves with leather protectors shall be worn.

6.11.11 It is the responsibility of each individual to inspect all electrical personal protective clothing and equipment prior to use to ensure it is in good condition.

Voltage Rated Rubber Insulating Materials

6.11.12 Voltage rated rubber insulating materials include voltage rated gloves, blankets, sleeves and line covers.

6.11.13 Selection, use, and care of voltage rated rubber insulating materials shall meet applicable ASTM, and ANSI standards.

6.11.14 Voltage rated rubber insulating materials shall have a rated maximum use voltage that is no lower than the nominal voltage of the circuit on which they are applied.

6.11.15 Voltage rated rubber insulating materials shall be tested periodically at their rated test voltage. The interval between electrical tests shall not exceed six (6) months. Those performing tests shall comply with ASTM approved methods and shall be certified to perform such tests.

6.11.16 The most recent test date must be clearly indicated on the item(s). In addition, items must have markings that clearly show the Class, Type, maximum use voltage, and test voltage.

6.11.17 Voltage rated rubber insulating materials shall not be used for non-electrical jobs where they could be subject to physical damage, thermal exposures and/or chemical attack.

6.11.18 Leather protectors are required to be worn over voltage rated rubber gloves under normal conditions. The use of voltage rated rubber gloves without leather protectors shall be allowed only after an analysis of the hazards involved has been made and all hazards identified have been properly addressed.

6.11.19 Prior to each use, voltage rated rubber insulating materials shall be visually inspected. This inspection shall include verifying that the test date, or date put in service is not past six months and inspecting for holes, tears, cuts, punctures, ozone damage, imbedded foreign objects or texture changes.

Arc Flash Protective Clothing and Equipment

6.11.20 Arc Rated clothing is required for normal daily wear for Qualified People who face the risk of injury due to electric arc flash. Clothing and other apparel made from flammable, melting synthetic materials such as nylon, acrylic, polyester, polyethylene, polypropylene, and acetate are prohibited for use by Qualified People while in the workplace.

6.11.21 Special arc rated protective apparel shall be worn while performing specific tasks that have exposure to the potential of electrical arc flash. This special arc rated protective apparel shall provide proper protection for the arc flash energy level present and the appropriate parts of the body in all appropriate body positions.

6.11.22 Arc rated protective apparel shall be identified by the manufacturer with its arc flash protection rating in cal/cm^2, and that it complies with applicable standards.

6.11.24 FR / Arc Flash Clothing shall cover potentially exposed areas as completely as possible. Shirt sleeves should be fastened at the wrists, and shirts and jackets shall be closed at the neck.

6.11.25 Arc rated protective clothing and equipment shall be chosen to result in the least interference to the task and should be designed to allow rapid removal.

6.11.26 Ear canal inserts should be worn for hearing protection whenever working within the arc flash boundary.

"Other" Protective Equipment

6.11.27 "Other" protective equipment are those items used to protect against electrical hazards that are not considered personal protective clothing and equipment. Such items include ladders, warning signs and tags, barricades, insulated tools, temporary grounding equipment, fiberglass reinforced rods and tools, and barriers.

6.11.28 Other protective equipment shall be provided according to the job task and hazards involved. This other protective equipment shall be inspected prior to each use and periodically tested as appropriate.

6.11.29 Other protective equipment used shall meet the requirements of applicable codes and standards and shall be purchased per Resolute - *Electrical Safety Equipment* purchasing specification.

6.12 Electrical Safety Equipment Purchase Specifications

6.12.1 Specifications for items purchased to meet the requirements of this procedure shall be developed by Qualified Persons and approved by Management, to ensure they meet applicable codes and standards.

6.12.2 Specifications developed shall clearly state the requirements for items purchased. Certification that the requirements are met shall be indicated either by markings on the products or by documentation, all by the manufacturer.

6.12.3 Specifications developed shall include at a minimum those for:
- Electrical plug and cord connected equipment and tools
- Electrical personal protective clothing and equipment
- Electrical test instruments and equipment
- "Other" protective equipment such as ladders, warning signs and tags, barricades, insulated tools, temporary grounding equipment, fiberglass reinforced rods and tools, and barriers

6.13 Protection of Others

6.13.1 Only Qualified People shall work on or near exposed energized conductors or circuit parts. In areas where only Qualified Persons are allowed, warning signs, pylons, barricades, etc. shall be used where necessary to warn Unqualified Persons about the potential for injury due electrical hazards, and to prohibit Unqualified Persons from entering the area. If necessary, a Qualified Person shall be posted at all entrances to warn and prevent entry by Unqualified Persons.

6.13.2 Protective shields, barriers, isolating and/or insulating materials shall be used to protect Unqualified Persons from contact with live components that are exposed for maintenance or repair.

6.13.3 Where there is a need for an unqualified person(s) to cross the Limited Approach Boundary, a qualified person shall advise him or her of the possible hazards and continuously escort the unqualified person(s) while inside the Limited Approach Boundary. Under no circumstances shall the escorted unqualified person(s) be permitted to cross the Restricted Approach Boundary or the Arc Flash Boundary.

6.13.4 Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing energized conductors or circuit parts. Conductive barricades shall not be used where it might increase the likelihood of exposure to an electrical hazard. Barricades shall be placed no closer than the Limited Approach Boundary or the Arc Flash Boundary, whichever is greater.

6.13.5 During normal operation, electrical equipment enclosure covers and doors shall be in place as intended by the manufacturer with all fasteners secured. Unqualified Persons are prohibited from opening an electrical equipment enclosure for any reason. If an unattended open enclosure is observed, this condition shall be immediately reported to a Qualified Person for correction.

6.14 Electrical Safety Program Audits

6.14.1 The electrical safety program shall be periodically audited to ensure that the principles and procedures of the program are in compliance with this procedure and applicable codes and standards. Audits shall be performed at intervals not to exceed 2 years

6.14.2 Field work shall be periodically audited to verify the requirements contained in the procedures of the electrical safety program are being followed. Audits shall be performed at intervals not to exceed 1 year.

6.14.3 An audit of the site lockout/tagout/try procedure shall be conducted at least annually by a Qualified Person and shall cover at least one lockout/tagout/try in progress and the procedure details. The audit shall be designed to correct deficiencies in the established electrical lockout/tagout/try procedure or in employee understanding. An example of an acceptable Electrical Lockout / Tagout / Try Audit form is in Attachment VI.

6.14.4 Regular supervision or inspections conducted on at least an annual basis shall determine each employee's compliance with the safety-related work practices required by this procedure.

6.14.5 Where the audit(s) determines that the principles and procedures of the electrical safety program are not being followed, appropriate revisions to the training program or procedures shall be made.

6.14.6 All audits shall be documented.

7.0 ATTACHMENTS

Attachment I	Excavation Permit Form example
Attachment II	Job Risk Assessment, Job Safety Analysis (JSA) form example
Attachment III	Electrical Hazards Warning Label example
Attachment IV	Electrical Safety Training Plan example
Attachment V	Hands-on Skills Demonstration Form example
Attachment VI	Electrical Lockout / Tagout / Try Audit Form example
Attachment VII	Energized Electrical Work Permit form

8.0 HISTORICAL RECORD

Resolute Policy Revision 7

Scott Palmer
General Manager

Dallas Jones
Health & Safety Manager

Attachment I

Resolute Forest Products

Excavation Permit

Date: _____
Requested By: _____
Department: _____

Check all that will be affected in conjunction with work:

- ☐ – Water lines
- ☐ – Sewage lines
- ☐ – Storm drainage lines
- ☐ – Process lines
- ☐ – Air lines
- ☐ – Gas lines
- ☐ – Electrical / instrumentation
- ☐ – Other _____

Location of excavation: _____

_____

Purpose of excavation: _____

_____

Approximate depth of excavation: _____

Have engineering drawings of the location been reviewed? ☐ Yes ☐ No

Prior to any excavation work beginning, notify the following individuals:	Signature of Mill Representative
Project Controller / Originator -	
Engineering -	
Maintenance Manager -	
Process Control / E & I Superintendent -	
Department Operations Manager -	
Maintenance and Engineering Manager -	
Safety Manager -	

Note:
- It is mandatory that this permit be completed and posted at the job site for the duration of the job.
- It is mandatory to barricade area with red danger tape when excavation is left unattended.
- It is mandatory that all work is inspected and approved by the Project Controller / Originator before back filling has begun.
- It is mandatory that Project Controller / Originator inspects and approves of excavation after work has been completed.

Signature of Project Controller / Originator at completion: _____ **Date:** _____

Attachment II

Resolute Forest Products

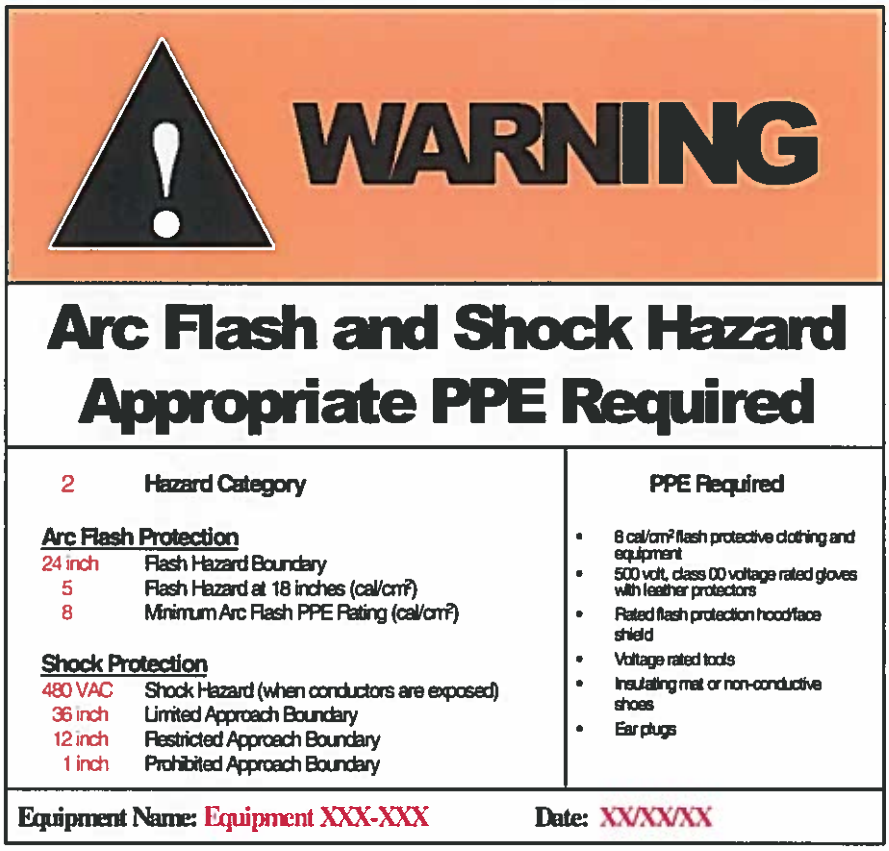
Job Risk Assessment
Job Safety Analysis (JSA)

Job Description	JSA No.	Revision	Date
	X.X	0	xx/xx/xx
Written by:	**Document Approved by:**		
JSA Participants			
Tools to be used:	**Equipment or Materials to be used:**		
Electrical Job Hazards Analysis Steps	**Results**		
1) Analysis of Shock Hazards			
2) Determination of Shock Protection Boundaries			
3) Analysis of Arc Flash Hazards			
4) Arc Flash energy level in cal/cm^2			
5) Distance from the potential arc flash source on which the arc flash energy level is based (working distance)			
6) Determination of the Arc Flash Boundary			
7) Special precautions			
8) Job specific hazards			
9) Energy source controls			
10) Shock and arc flash PPE needed to safely perform the task			
11) Safe work practices to be used			
12) Means employed to restrict access to the work area by unqualified persons			
13) Evidence of a completed Job Tail Board Meeting including any job-specific hazards			
14) Evidence of a completed Energized Electrical Work Permit, if a permit is required.			

Sequence of Basic Job Steps	Potential Hazards	Recommended Action or Procedure	Safe Work Practices to be Used
1) Communicate with Operations on exact problem and piece of equipment involved			
2) Discuss exact job procedure with all who could be exposed to electrical or mechanical hazards			
3) Conduct electrical job hazards analysis, as described above.			
4) Conduct analysis of potential non-electrical hazards	a) exposure to rotating machinery b) nip points, hit by flying debris, c)clothing, tools, parts of the body getting caught by machine	Use commutator stoning tool, use tool properly, keep hands away from rotating machine.	•25 Call full protective PPE for person working the stoning tool. •8 Cal PPE for safety watch person. •Barrier cones set up at least 7 feet from hazard to keep others away. Shock protective gloves for person working the stoning tool.
5) Reduce motor speed to minimum level			
6) Perform "stoning" procedure			
7) Replace protective covers, barriers, guards when complete			
8) Release the machine to Operations.			

Attachment III

Electrical Hazards Warning Label Example



WARNING

Arc Flash and Shock Hazard
Appropriate PPE Required

2 Hazard Category

Arc Flash Protection

24 inch	Flash Hazard Boundary
5	Flash Hazard at 18 inches (cal/cm²)
8	Minimum Arc Flash PPE Rating (cal/cm²)

Shock Protection

480 VAC	Shock Hazard (when conductors are exposed)
36 inch	Limited Approach Boundary
12 inch	Restricted Approach Boundary
1 inch	Prohibited Approach Boundary

PPE Required

- 8 cal/cm² flash protective clothing and equipment
- 500 volt, class 00 voltage rated gloves with leather protectors
- Rated flash protection hood/face shield
- Voltage rated tools
- Insulating mat or non-conductive shoes
- Ear plugs

Equipment Name: Equipment XXX-XXX **Date:** XX/XX/XX

Attachment IV

Resolute Forest Products

Electrical Safety Training Plan

Description	Audience	Estimated Duration	Frequency	Course Content	Documentation
Part 1) Basic Electrical Safety Training a) General Electrical Hazards b) NFPA 70E–2009, *Standard for Electrical Safety in the Workplace* Overview c) Site Specific Electrical Hazards d) Electrical Safety Policy, Procedures, Forms Overview	All Employees	1 hr	Annually		
Part 2) Electrical Safety for Non-Electrical People Job/Task Specific Training for: a) Maintenance Activities b) Mill Operators Activities c) Site Specific Electrical Hazards	Non-Inst/Elect Exposed to Electrical Hazards	1hr	Annually		
Part 3) Qualified Personell Training	All Inst/Elect Technicians, Supervisors, and Resources	16hr			
Emergency Procedures a) CPR and Emergency First Aid b) Emergency Response and Reporting c) Proper Methods of Releasing Victims from Contact with Energized			Annually		
Codes, Standards, Policies, Procedures a) NFPA 70E-2009 Detailed Training b) Electrical Safety Policy, Procedures, Forms, Training Plan			Initially, every 2 yrs, or after revisions	NFPA 70E PPT Presentation	
Advanced Electrical Hazards Training 1) Skills necessary to recognize potential safety hazards, ways to eliminate or avoid the hazards, proper PPE to be used, proper Safe Work Practices to be used 2) Distinguish live parts from other parts, nominal voltage, clearance distances, precautionary techniques, insulating and shielding materials and tools, proper selection and use of electrical test equipment 3) Electrical Hazards involved with work on or near 120/208 V, 277/480V 5KV, 15KV equipment, High Voltage Substation/Distribution equipment, Overhead Lines, Open Bus Systems, System and Personal Protective Grounding, etc. 4) Multimeter Safety 5) Proper Selection and use of Electrical Protective Clothing and Equipment			Initially, every 2 yrs, or after revisions	Fluke Electrical Safety DVD, CD	
Hands-on Demonstration a) Ability to: 1) Distinguish Live Parts 2) Determine Nominal Voltage 3) Determine Arc Flash Hazard 4) Determine Proper PPE needed 5) Determine Proper Safe Work Practices 6) Determine Safe Approach Distance 7) Proper Selection and Use of Electrical Test Equipment			Initially, every 2 yrs, or after revisions	Field Demonstration Supervised by Qualified Instructor	Performance Checklist Certified by Qualified Instructor
Part 4) Periodic Refresher Training			Semi-Annually		
1st Half Year a) NFPA 70E-2009 Review b) Policy, Procedures, Forms, Training Plan Review c) Brief Hands-On Skills Demonstration		4hr		Plan Field Demonstration Supervised by Qualified Instructor	Performance Checklist Certified by Qualified Instructor
2nd Half Year d) Advanced Electrical Hazards Review e) Multimeter Safety f) Relevant Incidents and or Issues since last training g) Selection and Use of Electrical Protective Clothing and Equipment h) Brief Hands-On Skills Demonstration		4hr		Fluke Electrical Safety DVD, CD Field Demonstration Supervised by Qualified Instructor	Performance Checklist Certified by Qualified Instructor

Attachment V

Resolute Forest Products

Electrical Safety Training
Hands-on Skills Demonstration Form

Qualified Person: _____

Trainer: _____

Date: _____

Qualified Personnel Training Hands-On Skills Demonstration	Task Description							
	1) Use a voltage tester to determine all energized, grounded, and grounding conductors in a 120/208V lighting panel	2) Replace a single pole 120V circuit breaker in a 120/208V lighting panel	3) Relocate a 480V welding receptacle using a 120V portable drill and extension cord.	4) Troubleshoot the control circuit in a 480V motor MCC bucket	5) Replace a 480 V MCC Bucket	6) Replace a 480V motor	7) Rack out a 480V power circuit breaker	8) Replace a 13.8KV / 480V substation transformer
1) Assessment of potential electric shock hazards								
2) Distinguish energized parts from other parts								
3) Determine the nominal voltage								
4) Determination of the electric shock protection boundaries								
5) Analysis of arc flash hazards								
6) The distance from the source on which the arc flash energy levels are based								
7) The arc flash energy levels in cal/cm2 at the working distance								
8) The arc flash protective clothing and equipment required								
boundary								
10) Any special precautions								
11) Energy source controls								
12) Description of the safe work practices to be used								
13) Determination of the personal protective equipment to be used								
14) Means used to restrict access by unqualified persons								
15) Determination of any job-specific hazards								
16) Determination of Energized Electrical Work Permit Requirements								
17) Determination of any Personal Protective Grounds requirement								
18) Determination of steps needed to establish an electrically safe working condition								

7/7/2010

Attachment VI

Resolute Forest Products

Electrical Lockout / Tagout / Try Audit Form

This form should be completed when an energy control procedure for work involving electrical hazards is inspected in accordance with the Resolute Forest Products Calhoun Operations Electrical Lockout/Tagout/Try Policy.

Specify equipment/activity involved: _____

Date: _____ Time: _____

_____ Employee(s) properly notify supervisor and/or affected employees prior to starting lockout procedure that maintenance/repair was to be performed.
_____ Employee(s) utilized or is completely familiar with written procedures to properly identify all energy isolating devices (valves, breakers, blinds, switches, etc.).
_____ Employee(s) had or obtained sufficient lockout/Tagout/Try devices and locks.
_____ Employee(s) determined electrical shock and arc flash hazards.
_____ Employee(s) determined shock and arc flash hazards protection boundaries.
_____ Employee(s) properly restricted unqualified persons access to the work area.
_____ Employee(s) provided evidence of a job briefing conducted prior to beginning work.
_____ Employee(s) provided a completed energized electrical work permit where required.
_____ Employee(s) provided evidence that all potentially affected people were provided the results of a Risk Assessment prior to beginning work.
_____ Employee(s) had locks and tags applied where required.
_____ Employee(s) properly verified all hazardous energy was controlled (equipment could not operate).
_____ Employee(s) performed task in a safe and timely manner.
_____ Employee(s) did not reactivate equipment or bypass lockouts while performing tasks.
_____ Employee(s) retrieved tools and equipment after completion, prior to lock removal.
_____ Employee(s) verified personnel were clear and accounted for prior to lock removal.
_____ Each individual involved removed his or her own lock(s).
_____ Employee(s) properly notified supervisor and/or affected employees before restoring power to equipment.
_____ Employee(s) restored power and verified proper operation of equipment or identified a problem as not repaired and repeated proper lockout procedure.

PERSON(s) INVOLVED (NAMES)

_____ _____

_____ _____

_____ _____

COMMENTS: _____

_____

_____

INSPECTION/VERIFICATION COMPLETED BY: _____

Copies to: _____ **& Archive in the Safety Department Files**

Attachment VII

Resolute Forest Products

Energized Electrical Work Permit

PART I: TO BE COMPLETED BY THE REQUESTER:

Job Number_____

1) Description of circuit/equipment/job location:

_____

_____

2) Description of work to be done:

_____

_____

3) Justification of why the circuit/equipment cannot be de-energized or the work deferred until the next scheduled outage:

_____

_____

_____ _____

Requester/Title Date

PART II: TO BE COMPLETED BY THE ELECTRICALLY QUALIFIED PERSONS DOING THE WORK:

		Check when Complete
1)	Detailed job description procedure to be used in performing the above described work: _____	☐
2)	Description of the Safe Work Practices to be employed: _____	☐
3)	Results of the Shock Hazard Analysis: _____	☐
4)	Determination of Shock Protection Boundaries: _____	☐
5)	Results of the Flash Hazard Analysis: _____	☐
6)	Determination of the Flash Protection Boundary: _____	☐
7)	Necessary personal protective equipment to safely perform the assigned task: _____	☐
8)	Means employed to restrict the access of unqualified persons from the work area: _____	☐
9)	Evidence of completion of a Job Briefing including discussion of any job-specific hazards:	☐

10) Do you agree the above-described work can be done safely? ☐ Yes ☐ No (If no, return to requester)

_____ _____ _____ _____

Electrically Qualified Person Date Electrically Qualified Person Date

_____ _____ _____ _____

Electrically Qualified Person Date Electrically Qualified Person Date

PART III: APPROVAL(s) TO PERFORM THE WORK WHILE ELECTRICALLY ENERGIZED:

_____ _____ _____ _____

E/I Team Leader Date Shift Manager Date

_____ _____ _____ _____

Maintenance Manager Date Mill Manager Date