BILLERUD

EHS SAFETY POLICY

Subject: Electrical Safety Policy	**Doc ID: #34468**	**Page** 1 **of** 12
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I. POLICY / SCOPE

The Quinnesec Mill will establish, document and train employees, contractors and others (as needed) on safety related work practices and procedures relative to electrical hazards they may be exposed to as defined by NFPA-70E. Electrical safety at Quinnesec will be divided into (3) training sessions based on job description and exposure to electrical hazards. This training will cover general electrical safety which includes basic electricity, electrical hazards, common electrical tasks/activities and use of portable power tools and cords. This will be an annual requirement for all employees, contractors and others (as needed) who may be exposed to electrical hazards.

In depth training will be provided to Qualified Electrical Personnel "QEP" that service electrical equipment and only references to QEP training will be made in this document. The additional QEP training sessions are:

- "NFPA-70E " Training Certification
- "Task and Equipment Specific Detailed Training".

II. INTENT/PURPOSE

The purpose of the program is to establish safe work practices and procedures that are intended to protect employees affected by the presence of electrical hazards.

III. DEFINITIONS

Authority Having Jurisdiction (AHJ) – A designated Quinnesec Mill employee responsible for enforcing the requirements of National Electrical Code and NFPA-70E, or for approving equipment, materials, an installation, or a procedure. This position is required by Michigan law to be exempt from inspections by county electrical inspectors.

General Electrical Awareness Personnel (GEAP) – Individuals who have been trained in identifying the hazards of electricity and the use of portable electrical tools. All mill personnel, contractors and others (as needed) who may be exposed to potential electrical hazards will maintain this level of qualification.

Qualified Electrical Personnel (QEP) – 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 the hazards and reduce the associated risk.

Qualified Lockout Personnel. A person who is not electrically qualified to work on live electrical circuits, but has operating and lockout responsibilities that involve equipment associated with or in the proximity of potential electrical hazards. Qualified Lockout personnel will receive electrical safety training to understand the facility electrical safety program, be able to recognize general electric hazards, and demonstrate proficiency in the recognition of approach boundaries, electrical safety barricading, and proper operation of disconnect switches and breakers rated up to 600V.

Unqualified Person – A person who is not trained or knowledgeable in the construction and operation of electrical equipment or a specific work method, and is not able to recognize and avoid the electrical hazards.

Qualified Electrical Low Voltage Personnel (LVP) – Qualified Electrical Personnel trained in identifying electrical hazards and is proficient in operating and maintaining equipment with voltages between 50 and 750 volts.

Qualified Electrical Medium Voltage Personnel (MVP) – Qualified Electrical Personnel trained in identifying electrical hazards and is proficient in operating and maintaining equipment with voltages between 751 and 15,000 volts.

Arc Blast– Arc Blast is a high-pressure sound wave caused by a sudden arc fault.

Arc Fault - An arc fault is a high power discharge of electricity between two or more conductors.

Arc Flash– An arc flash is a short circuit through air. When insulation or isolation between electrified conductors is breached or can no longer withstand the applied voltage, an arc flash occurs.

Boundaries:

- **Flash Protection Boundary –** When an arc flash hazard exists, an approach limit from an arc source at which incident energy equals 1.2 cal/cm2
- **Limited Approach Boundary –** An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.
- **Restricted Approach Boundary** –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.

Working Distance- The distance between a person's face and chest area and a prospective arc source.

Circuit Breaker– A device designed to open and close a circuit by non-automatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.

Electrical Clearing – Procedure used to de-energize the parts of the system to which workers may be exposed.

Electrical Isolation – State in which all electrical sources have been removed or disconnected.

Electrical Lockout – The term "electrical lockout" shall mean the locking of electrical equipment in such a manner that it cannot be energized without the lock being removed. Example; A lockout performed by opening the circuit at a physical disconnect or breaker and applying a lock so that it is locked in an open position.

Electrically Safe Work Condition. A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to verify the absence of voltage, and, if necessary, temporarily grounded for personnel protection.

Quinnesec Energized Electrical Work Permit– If live parts are not placed in an electrically safe work condition (i.e., for the reasons of increased or additional hazards or infeasibility per NFPA 130.1) or when the employee interacts with the equipment when conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists, work to be performed shall be considered energized electrical work and shall be performed by written permit only.

Requestor (for permit) – Typically a member of the operating department, but may also be a maintenance member, a member of engineering or other area.

Equipment Labeling- Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling units and that are likely to require examination, adjustment, servicing, or maintenance while energized shall be marked with a label containing all the following information:

(1) Nominal system voltage
(2) Arc flash boundary
(3) At least one of the following:
   a. Available incident energy and the corresponding working distance, or the Arc flash PPE category in Table 130.7(C) (15) (a) or Table 130.7(C) (15) (b) For the equipment, but not both.
   b. Minimum arc rating of clothing
   c. Site-specific level of PPE

Energized – Electrically connected to or having a source of voltage.

Exposed Conductors – **(as applied to energized electrical conductors or circuit parts).** Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

Flash Hazard Analysis (Arc Flash Study) – A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices and the appropriate levels of PPE.

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

Grounded Conductor – A system or circuit conductor that is intentionally grounded.

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/cm2).

Isolation/Disconnect Switch– A switch designed to open a circuit

- **Load Break Rated** – A switch capable of making and interrupting specified currents based on the switch rating. Switch ratings are in Amps and Horse Power.
- **Non-Load Break Rated** – A switch designed to open a circuit after the load has been removed by a different means.

Motor Starter– A motor starter is an electrical/electronic circuit composed of electro-mechanical and electronic devices which are employed to start and stop an electric motor.

PPE– Personal Protective Equipment (PPE) should cover all parts of the body of the worker that may be exposed to an arc flash or electrical shock. This could include shoes, gloves, flame resistant clothing, safety glasses, etc.

Temporary Wiring- must meet all the requirements of the NEC and can only be installed for 90 days. Extension cord routed through ceilings, in trays and left in place for longer than 1 shift are to be considered temporary wiring.

Voltage (V) Rated Tools– V-Rated Tools are tools rated and tested for the maximum line-to-line voltage upon which work will be done.

IV. PROCEDURES / PRACTICES

A. Basic Knowledge for General Electrical Awareness Personnel (GEAP)

A.1 Electrical Hazard.

A dangerous condition where contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or arc blast injury. Every employee can potentially be exposed to the hazards of electricity. Therefore, all employees shall be knowledgeable of the hazards of electricity and the proper work practices they must follow to reduce or eliminate these hazards.

A.2 Ground Fault Circuit Interrupters (GFCI's)

GFCI's must be used anytime (indoors or outdoors) extension cords are used or when using portable electric tools or charging systems (i.e. drill motors, skill saws, die grinders, elec. carts, etc.…) with or without an extension cord.

- GFCI's **must** be tested prior to each use in accordance with the manufacturer's instructions...
- Portable GFCI's **must** be plugged in at the source (at the outlet).

A.3 Access to electrical panels

Only Qualified Electrical Personnel (QEP) are permitted to open electrical panels or electrical equipment unless it is labeled 'Safe to Access'.

Electrical Circuit Panelboards can be opened to operate the breakers as long as the interior cover remains in place.

A.4 Overload and Circuit Breaker Reset

Only Qualified Electrical Personnel are permitted to reset circuit breakers. A Qualified Electrical Person must be called to investigate the cause of the problem.

It is permissible to reset motor overloads **one time**. *If the cause of the overload is known (i.e. the repulper is plugged) E&I can verbally give the OK to reset the device more than one time.*

A.5 Housekeeping around Electrical Equipment

Do not lean against electrical equipment or panels to prevent accidental operation of electrical switches.

The National Electric Code requires clear working space in front of all electrical panels. Storage of anything in this space is prohibited.

Do not wash motors. Some motors are open type and you could become a path to the ground. Some motors (refiners and other 2,300V motors) have 230V heaters and are exposed in the bottom of motor. They could be energized even when the motor is off.

Do not wash any other electrical equipment. This includes panels, electrical devices, and cable trays. Water in electrical rooms shall be immediately reported to E&I to assess the risk.

When washing walls and ceilings, do not wash lighting. Lights can explode and glass will break when hit with water. If you are holding the hose, you may become part of the circuit to the ground.

A.6 Lockout of Equipment over 751V

Lockout of equipment over 751V by Qualified Lockout Personnel is **not** permitted unless they maintain an Electrical Task qualification for that equipment. This qualification is explained in section B.3

A.7 Extension cords and portable tools:

- **Visual Inspection:**
  Extension cords or cords connected to portable power tools shall be visually inspected before use for external defects such as loose parts, deformed and missing pins, or damage to outer jacket or insulation, and for evidence of possible internal damage such as pinched or crushed outer jacket. If there is a defect or evidence of damage, the item shall be removed from service and disposed of or tagged as inoperable until repairs and tests necessary to render the equipment safe have been made.

- **Use:**
  Portable equipment shall be handled in a manner which will not cause damage. Flexible cords may not be used for raising or lowering equipment, nor fastened with staples or used in a manner which would cause damage to the outer jacket or insulation. Portable tools or cords shall not be used in locations where water or other high conductivity liquids are present unless the equipment is designed and rated for such use.

- **Grounding Type Equipment:**
  Flexible cords used with grounding type utilization equipment shall contain an equipment grounding conductor. Attachment plugs and receptacles shall not be connected or altered in a manner that would interrupt continuity of the equipment grounding conductor. Additionally, these devices shall not be altered in order to allow use in a manner that was not intended by the manufacturer. Adapters that interrupt the continuity of the equipment grounding conductor shall not be used.

- **Conductive Work Locations:**
  Portable electric equipment used in highly conductive work locations (such as those inundated with water or other conductive liquids) shall be approved for those locations.

- **Connecting Attachment Plugs:**
  Employees' hands shall not be wet when plugging and unplugging flexible cords and cord-and-plug connected equipment if energized equipment is involved. Energized plug and receptacle connections shall be handled only with insulating protective equipment if the condition of the connection could provide a conductive path to the employee's hand (e.g. if a cord connector is wet from being immersed in water). Locking-type connectors shall be secured after connection.

- **Flammable or Ignitable Materials:**
  Where flammable materials are present only occasionally, electric equipment capable of igniting them shall not be permitted to be used, unless measures are taken to prevent hazardous conditions from developing. Such materials shall include, but are not limited to, flammable gases, vapors, or liquids, combustible dust, and ignitable fibers or flying's.

A.8 Electrical Room Authorization

All Qualified Lockout Personnel are authorized to enter electrical rooms for the purpose of lockout of 480 volt motor starters and circuit breakers. In addition, safety department members, IT department members, and other mill members may enter to conduct Audits, Assessments or perform general cleaning. All Other tasks require a mill QEP. Contractors shall be escorted by trained personnel with the exception of the following general presence contractors and electrical specialty contractors who have been trained on General Electrical Awareness and can work in our electrical rooms w/o direct supervision.

B&B, GE, ABB and L&S Electrical Contractors
Jamar
CR Meyer
Plant Protection/JF Ahern making rounds

Personnel in Electrical Rooms recognize potentially hazardous energy, respect the Limited Approach Boundary and barricades set up by QEP's to prohibit members from entering work zones.

Electric Rooms are not Break Rooms and shall not be used as such. No chairs, radios, or other material may be left in electric rooms unless they are used for electrical troubleshooting and repair.

A.9 Electrical Defect Labeling

Defects found in electrical equipment through inspections (IR Scans – AB&C levels, Overdutied equipment, etc…) will be labeled with a magnetic "Attention" label detailing the problem with the equipment and requires E&I for Lockout.

Depending on the severity of the defect, the equipment may also be barricaded off until the next outage opportunity or if severe enough, the equipment will be shut down immediately and the repair made.

A.10 Power Lines

Do not touch Power lines. A downed cable, exposed cable, damaged cable, or dead-ended cable are never safe to touch. If you find one, report it to any qualified E&I Member.

Maintain a clear distance. A minimum of ten feet must be kept by unqualified workers, vehicles, and other mechanical equipment from exposed live conductors.

Cable Trays. Be careful not to run into overhead cable trays with fork trucks or cranes. Also, use caution around cables that come through the floor going to and from power distribution centers and equipment.

Excavation (Digging). Do not dig holes on mill property without obtaining an excavation permit. It is dangerous to dig anywhere on the mill site without knowing what could be buried below.

A.11 Portable Equipment Lockout

De-Energize equipment that is operated by electrical plug-in or by air pressure by unplugging/uncoupling their electrical or power sources.

Attach a Lockout Device or a "DANGER - DO NOT OPERATE" tag at the plug or coupling.

A.12 Field Device Disconnect Switch Operation (Welders, Motors, others…)

Operation of a field disconnect switches for welders, motors or other remote devices that provide disconnecting means follow these general rules:

- Confirm the switch enclosure is not physically damaged and all covers are closed and properly secured or an E&I must be contacted for assistance.
- Prior to switch operation the load should be de-energized whenever possible. (Motor, welder or other equipment shut off).
- Operation of the disconnect switch from the hinged cover side standing and looking away from the switch when operating.
- Use of 480 Volt Extension or Splitter Cords shall not be permitted unless means to lock out connections has been established ensuring they cannot be opened while the circuit is energized.
- If device has an arc flash label, follow the label recommendation.

A.13 Personal Apparel and Personal Protective Equipment (PPE)

Personnel required to be in the MCC are required to wear personal apparel - long-sleeves and long pants made of 100% non-melting fiber (cotton, wool, silk, arc rated rayon,…etc.). Safety shoes/boots must be all leather or electrically rated.

All Qualified Lockout Personnel who are responsible for electrical clearing and lockout are required to wear 100%, non-melting shirts and pants and the PPE provided. Prior to each use, all electrical PPE must be inspected for tears, cracks, pin holes, or other damage.

Any type of non-natural (i.e. plastic) picture or wording is NOT allowed on natural fiber under-garments, pants, or shirts. In the event of an actual arc flash incident, the non-natural material will have a tendency to melt into the skin and cause additional injuries. Material of this nature may be worn under general plant guidelines but must be removed when in the presence of potential electrical hazards.

Approved Laboratory Testing for Electrical PPE:
The following listed equipment/PPE must be tested by an approved laboratory and certification of analysis provided to the mill:
Electrical Rated Gloves – Every 6 Months once issued or 1 Year since previous test
Hot Sticks – Every 2 Years
HV Testers – Every 2 Years

Electrical Insulating Blankets – Every 2 years

A.14 Electrical Equipment Labeling

Electrical equipment labeling will be applied to all equipment that is likely to require servicing or maintenance while energized. Labeling will provide the following:

- Available incident energy and the corresponding working distance
- Minimum arc rating of clothing
- Required level of PPE
- Date of the hazard analysis
- Highest Hazard/Risk category (HRC) for the equipment
- Nominal system voltage and shock boundaries (Limited and Approach)
- Arc flash protection boundary

B. Electrical Safety for Qualified Electrical Personnel (QEP)

B.1 NFPA-70E Training Certification

This training will detail the compliance requirements of an electrical safety program which includes the development of Safe Work Practices, Risk Assessments, Hazard Elimination, Work Involving Electrical Hazards and the goal to achieve an “Electrically Safe Work Condition”. This certification will be completed annually and cover the latest version of NFPA-70E and include updates of the latest changes that have been released.

B.2 Task and Equipment Specific Detailed Training

Training Procedures for Common Tasks Performed by the QEP

Procedures developed for common electrical tasks that include a risk assessment of the hazards, human error potential, the likelihood of an occurrence, potential severity of harm, PPE required and safe work practices to be used.

Procedures also cover proper use and testing requirements for Tools, Test Equipment and PPE.

Low Voltage Electrical Qualification (50 – 750Volts)

All Qualified Electrical Low Voltage Personnel (LVP) shall be knowledgeable of the hazards of electricity and the proper work practices they must follow to reduce these hazards. Annual Re-qualification including a hands on demonstration is required.

Medium Voltage Electrical Qualification (751 – 15,000V)

All Qualified Electrical Medium Voltage Personnel (MVP) shall be knowledgeable of the hazards of electricity and the proper work practices they must follow to reduce these hazards. Annual Re-qualification including a hands on demonstration is required.

B.3 Electrical Task Qualification

Electrical Task qualification is a process to train personnel on a specific task or equipment or to train QEP on a task above their current qualification. The person must be trained to identify the hazards associated with the task, the proper procedures to use for the task, and how to identify when the task requires additional QEP.

Departments maintaining task qualifications must maintain annual training records for each qualification level FOR **EACH PERSON BEING QUALIFIED**.

Examples:
2300V Starter Disconnect lockout
2300V Starter Disconnect Maintenance and Troubleshooting
480V Switchgear Breaker Operation

V. RESPONSIBILITIES

A. Health & Safety Department

Develop initial training materials to ensure MIOSHA requirements are in compliance.

Keep documentation of training as completed by operating and maintenance departments through Verso Learning Center.

B. Purchasing

Provide the initial training link to contractors whose work falls under this policy.

Keep documentation of training as completed by contractors and when annual training has to be refreshed.

C. Facility Management

Responsible for ensuring mill members have received the policy training.

Responsible for field audits ensuring members are complying with the policy

D. Members exposed to basic electrical hazards

Members are responsible for implementing and adhering to this policy

Members are responsible for knowing the Shock and Arc Flash Boundaries when equipment doors are open and to respect barricades prohibiting entry into these areas when electrical work is being performed.

E. Contractors exposed to basic electrical hazards

Contractors are responsible to read, understand, and adhere to this policy

F. AHJ, Power System Maintenance and Engineering

Review the Maintenance plans and ensure proper Execution of all PM's for distribution equipment with particular attention to Breakers, Relays, fuses and other protective devices.

Maintain an accurate listing of all the power system assets down to the MCC level including the type, protective settings, ampacity, voltages, last test date and any other information necessary to safely operate the equipment

Review all new Power System installations for Proper Design and Installation
Insuring that all electrical equipment including trial skids are installed in compliance with the NEC.

Ensuring that all new installations have the appropriate engineering studies (Short Circuit, Coordination, Arc Flash…etc.) and labeling as required by NFPA 70E

Insuring all new installations are below the maximum operating Arc Flash Levels (40 Cal/cm2) and are in compliance with mill standards for PPE requirements.

VI. SUPPORTING DOCUMENTS

"NFPA-70E 2018" Training Certification
"Task and Equipment Specific Detailed Training"