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## 1.0 PURPOSE

This procedure describes the mandatory processes required for adding personal protection on running mobile equipment.

## 2.0 APPLICATION

The ZES (Zero Energy State) Program is applicable at all Vale Ontario operations.

Parameters for Electrical Locking & Tagging	
Up to 600 volts	<ul style="list-style-type: none"> <li>Employees must be trained and qualified to ZES003</li> </ul>
Greater than 600 volts and up to 15kV	<ul style="list-style-type: none"> <li>Employees must be trained and qualified to ZES003</li> <li><b>Power Department</b> will follow <b>MPROC-55001 High Tension Lines, High Tension Switching Procedure</b> between 600 volts and up to 15kV</li> <li><b>All other departments</b> will follow <b>MPROC-50001 Electrical Department Switch Room and Substation Access Procedure</b> <ul style="list-style-type: none"> <li>Employees must be trained and qualified electrical tradespersons or have been trained, qualified and permitted through MPROC-50001</li> <li>Requires communication with the plant's Electrical Department to establish the level of involvement required from them</li> </ul> </li> </ul>
Greater than 15 kV	<ul style="list-style-type: none"> <li>Requires Power Department</li> </ul>

### 2.1. EXCEPTIONS

- High tension power lines and related equipment are under the direct control of the Power Department i.e. all 230kV, 69kV, and 44kV lines and equipment. All personnel must follow Power Department procedure MPROC-55001 High Tension Lines, High Tension Switching Procedure
- Overhead lines and related equipment below 15kV must follow plant specific policies and procedures
- Equipment greater than 15kV not owned by the Power Department e.g. Cottrell, must follow plant specific policies and procedures

## 3.0 REFERENCES

The following references were used in the development of this document or are related to it. Reference should always be made to the most current official version of these regulations.

- Occupational Health and Safety Act
  - Ontario Regulation 854, Sections 160, 185
  - Ontario Regulation 632/05, Confined Spaces Section 14
- CSA-Z460 Control of Hazardous Energy

## 4.0 DEFINITIONS

**Authorized:** a person who has been given permission to perform the task

**Cascaded Lock Bock:** a lock box that contains the keys from an identified red project lock that has been affixed to the exterior of another lock box or lock boxes

**De-energized:** disconnected from all energy sources and not containing residual or stored energy.

**Do Not Operate Tag:** a yellow reusable tag that indicates authorization from the System Operator must be obtain before removing tag or operating of the device (used by Electrical Tradespeople)

**Delayed Starts:** used to delay the operation of a process or start of a motor, pump, fan, etc. The time can be varied depending on the requirements and typically uses time delay relays to accomplish it.

**Designated Tagger:** a qualified worker or another person who installs and removes project personal protection and manages status tags

**Device:** a piece of equipment or a mechanism designed to serve a special purpose or perform a special function

**Energy Source:** any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravity, pressurized, flow of material or other stored energy.

**Energy Isolating Device:** a mechanical device that physically prevents the transmission or release of energy, such as a disconnect of switches, valves, spades, or blocks

**Equipment:** any machine driven by electricity or any other prime mover, and/or combination of machines that operates as a system / process, such as pumps, fans, electric motors, mobile machines, vessels, piping, valves, etc.

**Frequency Drive:** a type of motor controller used with AC motors to vary the frequency and voltage supplied to the motor (In doing so, it can vary the motor speed to match the load requirements of the motor such as controlling the speed of a conveyor belt, fan, mine hoist, etc.)

**Grounding Device:** an approved device to mechanically connect electrical conductors to ground

**Ground Tag:** a green tag identifying that a grounding device has been installed on the circuit

**Hold Off Tag:** Affixed to fused disconnects or breaker control handles by a linesman or P&C technician (tag issued by the Systems Operator) to prevent individuals from reclosing a tripped device

**Interlocks:** Used in electrical circuits, it is usually a device (common switch, infrared beams, photo detectors, etc.) used to prevent undesirable actions in a piece of equipment, machine or process.

**Isolate:** a process use or action taken to introduce any number of approved physical barriers between the equipment and sources or forms of energy and/or process material.

**Isolation Equipment Operator:** a qualified person who operates the Energy Isolation Device (i.e. controls, valves, etc.)

**Isolation Equipment Operator:** a qualified person who operates the energy isolation device.

**Lock Box:** a lockable device with provision to secure/see and count keys and hold forms that can be used in two applications: 1) By a Designated Tagger to secure keys and hold the lock box form 2) By a Local Tagger to secure the remote tagging form and hold the lock box form

**Lock Extender:** a red device used to allow multiple personal protection locks to be installed on an energy isolating device

**Lockout Device:** a mechanical means of locking an energy isolation device, using a Personal Protection Lock.

**Local Tagger:** a qualified person who uses a Remote Tagger to install the Local Tagger's personal protection locks and tags on energy isolating devices

**Personal Protection Lock:** an approved single keyed red lock capable of locking an energy isolating device or a lock box

**Personal Protection Tag:** an approved red tag that is used in conjunction with a personal protection lock to lock and tag an energy isolating device

**Project Lock:** an approved single keyed blue lock that is used by a Designated Tagger to secure keys in a lock box

**Protected Worker:** a Tagger who has installed personal protection and has verified a Zero Energy State

**Qualified:** a competent person designated by his/her employer as being qualified because of knowledge, training and experience to safely perform an assigned task.

**Remote Tagger:** a qualified person who operates, locks and tags energy isolation devices on behalf of a Local Tagger

**Running Repairs:** a repair to a piece of mobile equipment that is in an energized state (Two types of running repairs: 1. Running repairs with power ON + key ON / engine not running and the electric/hydraulic motor is not energized – personal protection tag required in operators control area 2. Running repairs with key ON / engine running or electric / hydraulic motor energized – personal protection tag and a qualified operator required in operator's control area)

**Soft Starts:** Used with AC motors to reduce the load and torque on the powertrain and current surge during start up. Allow the motor to slowly (softly) ramp up to full speed.

**Status Tag:** an approved white tag identifying why an energy isolating device may not be operated so as to protect equipment

**Station Guarantee Tag:** a white, reusable numbered tag used by Power Department to identify the fact that a certain device is being used to protect a person or group of persons while working on or near equipment

**Superintendent:** the level of management that supervisors who are in charge of equipment and/or processes report to.

**Tagger:** a qualified worker who installs and removes his/her personal protection and manages status tags.

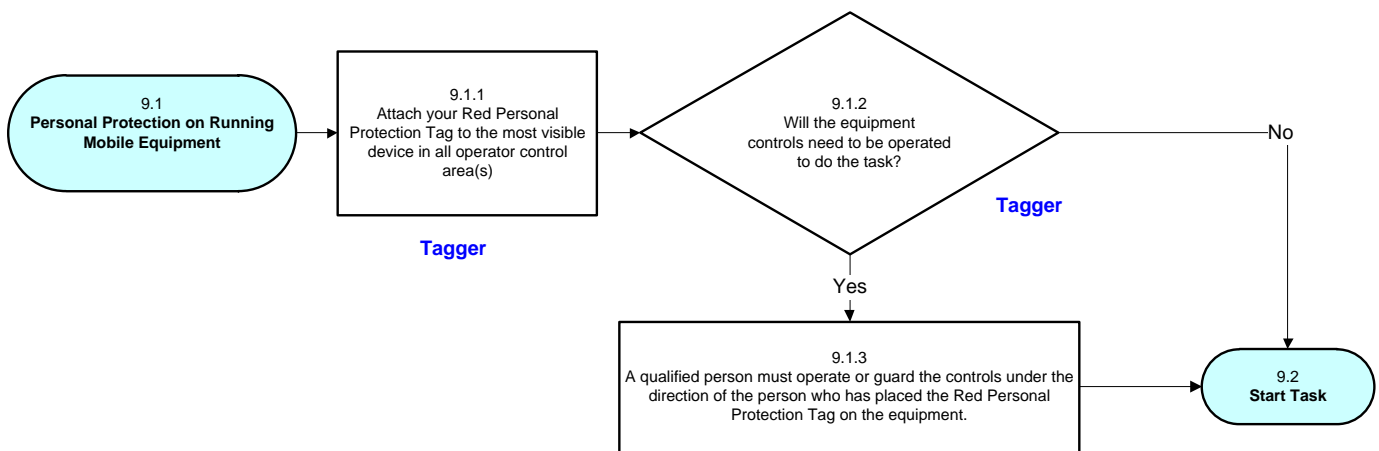
**Variance:** an approved plant specific measure put in place when it is impractical or unsafe to follow the Zero Energy State Locking and Tagging Procedure

**Zero Energy State:** a state where all hazardous energy has been isolated and de-energized, or otherwise controlled to manage risk.

### 5.0 PERSONAL PROTECTION ON RUNNING MOBILE EQUIPMENT

The following flowchart outlines the mandatory steps required for installing personal protection on running mobile equipment.

**Personal Protection on Running Mobile Equipment  
ZES Flowchart #9**



## 6.0 ZES PROCEDURE – FLOWCHART #9

### FC: 9.1 PERSONAL PROTECTION ON RUNNING MOBILE EQUIPMENT

The purpose of this flowchart is to outline the steps to follow when a task requires personal protection on mobile equipment that is running.

Special hazards are introduced into the work place when mobile equipment has to be operating in order to complete the work. It may not be possible to de-energize the equipment to a zero-energy state and perform the task. One example might be when the hydraulic pressure requires adjustment, the diesel engine must be running but we must not move the equipment because there are workers in close proximity to the equipment.

Another example is when we need to line up a hydraulic cylinder to install the pin, in this case the diesel engine has to be running and the controls have to be operated to line up the cylinder.

Opportunities exist for downgrading incidents if the plan or communications are insufficient.

The flow chart for this procedure outlines how personal protection is to be installed on mobile equipment that must be operated to complete the work. To use this flow chart, the Tagger must be:

- Qualified on the zero energy state locking and tagging procedure.
- Qualified on the personal protection on running mobile equipment portion of the zero energy state locking and tagging procedure.

#### FC: 9.1.1 ATTACH YOUR RED PERSONAL PROTECTION TAG TO THE MOST VISIBLE DEVICE IN ALL OPERATOR CONTROL AREAS

The purpose of this step is to provide personal protection for the Tagger while performing a task on running mobile equipment.

A worker cannot begin a task that requires hazardous energy control on mobile equipment that is running until the required protection is installed. In all instances this will be an approved red personal protection tag that is securely attached to the most visible control device in the operator's control area. In the event that there is more than one operator's control area, red personal protection tag shall be installed in each operators control area. Some examples of operators control areas are:

- Jumbos have the steering /drive area and drill control area.
- Radio remote control transmitters.
- Cable remote control units.

Running Repairs is a repair to a piece of mobile equipment that is in an energized state. There are two types of "Running Repairs":

1. Running repairs with power on + key on /engine not running and the electric/hydraulic motor is not energized.
  - a. Personal protection tag required
  - b. No qualified operators required
2. Running repairs with key on /engine running or electric/hydraulic motor is energized.
  - a. Personal protection tag required
  - b. Qualified operator required in operators control area

This step is to be performed before the tagger begins work where hazardous energy must be controlled on mobile equipment that is running.

### **FC: 9.1.2 WILL THE EQUIPMENT CONTROLS NEED TO BE OPERATED TO DO THE TASK?**

The purpose of this step is to determine if the controls need to be operated to perform the task while the equipment is running?

The Tagger has already installed their red personal protection tag(s) in the operators control area(s). The tagger must now make the decision whether the controls of the mobile equipment need to be operated in order to complete the work.

One example might be when the hydraulic pressure requires adjustment, the diesel engine must be running but we must not move the equipment because there are workers in close proximity to the equipment.

Another example is when we need to line up a hydraulic cylinder to install the pin, in this case the diesel engine has to be running and the controls have to be operated to line up the cylinder. Opportunities exist for downgrading incidents if the plan or communications are insufficient.

A worker cannot begin a task that requires hazardous energy control until the required protection is installed.

The tagger must answer the question, “Will the equipment controls need to be operated to do the task?” to determine the next step to be performed.

- If the answer is ‘yes’, then proceed to step 9.1.3.
- If the answer is ‘no’, then proceed to step 9.2 on the Flowchart – START TASK.

The step is performed after the tagger’s red personal protection tag(s) are installed and before work commences.

### **FC: 9.1.3 A QUALIFIED PERSON MUST OPERATE THE CONTROLS UNDER THE DIRECTION OF THE PERSON WHO HAS PLACE RED PERSONAL PROTECTION TAG ON EQUIPMENT**

The purpose of this step is to allow a qualified equipment operator to operate the controls on mobile equipment under the direct instructions from the Tagger while the Tagger’s personal protection remains in place.

The Tagger has already installed their red personal protection tag(s) in the operator’s control area(s) and the controls of the mobile equipment need to be operated in order to complete the work. The Taggers red personal protection tags must remain on the operator’s control station(s).

An example is when we need to line up a hydraulic cylinder to install the pin, in this case the diesel engine has to be running and the controls have to be operated to line up the cylinder. Because the qualified operator is operating the controls under direct instructions from the tagger, the red personal protection tag must be left on the control(s).

The communications between the Tagger and the person operating the controls must be clear. The person operating the controls must only take direction from the person who has installed the personal protection.

The operator at the controls must be qualified to operate the equipment.

Clear and reliable communications must exist between the tagger and qualified equipment operator.

The above must be in place before the task begins.

**FC: 9.2      START TASK**

Start Task

**7.0      APPENDICES**

APPENDIX A: Revision Notes



**Appendix A: Revision Notes**

Revision notes describe what was changed, and if applicable, why it was changed, and the plan to implement the change, including whether changes are retroactive. The revision notes are a summary of the changes and may not necessarily be a complete list. A risk code is entered each revision and if applicable, the revision notes will describe how risk was addressed for the revision

Risk Code:	Risk Category
A	The revision is a minor change and/or introduces no risk.
B	Risk has been addressed for this revision by the reviewer and approver. Low risk or no new hazards identified.
C	For this revision, a risk management tool has been used to address risk and minimize hazards. This risk assessment has been document and is available through Maintenance Engineering.

Rev	Revision Notes
6	July 25, 2019 ownership of ZES Program transitioned to Ontario Operations Safety, Central Services. Risk Code A – minor change and introduces no risk. Changes include: Header of program documentation and reference number changes for example: MPROC-60000 now SPI-ZES-60000. Location of documents and forms on Websites remain the same. FORMS have no change other than "reference numbers" to the documents where applicable.
5	Revision of <b>Section 2 - Application</b> to clarify locking and tagging requirements for different voltages and involvement levels required of Electrical Department and Power Department. Risk Code for this revision is <b>A</b> – The revision introduces no risk.
4	Oct 31, 2017 - Added clarity to 9.2 – to reference FLOWCHART – START TASK step. Content not changed.
3	November 2015 - Ontario Operations Zero Energy State Locking & Tagging Program, Section 6 Procedures, 6.9 Flowchart 9 and its related CPQQRT 1. Formatted content into a maintenance standard "procedure" document: MPROC-60009 Personal Protection on Running Mobile Equipment. The reason for reformat:
2	March 31, 2009 <b>Ontario Operations Zero Energy State Locking &amp; Tagging Program</b> Ontario Division changed its organizational structure. ZES Program document updated: "Section 7 – Accountabilities" to reflect the new organization structure
1	June 15, 2008 Implemented the <b>Ontario Operations Zero Energy State Locking and Tagging Program</b>