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ZES PROGRAM Using Cascading Lock Boxes

1.0 PURPOSE

This procedure describes the mandatory process required when using a cascading lock box.

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

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



ZES PROGRAM

Using Cascading Lock Boxes

Ontario Operations – Safety, Central Services

SAF-ZES-60012

Version: 5

Effective Date: 2019-07-25

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

5.0 USING CASCADING LOCK BOXES

In many cases due to commissioning or testing requirements, it is necessary to access and remove the locks from a subset of energy isolating devices associated with a lock box at some point during a project. With proper planning, a cascaded lock box application will simplify the removal of locks and tags from a subset of equipment identified for commissioning or testing purposes.

This procedure for applying a cascading lock box arrangement must be reviewed prior to the installation of locks to prevent the wrong application or use of a cascading lock box. There are three applications for cascading lock boxes:

1. **Extending a Lock Box:** Use this application when a large group or groups working at different sites are working on the same project but need to lock in different locations. This application allows multiple lockout points for the same project.
2. **Cascading Using Multiple Lock Boxes:** When a secondary project is being completed that can take advantage of existing lock boxes, or when a project has multiple phases (i.e. installation and commissioning, or rotating a piece of equipment mid-project).
3. **Cascading a Lock Box and Additional Isolation Points:** When a secondary project is being completed that can take advantage of a combination of equipment such as a lock box plus additional equipment (i.e. installation and commissioning, or rotating a piece of equipment mid-project).

IMPORTANT:

You can ONLY cascade off of an original lock box.

- Cascading off of a cascaded lock box is NOT permitted.

A worker shall not have personal protection installed on more than one lock box at a time.

Cascading lock boxes have added a certain amount of complexity. If you have any questions about a cascaded lock box process, refer to your Supervisor.

NOTE: A protected worker must answer “Yes” to the following three questions in order to determine if his or her task is part of the project as listed on the cascaded lock box form in the cascaded lock box. The protected work will also need to look at the original lock box form(s) to answer Questions 2 and 3:

1. Is your task part of the listed project?
2. Are the listed Energy Isolation Devices adequate for the work you are doing?
3. Is the list ZERO Energy verification adequate for the work you are doing?

If worker requiring protection cannot answer “Yes” to all three questions, **he or she cannot use this cascaded lock box.**

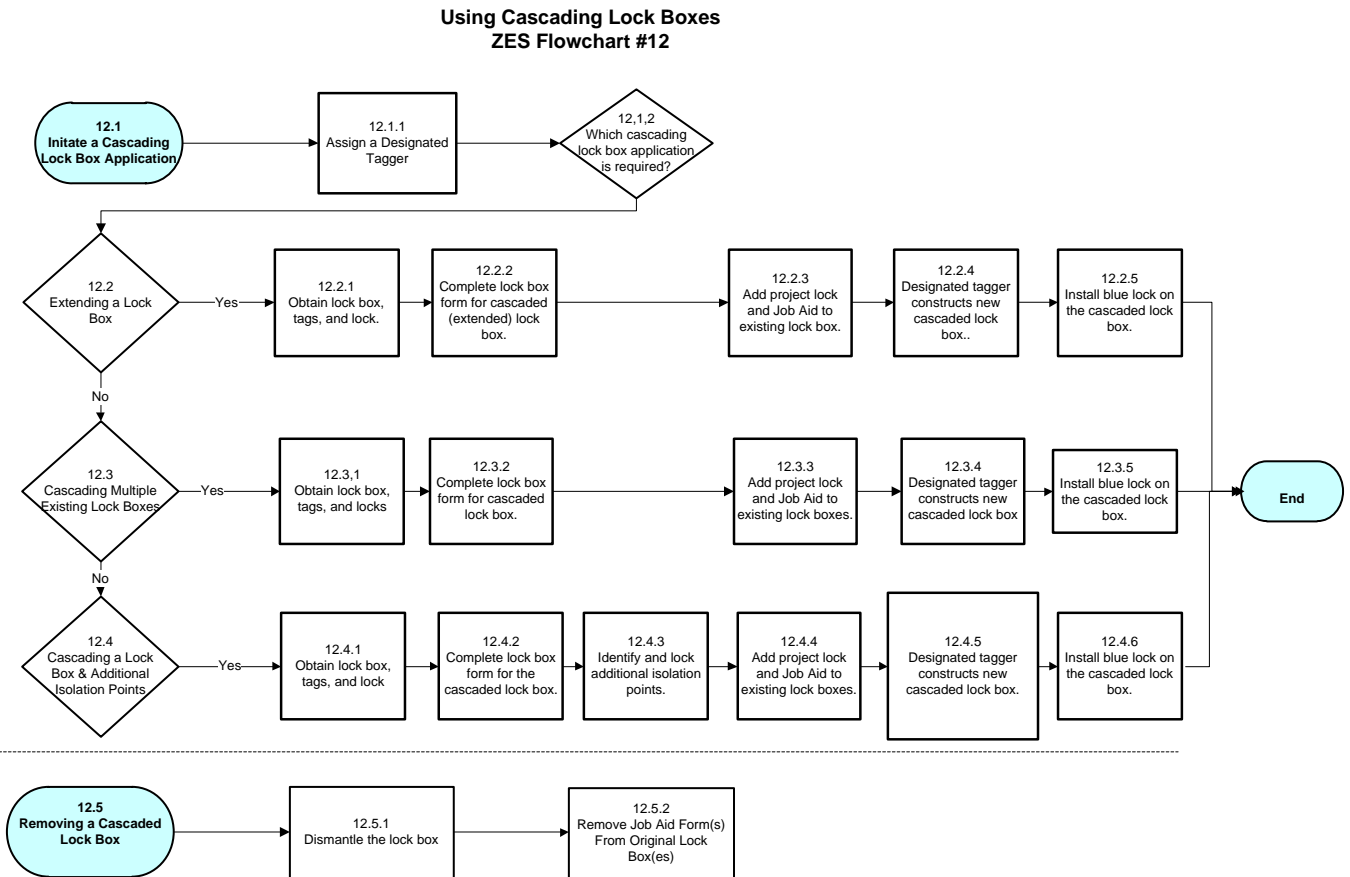
ZES PROGRAM Using Cascading Lock Boxes

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6.0 ZES PROCEDURE – FLOWCHART #12

FC: 12.1 INITIATE A CASCADING LOCK BOX APPLICATION

The purpose of this flowchart is to outline the steps required to initiate a cascading lock box application.



This flowchart assumes that a decision has already been made to use a cascaded lock box for the project.

IMPORTANT:

You can ONLY cascade off of an original lock box. Cascading off of a cascaded lock box is NOT permitted. A worker shall not have personal protection installed on more than one lock box at a time.

FC: 12.1.1 ASSIGN A DESIGNATED TAGGER

The purpose of this step is to assign one person that will be accountable for the isolations required for a particular project. Each project requires a Designated Tagger.

The Designated Tagger must be:

- Qualified on the Zero Energy State Locking and Tagging procedure
- Familiar with the isolation/de-energization required for the project

A cascaded lock box contains the keys from an identified red project lock that has been affixed to the exterior of another lock box or lock boxes.

The blue project lock secures keys in the cascading lock box to provide personal protection for each protected worker who uses the lock box. The blue project lock secures the keys for the duration of the project.

The Designated Tagger must always keep the key for the blue lock secure.

The Designated Tagger may pass the key for the blue project lock to a new designated tagger who becomes the subsequent designated tagger for the project if required.

FC: 12.1.2 WHICH CASCADING LOCK BOX APPLICATION IS REQUIRED?

The purpose of this step is to make a decision as to which type of cascaded lock box application is required for the project. There are three applications for cascading lock boxes.

1. Extending a Lock Box
2. Cascading Using Multiple Lock Boxes
3. Cascading a Lock Box and Additional Isolation Points

The next sections describe the steps required for each of the cascading lock box applications identified above.

FC: 12.2 EXTENDING A LOCK BOX

The extending a lock box application is used when a large group or groups working at different sites are working on the same project but need to lock in different locations. This application allows multiple lockout points for the same project.

FC: 12.2.1 OBTAIN LOCK BOX, TAGS AND LOCK

The purpose of this step is to identify all personal protection Locking and Tagging requirements for the protection of workers.

The Designated Tagger has determined that the project will use a cascaded lock box to protect workers. They must now gather the material required to install the extended lock box.

1. Obtain Lock Box form and Job Aid form from the ZES Website
2. Obtain red lockout tags and locks
3. Obtain a blue lock
4. Obtain lock box

FC: 12.2.2 COMPLETE LOCK BOX FORM FOR CASCADED (EXTENDED) LOCK BOX

The purpose of this step is to complete the Lock Box Form and the Using Cascading Lock Boxes Job Aid Form.

The Designated Tagger fills in the Lock Box Form:

1. Add date and project description – write the same project name on the Lock Box Form (same as the original Lock Box Form).
2. Add '*Extended*' to the end of the project name on the new Lock Box Form.
3. Ensure device list includes only the original project name for the original project.
4. Indicate project name of the cascaded lock box and contact information on the Job Aid form.

FC: 12.2.3 ADD PROJECT LOCK AND JOB AID TO EXISTING LOCK BOX

The purpose of this step is to effectively lock and tag the energy isolation devices in the isolated position by utilizing an Extended Lock Box application.

1. The Designated Tagger will install a red project lock and tag on the existing, original lock box.
2. The Designated Tagger will place the completed Job Aid Form in the document slot on each lock box being extended.

FC: 12.2.4 DESIGNATED TAGGER CONSTRUCTS NEW CASCADED LOCK BOX

The purpose of this step is to initiate a cascaded lock box for personal protection from an existing project lock box.

1. All red project lock key are placed in the new (extended) lock box. There must be one key for each lock.

FC: 12.2.5 INSTALL BLUE LOCK ON THE CASCADED LOCK BOX

The purpose of this step is to ensure that the extended lock box has been properly secured for a cascading lock box application.

The Designated Tagger installs a blue project lock on the extended lock box and places the completed lock box form in the document slot of the lock box.

Copy the existing, original Lock Box form, marked as “COPY” and place it in the the document slot of the new cascaded lock box.

The Extended Lock Box is now ready for use for personal protection.

FC: 12.3 CASCADING MULTIPLE EXISTING LOCK BOXES?

Cascading multiple existing lock boxes is used when a secondary project is being completed that can take advantage of existing lock boxes, or when a project has multiple phases (i.e. installation and commissioning, or rotating a piece of equipment mid-project).

FC: 12.3.1 OBTAIN LOCK BOX, TAGS AND LOCKS

The purpose of this step is to identify all personal protection Locking and Tagging requirements for the protection of workers.

The Designated Tagger has determined that the project will use a cascaded lock box to protect workers. They must now gather the material required to install the extended lock box.

1. Obtain Lock Box form and Job Aid form from the ZES Website
2. Obtain red lockout tags and locks
3. Obtain a blue lock
4. Obtain lock box

FC: 12.3.2 COMPLETE LOCK BOX FORM FOR CASCADED LOCK BOX

The purpose of this step is to complete the Lock Box Form and the Using Cascading Lock Boxes Job Aid Form.

The Designated Tagger fills in the Lock Box Form:

1. Ensure device list includes names of all the project lock boxes being used to cascade.
2. Indicate project name of the cascaded lock box and contact information on the Job Aid Form.

FC: 12.3.3 ADD PROJECT LOCK AND JOB AID TO EXISTING LOCK BOXES

The Designated Tagger will install a red project lock and tag on the existing original lock box.

The Designated Tagger will place a completed Job Aid Form in the document slot of each existing, original lock box being cascaded from. NOTE: One Job Aid Form is required for each lock box being cascaded.

FC: 12.3.4 DESIGNATED TAGGER CONSTRUCTS NEW CASCADED LOCK BOX

The purpose of this step is to cascade multiple existing lock boxes into a cascaded lock box application for personal protection.

1. All red project lock key are placed in the new (cascaded) lock box. There must be one key for each lock.

FC: 12.3.5 INSTALL BLUE LOCK ON THE CASCADED LOCK BOX

The purpose of this step is to ensure that the cascaded lock box has been properly secured for a cascading lock box application.

The Designated Tagger installs a blue lock on the cascaded lock box and places the completed lock box form in the document slot of the cascaded lock box.

If the lock boxes are not in proximity to one another, make a copy of all existing, original lock box forms, mark them as 'COPY' and place the copies in the document slot of the new cascaded lock box.

The Cascaded Lock Box is now ready for use for personal protection.

FC: 12.4 CASCADING LOCK BOX & ADDITIONAL ISOLATIONS POINTS?

This cascading lock box application is used when a secondary project is being completed that can take advantage of a combination of equipment such as a lock box plus additional equipment (i.e. installation and commissioning, or rotating a piece of equipment mid-project).

FC: 12.4.1 OBTAIN LOCK BOX, TAGS AND LOCK

The purpose of this step is to identify all personal protection Locking and Tagging requirements for the protection of workers.

The Designated Tagger has determined that the project will use a cascaded lock box to protect workers. They must now gather the material required to install the extended lock box.

1. Obtain Lock Box form and Job Aid form from the ZES Website
2. Obtain red lockout tags and locks
3. Obtain a blue lock
4. Obtain lock box

FC: 12.4.2 COMPLETE LOCK BOX FORM FOR THE CASCADED LOCK BOX

The purpose of this step is to complete the Lock Box Form and the Using Cascading Lock Boxes Job Aid Form.

The Designated Tagger completes the Lock Box Form for the cascaded lock box.

1. Ensure device list includes
 - a. Name of project lock box that is being used to cascade
 - b. All additional devices that will be locked
2. Indicate project name of the cascaded lock box and contact information on the Job Aid Form.

FC: 12.4.3 IDENTIFY AND LOCK ADDITIONAL ISOLATION POINTS

The Designated Tagger will lock all additional isolation points with project lock and tag.

FC: 12.4.4 ADD PROJECT LOCK AND JOB AID TO EXISTING LOCK BOXES

The purpose of this step is to secure the original lock box and identify that it has been cascaded.

The Designated Tagger will:

1. Install a re project lock and tag on the existing original lock box.
2. Place the completed Job Aid form in the document slot on the existing original lock box.

FC: 12.4.5 DESIGNATED TAGGER CONSTRUCTS NEW CASCADED LOCK BOX

The purpose of this step is to provide personal protection for a job.

The Designated Tagger will place all red project lock keys in the new cascaded lock box.

NOTE: Include keys from isolation points as well as key from red lock on existing lock box being used to cascade.

FC: 12.4.6 INSTALL BLUE LOCK ON THE CASCADED LOCK BOX

The purpose of this step is to ensure that the cascaded lock box has been properly secured for a cascading lock box application.

The Designated Tagger installs a blue lock on the cascaded lock box and paces the completed lock box form in the document slot of the cascaded lock box.

If the lock boxes are not in proximity to one another, make a copy of all existing, original lock box forms, mark them as 'COPY' and place the copies in the document slot of the new cascaded lock box.

The Cascaded Lock Box is now ready for use for personal protection.

FC: 12.5. REMOVING A CASCADED LOCK BOX

Removing a cascaded Lock Box is similar to the process outlined in procedure: *SAF-ZES-60004 Designated Tagger Removing Lock Box*; however, in the case of a cascaded lock box the Designated Tagger must remove the Job Aid from the original lock box.

FC: 12.5.1 DISMANTLE THE LOCK BOX

The purpose of this step is to access key to the project locks that were affixed to the original lock box.

The Designated Tagger will ensure all red project locks and tags are removed from the original lock box(es) and all Lock Box forms are filed as outlined in procedure: *SAF-ZES-60004 Designated Tagger Removing Lock Box*

FC: 12.5.2 REMOVE JOB AID FORM(S) FROM ORIGINAL LOCK BOX(ES)

The purpose of this step is to remove the Job Aid from the original lock box indicating the original lock box is no longer cascaded.

The Designated Tagger will remove the Job Aid from the original lock box and discard it.



7.0 APPENDICES

APPENDIX A: Revision Notes

ZES PROGRAM Using Cascading Lock Boxes

Ontario Operations – Safety, Central Services SAF-ZES-60012 Version: 5 Effective Date: 2019-07-25

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
5	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.
4	Revision of Section 2 - Application 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 A – The revision introduces no risk.
3	Ontario Operations Zero Energy State Locking & Tagging Program, Job Aid – Cascading Lock Boxes Job Aid 1. Created NEW content for a maintenance standard "procedure" document: MPROC-60012 <i>Using Cascading Lock Boxes</i> aligned to steps outlined in existing Job Aid. <ol style="list-style-type: none"> 1. To meet the minimum requirements of documents maintained in the recently established Maintenance Standard Document Management System 2. To maintain the procedure on the Maintenance Standards Website for easy access for internal and external reference. 2. New Flowchart 12 created to cover 4 scenarios under 12.1 – Initiate a Cascading Lock Box Application – 12.1.1 Assign a Designated Tagger – 12.1.2 which cascading lock box application is required? <ul style="list-style-type: none"> • 12.2 Extending a Lock Box • 12.3 Cascading Multiple Existing Lock Boxes • 12.4 Cascading a Lock Box & Additional Isolation Points • 12.4 Removing a Cascaded Lock Box Process steps for each option added to chart and aligned in stacked view so that what is the same and what is different between each option is visible. Added note to flowchart: You can ONLY cascade off of an original lock box. Cascading off of a cascaded lock box is NOT permitted. A worker shall not have personal protection installed on more than one lock box at a time.
2	March 31, 2009 Ontario Operations Zero Energy State Locking & Tagging Program 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 Ontario Operations Zero Energy State Locking and Tagging Program