The *BSO Plus Safety Topic* is a review designed from the BSO Plus agenda. This safety topic is your way to stay current on the safety information over the 3 years between BSO Plus and BSR.

ENERGY HAZARDS

What is hazardous energy?

According to Canadians Standards Association, *CAN/CSA Z460-05: Control of Hazardous Energy – Lockout and Other Methods*, "Hazardous energy is defined as any electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, or other energy that can harm personnel."

The following table describes types of energy and some of their potential sources:

(Source: WSPS)

Approximately 2,000 people are injured in Ontario each year from machine-related incidents.
This accounts for about 3.5% of all lost-time claims in the province.

TYPE	DESCRIPTION	ENERGY SOURCE EXAMPLES
Electrical	Energy made available by the flow of electric charge through a conductor.	Power transmission lines; machine power cords; motors; solenoids; capacitors (stored electrical energy).
Chemical	Energy stored in the bonds of chemical compounds and released by a chemical reaction.	Batteries, gasoline, natural gas, and coal.
Hydraulic	Energy produced by the compressive force or movement of a liquid in a confined area (often pipes, cylinders, and valves).	Hydraulic systems such as presses, rams, cylinders, and hammers.
Kinetic	Energy produced by an object in motion.	Blades; flywheels; materials in supply lines of bins or silos.
Pneumatic	Energy created by the motion and pressure of a gas, such as air.	Pneumatic systems such as pressure reservoirs, accumulators, air surge tanks, rams, and cylinders
Potential	Also known as "stored energy". This energy has the potential to move machine parts or be acted upon by gravity even after the main energy source has been isolated.	Springs; actuators; counterweights; raised loads; top or movable part of a press or lifting device
Thermal	Energy created by or in the form of heat.	Supply lines; storage tanks and vessels

Source: Tooling University. *Lockout/Tagout Procedures 130*. Retrieved 12/10/12, from http://www.toolingu.com/definition-850130-19441-electrical-energy.html

It is important to understand that these energy types can be considered as either the primary energy source or stored energy, which is energy that can remain in the system.

- **Primary energy** is the supply of power that is used to perform work.
- **Stored energy** is energy within the system that is not being used, but when released can cause the related machinery or equipment to respond.

How do we control hazardous energy?

The purpose of energy isolation is to control hazardous energy to prevent unexpected equipment start-up and hazardous energy releases. The main method used and recommended to protect workers from risk of harm in these cases is the use of a **lockout/tagout program**.

Lockout: is the method used to physically neutralize all energy to a piece of equipment or machine prior to starting maintenance work on it. The locking device (or lockout device) can be any device that has the ability to secure the energy-isolating device in a safe position. The purpose of lockout is to prevent an energy-isolating device, such as a switch, circuit breaker, or valve, from accidentally or inadvertently being operated while workers are performing maintenance on machinery or equipment.

Tag out: A danger tag must be used with all lockouts. The Construction Regulation 213/91 s.190.(6) states that the tag shall:

- Be made of non-conducting material and shall be installed so as not to become energized
- Be placed and secured in a noticeable location
- Name of person who disconnected; name of person's employer; and date of disconnect
- The tag may also require a written explanation about why the lockout/tag out is required (repair, maintenance, etc.).

Locally, the IEC Safety Partnership also requires the tag to include a contact information of the person who installed the tag. This ensures that the owner of the lock can be contacted to confirm that he or she is safely out of the work area if necessary. If a danger tag is in place, it is never to be removed, bypassed, ignored or otherwise defeated without the authority of the authorized person responsible for it.

At least one **qualified trade technician** from each trade working on equipment must apply a trade lock and information tag on electrical isolation points.

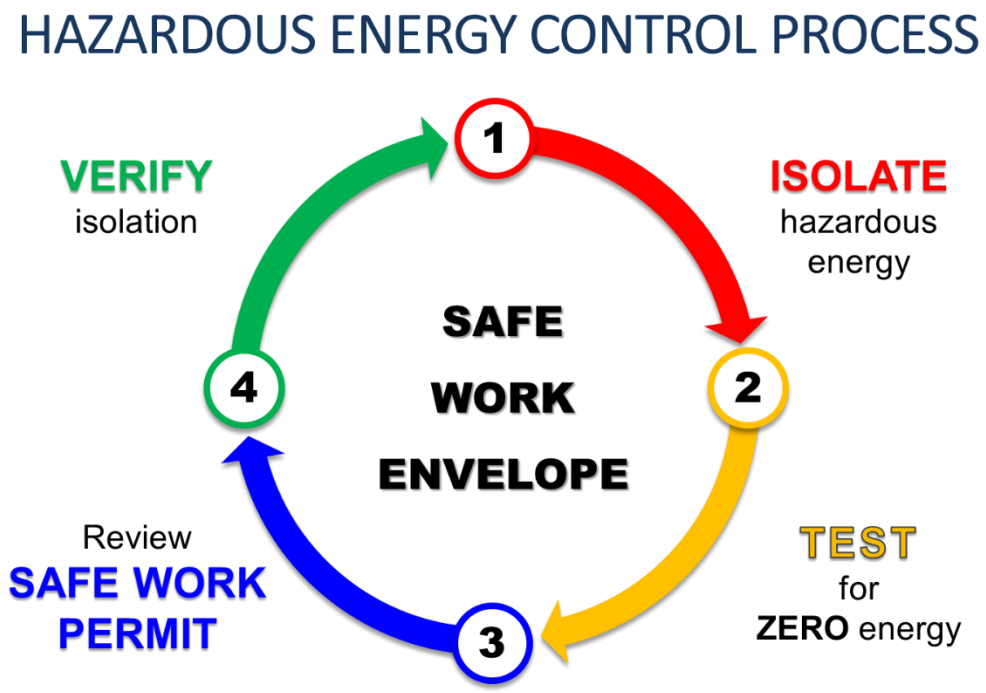
Lock Boxes: Instead of every worker applying their locks on each specific energy isolation device, using a group lock box enables the team to apply just one lock on each energy source.

- Using a group lockout box ensures controlled access to locked out points on different equipment during a job.
- The keys of these security locks are then stored in the group lockout box.
- Authorized workers then apply their own personal lock on the group lockout box.
- This means the keys to energy isolation devices cannot be accessed unless all authorized workers remove their personal padlocks to release the keys, only after ensuring the equipment is ready for regular use.

What is a "Safe Work Envelope"?

Before the work can begin, a worker needs to verify that hazardous energy has been controlled. All workers have the right to apply a personal lock and confirm the effectiveness of the isolation points. Depending on the type of energy source that is being locked out, there are different ways to verify the effectiveness.

If a lock is not in place, or is done incorrectly, it can lead to electrocution, crush injuries, amputations, or death resulting from equipment start up, fires and explosions, or chemical exposures. Before re-energizing the equipment or machine, you must ensure that work has been completed and the permit is surrendered.



1. **Isolate hazardous energy** (done by Operations)
   - Operations personnel are responsible for identifying the sources of energy, then isolating those sources by neutralizing, redirecting or stopping the energy
   - At least one qualified trade technician from each trade working on equipment must apply a trade lock and information tag on electrical isolation points.

2. **Test for zero energy** (Operations)
   - This involves a visual check as well as physically testing the machine, equipment, or process controls to make sure it's safe to perform work.

3. **Review the safe work permit** (Operations AND Permit Receiver)
   - Reviewing the permit is a formal interaction between Operations and Permit Receiver to ensure both parties have a clear understanding and agreement of work involved.

4. **Verify the isolation points prior to starting work** (Operations AND Permit Receiver)
   - The permit receiver is responsible to VERIFY with Operations that hazardous energy has been controlled prior to executing work. This involves going into the field to verify the isolation points.
   - All workers have the right to verify the effectiveness of isolation and lock-out measures and to apply a personal lock and information tag to any energy Isolation point if they so choose.

Ontario

Vale Canada Limited Fined $1 Million in Death of One Worker, Critical Injury to Another

SUDBURY, ON - Vale Canada Limited pleaded guilty and has been fined $1,000,000 after one worker died and another was critically injured while attempting to clear a jam in a rock-crushing machine at a plant near Sudbury.

The incident took place at the company's rock-crushing facility located at 18 Rink Street in Copper Cliff, Ontario on April 6, 2014. A rock crusher, used in the first stages of the refining process, became jammed with a broken-off steel moil point (a pointed tool) inside the crusher. There were no established procedures for removing broken or jammed materials from crushers.

After one failed attempt to remove the moil point, two workers positioned themselves above the jaws of the crusher to use a cutting torch to free the moil point, which weighed about 53.5 kilograms. As the cutting torch was applied, the heat softened the steel of the moil point, reducing friction and causing the moil point to be released from the compressive power of the crusher jaws created by stored energy. The moil point propelled vertically toward the two workers, striking each of them. One suffered fatal trauma and the other suffered critical injuries.

The subsequent Ministry of Labour investigation found the electrical motor of the crusher had not been locked out, and no measures were taken to release the stored energy of the crusher.

Vale Canada Limited pleaded guilty to failing to ensure that gravity-stored energy was dissipated or contained while work was being done on the crusher, and to failing to provide information, instruction and supervision to a worker on a safe procedure to remove the broken moil point from the crusher. The company also pleaded guilty to failing to ensure that pinch points were guarded on the conveyor and crusher; these offences were not related to the fatality or injury.

The company was fined a total of $1,000,000 in provincial court by Justice Patrick Boucher on October 24, 2016 in Sudbury court.

A supervisor who was acting as a worker that day, Greg Taylor, pleaded guilty to failing to work in compliance with Ontario's mining regulation, and was fined $3,000 for his involvement in the failed attempt to remove the moil point.

In addition to the fines, the court imposed a 25-per-cent victim fine surcharge as required by the Provincial Offences Act. The surcharge is credited to a special provincial government fund to assist victims of crime.

This is the second-highest fine imposed by a court in Ontario for contraventions of the Occupational Health and Safety Act. In 2013 Vale Canada Limited was convicted and fined $1,050,000 in the 2011 deaths of two workers at its Stobie Mine near Sudbury.

Conviction: Occupational Health and Safety Act Section 25(1)(c); Section 25(2)(a); Ontario Regulation 854 (Mines and Mining Plants Regulation) Section 185(2); Section 185(7)(b); Section 196(2)(d)