This session covers the safety procedure known as “Lockout/Tagout,” which is required by OSHA in its standard on Control of Hazardous Energy. This is part of your training in becoming an “authorized employee”—an employee who services or maintains machinery and equipment.
The main objectives of this session are to train you, as an authorized employee, to be able to:

- Recognize hazardous energy sources – to know when machinery and equipment may be hazardous to yourself and others;
- Understand your responsibilities to yourself and other employees in making sure that conditions are safe; and
- Control hazardous energy by following specified lockout/tagout procedures.
What is hazardous energy? It’s important to know the possible sources of hazardous energy in order to protect yourself and other employees. Hazardous energy is:

- Often invisible—it’s not immediately obvious that a hazard exists;
- Hydraulic or mechanical;
- Live or stored; or
- Machine or equipment parts that are still moving—or have the potential to move—after shutoff.

Think about examples of hazardous energy in our workplace, including machinery or equipment that could injure someone even after it is shut down.
One major category of hazardous energy is the energy stored in machinery or equipment after the machinery has been turned off. Examples include:

- Heat;
- The force of gravity that could cause machinery to continue to move;
- Electricity, where the flow of electrical current can cause an unsafe condition;
- Pressure of fluids or air, as with pneumatic or hydraulic equipment;
- Steam, such as when it remains in a pipe after shutoff; and
- Chemicals that might remain under pressure or subject to the force of gravity.
The release of hazardous energy can cause extremely serious injuries. This is why lockout/tagout procedures are so important.

- There are thousands of injuries every year resulting from hazardous energy. Injuries include electrocution, burns, amputation, cuts, scalding, and crushing.
- Many of these injuries could be prevented simply by turning off equipment and making sure it stays off before servicing it. This means locking it out. In fact, a government study showed that 80 percent of workers fail to turn off equipment before servicing it.
- The primary causes of these types of injuries result from:
  - Unexpected start-up of equipment;
  - The release of stored energy in a machine or piece of equipment; or
  - Failure to lockout or tagout machinery or equipment.
As an authorized employee, it’s your job to know how to control hazardous energy. Here are some ways to do this:

• First, follow lockout and tagout procedures—that is, use devices that prevent access to hazardous energy or that warn others to avoid it;

• Prevent machinery or equipment from being turned on during servicing and maintenance;

• Dissipate energy—all hydraulic lines should be bled and mechanical devices and counterweights lowered and secured.

• Prevent parts of machinery and equipment from moving, usually by using locking devices; and

• Provide means of warning others, usually with warning tags, when it is not possible to lock out controls or parts.

Have you ever been in a situation when a machine started up or an equipment part moved unexpectedly? It can be very frightening, and it shows why preventing it is so important.
Our lockout/tagout program is required by law—specifically by the Code of Federal Regulations, Title 29, Section 1910.147—and is regulated by the Occupational Safety and Health Administration, or OSHA. The following employees must be trained in lockout/tagout procedures:

- “Authorized employee”—those who service machinery.
- “Affected employee”—those who operate machinery, but do not service them. (If you do both, you need to be an “authorized employee.”)
- Finally, “other employees” need to be trained. These are workers who do not service or operate machinery or equipment, but who work nearby and need to know about energy control procedures.
It’s important to understand what being an “authorized employee” means.

- First, an authorized employee is specially trained to recognize sources of hazardous energy and to perform lockout or tagout procedures.

- Second, an authorized employee is the only employee who can perform lockout/tagout procedures, and attach or remove locks and tags. No other employee may do so.
Here are the main responsibilities of an authorized employee:

- Repair or service equipment as needed;
- Ensure that all energy sources are locked out;
- Test equipment to verify residual energy is dissipated; and
- Place warning tags on equipment to make sure other employees do not inadvertently start it up when it’s being serviced or repaired.
Other key responsibilities of an authorized employee include these:

- Obtain assistance as required when repairing machinery or equipment. Having an extra pair of eyes and ears to watch out for hazards is a good way to stay safe.

- Remove locks or tags when the service or repair work is done, and let other employees know when the job is finished. Remember, only authorized employees can remove locks or tags.

- Finally, authorized employees should coordinate repair work that must take place over more than one shift. Normally, authorized employees from the first shift should remove lockout or tagout devices and watch as authorized employees from the next shift place their own locks or tags.
Now that we have described the responsibilities of an authorized employee, let’s take a few minutes to discuss the responsibilities of an “affected employee.”

- An affected employee is one who operates machinery or equipment, but is not responsible for servicing or repairing it.
- However, an affected employee must be trained to know the purpose and use of energy control procedures. This is to make sure that an operator does not inadvertently energize machinery or equipment when it is under lockout or tagout.
- The affected employee must also know what to do if the machinery is inadvertently energized as an emergency procedure.
Affected employees have important responsibilities related to lockout/tagout.

• First, they are the ones who must notify maintenance personnel when equipment needs to be repaired or serviced.

• When machinery is being serviced, affected employees must leave all lockout/tagout devices in place.

• Affected employees should verify that the machinery or equipment is safe to operate after lockout/tagout is finished.

• In addition, affected employees must ensure that all safety guards are in place and properly functioning.

• Finally, affected employees should follow all safety rules when operating the equipment.
Our organization has certain important responsibilities in the control of hazardous energy.

- We must ensure that machinery or equipment is de-energized when it’s time for service or repair.
- We must ensure that employees are aware of hazardous energy and how to avoid injury from it.
- We must provide employees with the appropriate level of training, depending on whether an employee is an “authorized,” “affected,” or “other” employee.
- We must periodically review our hazardous energy control program to make sure it remains effective.
- We must maintain our program and revise it whenever necessary.
- And finally, we must take appropriate disciplinary actions if employees do not follow proper hazardous energy control procedures.
Now it’s time to see what you’ve learned. See if you can identify whether the tasks listed on the screen should be performed by an authorized employee or by an affected employee.

- Repair equipment—this is done by an authorized employee;
- Place tags on equipment—this also done by an authorized employee;
- Verify equipment is safe to operate—this is done by an affected employee;
- Remove locks or tags—done only by an authorized employee;
- Test Equipment—this can done by an affected employee and by an authorized employee; and
- Notify maintenance for servicing—this can be done by an affected employee.
• Do you understand how to recognize and control hazardous energy? Now it’s time to ask yourself if you understand the information presented so far.

It is important for your safety that you understand proper procedures for recognizing and controlling hazardous energy.
Now let’s focus on some of the devices to be used and procedures to be followed when implementing lockout/tagout.

- An energy isolation device is a device used to isolate the machinery or equipment from its energy source. Before you perform any service or maintenance on a machine, before there is any possibility that there could an unexpected start-up or release of energy that could cause an injury, use an isolation device.

- Examples of an energy isolation device include:
  - An electrical circuit breaker;
  - A pressure valve, such as a pipeline valve; *or*
  - A machine block.
A lockout device is a device that physically prevents access to the controls of a machine or piece of equipment. There are many kinds of lockout devices that might be used, depending on the situation, but all such devices must be capable of being locked. In addition, all types of lockout devices must be durable and capable of withstanding attempts to unlock or open it. Examples include:

- A lock,
- A block,
- A chain,
- A multilock hasp,
- A wheel valve cover, or
- A ball valve cover.
A tagout device is used when a lockout device is used or when a lockout device cannot be used and the equipment needs to be isolated.

- Tagout devices are for warning purposes only; they do not control hazardous energy;
- They must be readable and legible so that anyone working near them can notice and understand them;
- They must be attached securely to the isolating device, at the same place a lockout device would be attached;
- They must be resistant to degradation, so that they cannot be crumpled or unreadable;
- And finally, tagout devices can be removed only by an “authorized employee.” The tagout device must identify the person who employed it and can only be removed by that person.
All lockout and tagout devices must share certain characteristics:

- They must be durable, and capable of withstanding the environment they’re in;
- They should be standardized by color, size, and shape, so that they are more easily recognized by employees;
- They must be traceable, or able to identify the person who employed them;
- They should be substantial enough that they cannot be accidentally removed; and
- They should be identifiable as safety devices, with a legend that uses phrases such as “Do Not Operate,” “Do Not Start,” or “Do Not Energize.”
Any machinery or equipment that contains or stores hazardous energy is subject to lockout/tagout. Examples include:

- Presses,
- Power saws,
- Conveyors,
- Pumps,
- Production equipment, or
- Trash compactors.

Take a moment to think about the machinery and equipment in your workplace that is subject to lockout/tagout.
When should lockout/tagout procedures be used? They must be used whenever all of the following conditions exist:

- Machinery or equipment is being serviced, maintained, or repaired, and
- Hazardous energy exists, such as electricity from a battery, hydraulic system, or elevated mass; and
- Unexpected start-up could occur, such as if a machine operator were to start up a machine without realizing it is being serviced.

Remember to consider all possible sources of hazardous energy, and don’t take chances with the safety of your fellow employees by failing to require lockout/tagout. A good rule to follow is: When in doubt, lock it out!
Keep in mind that actions and circumstances trigger lockout/tagout procedures. Basically, any time an employee could be injured by the equipment during shutdown, it should be de-energized and locked out. Examples of circumstances like these include:

- Removing or bypassing a safety device while performing service or repair;
- Placing any part of the body in harm’s way during servicing; and
- Being potentially exposed to hazardous energy when doing service or repair work.
Occasionally, there are exceptions to lockout/tagout requirements. Examples of these exceptions include:

- Working where there is no hazardous energy that might be released.

- Routine adjustments to a machine that are part of normal operation. These do not require lockout, but it’s a good idea to have a second person near a disconnect who ensures that the equipment is shut down while the first person works on it.

- Equipment that is controlled by a plug-in power cord does not require lockout/tagout as long as the employee running the equipment is in exclusive control of the plug. There are lockout devices that fit the male end of an electrical plug, and it’s a good idea to use these to prevent any possibility that the equipment could be plugged in unexpectedly while it’s being serviced.

- Finally, “hot tap” operations, or under pressure drilling, that could conceivably shut down a plant are not subject to lockout/tagout if doing so would affect the operation of the plant as a whole.
When performing lockout/tagout procedures, authorized employees must follow these basic steps before servicing or repairing energized machines or equipment:

- First, affected employees should be notified of the planned lockout or tagout.
- Then, the machinery or equipment must be shut down.
- Next, isolate the machinery or equipment from all energy sources.
- Lock out or tag out the energy isolation device.
- All stored energy must be released or restrained from the equipment.
- Finally, the machine must be tested—that is, there should be an attempt to re-start it—to make sure that isolation and de-energization have actually occurred.
Following proper restart procedures after lockout/tagout is as important for safety as the original shutdown and de-energization. Here are the basic restart procedures to follow:

- First, inspect the equipment carefully. Make sure that nonessential items, such as tools or old parts, have been removed and that all components are intact. The inspection should be done before any lockout or tagout devices are removed.
- Next, clear all employees away from the equipment.
- Verify that the controls are in neutral.
- Now, remove locks and tags.
- Remember to ensure that all safety devices have been replaced and are functional.
- Reactivate any isolation devices that may have been deactivated.
- Then, notify all affected employees that all lockout or tagout devices are about to be removed and the equipment is about to be restarted.
- Finally, restart the machinery or equipment.
Let’s see if you can remember the correct steps for lockout. Can you put these actions in the proper order?
The correct order is:
1. Notify affected employees,
2. Shut down energized equipment,
3. Isolate energy sources,
4. Lock or tag out,
5. Release stored energy, and finally
6. Test to ensure equipment is inoperable.
• Do you understand lockout/tagout devices and procedures for controlling hazardous energy? Now it’s time to ask yourself if you understand the material presented.

It is important for your safety that you understand lockout/tagout devices and procedures for controlling hazardous energy.
Here are the key points to remember from this training session on lockout/tagout:

• First, all forms of energy can be dangerous and deadly. Failure to lock out equipment is a leading cause of death and injury in the workplace. Employees need to follow safety procedures whenever they perform maintenance or service on machines and equipment.

• Use lockout/tagout whenever there is the possibility of an unexpected start-up or release of stored energy. Don’t take chances. Remember the safety rule from before: When in doubt, lock it out!

• Always follow the proper lockout/tagout and restart procedures. Don’t cut corners to try to save time or because you think the procedures are not necessary. The safety of everyone is at stake.

• Finally, remember to keep all affected employees and other employees informed about lockout/tagout procedures. Let them know what you are doing and why it’s important to their safety.

This concludes the training session on Lockout/Tagout.