

## HIGH-IMPACT LOCKOUT/TAGOUT

This easy-to-use Leader's Guide is provided to assist in conducting a successful presentation. Featured are:

**INTRODUCTION:** A brief description of the program and the subject that it addresses.

**PROGRAM OUTLINE:** Summarizes the program content. If the program outline is discussed before the video is presented, the entire program will be more meaningful and successful.

**PREPARING FOR AND CONDUCTING THE PRESENTATION:** These sections will help you set up the training environment, help you relate the program to cite specific incidents, and provide program objectives for focusing your presentation.

**REVIEW QUESTIONS AND ANSWERS:** Questions may be copied and given to participants to document how well they understood the information that was presented. Answers to the review questions are provided separately.

**ATTENDANCE RECORD:** Document the date of your presentation as well as identify the program participants. The attendance record may be copied as needed.

### INTRODUCTION

Lockout/tagout procedures are a sequence of events that are executed to control the release of unwanted hazardous energy. The lockout/tagout system provides protection for everyone in the plant; its success depends upon each individual's knowledge and understanding of locks and tags used on the job.

Those workers who are authorized to service and maintain equipment must understand how to recognize types and amounts of hazardous energy sources. Before beginning the task, all energy forms must be de-energized and then locked and tagged. After the job is complete, authorized employees must safely return the equipment to service by removing the lockout devices and re-energizing the equipment or process line.

This program features eight accident re-creations\* that demonstrate the importance of following all prescribed lockout/tagout procedures. The viewer will also learn the responsibilities and safe work procedures of those who are affected by lockout/tagout as well as those who are authorized to service machines and perform lockout/tagout procedures.

\*Most accidents re-created in this program are based on OSHA investigations or company records. Details have been changed in the interest of confidentiality and instructional clarity.

### PROGRAM OUTLINE

#### BACKGROUND

- Lockout/tagout is a set of linking steps we follow to reduce equipment or process lines to a "zero energy state."
- All persons who are affected by lockout/tagout in the workplace must know these three things:
  - ❶ What a lockout/tagout means;
  - ❷ The reasons why the procedure is in process;
  - ❸ What to do and not do upon encountering a lockout/tagout device.
- If you have any doubts about whether this procedure affects you, ask your supervisor.
- While lockout/tagout procedures are easy to understand, you must remember that all potential energy as well as kinetic energy must be released or blocked.

### **AUTHORIZED WORKERS**

- You must be authorized by your company to perform lockout/tagout procedures while servicing, maintaining or adjusting equipment.
- You must understand the type and magnitude of energy to be isolated and how to control it.
- Because lockout procedures vary with the type of energy, it is important to know and understand the procedure for the specific equipment or process line you intend to de-energize and lockout.
- You must know the proper sequence and steps in performing the lockout procedure.
- You must understand the hazards of the machine and the energy related to the equipment you intend to service.

### **LOCKS AND TAGS**

- The locks used in the lockout/tagout procedure must be authorized by the company.
- The locks must have the appropriate identification and there must be only one key in circulation.
- If a lock and key are issued to you, they are your responsibility; they serve as your assurance that a locked out power source stays locked out.
- Tags are used in conjunction with locks and must be sturdy enough to withstand the elements that are present.
- They must bear warning signs such as “do not operate” and other appropriate information, including the name of the person placing the lock and tag.
- The person who attaches a specific lock and tag must be the person to remove them. It’s against company procedure to use another person’s lock/tag or place it for them.

### **ELECTRICAL LOCKOUT**

- After stopping the machine or process line, de-energize all electrical circuits, lock and tag the electrical disconnects and then try to start the machine to verify that the voltage has been removed.
- Be sure to return the power switch to the “off” position or another position that indicates the machine is inoperative after the test.
- Remember that on-off controls and interlock switches are not substitutes for energy controls.
- You must also discharge any stored electrical energy such as that contained in capacitors.
- During all electrical operations, verify your actions with a meter that is rated for the service and authorized by the company.
- Don’t forget to check the surrounding circuits to verify your findings and your meter.

### **LINE-BREAKING**

- Lockout procedures are an integral part of chemical, hydraulic and pneumatic line-breaking; it’s the only safe way to bring a process line to a zero energy state.
- Secure a line-breaking permit and check the lockout procedure before working with valves.
- Any valves placed in open or closed positions must be locked and tagged.

- Be sure to bleed all residual energy appropriately. Leaving a line or a reservoir under pressure can lead to an accident.

#### **RETURNING EQUIPMENT TO PRODUCTION**

- When the job is finished, make sure all tools and excess materials are cleared from machines and the immediate area.
- Alert everyone concerned that the machine is about to be re-energized.
- Make sure the “off-on” or “run-stop” controls are in the “off” or “stop” position and all the guards have been replaced.
- Reverse the lockout process as prescribed in the written plan; this usually proceeds from the source of energy to its destination.
- After testing to verify that the repair was successful, inform concerned persons that the machine or process line is back in service.

#### **GROUP LOCKOUT/TAGOUT PROCEDURES**

- Situations where groups are working together are often complex and require an authorized person to coordinate the job.
- The authorized person is responsible for the group’s safety and usually maintains a “key lock-box” or other multiple lockout device.
- Each worker places his lock and tag on this control unit and it will contain the keys to all the lockout devices on the machine or process line.
- After the job is completed, each person that placed a lock on the control device removes it. Only when all locks have been removed is the master key available to unlock the energy sources.
- During shift changes, the on-coming shift applies new locks and tags before the out-going shift removes theirs to ensure a continual lockout procedure.
- When working with off-site contractors, make sure you understand the company’s lockout/tagout procedures and what all the locks and tags mean.
- There may be different styles and types of equipment; ask your supervisor before the job starts if you have any questions.

#### **LOCKOUT/TAGOUT SAFETY TIPS**

- Always check the written procedure if you have any doubt about a job; if a power source can be locked out, it must be locked out.
- Make sure you know the sequence of events necessary to de-energize the parts within the machine or process line.
- Remember that lockout involves all energy sources, not just electricity.
- Be aware of objects and equipment with stored energy such as capacitors, springs, counterweights, rams and objects suspended in air.

- If a machine's function needs to be checked while work is in process, the lockout procedure must be reversed with each person removing his own lock and tag.
- After the tests to check the function are performed, the energy sources must be de-energized again and the lockout process repeated.
- Don't take short cuts in an effort to do a good job or try to get the machine on-line sooner. Always follow all necessary lockout procedures.

## **ACCIDENTS AND THEIR SAFETY LESSONS**

### **Accident 1: Machinery Crushes Maintenance Mechanic**

Kevin Bonney, maintenance mechanic, was trouble shooting the hydraulic system on a computer-controlled process line. He locked out the electric power sources and talked to the operations people working on the computer in the control room. He felt secure because he had recently worked on similar systems. He found a failing control valve in the system. As he began his repair, the operators removed the display screen card and the machinery crushed Kevin.

**Lesson:** *Always understand and follow the complete lockout procedure. Don't make assumptions or count on others to keep you safe.*

### **Accident 2: Forklift Operator Crushed in Compactor**

Mike Rorceni, forklift operator, was dumping cardboard into the compactor and noticed that it did not operate. He was not qualified or authorized to service or adjust the compactor, but decided to repair it anyway. The ram activated and crushed Mike.

**Lesson:** *You must be qualified to service company equipment and to perform any lockout procedure. Only do work for which you are trained and authorized.*

### **Accident 3: Failure to Account for Gravity Causes Mechanic's Death**

Two maintenance mechanics were working on a large, sectional overhead door that was sticking in the same location each time it was moved. They decided to use a pry bar to get it loose. As John was taking one last look before using the pry bar, the door came loose on its own and struck John on his back. John died several minutes later. Unfortunately, the cable holding up the door had developed slack on the drum and the only thing holding up the door was the bent section.

**Lesson:** *Before doing any job, consider all the possible energy sources that could create hazards. Remember that electricity is not the only energy source to be isolated. Gravity, as illustrated by this accident, is often a safety factor.*

### **Accident 4: Machine Becomes Energized and Smashes Hand**

Fred Shultz opened the guard gate which caused the interlock switch to stop the machine. He was going to make the adjustment to prevent any jamming. While he was working, the machine cycled and crushed his hand.

**Lesson:** *Always isolate and lockout the power source, not just the control device. Fred failed to locate and lockout the power source to this machine.*

### **Accident 5: Incomplete Line-Breaking Procedure Results in Severe Burns**

Three maintenance men were working to replace leaking steam jumpers in the chemical unloading area. The lead mechanic decided that a line-breaking permit was not needed since they were working on the steam lines. They closed and locked the steam valve on one side of the bad jumpers and thought they were safe. Jerry used a hammer to loosen rusted coupling and it broke off. The steam hit him in the face and caused serious burns. He didn't understand that additional steam valves also had to be closed and locked out.

**Lesson:** *Never let your guard down; check with your supervisor if you have questions about procedures. Follow all of these procedures to be sure your lockout is complete.*

#### **Accident 6: Short Circuit Causes Severe Hand Burns**

Two maintenance electricians were working on a continuing project to re-route feeder lines to junction boxes. They locked out the section they were working on and the other sections were hot. When the ground wire was touched to the wrong terminal, a short circuit and explosion occurred. One electrician received severe hand burns.

Lesson: *Be sure your lockout is complete. Don't take chances in order to save time.*

#### **Accident 7: Shortcuts and Negligence Lead to Employee's Death**

George Hays and Robert Sheldon took several shortcuts in order to replace an overhead conveyor roller more quickly. Robert decided to stop the belt after installing the new roller so he could make an adjustment. He did not lock out the power source and his protection was lost. The belt started up unexpectedly and Robert jerked away as the roller grabbed his hand. His sudden reaction caused him to go over the guardrail and fall to his death.

Lesson: *Lockouts and shortcuts do not go together. Always isolate and lockout power sources every time you place your body in potentially hazardous areas.*

#### **Accident 8: Small Error in Lockout Procedure Becomes Major Catastrophe**

Four workers are killed and another fourteen severely injured in the opening and closing of the program. An error in following the lockout procedure allowed natural gas to explode when a welder started to work. Had the plan been followed carefully, the crew would have known that two natural gas lines had to be closed and locked for the lockout to be complete.

Lesson: *What seems like a small error in following procedure can turn into a large catastrophe. Always follow approved safety procedures.*

### **PREPARE FOR THE SAFETY MEETING OR TRAINING SESSION**

Review each section of this Leader's Guide as well as the videotape. Here are a few suggestions for using the program:

Make everyone aware of the importance the company places on health and safety and how each person must be an active member of the safety team.

Introduce the videotape program. Play the videotape without interruption. Review the program content by presenting the information in the program outline.

Copy the review questions included in this Leader's Guide and ask each participant to complete them.

Copy the attendance record as needed and have each participant sign the form. Maintain the attendance record and each participant's test paper as written documentation of the training performed.

**Here are some suggestions for preparing your videotape equipment and the room or area you use:**

Check the room or area for quietness, adequate ventilation and temperature, lighting and unobstructed access.

Check the seating arrangement and the audiovisual equipment to ensure that all participants will be able to see and hear the videotape program.

Place or secure extension cords to prevent them from becoming a tripping hazard.

### **CONDUCTING THE PRESENTATION**

Begin the meeting by welcoming the participants. Introduce yourself and give each person the opportunity to become acquainted if there are new people joining the training session.

Explain that the primary purpose of the program is to demonstrate the importance of following all prescribed lockout/tagout procedures.

Introduce the videotape program. Play the videotape without interruption. Review the program content by presenting the information in the program outline. Lead discussions about dangerous situations that may have been caused by hazardous chemicals at your facility. Use the review questions to check how well the program participants understood the information.

After watching the videotape program, the viewer will be able to explain the following:

- The responsibilities of workers who are affected by lockout/tagout as well as the responsibilities of those who are authorized to perform lockout procedures.
- Electrical lockout, line-breaking and isolation of other forms of energy.
- The use of locks and tags, group lockout procedures and returning locked out equipment to production.

## HIGH-IMPACT LOCKOUT/TAGOUT REVIEW QUESTIONS

Name \_\_\_\_\_ Date \_\_\_\_\_

*The following questions are provided to determine how well you understand the information provided in this program.*

1. To perform lockout/tagout procedures, you must be trained and authorized by your company.
  - a. true
  - b. false
  
2. The worker that was crushed by the sectional door while trying to pry it loose failed to account for \_\_\_\_\_.
  - a. the door's electrical power source
  - b. his co-worker's whereabouts
  - c. the force of gravity
  
3. When you are issued a key for a lock to be used in a lockout procedure, \_\_\_\_\_ will also have a key for your lock.
  - a. your supervisor
  - b. the plant manager
  - c. all workers involved in the lockout process
  - d. no one
  
4. The workers attempting to replace the leaking steam jumpers in the chemical unloading area failed to \_\_\_\_\_.
  - a. obtain a line breaking permit
  - b. check the company lockout plan
  - c. both a and b
  - d. neither a or b
  
5. Situations where groups of employees are involved in lockout/tagout require affected persons to coordinate the job.
  - a. true
  - b. false
  
6. During shift changes, the oncoming shift applies their locks \_\_\_\_\_ the outgoing shift removes theirs.
  - a. at the same time
  - b. before
  - c. after
  
7. When returning locked out equipment to production, reverse the lockout process according to \_\_\_\_\_.
  - a. the company's written plan
  - b. your supervisor
  - c. the equipment operator's manual
  
8. List three things that all persons affected by lockout/tagout should know?

*ANSWERS TO THE REVIEW QUESTIONS*

1. a

2. c

3. d

4. c

5. b

6. b

7. a

8. 1) What lockout/tagout means

2) The reasons why the procedure is in progress

3) What to do and not to do upon encountering a lockout/tagout device