



# CHEMICAL EMERGENCY PREVENTION & PLANNING

*Newsletter*



July - August 2012

US EPA Region 10

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### CHEMICAL EMERGENCY PREVENTION & PLANNING Newsletter

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## Editor's Note:

**OPERATING PROCEDURES** The Risk Management Program (RMP) of the EPA requires the facility to develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information....(40 CFR 68.69.) The following articles cover two of the required procedures:

1. Provide for the control of hazards during specific operations, such as lockout/tagout [68.69(d)]
2. Startup following a turnaround, or after emergency shutdown [68.69(a)(1)(vii)]

For more information: [RMP Guidance](#)

## Know Your Lock-out and Tag-out Safety Procedures

### (CCPS Safety Alert)

Hazardous energy comes in many forms. Electrical energy can cause electrocution and burns, provide ignition to flammable atmospheres, and activate mechanical equipment. Steam can cause burns or initiate hazardous reactions. Nitrogen can cause asphyxiation. Chemical flow can cause uncontrolled reaction and injury. When a piece of equipment is being worked on, all sources of hazardous energy must be securely and positively locked out until the equipment is operational.

Untold numbers of major process safety incidents and individual injuries have been caused by failure of LOTO. A prime example is the Bhopal catastrophe, one of the worst incidents ever to have occurred, which was caused in part by the failure of LOTO.

It is better to learn from the mistakes of others rather than to learn by painful, personal experience. The purpose of this

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# REPORT

CHEMICAL or OIL SPILLS  
to the NATIONAL RESPONSE CENTER

## 1-800-424-8802

**Know Your Lock-out and Tag-out Safety Procedures**

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featured article is to share information with you, to help you lead the implementation or improvement of LOTO in your company. A brief overview of LOTO procedures and tools are provided, as are references to more detailed resources.

**Basics of LOTO**

Summarized here are the bare essentials of a good LOTO program. To have a good LOTO program:

**DO:**

1. Have a corporate-wide LOTO policy that is mandatory at all sites.
2. Train affected employees in proper LOTO procedures, and retrain regularly.
3. Assign authorized employees to ensure that LOTO procedures are faithfully and thoroughly followed.
4. Identify all sources of hazardous energy potentially impacting a piece of equipment and lock out all sources.
5. Make sure each person working on a piece of equipment applies his personal lock to the lockout device, as shown in Figure 1.
6. Apply a tag to the lockout point using a fastener that cannot be easily or accidentally removed. Use a tag that is not easily torn or defaced, as shown in Figure 2.
7. Make sure that any stored energy has been released. This includes electrical capacitance, pressure, residual fluids and hazardous atmospheres, and pent up mechanical and potential energy.
8. When maintenance activity extends beyond the current shift, replace the personal locks of the leaving shift with the personal locks of the arriving shift. The leaving shift should make sure the arriving shift understands the maintenance process and the hazards.
9. Once the locks and tags are place, try to operate the equipment
10. Locks should not be removed until the maintenance workers and the authorizing employee are satisfied that the equipment is ready to be operated safely.



Figure 1



Figure 2

**DO NOT:**

1. Remove another worker's lock unless the worker is completely unavailable and then only remove the lock after a qualified supervisor has verified that it is safe to remove the lock and authorized the removal.
2. Assume that a closing and locking a valve is sufficient to prevent flow. The pipe must also be blinded. A cut-away view of one blind arrangement is shown in the figure below.



3. Assume that a piece of equipment has only one electrical source. Often, equipment has two or more – all must be locked out.



## Plan to attend the FREE EPA Risk Management Training Day in your area

### RISK MANAGEMENT PROGRAM (RMP) Training

Portland, Oregon: September 11, 2012

Find details on:

[EPA Region 10's RMP website – Portland Training](#)

## Learning from CASE HISTORIES

The case histories presented here come from companies with good LOTO programs. They are offered to give you a better understanding of the full range of hazardous energy sources and situations where LOTO is important.

### Lock-out, Tag-out, and Try-out

Pay particular attention to the last step in locking out equipment – verify that the residual and stored energy has been released. Remember – Lock Out, Tag Out, and then Try Out. Make sure that you're not surprised by residual energy, as happened in this case:

*Workers were attempting to clear a plugged line. The LOTO permit was authorized and locks placed as per procedure. Unfortunately, the workers did not verify that all hazardous energy was removed. The residual pressure from blowing out the line remained. As workers opened a flange just below the plug, material was blown out, burning personnel in the immediate area.*

### Take Care When Troubleshooting

Sometimes LOTO might seem inconvenient, for example if you need to have parts of a machine or process energized for troubleshooting. In such cases, lock out the process completely, determine which lock-outs need to be removed to do the energized tests, evaluate the potential hazards carefully, and take the appropriate precautions. Only then remove the lock-outs. As soon as the need for the equipment to be energized has passed, the process should be locked out again. Here's what can happen if you forget that last important step:

*A worker was trying to clear a blocked pipe. The LOTO permit was authorized, and all of the required locks were placed according to procedure. The worker opened several valves in an attempt to try to blow it free. This did not work, so he re-closed the valves and reinstalled the lock-outs.....except that he missed the valve on the pressurizing line. When the worker opened a flange below the plugged valve, material was blown out, burning the worker.*

### Lock-out and Tag-out Equipment that is Out-of-service

LOTO is particularly important when removing defective equipment from service. Lock out and tag out defective and unused equipment until it can be removed or replaced. If you fail to do this, you could repeat the following accident:

*One pump of a two-parallel arrangement was out of service but not locked out. Workers, switched to the out of service pump as part of a routine rotation. This resulted in a major process upset costing millions of dollars. Luckily, no one was injured.*

### Lock-out Requires a Lock

Finally, never rely on an interlock for LOTO. Make sure you positively lock out all the sources of hazardous energy. This operator wished he'd done it right:

*An operator needed to clean a mixer. The mixer had an interlock limit switch that prevented the mixer from operating when the lid was up. For protection, the operator propped the lid up and entered (we assume he performed the appropriate confined space entry procedure, but that is a lesson for another day). When the mixer was clean, the operator started to climb back out. As he reached up, his hand touched the lid. This was just enough to clear the 'lid is up' limit switch and deactivate the interlock. Since he had not locked out the power, the motor started. The motion of the mixer caused the operator to fall back inside. When he fell, the lid returned to full-open and the limit switch interlocked the mixer mechanism. However, the mixer made a number of complete revolutions – badly injuring the operator – before coming to a stop.*

### LOTO References

The following references contain regulatory requirements. While different regulations may apply to your site, the OSHA standard and supporting documentation serves as a good reference to LOTO.

- OSHA Standard 29 CFR 1910.147: <http://www.osha.gov/SLTC/controlhazardousenergy/index.html>
- OSHA Training for Small Businesses: <http://www.osha.gov/Publications/smallbusiness/small-business.html#lockout>
- NIOSH Guidelines for Lock-out Tag-out: <http://www.cdc.gov/niosh/docs/wp-solutions/2011-156/pdfs/2011-156.pdf>
- CCPS, "Guidelines for Process Safety Documentation" pp 307-309, American Institute of Chemical Engineers 1995
- Oklahoma State University Lock-out Tag-out Program: <http://ehs.okstate.edu/manuals/lock-tag.htm>

## Startup Hazards

### (CCPS Beacon 12-05)

A number of chemical facilities have had disastrous events occur during startup activities. In many cases, these events point to the need for a higher level of attention and care than that needed for routine processing.

**WHY?** Startup hazards are increased by inexact operating instructions, lack of experience in startup operations, and a plant in a non-standard condition – for example, feed tanks empty, manual valves in the wrong position, new or modified equipment.

Time pressures to get the plant back in operation may be high, and operators may have worked long hours during the shutdown, making them less alert. Many plants require manual operation during startup. Continuous plants may startup so infrequently that plant personnel have little experience with required steps.



### Did You Know?

- Of 38 major incidents investigated by the U.S. Chemical Safety and Hazard Investigation Board (CSB) from 1998 to 2005, three occurred during startup of continuous process equipment.
- These three incidents resulted in 22 fatalities and more than 170 injuries.
- Other serious incidents occurred during startup of batch processes or during maintenance operations that followed a power outage.
- Startups may be rare, so refresher training may be needed.

### What You Can Do

- Have complete and accurate written startup procedures and checklists, and use them.
- Use Management of Change reviews before modifying any startup procedures.
- Ask questions and get help with startup operations which are not familiar to you.
- Check with the responsible people that shutdown activities have been completed and equipment approved for use.
- Verify equipment functionality and setup before startup, including pre-startup safety review after major maintenance or modifications.
- Make sure all valves are in the proper position.
- Maintain excellent communication between outside operations and the control room!

### Where Do I Go For More Information?

<http://www.epa.gov/emergencies/rmp> will be updated as new information becomes available.

EPA maintains numerous listservs to keep the public, state and local officials, and industry up to date, including several that pertain to emergency management. You can sign up for our list serve to receive periodic updates:

[https://lists.epa.gov/read/all\\_forums/subscribe?name=callcenter\\_oswer](https://lists.epa.gov/read/all_forums/subscribe?name=callcenter_oswer)

EPA Region 10 RMP Coordinator:  
Javier Morales 206-553-1255

EPA Region 10 RMP Website:  
<http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/rmp>

### Superfund, TRI, EPCRA, RMP & Oil Information Center

The Information Center can also answer questions related to Clean Air Act section 112(r) and RMP reporting requirements. (800) 424-9346 or TDD (800) 553-7672 (703) 412-9810 or TDD (703) 412-3323 in the Washington, D.C. area

Normal Hours of Operation:  
Monday - Thursday 10:00 a.m. - 3:00 p.m. Eastern Time

Extended Hours of Operation (May, June, and July):  
Monday - Friday 9:00 a.m. - 5:00 p.m. Eastern Time

Closed Federal Holidays

<http://www.epa.gov/superfund/contacts/infocenter/>

### Risk Management Program (RMP) Reporting Center

The Reporting Center can answer questions about software or installation problems. The RMP Reporting Center is available from 8:00 a.m. to 4:30 p.m., Monday through Friday, for questions on the Risk Management Plan program. (703) 227-7650 (phone)  
[RMPRC@epa.cdx.net](mailto:RMPRC@epa.cdx.net) (e-mail)

This newsletter provides information on the EPA Risk Management Program, EPCRA, SPCC/FRP and other issues relating to Accidental Release Prevention Requirements. The articles contained herein are provided for general purposes only. EPA does not accept responsibility for any errors or omissions or results of any actions based upon this information. Please consult the applicable regulations when determining compliance. Mention of trade names, products, or services does not convey, and should not be interpreted as conveying official EPA approval, endorsement, or recommendation. The information should be used as a reference tool, not as a definitive source of compliance information. Compliance regulations are published in 40 CFR Part 68 for CAA section 112(r) Risk Management Program, 40 CFR Part 355/370 for EPCRA, and 40 CFR Part 112.2 for SPCC/FRP.