Control of Hazardous Energy

(Lockout/Tagout – 1910.147)

"Authorized" - Students' Manual

A Program of the
Education and Health & Safety Department
International Union, UAW

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If you have suggestions or questions, contact:

Education and Health & Safety Department, UAW
8000 East Jefferson Avenue
Detroit, MI 48214
Phone: 313. 926.5563
Fax: 313. 926.5755

Course Goal

Course Goal – *The aim of this program is to provide comprehensive on-site training to high-risk workers (i.e. skilled trades and maintenance workers) and management on the requirements of 1910.147, "Control of Hazardous Energy" and the prevention of serious injuries and fatalities during service and maintenance operations at their worksites. Participants will develop an understanding of the requirements of the Lockout/Tagout (LOTO) Standard and will be able to identify and reduce, eliminate or control the hazardous energy in their workplace during "service and maintenance operations". The participants will review their own LOTO Program and identify areas that need improvement.*

Section	Content	Objective
1	**Introduction to "Control of Hazardous Energy"**	Participants will be able to: • Explain the issues (statistics) associated with failure to LOTO in the workplace. • Recall key LOTO terms which are essential to understanding and meeting the requirements of 1910.147. • Define and differentiate between authorized, affected and other persons under OSHA Control of Hazardous Energy and the training requirements for each. • Describe the intent of a Written Program and list the essential elements of an effective program. • Use a "Status Check" survey to assess the facility's LOTO program and where necessary develop strategies for improvement.
2	**Identifying the Hazardous Energy**	Participants will be able to: • List types of hazardous energy in their worksite and describe the nature of the hazards related to: o Electricity o Hydraulic o Pneumatic o Gravity, Kinetic, Thermal, Chemical, Steam, etc…. o Including all type of "Stored/Potential" energy. • Explain how other hazards are related to potential injuries/fatalities o Falls o Cranes/Hoists o Forklifts o Secondary Equipment, etc….
3	**OSHA Requirements**	Participants will be able to: • Identify requirements specified in OSHA 29 CFR 1910.147 • Determine training for workers in accordance with OSHA requirements. • Recall Site specific procedures including: o Where the machine/equipment specific LOTO procedures are located and the 6 basic steps required. o Procedure for job or end of shift transfer of locks/tags o Personal lock/tag on "every" energy source o Removal of locks other than their own procedure. o Recall the 4 basic steps for releasing a machine or equipment back to service or operation. o Steps required for machine/equipment removal from service for servicing or maintenance. o Describe the facility' lockout/tagout (LO/TO) procedure including requirements and activities in the procedure and identify the persons responsible for each activity. • Assess the facility for compliance with OSHA regulations utilizing a checklist. • Explain the reasons for doing a periodic inspection of all LOTO procedures. • Explain why LOTO locks/tags can "only" be used for performing service/maintenance on machines or equipment.

4	**Why LOTO is important**	Participants will be able to:
		
		• Identify excuses for not locking out and why it is unacceptable to them and their families:
		  ○ Takes too much time.
		  ○ Done it this way a million times.
		  ○ Don't have devices needed to control the energy.
		  ○ Haven't been hurt yet.
		  ○ It's only going to take a minute.

5	**Action Planning and Course Wrap-up**	Participants will be able to: • Outline an Action Plan to achieve compliance with OSHA Control of Hazardous Energy Standard (1910.147). • Provide assistance in their worksite in compliance with OSHA Standard 1910.147.

SECTION I: Introductions

- Your name _____
- Worksite _____
- Local Union _____
- Job Title _____
- Years in Skilled Trades _____
- Have you ever been involved in or witnessed a Skilled Trades incident?

_____

_____.

REPORTED OCCUPATIONAL FATALITIES AMONG *SKILLED TRADES WORKERS* IN UAW-REPRESENTED WORKPLACES 2000 – December 2010

1. **February 24, 2000 – Daniel Schonmeier**; **58** years old; Electrician (S/T); 18 years seniority; **General Motors Saginaw Metal Casting Operations, Saginaw, Mi.**; **LU 668; Region 1D**; The victim was pinned between the back of a sand distribution car and the sand hopper while replacing reflective tape on the board at the sand dump.

2. **May 17, 2000** – **Lazaro Fuentes**; **50** years old; Machine Repair (S/T); 12 years seniority; **DaimlerChrysler Jeep Assembly Plant,** Toledo, Ohio; **LU 12; Region 2B;** The victim and another machine repairman were replacing an air valve on a robot spot welder on the side body line. The victim walked across the line to get the replacement valve from another skilled tradesman and as he was walking back the transfer rails returned crushing him.

3. **September 18, 2000** – **Larry Green; 56** years old; Plumber-Pipefitter (S/T); 29 years seniority; **Visteon Corporation**, Sterling Axle Plant, Sterling Heights, Mi.; **LU 228; Region 1;** The victim was crushed while installing a pneumatic cylinder on a parts loading station of an automatic machining line. Maintenance activity initiated the loader cycle while the victim was between the conveyor and the automatic gantry loader.

4. **October 13, 2000 – Kenneth Hudgens; 54** years old; Millwright (S/T); 12 years seniority; **Visteon Nashville Glass;** Nashville, TN; **LU 737; Region 8;** The victim was crushed as he was performing preventative maintenance work when the machine was cycled inadvertently.

5. **November 24, 2000 – David Lyons; 51** years old, Electrician (S/T) , 28 years Seniority, Delphi Chassis, Dayton, Ohio**; LU 696; Region 2-B;** The victim was crushed by a semi-truck trailer as he was working on a shipping/ receiving dock. (Working alone)

6. November 13, 2001-Richard Robbins; 54 years old; Electrician (ST), 25 years seniority; General Motors, Arlington, Texas; LU 276; Region 5; The victim received fatal injuries when a burden carrier he was driving struck a building column.

7. **March 7, 2002 – John Aue; 52** years old; Millwright (S/T); 32 years seniority; **Federal Mogul**; Sparta, MI; **LU 8, Region 1D**. The victim was checking for leaking bags in an unlighted dust collector with an ultraviolet (black) light, when he fell 30 feet down an unguarded 60-inch clean air duct.

8. **July 30, 2002 – Samuel R. Heckman: 55** years old, Refrigerator and Air Conditioning Maintenance Journeyman (S/T); 34 years seniority (24 years in classification); **GM Allison Transmission**, Indianapolis, IN; **LU 933, Region 3.** The victim was repairing a fan on the roof when he stumbled backwards and fell over a parapet wall, falling 20 feet to his death.

9. **September 2, 2002 – Harold Moyle; 64 years old**; Electrician (S/T) 31 years seniority; **General Motors**; Linden, New Jersey; **LU 595, Region 9**. The victim fell 8' through a drop ceiling panel down to a steel floor adjacent to a paint spray booth. The victim was assigned to repair lights and apparently was tracking electrical lines. The ceiling panel the victim fell through was not secured to any structural beams.

10. **March 18, 2003** – **Drago Ilisevich; 57** years old; Toolmaker (S/T); 29 years seniority; **DaimlerChrysler, McGraw Glass**; Detroit, Michigan; **LU 227, Region 1A**. The victim crawled onto the #4 Roller Hearth Furnace to perform a routine maintenance task of replacing screen meshing used to assist the cooling process. While performing this task, the shuttle cycled, striking the victim in the head and ultimately dragging him 12 feet.

11. **August 2, 2003 – Raul R. Martinez; 54** years old; Caster Mechanical Team (Pipefitter) S/T 29 years seniority; **Rouge Steel**; Dearborn, Michigan; **LU 600, Region 1A**. The victim was removing a cracked roller on a continuous support roller assembly located on a rebuild stand. The victim had removed two one-inch bolts from the bearing block on one side and was removing the second bolt from the opposite side when the roller separated and fell. One of the parts fell striking the victim causing fatal injuries.

12. **October 23, 2003 – John Foster; 42** years old; General Maintenance (S/T); 15 years seniority; **Mitsubishi Manufacturing;** Normal, Illinois; **Local 2488, Region 4**. The victim was performing routine preventive maintenance, prior to the start of the day shift, on automated seat/tire carriers when he was caught between two carriers. He was working alone and had entered the area through an unguarded opening.

13. **October 30, 2003 - Douglas A. Mellom; 44** years old; Millwright (S/T); 25 years seniority; **General Motors;** Janesville, Wisconsin; **Local 95, Region 4**. The victim was on the roof of a freight elevator realigning the safety gate. After he had aligned the gate and as he was attempting to enter the access opening to return to ground level, he fell over the edge of the elevator roof 18 feet to the floor below.

14. **November 3, 2003 – Ed Steinke; 55** years old; Electrician (S/T); 32 years seniority; **Ford Motor;** Livonia, Michigan; **Local 182, Region 1**. The victim was on a JLG aerial lift removing old conduit from the overhead steel structure when he was caught between the upper guardrail of the basket and a six inch pipe.

15. **November 22, 2003 – Jeff West; 44** years old; General Welder (S/T); 13 years seniority; **Ford Motor Company**; Dearborn, Michigan; **Local 600**, **Region 1A**. The victim fell approximately twenty (20) feet to a basement area during the installation of a stamping machine. He had received numerous injuries including head injuries and **died on December 22, 2003.**

16. **June 22, 2004 – Gerald F. Storey, 62** years old; Millwright (S/T); 33 years seniority; **Ford Motor Company**, Woodhaven, Michigan, **LU 387, Region 1A**. The victim was troubleshooting a 50-ton overhead crane when there was a catastrophic failure of the hoisting system causing traumatic head injuries.

17. **October 29, 2004- Marcel Chagnon, 53** years old, Machine Repair (S/T), 33 years seniority: **General Motors**; Warren, Michigan, **LU 909, Region 1**. The victim was crushed during maintenance of a pick and place robot. There was a failure of the rigging allowing a temporarily unblocked weight suspended over the victim to fall.

18. **February 10, 2005 – Rodney Windish, 52** years old; Electrician (S/T); six years seniority; **EaglePicher**, Traverse City, Michigan, **LU 3032, Region 1D**. The victim was troubleshooting a machining operation inside a guarded area when motion was initiated, causing crushing injuries.

20. **July 16, 2005 – Wayne Mueth** (died 7/17/05), **42** years old, Millwright (S/T), 21 years seniority, **DaimlerChrysler**, Fenton, Missouri, **LU 110**, **Region 5**. Victim was ejected from a work platform basket elevated on hi-lo forks while pulling conveyor chain, which was attached to the basket. Investigation indicates that a weld securing the restraining chain attaching the basket to the mast failed, causing the basket to slide on the forks and then fall.

21. **July 28, 2005 – Brett Maggart, 41** years old, Electrician (S/T), 12 years seniority, **DaimlerChrysler Kokomo Transmission,** Kokomo, Indiana, **LU 685, Region 3.** Victim was servicing equipment when it cycled and he was crushed. (Working alone)

22. **February 2, 2006 – William "Bill" Neill; 59** years old; Millwright; 39 years seniority; **Ford Motor Company**; Sterling Heights, Michigan; **LU 228, Region 1**. The victim was struck by a falling conveyor section while he and a co-worker were unloading a conveyor system and components from a flatbed truck trailer. After the co-worker had removed a skid containing components with a forklift, an unrestrained adjacent section of roller conveyor, which weighed about 800 pounds, toppled and struck the victim who was standing adjacent to the trailer.

23. **February 26, 2006** (deceased April 3, 2006) **- Michael A Kruszka; 57** years old; Millwright, 38 years seniority; **DaimlerChrysler** Sterling Stamping Plant, Sterling Heights, Michigan, **LU 1264, Region 1.** The victim suffered a head injury after falling five feet from a temporary maintenance platform in a press basement while securing a cushion to a press.

25. **November 28, 2006 - Allen Randleman, 58** years old; Maintenance Technician, 31 years seniority, **Mayflower Vehicle Systems** (CVG Inc.), Norwalk, Ohio, **LU 1379, Region 2B**. The victim suffered a head injury while troubleshooting doors that were jammed on a vehicle body in a sealer-curing oven.

26. **January 16, 2007 – James Bains: 64** years old; Electrician; 6 years seniority; **CC Metal and Alloys;** Calvert City, Kentucky; **LU 523, Region 3**. The victim was found mortally injured near the base of a manlift vertical conveyor used to travel up and down 4 levels of an electric arc furnace. He had apparently fallen while descending on the manlift. The victim had been assigned to change light bulbs at the top of the eight story furnace and was working alone at the time of the incident. The victim fell from the 8th floor to 4th floor, a distance of approximately 66 feet.

27. **February 12, 2007 – Michael Tiller: 51** years old; Electrician; 32 years seniority; **DaimlerChrysler – Toledo North Assembly**; Toledo, Ohio; **LU 12, Region 2B**. The victim was found lying on the roller bed of a Hydra-Handler battery changing truck, fatally injured, with his arm pinned in the battery washer door. He was assigned to change, charge and maintain batteries for powered industrial vehicles at the facility. There were no witnesses to the incident and it is unclear why the victim was on the roller bed in front of the battery washer. The victim was working alone at the time of the incident. Initial investigation indicates the washer door may have mis-cycled and closed on the victim's arm causing him to fall to the roller bed.

28. **April 21, 2007 - Anthony J. Dier: 64** years old; Mechanic; 35 years seniority; **Kohler Company**; Kohler, Wisconsin; **LU 833, Region 4**. The victim and another mechanic were assigned to disassemble the lid of an electric arc furnace, which included a shaft and yoke assembly, and remove it from the building. After disassembly, the mechanics moved the lid by fork truck to a second story access door and dropped it to the yard below. They could not separate the yoke and shaft as planned so a decision was made to move it in one piece. At this point, the second mechanic went down to the first floor. It is likely the victim used a fork truck to move the shaft and yoke assembly to the second story access door and attempted to transfer it to the yard using a 10 ton, pendulum controlled, overhead crane located nearby. The shaft and yoke assembly apparently fell, striking the victim in the head and pinning him to the floor. The victim was working alone at the time of the incident.

29. **January 8, 2008 – William D. LaVanway (died 2-4-08): 54** years old; Electrician; 14 years seniority; Robert Bosch Corp. Chassis Systems; St. Joseph, Michigan; **LU 383, Region 1D**. The victim was assigned to investigate a "hot spot" found by thermograph scans on a power distribution panelboard in Dept. 48. He was working on a fusible switch bucket to determine the problem in the fuse block. The victim followed established procedures placing the disconnect switch in the off position prior to opening the bucket door and tested to verify power was off to both the load side

and line side of the fuse block. The fusible switch bucket is an older design which does not have visible switch blades for positive identification of their position. He was using a screw driver to demonstrate to his supervisor that the fuse clip had good compression and was not loose when an arc fault explosion occurred.

30. **February 20, 2008 – David Wentz: 38** years old; Maintenance Mechanic: 11 years seniority; AK Steel Coshocton Works; Coshocton, Ohio; **LU 3462, Region 2B**. The victim was assigned to check torque on a nut in the fan assembly at the base of a bell furnace prior to the loading of coiled flat steel. The bell furnace base is located in an 11 foot deep pit. This task had become necessary before each load cycle because preventive maintenance resources have been reduced. Also, prior to the reductions two Maintenance Mechanics were assigned to perform this task. As the victim bent over tightening the bolt, an overhead trolley crane positioned and lowered a 17 ton roll of steel on to the base, crushing him. The victim was working alone at the time of the incident.

31. **July 23, 2008 – Frederick A. Todd: 39** years old; Die Setter; 19 years seniority; Ford Woodhaven Stamping; Trenton, MI; **Local 387, Region 1A**. The victim and other maintenance workers were preparing four dies for placement into a transfer press. The dies are moved using transfer bolsters. The transfer bolster in use was positioned in a staging area near the press doors, and parallel to a second transfer bolster. The transfer bolsters are air driven and controlled by a two-button pendant with directional movement set by three air valves. The pendant had been set down on the bolster work platform. The victim walked on the platform path (approximately 1' wide) between the two transfer bolsters to the air supply valve located 14-feet away. He turned the valve, located between the bolsters, to the on position. The transfer bolster he was working on unexpectedly moved toward the second, stationary bolster trapping the victim. He died of crushing injuries when he was caught between the pillars of the two transfer bolsters.

32. **May 20, 2009 – Jeff Malins: 51** years old; Toolmaker; 7 years seniority; Detroit Diesel Corp.; Redford, Michigan; **LU 163, Region 1A**. The victim was working inside a machine, assisting two other toolmakers un-jamming a parts feeder, when the machine cycled, striking and trapping his head. The machine was not locked out and an access gate equipped with an interlock device was open. The interlock device was bypassed with a "cheat key" (actuator). The use of "cheat keys" to bypass interlock devices was a common, well known and accepted practice in this facility.

33. **December 26, 2009 - Ron Cassidy** - Pipefitter – **Ford**; Louisville, KY; **Local 862, Region 3** Final Assembly at KTP was killed this morning when struck by an 11 foot piece of I beam. A team was in the process of removing the piece of I beam from the ceiling. Cassidy who was on the ground spotting was struck when the final cut was made and the beam slid off the lift.

34. **March 19, 2010 – Roger Brooner: 58** years old; Maintenance Mechanic; 3 years seniority (30 year diesel mechanic) ; **Spirit AeroSystems**; Tulsa, Oklahoma; **LU 952, Region 5**. The victim was working on a semi-tractor outside the maintenance shop when the vehicle went into motion striking and trapping him underneath. The vehicle was being serviced for a leak in the air system and the victim had finished replacing the "air brake DOT" fitting just prior to the fatal incident. The final step in repair is to charge the air system by starting the vehicle and letting it run for a short time; turning the truck off and listening for air leaks. It appears the truck did not start properly and the victim used a battery booster in an attempt to jump-start the engine. At some point the victim was either standing just in front of or positioned laying under the truck as it took off dragging him approximately three hundred feet. The vehicle was chocked and the victim was working alone at the time of the incident.

Sorted by "CAUSE":

Cause:	Age:	Seniorty:
Arc Flash	54	14
C.S.	52	32
CRANE-Trouble-shooting	62	33
FALL	55	34
FALL	64	31
FALL	44	25
FALL	44	13
FALL	57	38
FALL	64	06
JLG-LIFT-Crushing	55	32
LOTO	58	18
LOTO	50	12
LOTO	56	29
LOTO	54	12
LOTO	51	28
LOTO	57	29
LOTO	54	29
LOTO	41	12
LOTO	42	15
LOTO	42	21
LOTO	53	33
LOTO	52	06
LOTO	58	31
LOTO	51	32
LOTO	51	7
LOTO	39	19
LOTO	38	11
PIT	54	25
Material Handling	59	39
Material Handling	64	35

Sorted by "AGE":

Cause:	**Age:**	Seniorty:
LOTO	38	11
LOTO	39	19
LOTO	41	12
LOTO	42	15
LOTO	42	21
FALL	44	25
FALL	44	13
LOTO	50	12
LOTO	51	7
LOTO	51	32
LOTO	51	28
C.S.	52	32
LOTO	52	06
LOTO	53	33
LOTO	54	12
Arc Flash	54	14
LOTO	54	29
PIT	54	25
FALL	55	34
JLG-LIFT-Crushing	55	32
LOTO	56	29
FALL	57	38

LOTO	57	29
LOTO	58	18
LOTO	58	31
Material Handling	59	39
CRANE-Trouble-shooting	62	33
Material Handling	64	35
FALL	64	31
FALL	64	06

Sorted by "SENIORTY":

Cause:	Age:	Seniorty:
FALL	64	06
LOTO	52	06
LOTO	51	7
LOTO	38	11
LOTO	50	12
LOTO	54	12
LOTO	41	12
FALL	44	13
Arc Flash	54	14
LOTO	42	15
LOTO	58	18
LOTO	39	19
LOTO	42	21
FALL	44	25
PIT	54	25
LOTO	51	28
LOTO	56	29
LOTO	57	29
LOTO	54	29
FALL	64	31
LOTO	58	31
LOTO	51	32
C.S.	52	32
JLG-LIFT-Crushing	55	32
CRANE-Trouble-shooting	62	33
LOTO	53	33
FALL	55	34
Material Handling	64	35
FALL	57	38
Material Handling	59	39

1. What is the # 1 cause of fatalities in skilled trades?

2. What is the #2 cause of fatalities in skilled trades?

3. The younger skilled trades are not careful enough? True___ False____
   Why or why not?

4. The majority of skilled trades fatalities have 15 or more years seniority. What, in your groups opinion, is the reason(s) that may lead to the fatality?

5. Review the 6 "Fall Fatalities" (# 7, 8, 9, 13, 15 and 23). How could these have been prevented?

How Familiar Are You With Your Facilities LOTO Program?

Column 1 -- Does this item describe your LOTO Program? Answer YES, NO, or SOMEWHAT

Column 2 -- Is this item important to LOTO effectiveness? Respond YES, NO or SOMEWHAT

Have you ever seen your written LOTO Program?	1	2
ITEM -- Each sentence starts with "Does Your LOTO Program..."		
1. …have list **"all"** the energy sources present at the worksite?		
2. …list the people authorized to apply locks and tags?		
3. …indicate exactly (picture or description) what your LOTO locks and tags look like?		
4. …provide for a "tagout only" application?		
5. ...describe how your locks/tags can be removed (bolt cutters or master key)?		
6. …describe what steps that must be taken and by whom before removing someone elses' lock/tag?		
7. ...describe procedures for shift or personnel changes?		
8. …define what training is required for "Authorized", "Affected" and "Others" ?		
9. … define who is going to perform the periodic inspections?		
10. … describe what to do if the machine or equipment can't be locked out?		
11. ... set procedures for troubleshooting?		
12. ...include the machine/equipment specific lockout/tagout procedures?		
13. ...indicate "one lock on every energy source" for ***each person*** doing service or maintenance on a single piece of machinery or equipment?		
14. ...have a revision date?		
15. ...provide for review of the written program to be done periodically?		
16. …provide for access to the written program for skilled trades and authorized representatives?		
17. …prohibit the use of LOTO locks and tags from being used for any other purpose?		
Note: # 14 and 15 are not specifically required by the 1910.147 OSHA Standard but is recommended by the UAW.		

3. **Circle the items that your facility most needs to improve.**
4. **Next, compare your responses:**
   - *What are the common understandings?*
   - *Where are the differences?*
   - *What work has to be done?*

The Hierarchy of Health & Safety Controls

A heated debate often occurs between labor and management in the health and safety arena that is sometimes referred to as the **"Do we fix the workplace or the worker?"** issue.

Tendency is to focus on workers' behavior and short-term cost reduction, is to argue for "fixing the worker" solutions: protective gear and discipline for failure to follow procedures. The Union considers this to be "blaming the victim" and advocates for solutions that "fix the workplace."

Research indicates that the latter approach is actually more effective and less expensive in the long run. One reason is that human behavior can never be completely regulated and controlled, so solutions based on compliance with procedures will always lead to mishaps. Machine controls and replacement of hazardous materials are much more capable of guaranteeing safety and health. The UAW's and OSHA's analysis of control effectiveness is captured in the graph below.

Question:

1. Where does Lockout/Tagout fall in the "Hierarchy of Health and Safety Controls" chart (below)?_____

2. What does this step require people to do? _____!

MOST EFFECTIVE	1. Elimination or Substitution	• **substitute for hazardous material** • **change process to eliminate noise** • **perform task at ground level** • **automated material handling**
↓	2. Engineering Controls	• **ventilation systems** • **machine guarding** • **sound enclosures** • **circuit breakers** • **platforms and guard railing** • **interlocks** • **lift tables, conveyors, balancers**
↓	3. Warnings	• **odor in natural gas** • **signs** • **back-up alarms** • **beepers** • **horns** • **labels**
↓	4. Training & Procedures	• **Safe job procedures** • **Safety equipment inspections** • **Hazard Communications Training** • **Safe Lifting Training** • **Lock-out** • **Electrical Safe Work Practices** • **Confined Space Entry, etc…**
LEAST EFFECTIVE	5. Personal Protective Equipment	• **safety glasses** • **ear plugs** • **face shields** • **safety harnesses and lanyards** • **knee pads** • **Flame Retardant Clothing**

Small Group Activity: Review the following two fatality summary statements and in your small groups answer the questions following each summary:

Summary #1:

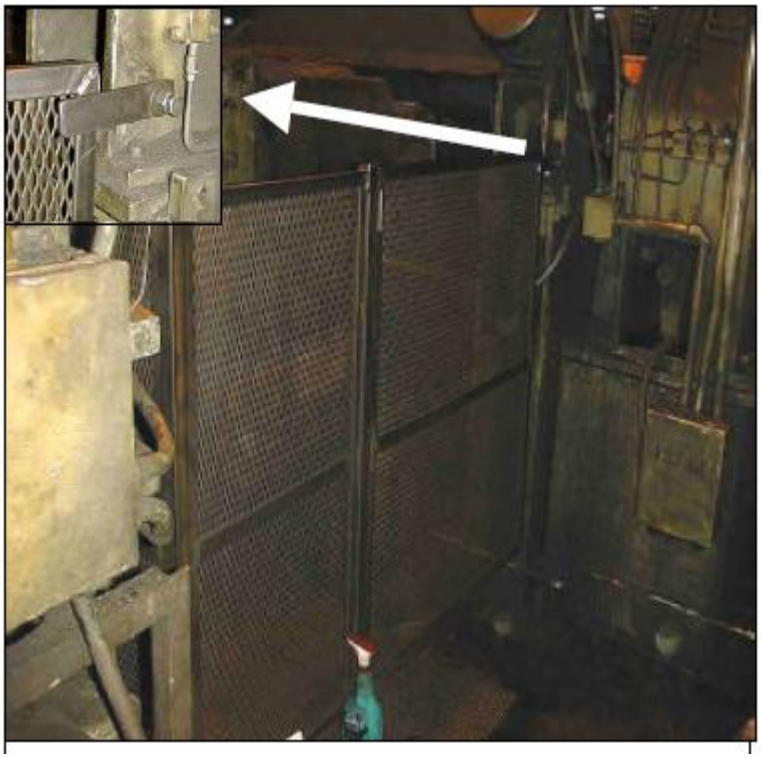
On May 17, 2000 at approximately 4:30 PM, machine repairman, Lazaro Fuentes, suffered fatal injuries as a result of being caught between a moving transfer rail and fixture tooling and a part on the RWC body side line at the DaimlerChrysler Jeep Assembly Plant. The victim and another machine repairmen were attempting to replace a pneumatic valve that controls the function of a robot spot welder. A machine repairman placed the robot control in the "service required" mode, pulled the gate interlock plug, and entered the cell. The victim entered the cell through the same gate. The defective valve was removed. The victim stepped up onto and crossed the line to get the replacement valve from another machine repairman. He reached over the fence guard and was handed the replacement part. As he returned, crossing the line, the transfer rails began to move to the "home" position, crushing the victim between the transfer tooling and stationary tooling and a side body panel. (The transfer rails travels about 20 feet in 6 seconds.)

- Was the victim doing service and maintenance work that exposed them to the "unexpected startup or release of hazardous energy"? _____.
- Job classification of victim_____.
- What caused the incident? _____.
- Was it preventable?_____.
- How? _____.

Summary #2:

On February 9, 2000 Steven Schneider, a block line machine operator was crushed between the head of a drilling station and the frame of the adjacent station. He had entered the station through a non-interlocked gate guard to spray lubrication oil on the tooling. The incident was primarily the result of inadequate safeguarding. In addition, operators on the line had not been trained in lockout procedures for the line and had not been issued locks.

- Was the victim doing service and maintenance work that exposed them to the "unexpected startup or release of hazardous energy"? _____.
- Job classification of victim_____.
- What caused the incident? _____.
- Was it preventable?_____.
- How? _____.



UAW Health and Safety Department

Fatality Report
Lazaro Fuentes

Injured Person:
Lazaro Fuentes

Location:
DaimlerChrysler
Jeep Assembly Plant
Local 12/Region 2B

Age:
50 years

Job Title:
Machine Repair

Seniority:
12 years

Date of Incident:
May 17, 2000

UAW HEALTH & SAFETY DEPARTMENT
8000 East Jefferson
Detroit, Michigan 48214

Phone: (313) 926-5563
Fax: (313) 824-4473

Email: uawhs@earthlink.net
Web Page: www.uaw.org

opeiu494AFL-CIO

Summary

On May 17, 2000 at approximately 4:30 PM, machine repairman, Lazaro Fuentes, suffered fatal injuries as a result of being caught between a moving transfer rail and fixture tooling and a part on the RWC body side line at the DaimlerChrysler Jeep Assembly Plant. The victim and another machine repairmen were attempting to replace a pneumatic valve that controls the function of a robot spot welder. A machine repairman placed the robot control in the "service required" mode, pulled the gate interlock plug, and entered the cell. The victim entered the cell through the same gate. The defective valve was removed. The victim stepped up onto and crossed the line to get the replacement valve from another machine repairman. He reached over the fence guard and was handed the replacement part. As he returned, crossing the line, the transfer rails began to move to the "home" position, crushing the victim between the transfer tooling and stationary tooling and a side body panel. (The transfer rails travels about 20 feet in 6 seconds.)

An electrician was standing in the gate opening. He noticed the transfer moving and ran to the station control panel about 10 feet away. He repeatedly pushed the cycle stop and emergency stop buttons but the transfer continued to move. The machine repairman at the fence guard on the other side of the line pulled the gate interlock plug, entered the cell and stepped on a safety mat but the transfer continued to move.

Conclusions

The RWC line was not properly safeguarded. Removal of the gate interlock plug did not prevent the transfer from moving and did not take the line out of automatic mode. The primary cause of this incident was ineffective safeguarding devices. In addition, failure to implement and enforce the lockout procedure was a major factor. The lockout/energy control program did not clearly define what tasks and types of service and repair could be done under specific methods of energy control. Some emergency stop devices on the line (including the device pushed by the electrician at the time of the incident) did not comply with *Electrical Standard for Industrial Machinery*, NFPA 79-1997 or *Automation Safeguarding Requirements for Design, Construction, Manufacturing and Installation of Automated Systems,* DaimlerChrysler Manufacturing Technical Instruction SMI-145, in that actuation did not immediately stop movement of all hazardous motion.

Recommendations

1. Improve safeguarding on the RWC line by insuring that pulling a gate interlock plug will: 1) remove drive power from robots and all associated equipment (transfer, hydraulic/pneumatic lift and clamps) that can create a hazard, 2) take the system out of automatic mode, and 3) require closing of the gate, insertion of the gate plug and a deliberate action outside the safeguarded space to resume automatic operation. Safety devices should be periodically tested.

2. A task based risk assessment should be conducted to identify all tasks and related hazards on the RWC line. Appropriate controls should be implemented that address each hazard.

3. Every emergency stop device must be periodically tested and modified if necessary to conform to consensus standard *Electrical Standard for Industrial Machinery. Emergency,* NFPA 79–1997 stop device requirements include: it shall override all other functions and operations in all modes, 2) power to the machine actuators that can cause hazardous condition(s) shall be removed as quickly as possible without creating other hazards, and 3) reset shall not initiate a restart.

4. All safety devices and systems should be hardware based, and not dependent on the Programmable Logic Controller (PLC) for performance of the safety function.

5. The lockout/energy control program should be improved to insure that personnel understand the specific energy control methods and safety devices to be used for each specific service and maintenance task.

6. The plant should establish a process to insure that all safety devices and emergency stop devices are tested on a regular basis and covered by the plant's preventive maintenance programs.

SEQUENCE OF EVENTS

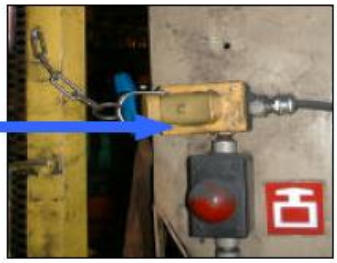
1 4:13 PM. The inspector and supervisor were checking body panels on the overhead conveyor. The inspector identified weld defects and told the supervisor.

2 The supervisor told the unloaders to stop unloading the panels from the conveyor and then radioed maintenance.

3 The inspector pushed the stop button on the west side conveyor. The combo line stopped operating within about 45 seconds because panels could not be transferred to the conveyor.

4 A machine repairman answered the radio call and went to the RWC line. The line was stopped. The production supervisor and inspector explained the problem. The inspector said the problem was caused by robot 27. The machine repairman placed robot 27 control in the "service required" mode.

5 He then pulled the gate interlock plug, opened the gate and entered cell.



6 The machine repairman took a ladder into the cell, climbed the ladder and performed tests on robot 27 by moving the pneumatic control valve that energizes the cylinder causing it to open and close the weld gun. He then radioed another machine repairman (victim). The victim came to the line and entered the cell. They discussed the problem and decided to replace the air valve. They radioed a machine repairman in the maintenance crib and asked him to bring a replacement valve to the line. The machine repairman who was first to enter the cell closed the air valve that supplies air to the defective valve. He then removed the defective valve.

7 The machine repairman brought a few replacement valves from the maintenance crib and stood outside the safety gate on the opposite side of the line. The victim stepped up onto the line and walked across to the gate. The victim told the machine repairman that the valves he had brought were the wrong ones and that they needed a "16". The machine repairman went back to the crib and returned with the correct valve.

8a 4:30 PM The machine repairman handed the replacement valve over the guard to the victim. The victim handed him the defective valve. The victim stepped up onto the line and started to walked back across and appeared to stumble. The transfer rails started to move (south, return direction) and he was crushed between the transfer rail tooling, stationary tooling and side panels. The transfer rails move approximately 20 feet in 6 seconds.

8b 4:30 PM The production supervisor told the unloaders on the west side conveyor to unload the panels from the line. As the unloaders started to unload the panels, one of the unloaders on the east side yelled, "Don't take the panels off!" The supervisor looked at him and told the other unloaders to take the panels off the conveyor. Just as they took the last panel off, the transfer rails started to move.

9a An electrician was standing in the gate opening talking with the machine repairmen. When he heard the transfer start to move he immediately ran to the station control panel and repeatedly pushed the "cycle stop" and "emergency stop" buttons. The transfer continued to move.

9b When the transfer started to move, the machine repairman that handed the valve to the victim pulled the gate plug, stepped inside the cell onto a safety mat - the transfer continued to move.

Why Did The Transfer Move?

Interview statements that establish that the number of panels on the west conveyor and their location, the lack of the witnesses hearing beeping sounds that occur when the turntable is loaded and tests performed on the line strongly support the following scenario of events.

The PLC logic prevents the transfer rails from returning when the limit switch on the pre-unload conveyor is activated.
When the conveyor was stopped one panel was on the conveyor and one panel was on the pre-load

conveyor causing the limit switch to be activated. The line completed the cycle but the transfer rails did not return. When the panel that was holding down the limit switch was pulled off, the PLC caused the transfer rails to return. The software logic that prevented the transfer rails from returning when the limit switch was made (actuated) was unknown to all that were interviewed.

Findings

RWC Line

1. The cycle time is approximately one minute.
2. The line was in the automatic mode when the incident occurred.
3. Loading parts and unloading parts when the line was stopped was a standard practice.
4. At the time of the incident the transfer rail was moving south returning to the starting position.
5. The transfer rails are approximately 100 feet long.

Machine Guarding

Safeguarding on the line did not comply with DaimlerChrysler Manufacturing Instruction SMI-145 and *Robot Safety,* SMI-109. Deficiencies include interlock plugs not properly wired, emergency stop devices that do not require local reset and were not properly wired, lack of pinning devices to control hazardous motion and insufficient labeling. Plants were required to retrofit operations to insure compliance with these internal guideline in 1988.

Lockout

1. A machine specific lockout procedure that included a layout graphic and location of each energy isolation device was attached to each entry gate.
2. The first machine repairman to enter the line did not take the station control out of automatic.
3. Skilled trades workers stated that they had never locked out the line according to the posted procedure.
4. The posted procedure did not include the transfer main disconnect, the hydraulic unit main disconnect or the air lift assist main shut off valves.
5. All maintenance personnel involved in this incident had been trained in lockout during the past year.

UAW Health and Safety Department

Fatality Report
Steven Schneider

Injured Person:
Steven Schneider

Location:
John Deere,
Dubuque Plant
Local 94/Region 4

Job Title:
Machine Operator

Age:
48 years

Seniority:
28 years

Date of Incident:
February 9, 2000

UAW HEALTH & SAFETY DEPARTMENT
8000 East Jefferson
Detroit, Michigan 48214

Phone: (313) 926-5563
Fax: (313) 824-4473

Email: uawhs@earthlink.net
Web Page: www.uaw.org

opeiu494AFL-CIO

Summary

On February 9, 2000 Steven Schneider, a block line machine operator was crushed between the head of a drilling station and the frame of the adjacent station. He had entered the station through a non-interlocked gate guard to spray lubrication oil on the tooling. The incident was primarily the result of inadequate safeguarding. In addition, operators on the line had not been trained in lockout procedures for the line and had not been issued locks. Recommendations include, conducting a task based risk assessment to identify hazards and risk, installing necessary safeguarding devices based on the risk assessment and a review of standards, improving the lockout procedures, and other items listed below.

Recommendations

1. A task based risk assessment should be conducted on the line. The assessment should include identification of all tasks related to production, tool changes, unjamming parts, service and maintenance. For each task the related hazards should be identified and evaluated to determine the level of risk. Selection of safeguarding must be based on the hierarchy of controls, which gives preference to highly effective controls such as elimination and engineering controls over lower level controls such as training and procedures. Typical methods of controlling points of operation and other mechanical motion hazards is to use fixed barrier guards, interlocked moveable guards and presence sensing devices such as safety mats, light screens, single and multiple beam photo cells and laser scanners. Safeguarding devices should be installed consistent with the requirements of OSHA standards such as 1910.212 and consensus standards such as ANSI B11.19. Additional safeguarding information is included in the draft of ANSI B11.24 Transfer Machines - Safety Requirements for Construction, Care, and Use.
2. Emergency stop devices should be installed and located appropriately throughout the line. Location and selection of emergency stop devices should be based on tasks performed near hazardous locations.
3. Machine safeguarding consultant(s) should be invited to the plant to observe operations and recommend safeguarding devices currently available to address hazards identified in the task based risk assessment.
4. Appropriate company and union representatives should attend a comprehensive training course on machinery safeguarding.
5. Machine specific lockout procedures should be updated for all stations on the block line. Workers should be trained and issued necessary lockout devices. Periodic audits should be conducted to insure compliance.

6. Health and safety suggestions should be solicited from workers. A near miss reporting system should be instituted that encourages reporting without fear of reprisal.
7. Investigate the use of an audible and/or visual warning system to alert personnel prior to line start-up.
8. Improve visibility and communication between operators.
9. Review other lines to insure that deficiencies found on the block line do not exist elsewhere.

Background

The incident occurred on the block machining line, which was originally installed in the 1960s. The line is made up of multiple stations and operations. The operations include drilling, tapping, reaming and milling operations.

Two operators are normally assigned to the block line. Two operators were running the line on the day of the incident. The line includes 14 machining operations. One operator loads blocks and cycles each block through the line. The machine cycle is about three minutes. Once a cycle is initiated a series of automatic operations are performed such as drilling, tapping and reaming. Part transfer clamping and unclamping are performed manually on each cycle. The second operator worked the "back-end" and would periodically go to each station on the west and east side of the line and make quality checks for proper inside diameter, hole depth, proper number of holes, check tool condition and lubrication levels and lubricate tools and dowel pins. In addition the job included changing taps, drills and reamers and other setup functions. The operator performing the "back side" job would normally be out of sight of the operator that initiates the machine cycle on the west side of the line.

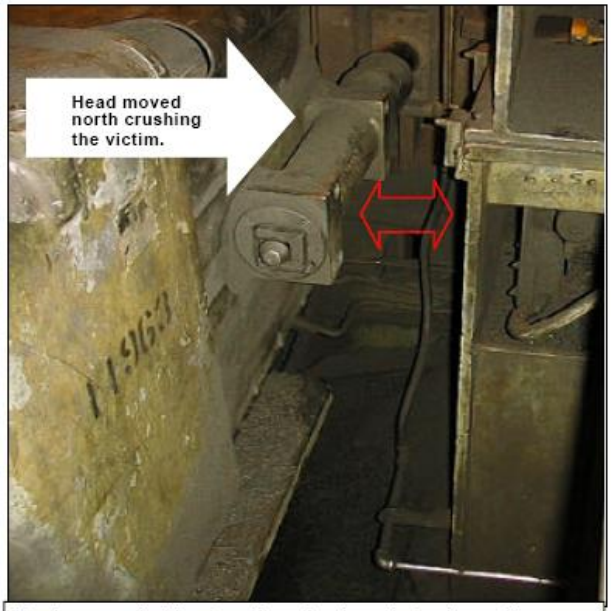
Sequence of Events

At 6:00 A.M. on February 9, 2000 two operators started production on the block machining line. One of the operators was on the west side of the line loading blocks and cycling the stations. The other operator (victim) performed inspection tests and measurements on the block at an inspection bench located on the west side of the line from 6:00 A.M. and 7:15 A.M. (all times are approximate). At 7:15 A.M. the victim began performing "back side" duties such as checking blocks and tooling on the southeast and west side of the machine. The operator ran the line, cycling the stations until 8:00 A.M. He stated that the line ran normally from 6:00 A.M. to 8:00 A.M. He did not see the victim between about 7:15 A.M. and 8:00 A.M. At 8:00 A.M. an operator from an adjacent line asked him for assistance to fix a gun drill that had overheated. He stopped operating the block line and told the "back side" operator that he was leaving to assist the operator on the adjacent line until 8:45 A.M. At 8:35 A.M. a skilled trades worker saw the victim ("back side" operator) walking along the east side of the line. At 8:45 A.M. the operator began operating the line. At 9:00 A.M. he went on break. At 9:15 A.M he felt concerned that he had not seen the other operator from the "back side" of the line for sometime. He went back to the line to look for the other operator. As he walked around the east side of the line he found the other operator lying on his back on the floor motionless, outside of drilling station #11963. A

White towels mark the location where the victim was found.

gate guard made of expanded metal was unlatched and swung open. A plastic spray bottle that was used to spray oil on the drills and dowel pins was lying on the floor near the body. A lighted flashlight was also lying on the floor near the body. The operator called for help. The victim was not breathing and did not have a pulse. Additional emergency personnel that

responded include a County Deputy Sheriff, plant security and a local ambulance crew. Medical personnel were not able to revive the victim. The coroner determined the cause of death to be a ruptured aorta.



Red arrow indicates the pinch point where the victim was crushed.

The victim apparently was caught between the head of a gang drill at station #11963 and the frame of the adjacent station (see photo). Forensic evidence indicates that he was facing south when he was crushed.

A hinged gate barrier guard limits access to this area. A non-interlocked latch was used to secure the gate in the closed position. Opening the gate would not stop machine operation. Interviews revealed that the gate was often left open while the line was in operation. Interview reports indicated that in the past, some workers had opened the guard and performed job functions while the machine was operating in automatic.

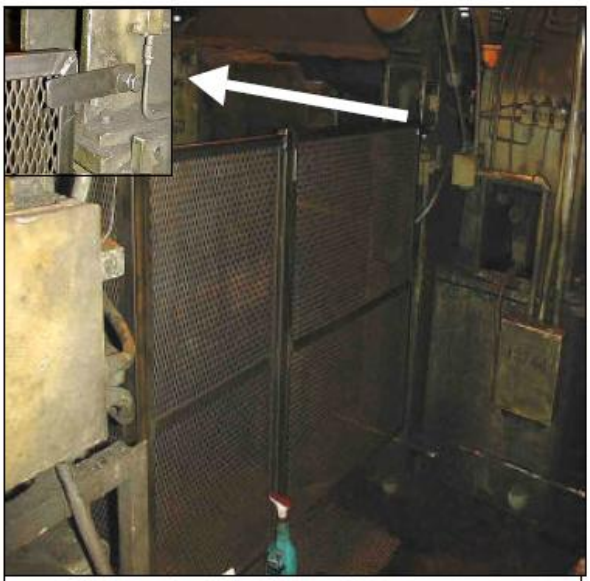
It was also reported that workers on the line had been told not to open the gate guard while the machine was in the automatic mode. The accepted procedure was to open the gate and perform tasks while the machine was in the manual mode or shut off.

The victim was a knowledgeable and an experienced operator that had been on the block line for approximately one year prior to the incident.

The gate guard had originally been installed in 1995 after a near miss incident. A worker from an adjacent line was observing the operation of this station. Just as he was about to move closer, to observe the operation the head moved to the north. He realized that had he moved closer just a few moments sooner, he would have been caught in the pinch point between the head and frame of the adjacent station. He raised the issue at a safety meeting. His supervisor arranged for the guard to be installed.

Most of the other stations on the line were not safeguarded with guards or safety devices. Workers are exposed to point of operation hazards (drilling, tapping, reaming) as well as pinch points associated with head movement and part transfer. The photographs on page four depict tasks performed by the operator working the "back side" of the line.

Most of the tasks are performed while the machine is energized - either in automatic or manual mode. Operators depended on the machine cycle sequence and delays between operations for protection. Operators check blocks, touch machined surfaces and blow off chips with compressed air while parts await transfer to the next operation. The spindles continue to rotate on about one third of the stations during all phases of the cycle. Depending on the timing of the machine cycle for



Gate guard and latch.

protection creates additional risk in this situation because of potential machine malfunctions, the periodic need for a block to be rerun through a particular station which can change the anticipated motion and poor visibility and communication with the other operator. Certain stations have the capability of changing the "home" or starting position of the machining head. If the "back side" operator were unaware of such a change he could be injured while performing tasks while anticipating a different "home" position and machine sequence. Some operators performing "back side" tasks would place a "Do Not Operate" tag over the control panel to alert the other operator not to cycle the line. None of the operators reported shutting off the electrical disconnect during such operations.

"Do Not Operate" tag

Some operators stated that they had reached from the east side of the line to controls on the west side to initiate manual functions.

An operator related a near miss incident that took place a few years ago. A visitor was observing the line and placed his head in the path of the transfer. The area is not safeguarded. The operator saw the visitor and grabbed his shoulder and pulled him out of the machine before the line transferred. Other near misses were reported including one operator that had his shirt caught in a machine and escaped without injury.

It was reported that the line was inspected and behavior observations were conducted in accordance with the DuPont STOP program.

The line is equipped with "emergency stops" on the operator control panels and a pull cable that extends the length of the line from north to south on the west side of the line. There was no means of shutting off the line on the west side of the line. Actuating the "emergency stop" causes the heads to retract but does not stop spindle rotation. Many referred to the "emergency stop" as a "return stop."

A machine specific lockout procedure had been developed for each section of the block line. The operator had not been trained on the procedure and did not have access to it. The operators had not been issued locks for lockout.

There were no automatic audible or visual warnings that would alert personnel in the area prior to the line starting up.

Typical "Back Side" Operator Tasks


Oiling Tooling


Gaging Holes

Checking Parts and Tooling


Changing Tooling

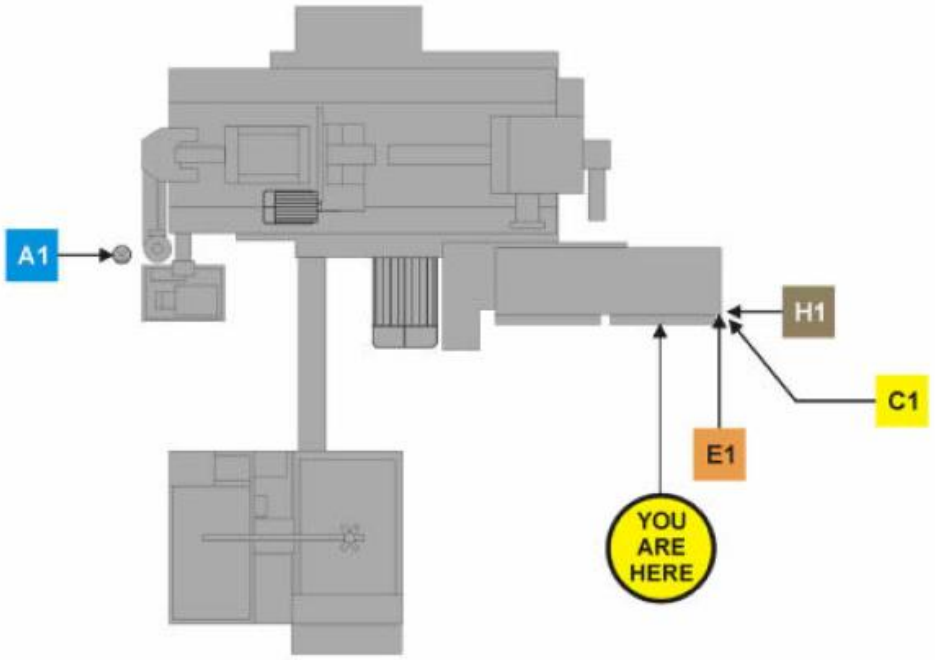
LOCKS REQUIRED * 4

GM POWERTRAIN
ROMULUS TRANSMISSION PLANT

KC 200 CENTERLESS GRINDER

BT# 45158
DRAWING# 404-8519

BEFORE SERVICING THIS MACHINE, NOTIFY AFFECTED PERSONNEL



FOLLOW SHUT DOWN PROCEDURES

Energy Source	Location	Perform Action	You Must Verify
* ELECTRICAL MAIN DISCONNECT	E1 ON PANEL	PLACE DISCONNECT IN OFF POSITION. ATTACH MULTIPLE LOCKOUT DEVICE, LOCK AND TAG.	ATTEMPT TO RESTART SYSTEM. SYSTEM MUST NOT START.
* AIR MAIN SUPPLY	A1 SIDE OF UNIT	CLOSE LOCKOUT VALVE SLOWLY, ATTACH MULTIPLE LOCKOUT DEVICE, LOCK AND TAG.	VISUALLY CONFIRM LOCKOUT VALVE IS IN CLOSED POSITION. LISTEN FOR RELEASE OF AIR.
* HYDRAULIC MAIN SUPPLY	H1 NEAR PANEL	CLOSE MANUAL VALVE SLOWLY, ATTACH MULTIPLE LOCKOUT DEVICE, LOCK AND TAG.	VISUALLY CONFIRM LOCKOUT VALVE IS IN CLOSED POSITION. ENSURE GAUGE READS (0) ZERO PSI. DOES NOT HOLD RESIDUAL PRESSURE.
* CHEMICAL COOLANT SUPPLY	C1 NEAR PANEL	CLOSE MANUAL VALVE, ATTACH MULTIPLE LOCK DEVICE, LOCK AND TAG.	VISUALLY INSPECT FOR NO FLUID MOVEMENT IN MACHINE.

FOLLOW START UP PROCEDURES

Premier AUTOWORKERS, INC.

STOP **IF LOCKOUT ENERGY CONTROL CANNOT BE PERFORMED / VERIFIED - STOP AND NOTIFY YOUR SUPERVISOR**

FILE: MR0029YD1
SURVEY DATE: 1/10/2001
REVISED DATE: 2/5/2001

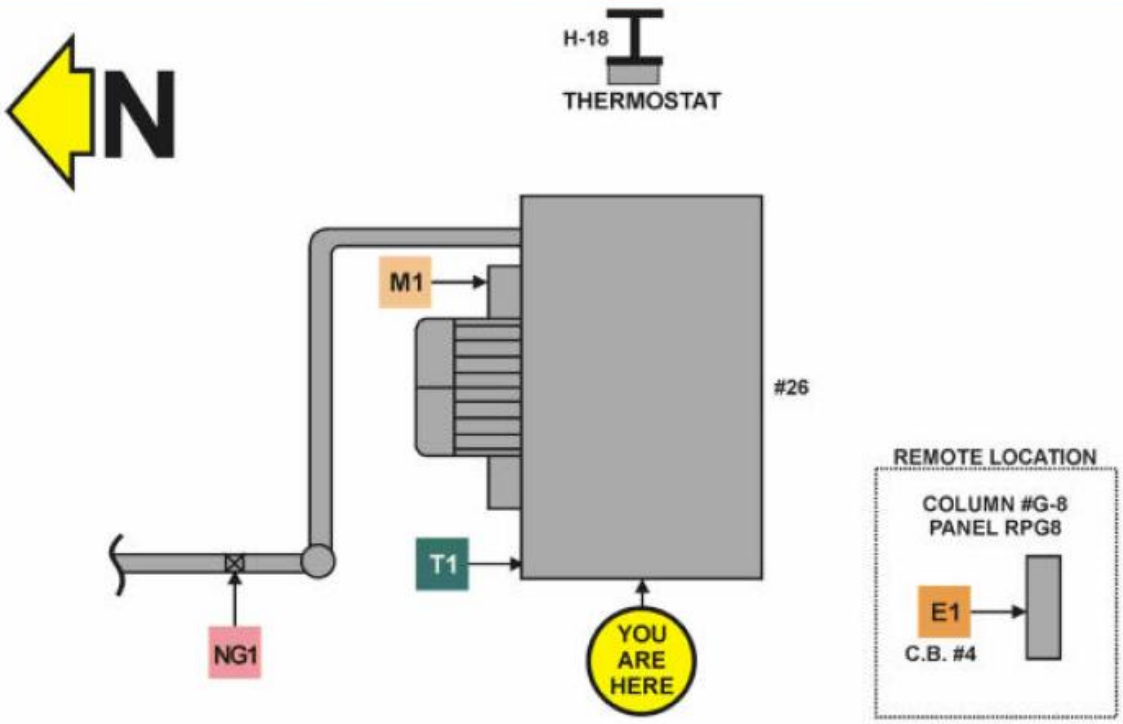
MAXIMUM LOCKS REQUIRED * 2

GM SPO - WAYNE - SAFETY LOCKOUT

UNIT HEATER #26

LOCATION
SURPLUS STORAGE AREA
COL. H-18

BEFORE SERVICING THIS MACHINE, NOTIFY AFFECTED PERSONNEL



ALWAYS PERFORM CONTROLLED SHUTDOWN BEFORE LOCKING OUT DISCONNECTS

FOLLOW SHUT DOWN PROCEDURES

Energy Source	Location	Perform Action	You Must Verify
* ELECTRICAL MAIN DISCONNECT	E1 COLUMN G8 PANEL RPG8 C.B. #4	PLACE SWITCH IN OFF POSITION. ATTACH MULTIPLE LOCKOUT DEVICE, LOCK AND TAG.	ATTEMPT TO RESTART UNIT. UNIT MUST NOT START.
* GAS SUPPLY	NG1 NORTH SIDE	CLOSE MANUAL VALVE, ATTACH MULTIPLE LOCK DEVICE, LOCK AND TAG. BLANK OR CAP SUPPLY LINE. VENTILATE ANY ENCLOSED AREAS.	VISUALLY CONFIRM THAT VALVE IS IN CLOSED POSITION AND LOCKED OUT.
DISSIPATE THERMAL BURNER	T1 INSIDE UNIT	WAIT UNTIL EQUIPMENT RETURNS TO AMBIENT TEMPERATURE.	USE TEMPERATURE SENSING DEVICE TO ENSURE EQUIPMENT HAS RETURNED TO AMBIENT.
DISSIPATE ROTATION FAN	M1 NORTH SIDE	WAIT FOR FAN MOTION TO CEASE.	VISUALLY CONFIRM THAT ROTATING COMPONENT HAS STOPPED.

FOLLOW START UP PROCEDURES

Premier AUTOWORKERS, INC.

2/22/2001

STOP

IF LOCKOUT ENERGY CONTROL CANNOT BE PERFORMED / VERIFIED - STOP AND NOTIFY YOUR SUPERVISOR

Control of Hazardous Energy (lockout/tagout). - 1910.147

SubPart Number: J
SubPart Title: General Environmental Controls

(a) Scope, application and purpose
(a)(1) Scope

(a)(1)(i) This standard ***covers the servicing and maintenance of machines and equipment in which the unexpected energization or start up of the machines or equipment, or release of stored energy could cause injury to employees.*** This standard establishes minimum performance requirements for the control of such hazardous energy.

(a)(1)(ii) This standard does not cover the following:

(a)(1)(ii)(A) Construction, agriculture and maritime employment;

(a)(1)(ii)(B) Installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering; and

(a)(1)(ii)(C) Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by *Subpart S* of this part; and

(a)(1)(ii)(D) Oil and gas well drilling and servicing.

(a)(2) Application.

(a)(2)(i) This **standard applies to the control of energy during servicing and/or maintenance of machines and equipment.**

(a)(2)(ii) Normal production operations are not covered by this standard (See Subpart O of this Part). Servicing and/or maintenance which takes place during normal production operations *is covered by this standard only if:*
(a)(2)(ii)(A) An employee is required to **remove or bypass a guard or other safety device; or**

(a)(2)(ii)(B) An employee is **required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed** (point of operation) **or where an associated danger zone exists during a machine operating cycle. NOTE:Exception to paragraph (a)(2)(ii):** Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection (See Subpart O of this Part).

(a)(2)(iii) This standard **does not apply to the following:**

(a)(2)(iii)(A) Work on *cord and plug connected electric equipment* for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

(a)(2)(iii)(B) *Hot tap operations* involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that-

(a)(2)(iii)(B)(1) continuity of service is essential;

(a)(2)(iii)(B)(2) shutdown of the system is impractical; and

(a)(2)(iii)(B)(3) documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

(a)(3) Purpose.

(a)(3)(i) This section **requires employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees.**

(a)(3)(ii) When other standards in this part require the use of lockout or tagout, they shall be used and supplemented by the procedural and training requirements of this section.

(b) Definitions applicable to this section.

Affected employee. An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Authorized employee. A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. ***An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.***

Capable of being locked out. An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

Energized. Connected to an energy source or containing residual or stored energy.

Energy isolating device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. **Push buttons, selector switches and other control circuit type devices are not energy isolating devices.**

Energy source. Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Hot tap. A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. it is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

Lockout. The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout device. A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
Normal production operations. The utilization of a machine or equipment to perform its intended production function.
Servicing and/or maintenance. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the **unexpected** energization or startup of the equipment or release of hazardous energy.
Setting up. Any work performed to prepare a machine or equipment to perform its normal production operation.
Tagout. The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
Tagout device. A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

(c) General -
(c)(1) Energy control program. The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

(c)(2) Lockout/tagout.

(c)(2)(i) If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize a tagout system.

(c)(2)(ii) If an energy isolating device is capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize lockout, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection as set forth in paragraph (c)(3) of this section.

(c)(2)(iii) After ***January 2, 1990***, whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designed to accept a lockout device.

(c)(3) Full employee protection.

(c)(3)(i) When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

(c)(3)(ii) In demonstrating that a level of safety is achieved in the tagout program which is equivalent to the level of safety obtained by using a lockout program, the employer shall demonstrate full compliance with all tagout-related provisions of this standard together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. Additional means

to be considered as part of the demonstration of full employee protection shall include the implementation of additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energization.

(c)(4) Energy control procedure.

(c)(4)(i) Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.
Note: **Exception:** The employer need not document the required procedure for a particular machine or equipment, when **all of the following elements exist: (1)** The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees; **(2)** the machine or equipment has a single energy source which can be readily identified and isolated; **(3)** the isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment; **(4)** the machine or equipment is isolated from that energy source and locked out during servicing or maintenance**; (5)** a single lockout device will achieve a locker-out condition; **(6)** the lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance; **(7)** the servicing or maintenance does not create hazards for other employees; and **(8)** the employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

(c)(4)(ii) The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

(c)(4)(ii)(A) A specific statement of the intended use of the procedure;
(c)(4)(ii)(B) Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;
(c)(4)(ii)(C) Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them; and
(c)(4)(ii)(D) Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

(c)(5) Protective materials and hardware.

(c)(5)(i) Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources.

(c)(5)(ii) Lockout devices and tagout devices shall be **singularly identified**; **shall be the only devices(s) used for controlling energy**; **shall not be used for other purposes**; and **shall meet the following requirements:**

(c)(5)(ii)(A) Durable.

(c)(5)(ii)(A)(1) Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

(c)(5)(ii)(A)(2) Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.

(c)(5)(ii)(A)(3) Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

(c)(5)(ii)(B) Standardized. ***Lockout and tagout devices shall be standardized within the facility*** in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.

(c)(5)(ii)(C) Substantial –

(c)(5)(ii)(C)(1) Lockout devices. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

(c)(5)(ii)(C)(2) Tagout devices. Tagout devices, including their means of attachment, shall be ***substantial enough to prevent inadvertent or accidental removal***. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a **minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie**.

(c)(5)(ii)(D) Identifiable. Lockout devices and tagout devices **shall indicate the identity of the employee** applying the device(s).

(c)(5)(iii) Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: **Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate.**

(c)(6) Periodic inspection.

(c)(6)(i) The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

(c)(6)(i)(A) The periodic inspection shall be performed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected.

(c)(6)(i)(B) The periodic inspection shall be conducted to correct any deviations or inadequacies identified.

(c)(6)(i)(C) Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.

(c)(6)(i)(D) Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected, and the elements set forth in paragraph (c)(7)(ii) of this section.

(c)(6)(ii) The **employer shall certify that the periodic inspections have been performed**. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

(c)(7) Training and communication.

(c)(7)(i) The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

(c)(7)(i)(A) Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available inthe workplace, and the methods and means necessary for energy isolation and control.

(c)(7)(i)(B) Each affected employee shall be instructed in the purpose and use of the energy control procedure.

(c)(7)(i)(C) All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

(c)(7)(ii) When tagout systems are used, employees shall also be trained in the following limitations of tags:

(c)(7)(ii)(A) Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

(c)(7)(ii)(B) When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

(c)(7)(ii)(C) Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

(c)(7)(ii)(D) Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.

(c)(7)(ii)(E) Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

(c)(7)(ii)(F) Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

(c)(7)(iii) Employee retraining.

(c)(7)(iii)(A) Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

(c)(7)(iii)(B) Additional retraining shall also be conducted whenever a periodic inspection under paragraph (c)(6) of this section reveals, or whenever the employer has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

(c)(7)(iii)(C) The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

(c)(7)(iv) The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

(c)(8) Energy isolation. Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.

(c)(9) Notification of employees. Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

(d) Application of control. The established procedures for the application of energy control (the lockout or tagout procedures) **shall cover the following elements and actions and shall be done in the following sequence:**

(d)(1) Preparation for shutdown. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

(d)(2) Machine or equipment shutdown. The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

(d)(3) Machine or equipment isolation. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

(d)(4) Lockout or tagout device application.

(d)(4)(i) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.

(d)(4)(ii) Lockout devices, where used, shall be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.

(d)(4)(iii) Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

(d)(4)(iii)(A) Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.

(d)(4)(iii)(B) Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

(d)(5) Stored energy.

(d)(5)(i) Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

(d)(5)(ii) If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

(d)(6) Verification of isolation. Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished.

(e) Release from lockout or tagout. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

(e)(1) The machine or equipment. The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

(e)(2) Employees.

(e)(2)(i) The work area shall be checked to ensure that all employees have been safely positioned or removed.

(e)(2)(ii) After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.

(e)(3) Lockout or tagout devices removal. Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. Exception to paragraph (e)(3): When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program. The employer shall demonstrate that the specific procedure provides equivalent safety to the removal of the device by the authorized employee who applied it. The specific procedure shall include at least the following elements:

(e)(3)(i) Verification by the employer that the authorized employee who applied the device is not at the facility:

(e)(3)(ii) Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and

(e)(3)(iii) Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

(f) Additional requirements.

(f)(1) Testing or positioning of machines, equipment or components thereof. In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the

machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

(f)(1)(i) Clear the machine or equipment of tools and materials in accordance with paragraph (e)(1) of this section;
(f)(1)(ii) Remove employees from the machine or equipment area in accordance with paragraph (e)(2) of this section;
(f)(1)(iii) Remove the lockout or tagout devices as specified in paragraph (e)(3) of this section;
(f)(1)(iv) Energize and proceed with testing or positioning;
(f)(1)(v) Deenergize all systems and reapply energy control measures in accordance with paragraph (d) of this section to continue the servicing and/or maintenance.

(f)(2) Outside personnel (contractors, etc.).

(f)(2)(i) Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures.

(f)(2)(ii) The on-site employer shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

(f)(3) Group lockout or tagout.

(f)(3)(i) When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

(f)(3)(ii) Group lockout or tagout devices shall be used in accordance with the procedures required by paragraph (c)(4) of this section including, but not necessarily limited to, the following specific requirements:

(f)(3)(ii)(A) Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);

(f)(3)(ii)(B) Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment and

(f)(3)(ii)(C) When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and

(f)(3)(ii)(D) Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

(f)(4) Shift or personnel changes. Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.
[54 FR 36687, Sept. 1, 1989, as amended at 54 FR 42498, Oct. 17, 1989; 55 FR 38685, 38686, Sept. 20, 1990; 61 FR 5507, Feb. 13, 1996]

1910.147 Lockout/Tagout

Written Plan Review

Review Question:	Yes	Incomplete	No
1. Is there a written plan?			
2. Does it include energy control procedures on every piece of equipment where “service and/or maintenance” is performed? (Including stored, residual or mechanical energy)			
3. Does it provide for training for ***everyone*** at the site?			
4. Does it outline the periodic inspection process for every piece of equipment that is locked out at least once a year? (who, when, how and why?)			
5. Is there a provision for “tagout” only?			
6. Does it indicate that lockout is the preferred method of controlling hazardous energy?			
7. Does it list any exceptions to Lockout? If so, What_____			
8. Describe lockout and tagout devices (color, size, shape or type?)?			
9. How are devices to identify the person who applied it?			
10. When is retraining necessary?			
11. Does it include a procedure for employer authorizing someone else besides yourself to remove your locks?			
12. Does it include a procedure for shift change or assignment change to protect integrity of Lockout?			
13. Is there a “Group” Lockout procedure?			
14. Who is responsible for notifying outside contractors of your Lockout requirement?			
15. Does it include a list of “AUTHORIZED” personnel?			
16. If there is a master key or duplicate keys, is there a strict chain of command?			
17. List of all energy sources at workplace?			

D:\Binderfiles\Lockout-Tagout\LOTO review checklist.doc

OSHA Letters of Interpretation

Page:	Date: Topic:
34	5/4/07 Lockout/Tagout & provisions for testing or positioning machines
35	5/9/06 Use of additional locks for secondary equipment
36	8/30/02 Color not only way to standardize LOTO locks
37	3/3/92 Use of LOTO Locks on tool boxes
37	2/28/00 Removal of locks by someone other than the person that applied it.
39	12/7/04 Use of nylon tie instead of locks and chains
40	10/20/04 Minor servicing and lockable on/off switch
42	1/14/03 **LOTO procedures for machines/equipment must be sufficiently detailed**
45	5/10/05 Written LOTO Program documentation and certification requirements

Standard Interpretations

05/04/2007 - Lockout/Tagout and the provisions for testing or positioning of machines while they are energized.

May 4, 2007

Mr. Dan Steigerwald, ARM
IMA of Kansas, Inc.
P.O. Box 2922
Wichita, KS 67201-2992

Dear Mr. Steigerwald:

Thank you for your June 8, 2006, letter to the Occupational Safety and Health Administration's (OSHA) Directorate of Enforcement Programs. You had questions regarding OSHA's *Control of hazardous energy (lockout/tagout* or LOTO*)* standard, 29 CFR 1910.147, as it relates to the troubleshooting of equipment. Your paraphrased scenario, questions and our responses follow.

Scenario: We operate several large punch presses[1] in our metal fabrication plant. We use several kinds of dies in some of our larger presses and, on occasion, our maintenance personnel stand inside the guard across the back of the machine to observe/troubleshoot malfunctions of our dies. The dies must be observed while the machine is running, and our personnel must be in close proximity to the dies as they come together to locate the minute imperfections which cause malfunctions. Once the problem is identified, our personnel leave the area and lock the machine out by following machine specific procedures until the repair is made. We cannot properly troubleshoot some of our dies without the machine running and our personnel standing inside of the rear guard.

Question 1: Does 29 CFR 1910.147 allow this practice?

Response: While it is not possible to conclusively determine the answer to your question without observing the particular pieces of equipment and considering the manner in which they are situated and used, the practices you describe would most likely not be in compliance with 29 CFR 1910.147.

The task you describe would involve an employee observing whether the equipment is operating properly. This activity would be considered *inspecting* the equipment and, therefore, would be considered *Servicing and/or maintenance* as defined at §1910.147(b). Although LOTO applies to servicing and maintenance, minor adjustments which occur during normal production operations may be exempt from the LOTO under the *minor servicing exception*. The *minor servicing exception* provides that minor tool changes and adjustments and other minor servicing activities which take place during normal production operations may be exempt from the LOTO standard if the activity is routine, repetitive, and integral to the use of the equipment for production purposes,

provided that the work is performed using alternative measures which provide effective employee protection. An employer bears the burden of demonstrating, on a case-by-case basis, that the *minor servicing exception* applies, in accordance with the note found at §1910.147(a)(2)(ii). If, in your scenario, the minor servicing exception were to apply, you would need to employ alternative safeguarding measures. Such alternative safeguarding measures may include devices such as, but not limited to, two-hand trip or control devices, restraint devices that prevent the employee from entering the zone of danger, video cameras that would allow remote observation of the dies, and plexiglass barriers that allow for close inspection of the operation, yet prevent introduction of the employee's body into the machine hazard area. It must be emphasized that every employee performing these inspection tasks must be protected from exposure to hazardous energy.

If the inspection/troubleshooting activity you describe does not constitute minor servicing during normal production operations, the LOTO standard also recognizes that there are circumstances under which it is absolutely necessary to test and position the machine while energized during servicing and maintenance. The provisions found in §1910.147(f)(1) allow for the testing or positioning of machines while energized, however, the provisions also require that employees be removed from the area when the energization and testing and/or positioning occurs. In the event that it is impossible to remove employees from the machine area and still conduct the type of inspection that must be performed, you must provide alternative employee protection through the use of the safeguarding measures previously discussed (e.g., two-hand trip or control devices, employee restraints, cameras, and plexiglass barriers) to be in compliance with the standard.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,
Richard E. Fairfax, Director
Directorate of Enforcement Programs

[1] If the presses are mechanical power presses, there are additional requirements in §1910.217, including provisions that address safeguarding, that may be applicable. Furthermore, industry consensus standards such as American National Standards Institute (ANSI) standards *Mechanical Power Presses — Safety Requirements for Construction, Care, and Use*, ANSI B11.1-2001, and *Hydraulic Power Presses — Safety Requirements for Construction, Care, and Use*, ANSI B11.2-1995 (revised 2005), may provide additional guidance with regard to safeguarding operations such as die try-out, adjustment, cleaning, and repair.

Standard Interpretations

05/09/2006 - Use of additional lock on a conveyor and baler system exceeds one lockout device.

May 9, 2006

Mr. Kevin Donaghue
Vice President
Aon Risk Services, Inc. of Illinois
200 East Randolph Street
Chicago, IL 60601

Dear Mr. Donaghue:

Thank you for your March 15, 2006, letter to the Occupational Safety and Health Administration's (OSHA) Correspondence Control Unit. You had questions regarding OSHA's *Control of hazardous energy (lockout/tagout)*, 29 CFR §1910.147, standard. Your question and our reply follow.

Question: In regard to exception number *5* — i.e., *a single lockout device will achieve a lock-out condition* — outlined in 1910.147(c)(4)(i), does the exception still apply if an additional lock is **required to isolate an adjoining piece of equipment** (i.e., conveyor feeding a hopper of a baler that is being locked out)?

Reply: ***No,*** since the addition of another lock on a conveyor and baler system would exceed one lockout device.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at 202-693-1850.

Sincerely,
Richard E. Fairfax, Director; Directorate of Enforcement Programs

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Standard Interpretations

08/30/2002 - Color is not the only prescribed factor for the standardization of LOTO devices.

August 30, 2002

Mr. Ronald E. Austin, CSP
Austin Safety LLC
10309 Salford Court
Glen Allen, VA 23060

Dear Mr. Austin:

Thank you for your letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs regarding the *Control of hazardous energy (lockout/tagout)*, 29 CFR 1910.147, standard. This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any scenario not delineated within your original correspondence. Your scenario, question, and our replies follow.

Scenario: I have found that customers are starting to use a label on their locks for lockout identification and labeling purposes.
I suspect that the sales people may be incorrectly stating that the labels comply with the following 1910.147(c)(5)(ii)(B) requirements:

Standardized. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: color; shape; or size...

Question: Do labels, which are usually, white in background meet the requirement for the locks to be unique by size, shape or color?

Reply: Color is not the only prescribed factor for the standardization of lockout and tagout (LOTO) devices. At a minimum, a lock's shape, or size, or color must provide employees with the capability to identify and distinguish a lockout device from other similar devices (e.g., security locks) in the workplace.

This hardware standardization requirement requires devices to be unique to the particular use (the only ones authorized for that purpose); to be singularly identified, durable, standardized, and substantial; and to identify the user. Moreover, the lockout devices cannot be used for purposes other than the control of hazardous energy. Based on the information supplied to us, it is difficult to make a thorough evaluation; thus, we cannot determine if an employer using your described label would be in compliance with all the provisions of the standard.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements

and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,
Richard E. Fairfax, Director
Directorate of Enforcement Programs

Standard Interpretations

03/03/1992 - Interpretation of 29 CFR 1910.147 - Lockout Devices.

March 3, 1992
MEMORANDUM FOR: JOHN T. PHILLIPS, REGIONAL ADMINISTRATOR

FROM: PATRICIA K. CLARK, DIRECTOR DIRECTORATE OF COMPLIANCE PROGRAMS

SUBJECT: **Request for Concurrence with an Interpretation of 29 CFR1910.147(c)(5)(ii) - Lockout Devices**

This is in response to your memorandum of April 19, 1991 asking if the **use of a lock**, which had been assigned to an authorized employee for use as a lockout device, and was **also being used to lock tool boxes**, was a violation of the standard. Please accept our apologies for the extreme delay in responding.

The answer is **yes. It is a violation** of the standard to use a lockout device for other purposes. If the lock is intended for use as a lockout device under the standard, but is also being used to lock tool boxes, then this is a violation of 1910.147(c)(5)(ii). This confirms a conversation on June 11, 1991 between Jeff Finch, formally of our staff, and Jonas Miniatas of your Office of Technical Support. We hope this helps to clarify your concerns.

Standards Interpretation and Compliance Letters

Removal of lockout devices by persons other than those who applied them.

February 28, 2000

Ms. Gretchen B.
Project Manager
Reynoldsburg, OH 43068
Dear Ms. B.:
Thank you for your July 10, 1999 letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Compliance Programs regarding 29 CFR §1910.147 The Control of Hazardous Energy (lockout/tagout). Your scenario, question, and our reply follow.

Scenario: Recently, one of my customers requested a written lockout/tagout program and I ran across some interpretations that I found both insightful and helpful. However, there is one interpretation that has raised some questions. The interpretation that I am referring to is dated July 28, 1995 from John B. Miles to Ms. Vicki Chouinard of Honeywell, Inc.

The specific question is in regard to using a master key on a lock when an authorized employee is not on site. The interpretation states that a master key is not acceptable and a bolt cutter [or equivalent means resulting in the destruction of the lock] must be used to remove the lock. After reviewing the 29

CFR 1910.147(e)(3) reference, I do not see any mention of the use of a master key as being unacceptable, nor conversely, the use of bolt cutters acceptable.

What I have found is that the regulation clearly states that the employer of the authorized employee may remove a lockout device as long as a documented procedure is followed. This procedure, at a minimum, must include:
(1) verification by the employer that the [authorized] employee [who applied the device] is not on site;
(2) [all] reasonable efforts to contact the authorized employee to inform him or her that the lock has been removed; and
(3) the employee is definitely informed of the removal of the lock upon his or her return to work.

Question: Based on the above information and a very specific written procedure, isn't it possible that an employer does have an alternative to bolt cutters as a way to remove lockout devices?

Reply: Bolt cutters, or other device-destructive methods, are not the only permissible means by which to remove a lockout device, if the employer can demonstrate that the specific alternative procedure, which the employer follows prior to removing the device, provides a degree of safety that is equivalent to the removal of the device by the authorized employee who first affixed it. The use of a master key to remove a lockout device would be deemed equivalent (to the removal of the lock by the person who applied it) only if it is performed under the employer's direction and in accordance with the requirements established in 1910.147(e)(3).

Obviously, the **"one person, one lock, one key" practice is the preferred means and is accepted across industry lines,** but it is not the only method to meet the language of the standard. However, prior to the use of **the master key method**, specific procedures and training, meeting the §1910.147(e)(3) exception, must be developed, documented, and incorporated into your energy control program. Among the features essential to a compliant master key procedure is **a reliable method to ensure that access to the master key will be carefully controlled by the employer such that only those persons authorized and trained to use the master key in accordance with the employer's program can gain access.**

Safety is ensured not through the use of a specific removal device, be it a master key or bolt-cutter; rather, it lies in effective procedures, careful training, and procedures designed to ensure accountability. The success of any employer's energy control program, including lockout or tagout device removal actions, depends upon ensuring that its employees follow established, effective procedures, thereby respecting the sanctity of another employee's lockout or tagout device.

Thank you for your interest in occupational safety and health. We hope this provides the clarification you were seeking and apologize for any confusion the earlier document may have caused. The interpretation in this letter supersedes the July 28, 1995 Honeywell, Inc. letter, which is hereby rescinded. As this letter demonstrates, OSHA's re-examination of an issue may result in the clarification or correction of previously stated enforcement guidance. If you have any further questions, please feel free to contact the Office of General Industry Compliance Assistance at (202) 693-1850.

Sincerely,
Richard E. Fairfax, Director
Directorate of Compliance Programs

FOOTNOTE (1) While your question does not specifically address tagout devices, please be aware that the destructive removal of the tagout device is required by the standard, and there is no equivalent "master key" concept for tagout devices. Tagout device attachment means must be of the non-reusable and non-releasable type. [See subsection 1910.147(c)(5)(ii)(C)(2).] The standard mandates non-reusable tagout devices in order to

adequately protect the authorized employee who affixes the tagout device and to prevent other employees from removing the tagout device in a way that is not permitted.

Standard Interpretations

12/07/2004 - LOTO: Use of heavy-duty nylon cable ties as lockout devices in lieu of chains and locks.

December 7, 2004

Mr. James Little
Safety Specialist
Georgia Gulf Lake Charles, LLC
1600 VCM Plant Road
Westlake, LA 70669

Dear Mr. Little:

This is in response to your correspondence dated July 30, 2004, to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs. This letter constitutes OSHA's interpretation of only the requirements discussed and may not be applicable to any questions not delineated within your original correspondence. You had aspecific question regarding regulatory provisions related to the use of heavy-duty nylon cable ties as lockout devices in lieu of chains and locks. You included two photos -- one depicting the practice of locking out a valve with a chain and lock, and one depicting your proposed practice of using a cable-tie to secure the valve instead. Your paraphrased scenarios and inquiries follow.

Question: Is it appropriate to use heavy-duty nylon cable ties as an alternative to chains and locks on devices that are not specifically designed to accommodate a lock?

Response: Under most foreseeable circumstances, the use of nylon cable ties would not be an appropriate substitute for more traditional and substantial lockout devices, such as locks and chains, when an energy isolation device is capable of being locked out. 29 CFR 1910.147(c)(5)(i) states that lockout devices "shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools." While a cable tie is a positive means of holding the energy isolating device in a safe position, most commercially available cable ties are not constructed such that it would require mechanisms such as bolt cutters or other metal-cutting tools to remove them. Nylon cable ties are generally removable through the use of common cutting tools (e.g., pocket knives, side cutters, or scissors) or by releasing the pawl mechanism with a device such as screwdriver; neither of which constitutes an "unusual technique," as required by the standard. Your company could, however, use the cable ties as part of a tagout system consistent with 1910.147(c)(5), as long as the use of the tagout system in the scenario depicted in your letter will provide "full employee protection," (e.g., double-block and bleed arrangement in conjunction with a tagout device, using a nylon cable tie as a means of attachment) as set forth in 1910.147(c)(3).

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules.
Sincerely, Richard E. Fairfax, Director

Standard Interpretations

10/20/2004 - LOTO: minor servicing exemption and the use of a lockable on/off switch as an alternate measure to provide effective protection.

October 20, 2004

Mr. Mark Kaster
Dorsey and Whitney LLP
50 South Sixth Street, Suite 1500
Minneapolis, Minnesota 55402

Dear Mr. Kaster:

Thank you for your May 12, 2004 letter to the Occupational Safety and Health Administration's (OSHA) Directorate of Enforcement Programs. You had questions regarding the application of the Lockout/Tagout standard's *minor servicing exception* and the use of a lockable on/off switch as an alternative measure to provide effective employee protection from hazardous energy associated with a particular machine or piece of equipment. Your paraphrased scenario, question, and our response follow.

Scenario: Our client manufactures machines for the corrugated industry, such as a high-speed feed machine for rotary die cutter production lines (see attached diagram). When in operation, the machine's extendo (telescoping conveyor and front sheet feeder), waste gate, belts, and other moving parts can be in operation during minor servicing work.

A customer wishes our client to install a lockable on/off switch on this machine to be used as a safeguard during routine minor service that might be needed during production runs. The switch would be a control circuit device that could be locked in the "off" position by use of a key that can be removed by the operator to prevent another individual from inadvertently starting the equipment. The switch would be designed to meet the control reliability criteria of American National Standard, ANSI B11.19-1997. This switch would be used with the following four tasks that the machine's operator would perform routinely:

1. Set-up: The operator must raise and go under the extendo to adjust the settings on the Finishing Machine Hopper (the finishing machine is downstream of the machine in question) and preload the hopper with material;

2. Interim access: The operator may raise and go under the extendo to adjust the settings on the Finishing Machine Hopper, straighten sheets, add or remove sheets, or clear a jam;

3. Waste sheet removal: The operator may go under the extendo to remove waste sheets; and

4. Feed interrupt: The operator may interrupt the feed to reach into the Finishing Machine Hopper area or over the extendo to straighten, add, or remove sheets.

During normal operations, and depending on the size of the orders and the quality of the incoming material, any and/or all of these tasks could occur one or more times per hour during the work shift.

To perform these tasks during a production run, the operator could lock the on/off switch in the "off" position, remove the switch key, and then proceed to access the machine for the minor servicing work. The machine could not be turned back on until the operator returned to the normal operating position with his switch key.

Question: Would the use of the aforementioned lockable on/off switch be appropriate for use as an alternative measure to provide effective employee protection, as required by the *minor servicing exception* found at 29 CFR 1910.147(a)(2)(ii)?

Response: The *minor servicing exception* applies only to minor servicing activities that must be performed during normal production operations (i.e., the utilization of a machine for its intended

production function) and that are necessary to allow production to proceed without interruption. The minor servicing activity must be:

- **Routine — performed as part of a regular, basic course of procedure;**
- **Repetitive — repeated regularly as part of the production process or cycle; and**
- **Integral — inherent to, and be performed as part of, the production process.**

The exception applies only if the employer provides effective alternative protection from hazardous energy.

OSHA has determined that a reliable control circuit is an acceptable method for protecting employees who are performing activities that fall within the minor servicing exception to the Lockout/Tagout standard. In our July 15, 2003 letter to David Teague (see enclosed copy), we stated that "a circuit that meets the control reliability and control-component-failure-protection requirements of the American National Standards for machine tools (ANSI B11.19-1990) would provide alternative safeguarding measures with respect to the minor servicing exception contained in 1910.147(a)(2)(ii)."

However, as stated in the letter to Mr. Teague, please be aware that mechanisms such as the one you mention can be used to control hazardous energy only in situations when the other provisions of the minor servicing exception apply. In regard to your enclosed machine design diagrams and task descriptions, you include some activities that may be servicing and maintenance activities covered by the standard (e.g. adding sheets, preloading the hopper), rather than the minor servicing activities contemplated in the exception to the standard.[1] Without direct observation of these tasks, it is not possible for us to determine with certainty whether they would fall under the minor servicing exception. Your client's customers may contact OSHA's free On-Site Consultation Service for assistance in performing a case-by-case hazard analysis to determine the applicability of the minor servicing exception for these activities.

In your scenario, you stated that machine parts such as the extendo, waste gates, and belts can be in operation during minor servicing work. It is assumed that locking the proposed on/off switch in the "off" position would deactivate the machine and prevent all movement in the machine's parts. If this is not the case, and employees are still exposed to hazards created by the action of the machinery when performing activities under the minor servicing exception, then additional safeguarding measures for effective employee protection must be undertaken. One such method would be effectively guarding the hazardous areas of the machinery, as required by *Subpart O - Machinery and Machine Guarding* of Part 1910. Under no circumstances is an employee ever permitted to place any part of his or her body within a hazardous area (such as the point-of-operation, ingoing nip points, or around power transmission apparatus), unless all hazardous energy is effectively controlled.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information.

Sincerely,
Richard E. Fairfax, Director, Directorate of Enforcement Programs

[1] In Westvaco Corp. 16 (BNA) OSHRC 1374 (90-1341, 1993), the Occupational Safety and Health Review Commission (OSHRC) rejected an employer's assertion that set-up activities associated with a

printer/slotter machine constituted servicing and maintenance within the scope of the exception. While not reaching the questions of whether the activities were "minor" or whether the alternative protection was effective, the OSHRC concluded that adjustments made while the machine was being set-up according to unique specifications to produce corrugated paperboard containers were not adjustments made during "normal production operations."

Standard Interpretations

01/14/2003 - Requirements for developing sufficiently-detailed written procedures for all machinery/equipment lockout/tagout.

January 14, 2003

Richard S. Jones, P.E.
TriTex Technologies, Inc.
4611 Langland Road, Suite 104
Dallas, Texas 75244

Dear Mr. Jones:

Thank you for your September 19, 2002 letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs (DEP). This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any scenario or questions not delineated within your original correspondence. You had questions regarding the *Control of hazardous energy (lockout/tagout)* standard, 29 CFR 1910.147. Specifically, you provided excerpts from a client's lockout/tagout procedures because the client is confused about the requirement to produce a procedure for every valve, pump, compressor, etc. Your scenario, questions, and reply follow:

Scenario: Assume a processing complex has 15,000+ valves. Of these 15,000+ valves, there are basically two families of valves: 1) control valves, and 2) block valves. Within these two classifications, there may be both actuated and non-actuated valves comprised of a dozen or so different types of valves, such as the gate valve, check valve, globe valve, ball valve, plug valve, butterfly valve, needle valve, angle valve, etc.

The following sample procedural excerpt for control valves from our client's *Guidelines for the Lockout/Tagout of Equipment* illustrates the type of procedure used for these 15,000+ valves:

Control Valves

A. Identify the flow rate through the control loop
    1. Look at the flow meter next to the control
B. Start closing the up-stream block valve slowly
C. Maintain the same flow rate through the flow loop by opening the by-pass as the block valve is closed
D. Inform the operator that the control is by-passed
E. Close the down stream block valve to isolate the control from the process flow
F. Slowly bleed all the liquid or gas from the control loop
    1. Bleed any pressure to the appropriate disposal location
    2. Have the operator open the control valve if the bleeders on each side of the control are not available
G. Lockout/Tagout all possible sources of energy from the control loop [1]
    1. Lock and tag the upstream block valve

2. Lock and tag the downstream block valve

3. Lock and tag the control valve activating energy source (air, electricity, hydraulic, etc.)

H. Obtain all the necessary safety permits (cold work, hot work, entry, etc.)

Additionally, you provided specific lockout/tagout procedural guidelines for electric and steam driven pumps, reciprocating and centrifugal compressors, heaters/furnaces, boilers, and vessels.

Question: Does the lockout/tagout standard require procedures for every single piece of equipment or is a procedure for each type of equipment sufficient?

Reply: No, energy control procedures are not required for every single piece of equipment if certain criteria are met. Similar machines and/or equipment (those using the same type and magnitude of energy), which have the same or similar type of controls, can be covered with a single procedure. However, the **procedure must be written in sufficient detail and provide enough direction so that the employees can follow the procedure and determine how to safely perform servicing or maintenance work.** Over-generalization can result in a document that has little or no utility for employees who must follow the procedure.

Paragraph 1910.147(c)(4)(ii) states, in part, that the required documentation must clearly and specifically outline the scope, purpose, authorization, rules, and techniques employees are to use to control hazardous energy, and the means to enforce compliance. During an inspection, OSHA will carefully examine the energy control procedure of any employer claiming that a single comprehensive procedure is sufficient throughout its workplace in order to ensure that a single procedure is indeed adequate.

While the Agency does not insist on multiple procedures, a procedure that addresses multiple machines or pieces of equipment must include the above referenced paragraph (c)(4)(ii) requirements (e.g., purpose, scope of machines/equipment to be covered) and a statement as to its intended use. Nevertheless, in order to be covered by one procedure, the various pieces of machinery or equipment, at a minimum, must have the same:

1. Specific procedural steps for shutting down, isolating, blocking, and securing machine or equipment to control hazardous energy;

2. Specific procedural steps for the placement, removal, and transfer of lockout or tagout devices and the responsibility for them; and

3. Specific requirements for testing a machine or piece of equipment to determine and verify the effectiveness of lockout/tagout devices and other control measures.

Your eight-step sample procedure alone appears to lack the detail necessary to comply with all of the 1910.147(c)(4)(ii) provisions; there appears to be insufficient information for employees to implement specific control measures necessary to safely perform the servicing and maintenance work. In short, the number of variables and associated risk involved with controlling hazardous energy in a processing complex with 15,000+ control valves necessitate a careful **hazard analysis** to permit an understanding of the job specific hazards and the specific method or means (specific control measures) to control the energy (see 1910.147(d)(1)) . It is important to emphasize that a thorough hazard analysis provides the foundation for developing, documenting, and implementing hazardous energy control procedures.

For example, a control system bypass task is significantly different from a process system lockout/tagout. In this latter scenario, employees need to know much more than the lockout/tagout steps for a specific type of equipment component, such as a control valve, in order to perform an orderly and safe shutdown. Simply listing the control valve steps without the proper preparation for the specific process system (e.g., identifying which valve(s) require isolation and the associated shutdown order) to be worked on may lead to confusion and error due to inadequate employee direction. The lack of procedural clarity and over-generalization could result in the employees failing to isolate key control valves, resulting in their exposure to the hazardous energy during the servicing or maintenance work.

Some employers utilize manufacturer guidelines (e.g., operational/maintenance manuals) that are referenced in and linked to generic lockout/tagout procedures in order to provide employees with specific steps for controlling

hazardous energy associated with equipment and machines. For example, your client may decide to link their control valve guidelines as part of a specific job procedure after a hazard analysis has been performed and the safe energy control sequence determined. These control valve guidelines or supplemental methods, such as using checklists, placards, work authorization permits, may provide an effective means to augment generic lockout/tagout rules and techniques, by addressing the specific sequential steps to control the hazardous energy associated with various servicing or maintenance projects.

Furthermore, the company procedure must specify that the employees are required to perform their work in accordance with the terms and limitations of the general lockout/tagout policy and the augmented checklist or work permit system. The checklist or permit would need to identify the equipment to be serviced or maintained, the types and unique energy characteristics to be encountered, methods for safe work, and the process or procedures to be used to accomplish the task safely.

Question: Is it acceptable to prepare a lockout/tagout procedure for the two general classifications of valves, or for the dozen or so types of valves, or is it the intent of OSHA to prepare lockout/tagout procedures for all 15,000+ valves?

Reply: As described above, this performance-oriented standard allows a degree of latitude to the employer to "tailor" the required procedures to fit the individual conditions of the workplace. However, a plant-wide approach for controlling hazardous energy that is based on system components (e.g., valves), rather than thorough process-specific equipment/machine hazard analyses, may be seriously flawed. The standard contemplates the control of hazardous energy associated with machinery and equipment; hence, a focus on system components often will not provide sufficient employee guidance regarding: (1) the various types and magnitude of hazardous energy; or (2) all of the means to effectively control the hazardous energy on the various pieces of machinery and equipment.

Question: Would the same procedural requirements (as stated above) apply to other common and redundant equipment such as pumps, compressors, heaters, furnaces, boilers, and vessels?

Reply: Yes. With regard to your client's equipment procedures (valves, pumps, compressors, heaters/furnaces, boilers, vessels), our office has not performed a detailed review for all of the procedures you provided, since the Agency does not review energy control procedures in this manner or certify that such procedures comply with the provisions of the lockout/tagout standard. OSHA does not test, approve, certify, or endorse any procedure, equipment, or product.
Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you haveany further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely, Richard E. Fairfax, Director
Directorate of Enforcement Programs

[1]The control valve procedure's hazardous energy control steps were not performed in the proper sequence as the:

1. Residual energy was released (Step F) prior to the application of the lockout/tagout device application (Step G); and

2. Specific measures to verify isolation and de-energizationwere not identified and designated to take place after the stored energy was dissipated (Step F). Furthermore, verification of isolation, depending on the process specific energy control application, may need to be continued while the servicing and/or maintenance work is underway or until the possibility of such accumulation no longer exists.

3. Step G.3 has employees lock and tag the *activating energy source* without any previous guidance in terms of shutdown preparation, shutdown, and isolation procedures. After the air, hydraulics, and/or electric

energy sources are locked/tagged out, then the stored energy [1910.147(d)(5)] and verification of isolation [1910.147(d)(6)] steps must be implemented.

Standard Interpretations

05/10/2005 - Hazardous energy control lockout/tagout (LOTO) program documentation and certification requirements.

May 10, 2005

Mr. David A. Ward
Safety Examiner
338 West Dog Ridge
Ashland, KY 41102
Dear Mr. Ward:

Thank you for your May 14, 2004, letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs. This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any questions not delineated within your original correspondence. You had specific questions regarding the *Control of hazardous energy (lockout/tagout)*, §1910.147, requirements for an energy control program. We apologize for the delay in our response. Your paraphrased questions and our replies are provided below.

Question #1: What is required in the lockout/tagout (LOTO) program, and must this program be in writing?

Reply: The LOTO standard contains criteria for establishing an effective energy control program. Pursuant to §1910.147(c)(1), an energy control program, includes: energy control procedures, employee training, and periodic inspections, which jointly function to ensure that hazardous energy sources are isolated and rendered safe before, and while, any employee performs any servicing or maintenance on any machinery or piece of equipment. The LOTO standard does not require a written energy control program; however, the standard does have several requirements regarding documentation and certification of records:

1. **Energy Control Procedure.** Paragraph 1910.147(c)(4)(i) states that employers must **document** the procedures used to isolate from its energy source(s), and render inoperative any machine or equipment prior to servicing, maintenance, or repair.[1] These procedures are necessary if energization, start up, or release of stored energy is possible and could injure workers.

2. **Periodic Inspection.** Paragraph 1910.147(c)(6)(ii) requires employees to **certify** the inspection by documenting the date of the inspection and identifying the machine or equipment inspected and the employee who performed the inspection. The inspection records provide employers with assurance that employees can safely service, maintain, and repair machines and equipment covered by the Standard.

3. **Training.** Paragraph (c)(7)(iv) provides that employers must **certify** that individual employees completed the required training and that this training is current. The certification must contain each employee's name and his/her training date.

Question #2: Must written energy control procedures include the elements given below:

a. Procedures if an energy isolating device is not capable of being locked out?

b. Procedures if an energy isolating device is capable of being locked out, [but will be tagged out,] including the *Full employee protection* requirements?

c. Protective materials and hardware, including LOTO device durability, standardization, and identification requirements?

d. Application of controls, including energy isolation?

e. Release from lockout/tagout?

f. Group lockout/tagout?

g. Shift or personnel changes?

h. Contractor responsibilities?

i. Periodic inspections?

j. Training and communication?

Reply: Paragraph 1910.147(c)(4)(ii) states that the procedures must clearly and specifically outline the scope, purpose, authorization, rules, and techniques that employees are to use to control hazardous energy and the means to enforce compliance. The document must include at least the following elements:

- a specific statement regarding the use of the procedure;
- a specific procedural steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy;
- specific procedural steps for placing, removing, and transferring lockout or tagout devices, including the responsibility for doing so; and
- specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout or tagout devices, as well as other energy-control measures.

OSHA used the word *specific* in the standard to describe the elements of the procedure because authorized employees must know and understand how to control hazardous energy effectively when they service or maintain machinery and equipment. Detailed procedures are required because over generalization does not provide the level of information necessary for an employee to use the procedure to effectively isolate hazardous energy.

Your items a, b, d, e, f, g, and h are elements that must be contained in the energy control procedure(s), if they are relevant to the types of servicing and/or maintenance activities at the workplace.[2] Likewise, energy control procedure(s) must identify the protective material and hardware that will be used to isolate energy (your item c), but while the employer must provide materials/hardware that meet the durability, standardization, and identification provisions of §1910.147(c)(5), these details need not be explicitly incorporated into the procedure(s). The LOTO standard does not require that periodic inspections (your item i) or training and communication (your item j) program elements be incorporated into an energy control procedure, since these are distinct and separate program requirements.

As you may know, the State of Kentucky administers its own occupational safety and health program under a plan approved and monitored by Federal OSHA. States that administer their own OSH plans must promulgate regulations that are "at least as effective" as the Federal regulations. Kentucky's LOTO standard is almost identical to the Federal standard, including the specific sections, §1910.147(c)(4)(i) and §1910.147(c)(4)(ii), that you addressed. Thank you for your interest in occupational safety and health. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further

questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,
Richard E. Fairfax, Director, Directorate of Enforcement Programs

[1] If all eight elements specified in the paragraph §1910.147(c)(4)(i) exception exist, the procedure need not be documented for a specific machine or piece of equipment. The exception is intended to apply to situations in which the LOTO process does not involve detailed interactions of energy sources, machines/equipment, and employees. However, this provision exempts only the **documentation** requirement; it does not relieve an employer of the obligation to **develop and utilize** energy control procedures.

[2] For example, some employers do not utilize tagout devices, negating the need for *full employee protection* when energy isolating devices are capable of being locked out, or they may not undertake multi-shift servicing or maintenance operations. In such cases, inclusion of these LOTO provisions into a procedure would not be appropriate or required.

Developing a One Year Plan

Month # 1	Month # 2	Month # 3	Month # 4	Month # 5	Month # 6
Month # 7	**Month # 8**	**Month # 9**	**Month # 10**	**Month # 11**	**Month # 12**

LOCKOUT/TAGOUT 1910.147

IT COULD SAVE YOU LIFE!

Activity #1:

List all the energy sources that are present at your worksite?

1.)_____ 2.)_____

3.)_____ 4.)_____

5.)_____ 6.)_____

7.)_____ 7.)_____

Activity #2:

Discuss the following questions and in your group, decide which answer(s) are correct. Pick a recorder and reporter.

1. Have you witnessed any incidents that could have been a serious injury or worse? Please describe_____
_____

2. What protects everyone from hazardous moving parts on machines and equipment?

[ ] Being careful
[ ] Guarding
[ ] Personal Protective Equipment

3. If you haven't been issued a lock you should use a lock of your own.

[ ] True
[ ] False

4. Never loan your lock to anyone else to use.

[ ] True
[ ] False

5. As soon as you've decided to "Lockout", you should first:

   [ ] Review Machine-Specific LOTO Procedures
   [ ] Communicate with necessary personnel
   [ ] Prepare the area

6. "Preparing the area" for lockout means:

   [ ] Checking the hazards
   [ ] Doing something about the hazards
   [ ] Both the above

7. Once you know the principles of lockout, you should be able to lockout any machine.

   [ ] True
   [ ] False

8. Effectively locking out a machine fed by multiple energies often requires the use of more than one lock.

   [ ] True
   [ ] False

9. Herman, Arnold and Mary are working on a machine that has electrical and pneumatic energy. How many total locks are needed to do the job ?

   [ ] 2
   [ ] 3
   [ ] 6

10. Which of the following are acceptable electrical disconnects for LOTO?

    [ ] On-Off button
    [ ] Selector switch
    [ ] Toggle switch
    [ ] Manually operated disconnect / breaker
    [ ] All the above

11. Stored energy cannot always be locked out.

    [ ] True
    [ ] False

12. Mechanical motion must be:

    [ ] Controlled
    [ ] Dissipated
    [ ] Released

13. Safety blocks (for presses) are built to withstand the force of a cycling machine.

[ ] True
[ ] False

14. Stored energy could be present in:

[ ] batteries
[ ] capacitors
[ ] water lines
[ ] compressed springs
[ ] All the above

15. Your “LOCKOUT” lock can be used to lock your toolbox or locker; that way you know where to get it.

[ ] True
[ ] False

16. Prior to removing your locks/tags from the machine:

[ ] Check the machine to insure all tools/equipment are removed
[ ] Check the area for people
[ ] Notify personnel you are about to re-energize
[ ] All the above

17. Any maintenance personnel can remove your lock, if you forget to.

[ ] True
[ ] False

18. If the service and/or maintenance activity is only going to take a couple of minutes, you don’t have to lock/tag the energy sources out.

[ ] True
[ ] False

19. Describe the locks your facility uses for Lockout. _____

20. If there is already locks on the energy disconnects there is no need to add your lock.

[ ] True
[ ] False

21. Describe your shift change procedure. _____

22. List the reasons or excuses you have heard about why people don't lockout/tagout equipment/machines before they work on them.

_____

_____

23. Failing to control hazardous energy during service and maintenance is the #1 root cause of fatalities in UAW represented workplaces? True_____ False____