

R.A.A

11014
MAIN
Memorandum

DATE: 31 December 1986

FROM: Base Maintenance Officer

TO: All General Foremen and Foremen

SUBJ: STANDARD OPERATING PROCEDURES FOR REPAIRS TO ELECTRICALLY OPERATED EQUIPMENT

Encl: (1) Occupational Locking and Tagging Guide

1. It is requested that the enclosure be provided and receipted for by each individual mechanic, maintenance worker, or helper who works in occupations that are covered by the OSHA standards for locking and tagging requirements.

2. Training classes on locking and tagging procedures have been scheduled for 13 and 14 January 1987 at Base Safety at 0900. General Foremen will provide a list of employees to the Director, Maintenance and Repair Branch by 8 January 1987 of those affected employees who did not attend the training class of 21 October 1986. You are encouraged to utilize your standup safety meetings and quarterly safety meetings to stress the importance of compliance.

3. Provide lockouts, padlocks, tags, etc. to all personnel covered by the OSHA standard reference.

4. All Foremen, General Foremen and Director's will incorporate inspections of equipment during daily checks of jobs in progress to ensure employees are complying with OSHA locking and tagging standards.

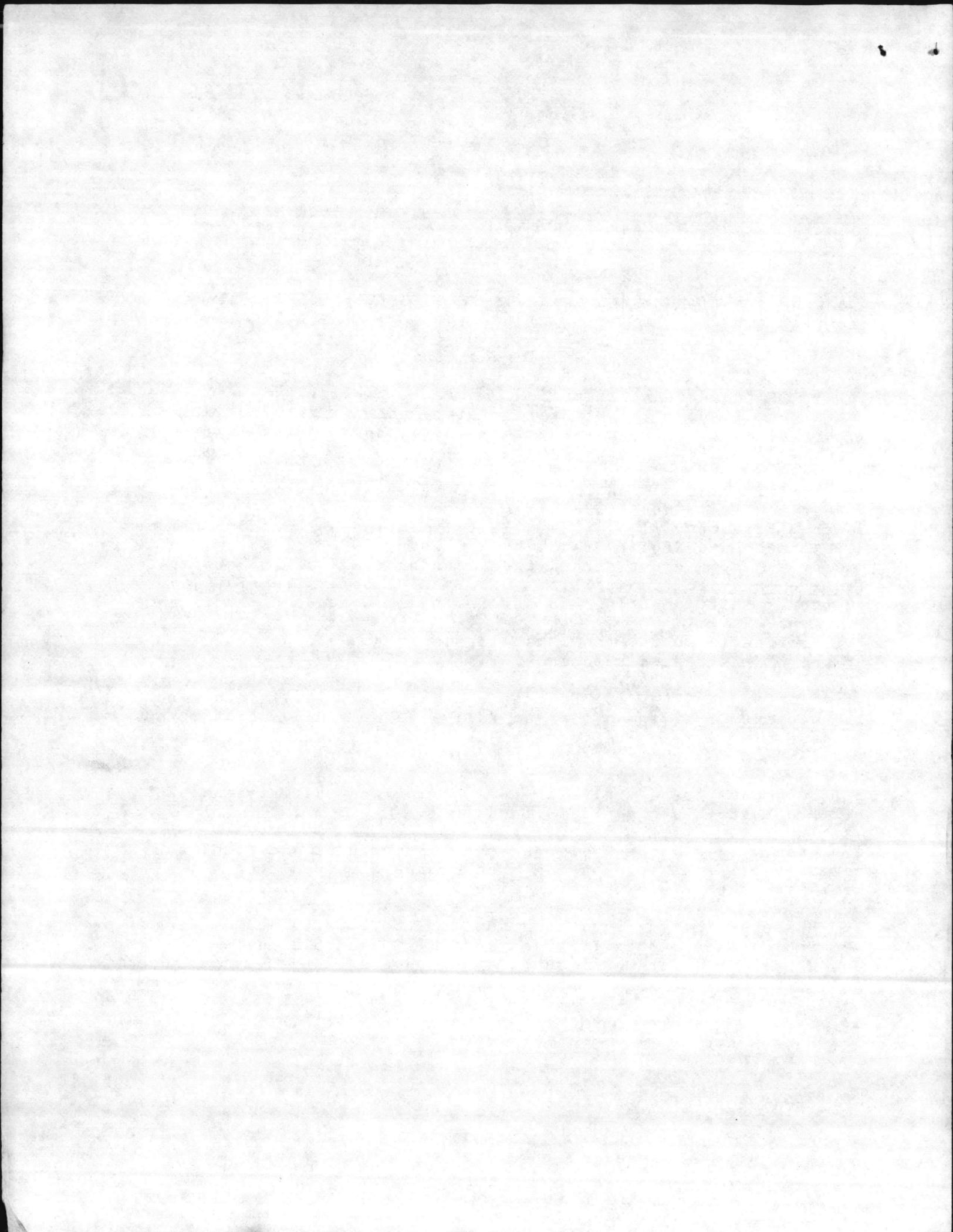
5. Personnel found violating the locking and tagging standards will be appropriately disciplined.

6. When main switches, disconnects, or circuits are found not having provisions for locking them in the open position, immediate repair and/or corrective action will be implemented.

7. Posters alerting shop personnel to the locking and tagging requirements have been provided and will be displayed in conspicuous locations in all shops which have personnel in these occupations.

8. Supervisors are to ensure that affected employees attend the training which is provided by the contractor or facility representative when new equipment is installed.

9. General Foremen will rewrite the performance standard relative to OSHA and safety compliance for foremen of occupations affected by the correct use of locking and tagging procedures to include this aspect of the supervisor's responsibility for safety.

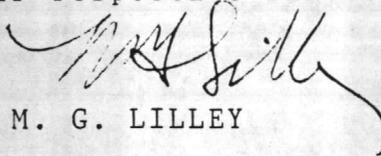


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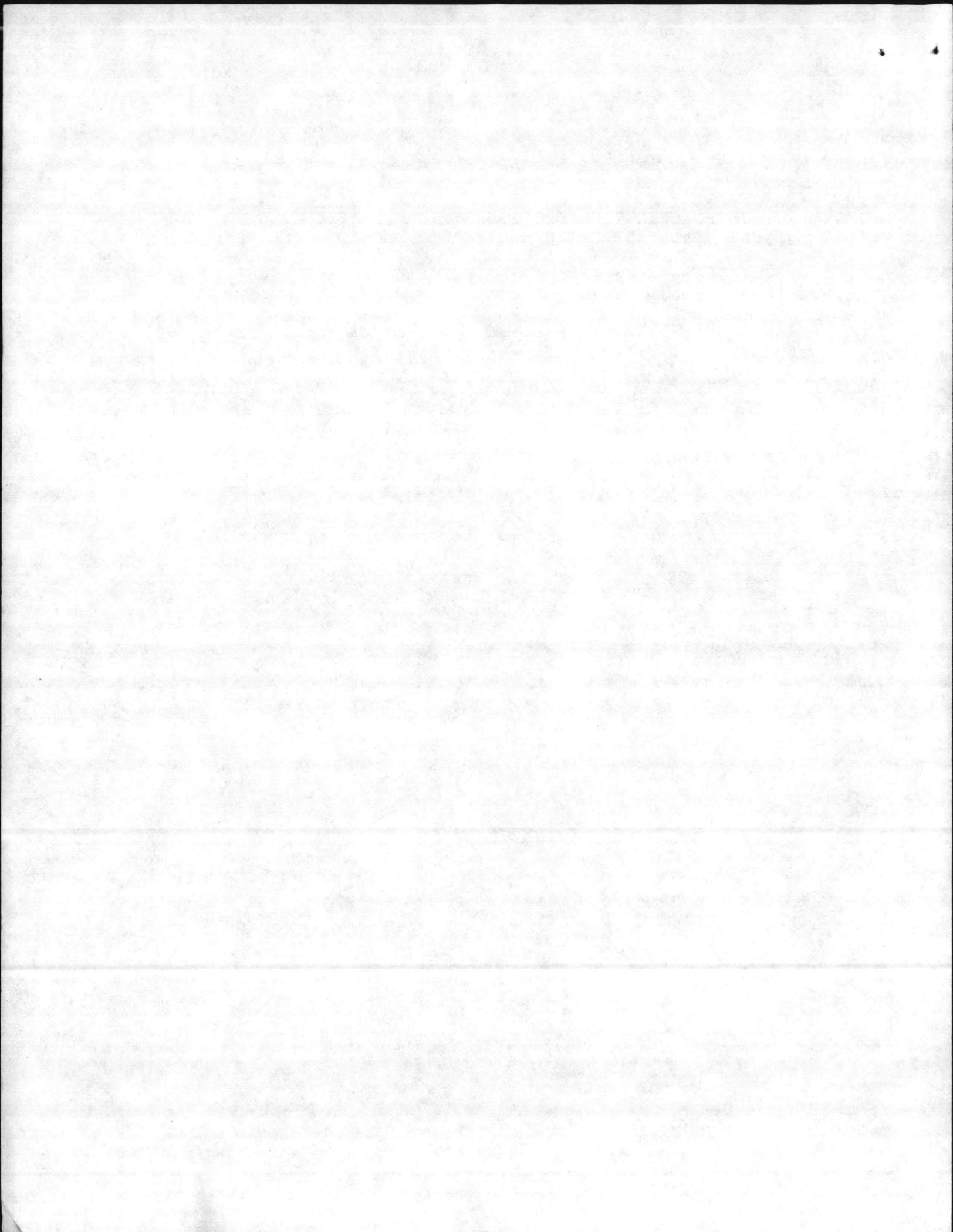
Subj: STANDARD OPERATING PROCEDURES FOR REPAIRS TO
ELECTRICALLY OPERATED EQUIPMENT

10. General Foremen are directed to ensure compliance of these instructions immediately.

11. General Foremen will provide a report of action taken no later than 30 January 1987 to their respective Director's.



M. G. LILLEY

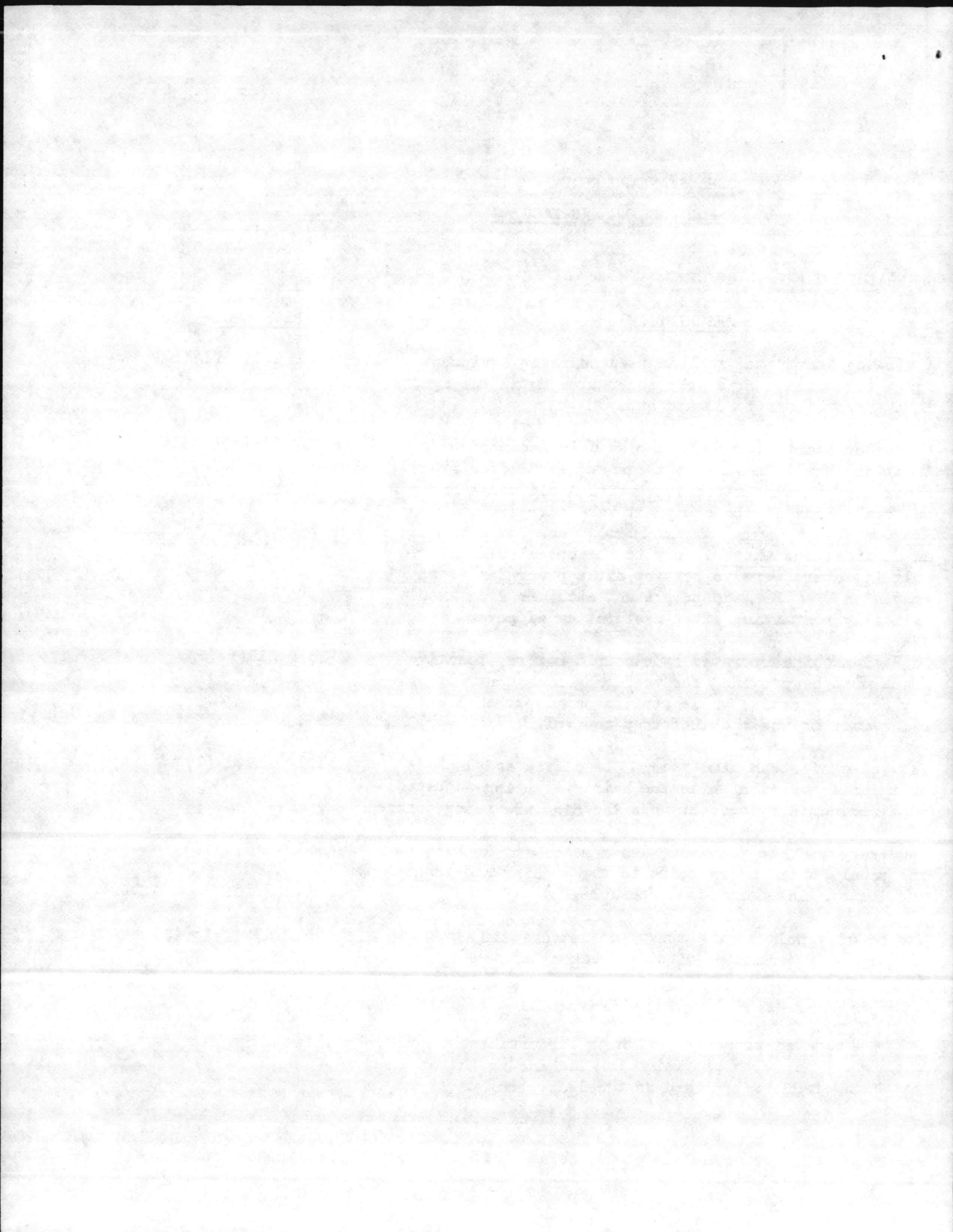


OSHA STANDARD REQUIREMENTS

FOR LOCKING AND TAGGING

GENERAL INDUSTRY - 29 CFR

<u>DESCRIPTION</u>	<u>STANDARD REFERENCE</u>
A "Do Not Start" tag shall be used on power equipment for a few moments or a very short time until the switch in the system can be locked out.	1910.145(f)(1)(i)
A "Do Not Start" tag shall be placed in a conspicuous location shall be in such a manner as to effectively block the starting mechanism, which would cause hazardous conditions if the equipment were energized.	1910.145(f)(3)(iii)
On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting after restoration of power.	1910.213(b)(3)
On each machine operated by electric motors, positive means must be provided for rendering such controls or devices inoperative while repairs or adjustments are being made to the machines they control.	1910.213(b)(5)
The valve of steam hammers shall be closed and locked in the off position while the hammer is being adjusted, repaired, or serviced, or when the dies are being changed.	1910.218(d)(2)
Upsetters shall be provided with a means for locking out the power at its entry point to the machine and rendering its cycling controls inoperable.	1910.218(h)(2)
The power supply to the runway conductors shall be controlled by a switch or circuit breaker located on a fixed structure, accessible from the floor, and arranged to be locked in the open position.	1910.179(g)(5)(i)
On cab-operated cranes a switch or circuit breaker of the enclosed type, with provision for locking in the open position, shall be provided in the leads from the runway conductors.	1910.179(g)(5)(ii)



STANDARD
REFERENCE

DESCRIPTION

On floor-operated cranes, a switch or circuit breaker of the enclosed type, with provision for locking in the open position, shall be provided in the leads from the runway conductors.

1910.179(g)(5)(iii)

The main or emergency switch shall be locked in the open position, if an electric hoist is used.

1910.181(f)(2)(i)(c)

Before any maintenance, inspection, cleaning, adjustment, or servicing of equipment (electrical, mechanical, or other) that requires entrance into or close contact with the machinery or equipment, the main power disconnect, switch or valve, or both, controlling its source of power or flow of material, shall be locked out or blocked off with padlock, blank flange, or similar device.

1910.261(b)(4)

On operations where injury to the operator might result if motors were to restart after power failures, provisions shall be made to prevent machines from automatically restarting after restoration of power.

1910.262(c)(1)

Main shut off valves must be locked in the closed position when men shall enter the oven or when the oven is not in service.

1910.263(1)(3)(iii)(b)

The main switch or circuit breaker shall have provisions for locking it in the open position if any work on the electrical equipment or inside the oven must be performed.

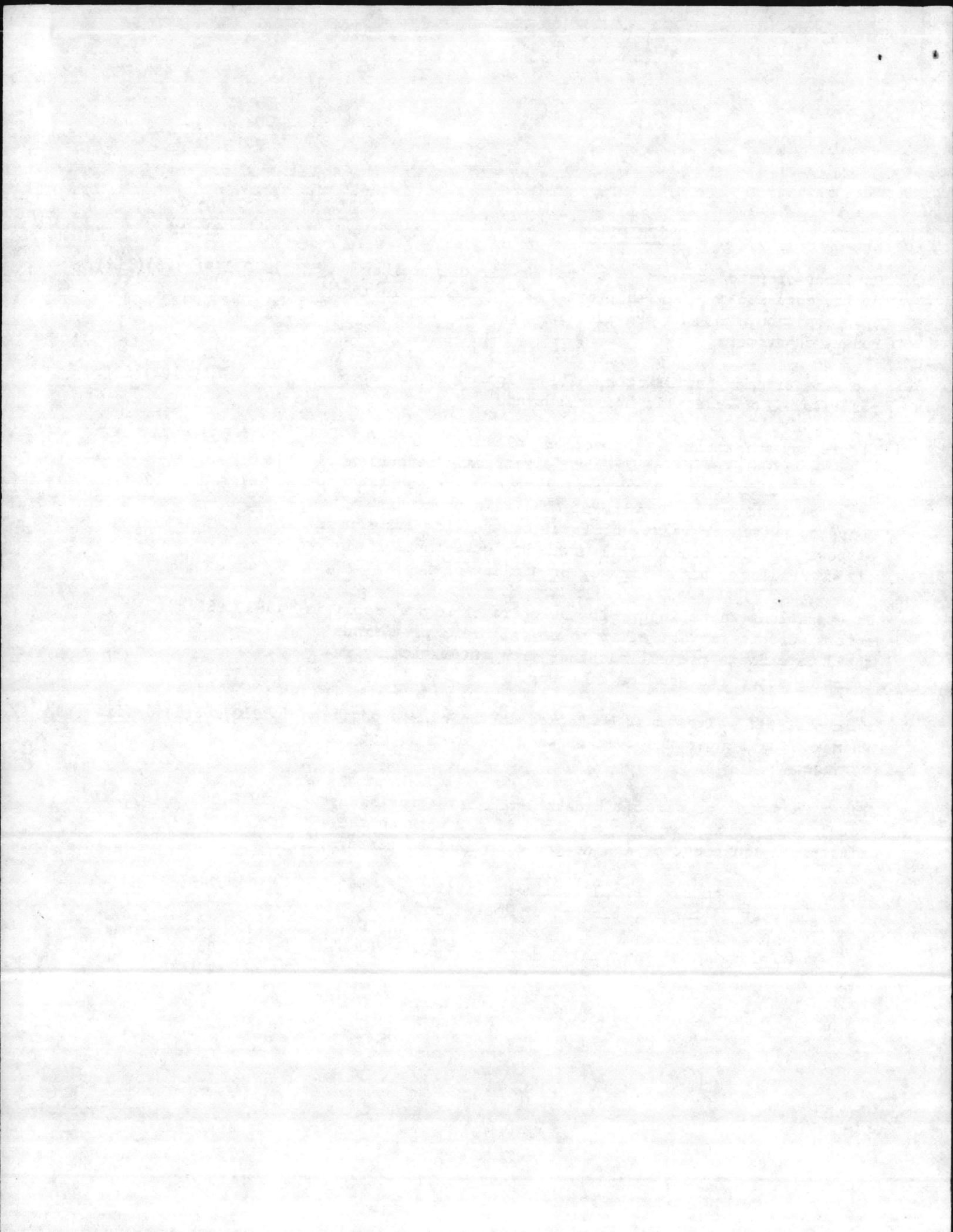
1910.263(1)(8)(iii)

Before working on electrical equipment, switches shall be open and must be tagged, blocked or locked out.

1910.265(c)(12)(v)

Main control switches must be so designed that they can be locked in the open position.

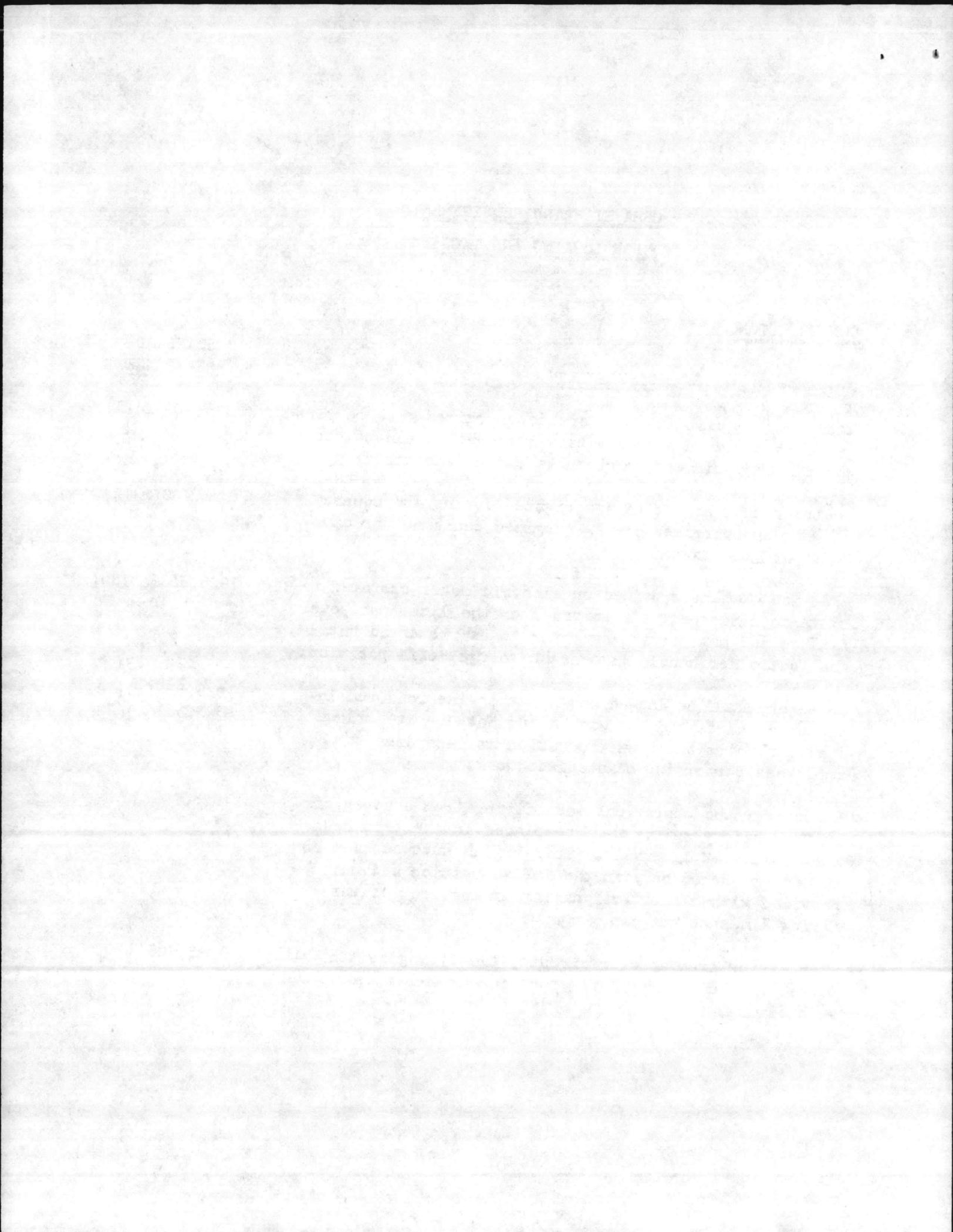
1910.265(c)(26)(v)



OSHA STANDARD REQUIREMENTS
FOR LOCKING AND TAGGING

CONSTRUCTION

<u>DESCRIPTION</u>	<u>STANDARD REFERENCE</u>
Equipment or circuits that are de-energized shall be rendered inoperative and have tags attached at all points where such equipment or circuits can be energized.	1926.400(g)(1)
Controls that are to be deactivated during the course of work on energized or de-energized equipment or circuits shall be tagged.	1926.400(g)(2)
A device shall be provided on electric motor operated hoists to disconnect all motors from the line upon power failure and not permit any motor to be restarted until the controller handle is brought to the "off" position.	1926.553(a)(3)(i)
Conveyors shall be locked out or otherwise rendered inoperable and tagged out with a "Do Not Operate" tag during repairs and when operation is hazardous to employees performing maintenance work.	1926.55 (a)(7) 1926.555(a)(7)
In underground operations when firing from a power circuit, a safety switch shall be placed in the permanent firing line at intervals. This switch must be made so it can be locked only in the "off" position and must be provided with a short-circuiting arrangement of the firing lines to the cap circuit.	1926.906(j)
When firing from a power circuit, the firing switch shall be locked in the open or "off" position at all times, except when firing.	1926.906(l)



GENERAL DUTY CLAUSE

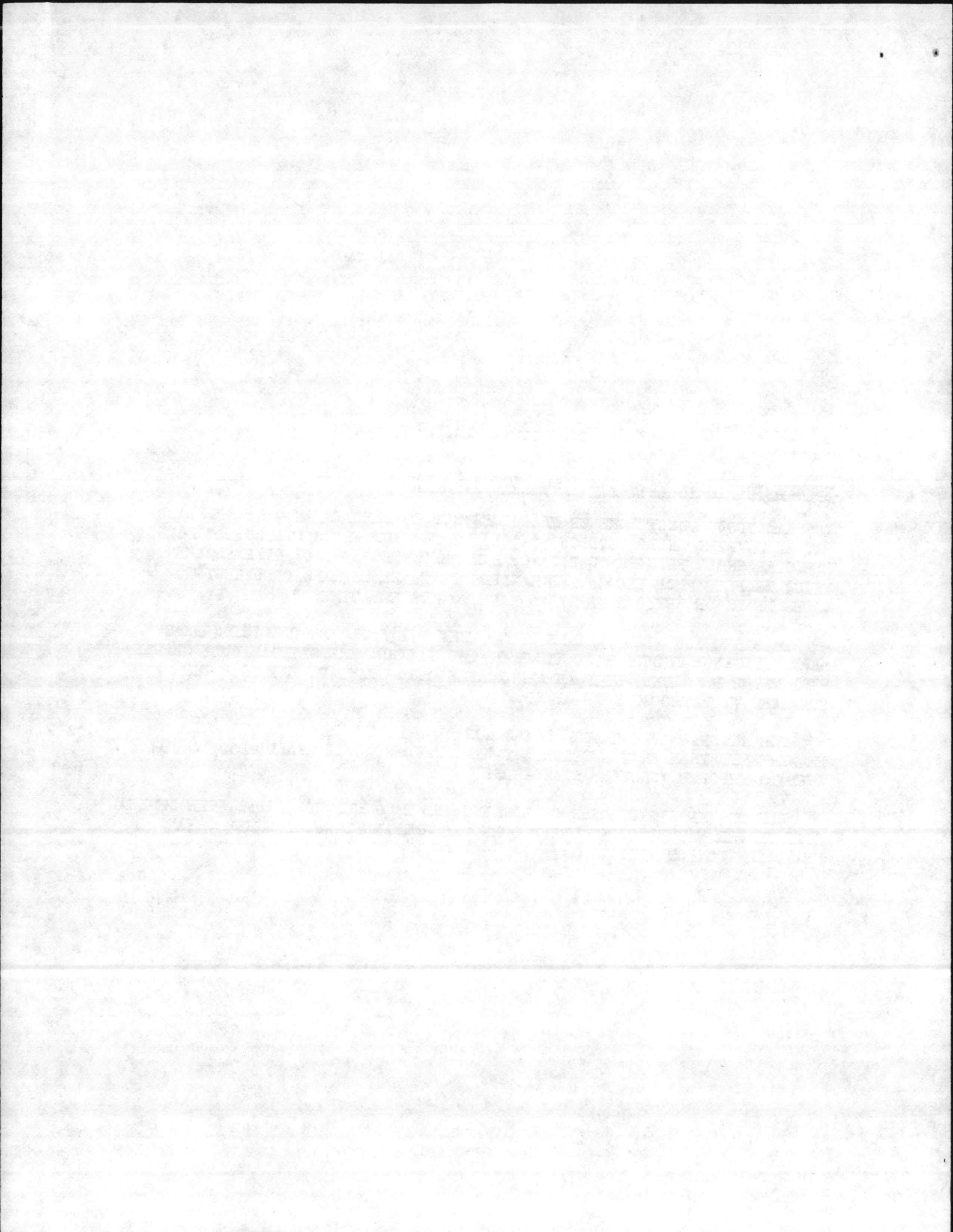
REFERENCE: OSHA PL 91-596, SECTION 5(a)(1)

HAZARDOUS CONDITIONS OR PRACTICES NOT COVERED IN AN OSHA STANDARD MAY BE COVERED UNDER SECTION 5(a)(1) OF THE ACT WHICH STATES: " EACH EMPLOYER SHALL FURNISH TO EACH OF HIS EMPLOYEES A PLACE OF EMPLOYMENT WHICH IS FREE FROM RECOGNIZED HAZARDS THAT ARE CAUSING OR LIKELY TO CAUSE DEATH OR SERIOUS PHYSICAL HARM TO HIS EMPLOYEES."

THIS SECTION WILL ONLY BE CITED WHEN THE EMPLOYER UTILIZING REASONABLE DILIGENCE SHOULD HAVE KNOWN OF THE HAZARD. THE GENERAL DUTY CLAUSE WILL NEVER BE CITED WHERE AN APPLICABLE OSHA STANDARD EXISTS. THE STANDARD VIOLATED WILL BE CITED.

THE GENERAL DUTY CLAUSE SHALL NOT BE USED TO IMPOSE A STRICTER REQUIREMENT THAN THAT REQUIRED BY THE STANDARD. IT SHALL ALSO NOT BE USED TO ENFORCE "SHOULD" STANDARDS.

DUE TO THE SERIOUSNESS OF LOCKING AND TAGGING VIOLATIONS, THE GENERAL DUTY CLAUSE MAY BE CITED UNDER SOME CIRCUMSTANCES WHERE OTHER OSHA STANDARDS DO NOT APPLY.



INTRODUCTION

THE PROBLEM

Companies with effective accident prevention programs have learned that they owe a large portion of their success to good locking and tagging procedures. The need for locking and tagging was learned in most cases through bad experience. Failure to lockout and tag often results in serious employee injuries or fatalities.

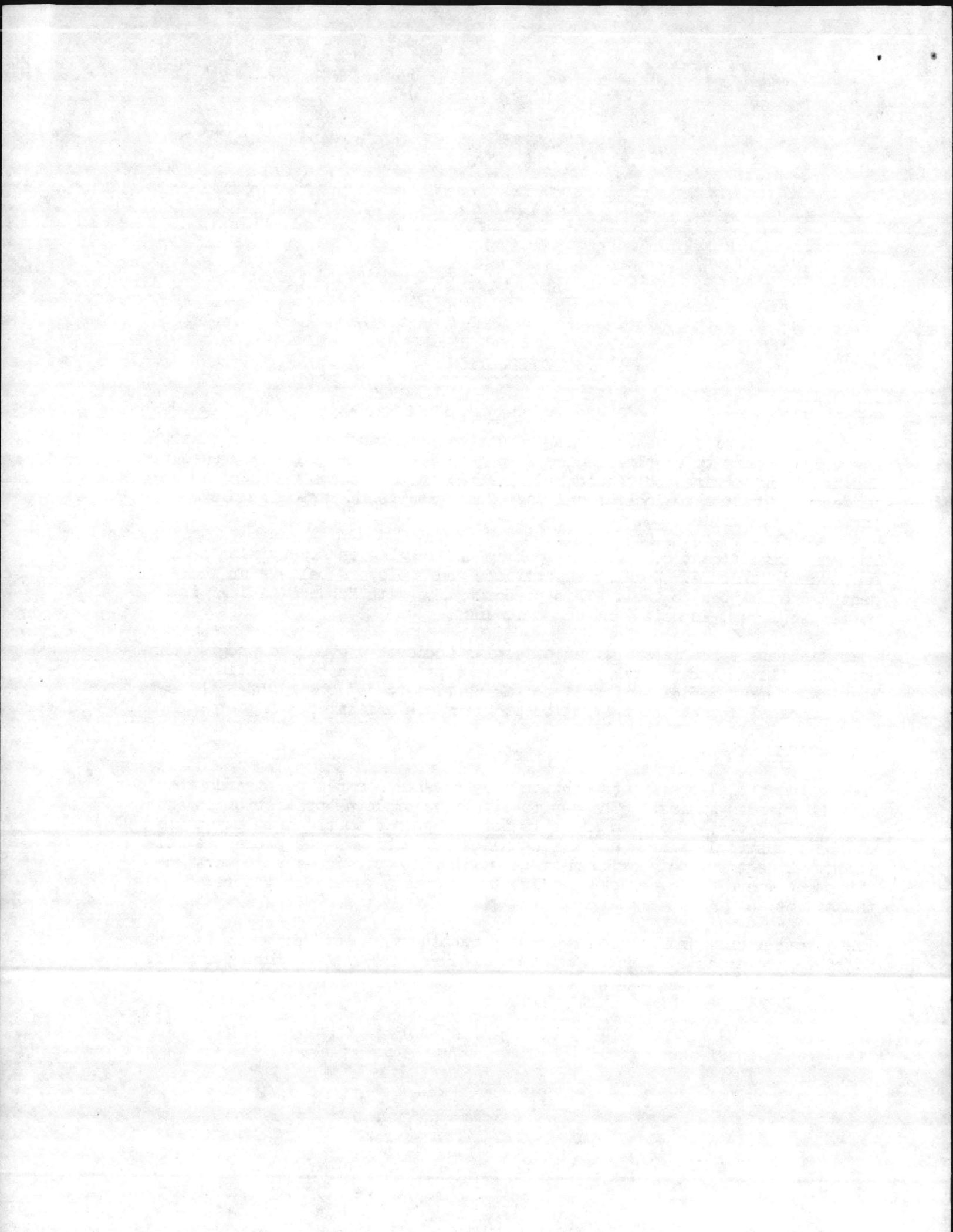
The most significant obstacle to locking and tagging is supervision's and employees' attitude. Usually supervisors and employees believe an accident cannot happen to them. This preoccupation with "chance taking" is costly in lives, injuries and economic loss.

Once management realizes that an effective accident prevention program cannot be built on "chance taking" and luck, a program can be established. When management dedicates itself to taking time to do jobs right - the safe way, successful accident prevention programs are initiated.

THE HAZARDS

Modern industrial operations contain many potential employee hazards that must be guarded against. The key to effective employee protection is education. However, education alone is not enough due to the complex nature of the industrial hazards and the complicated machinery and processes utilized. Effective engineering must be utilized to provide a safe work environment where employees can utilize their safety education to protect themselves.

Since most industrial accidents involve machinery, an effective locking and tagging program to eliminate employee exposure to moving machine parts will significantly reduce accidents.



SUGGESTED
LOCKING AND TAGGING PLAN

OBJECTIVE

The specific purpose of locking and tagging is to prevent employee exposure to the danger of

- Moving Equipment
- Electrical Shock
- Hazardous and Toxic Materials

Type of Exposure

Employees are exposed to moving equipment, electrical shock, and hazardous materials while performing many and varied operations. Locking and tagging must be used to protect employees against each exposure.

Maintenance: Frequently employees are exposed to hazards while performing equipment maintenance, lubrication, and repairs. Each mechanic and electrician must be properly instructed and equipped to deactivate, lock and tag equipment prior to exposing themselves to hazards. Due to the nature of maintenance operations employees are often exposed to the danger of moving equipment or the release of hazardous material.

Electrical: The complicated and technical nature of electrical installations and the diversity of electrical circuits makes an electrical repairman's job hazardous. A very slight mistake by an electrician could mean his life. Effective electrical circuit lockouts and tagging is vital to proper protection for electrical repairmen.

Operating Personnel: Often employers fail to include their operating or manufacturing employees in their locking and tagging procedures. Many operating personnel are routinely exposed to hazards while operating, adjusting, cleaning, and trouble-shooting equipment.

When an operator places his hands, head or any part of his body in a position where he could be caught by moving equipment, if the equipment would operate, locking and tagging is required.

In some cases the maintenance mechanic or electrician would be required to lockout and tag in the same situation where the operator is not. This is obviously an improper procedure where the operating personnel are not provided the same protection as other employees.

Construction: Hazards requiring locking and tagging exist in construction operations as they do in other situations. Construction machinery such as conveyors, elevators, piping systems, as well as tank and vessel entry require locking and tagging.

Construction employees must often "run-in" new machinery and equipment prior to releasing it to the operating group. During such "run ins" employees may be exposed.

ENGINEERING

Every effort must be made by employers to eliminate as much employee exposure as practical. Employee exposure that cannot be eliminated by engineering means must be eliminated by locking and tagging. No employee exposure can be justified if injuries, illnesses or fatalities may result.

Equipment Design

The most practical and economic way to eliminate employee exposure is through effective machinery and process design. Design engineers must include feasible protective measures in their design. Where locking and tagging procedures must be utilized, the design engineer must provide effective, practical means for lockouts.

Guards: Proper use of machine guards will eliminate the need for most locking and tagging. Guards specified by the OSHA standards will achieve this goal. Effective guards are those that prevent employee exposure. When the exposure cannot be guarded against, locking and tagging must be followed.

Electrical Disconnects: The one device most frequently utilized in locking and tagging is the electrical disconnect switch. Proper installation of disconnect switches will provide effective, practical means for locking out.

Mechanical Stops: In some instances electrical switches and guards are not provided to protect employees. In such cases employers must insure that employees are protected by utilizing mechanical stops such as blind flanges, valves, safety bars, chains, etc.

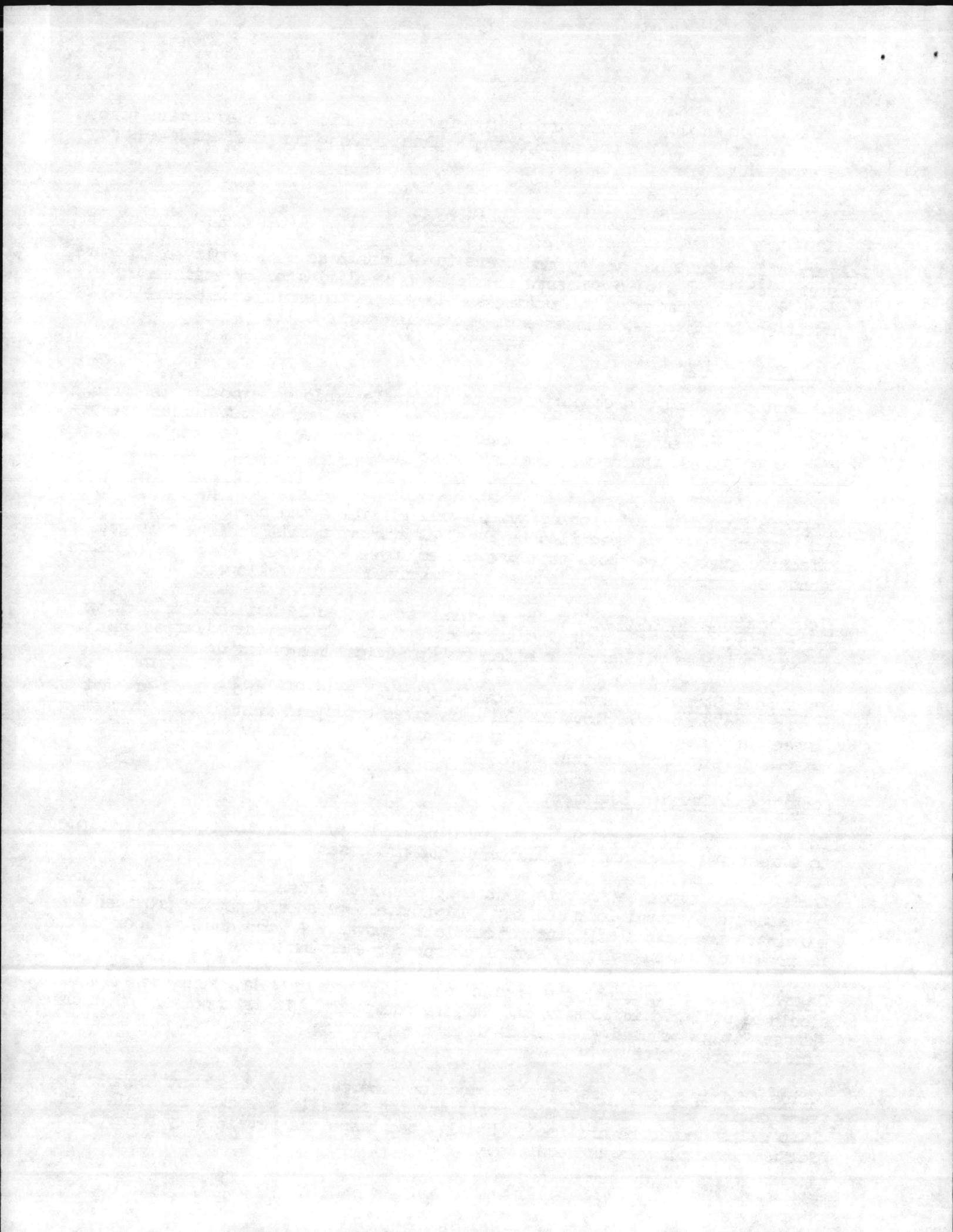
Locking and Tagging Equipment

The employer is responsible for providing employees with the required equipment to effectively lock and tag equipment and processes.

Locks: Each employee that is routinely required to use locks and tags should be issued a personal lock and key. Duplicate keys should not be provided to eliminate the chance of unauthorized lock removal. A good quality lock should be provided with an assigned serial number for each employee.

Tags: "Danger" accident prevention tags described in OSHA Standards 1910.145 should be utilized in locking and tagging equipment. It is important that only "danger" tags be used with locks to insure personnel recognition and effective accident prevention.

Clips (Multiple Lock Hasps): On occasion numerous employees must lockout the same device. To permit enough positions for installing locks, multiple lock hasp clips should be utilized. Usually the hasps are retained by supervision for use by employees as required.



Chains: Lockout of piping systems and valves requires special equipment such as chains. The chains can be wrapped around valve handles and locked to prevent inadvertent movement. Chains should be pre-cut and stored by supervision for use by employees.

Lockout Boxes: When large numbers of locks are required to protect employees, supervision may install the required locks and place the key(s) in a special lockout box. This box has numerous lockout positions for locking the key (s) in the box. Supervision cannot unlock the locks until each employee removes his personal lock from the lockout box.

EDUCATION

Employees and supervision must be properly educated to recognize locking and tagging situations. Safety rules and procedures concerning locking and tagging should be reviewed with new employees and routinely reviewed with old employees.

New Employees

The need for and importance of locking and tagging must be reviewed with all new employees during their initial orientation period. Disciplinary procedures concerning failure to lockout and tag must be thoroughly covered. Situations requiring locking and tagging must be described to new employees so they can recognize potential hazards.

Supervision

Supervision holds the key to maintaining an effective locking and tagging program. They must insure the employees know, understand and follow lockout procedures. Alert supervision can detect and eliminate unsafe practices before they cause accidents and injuries.

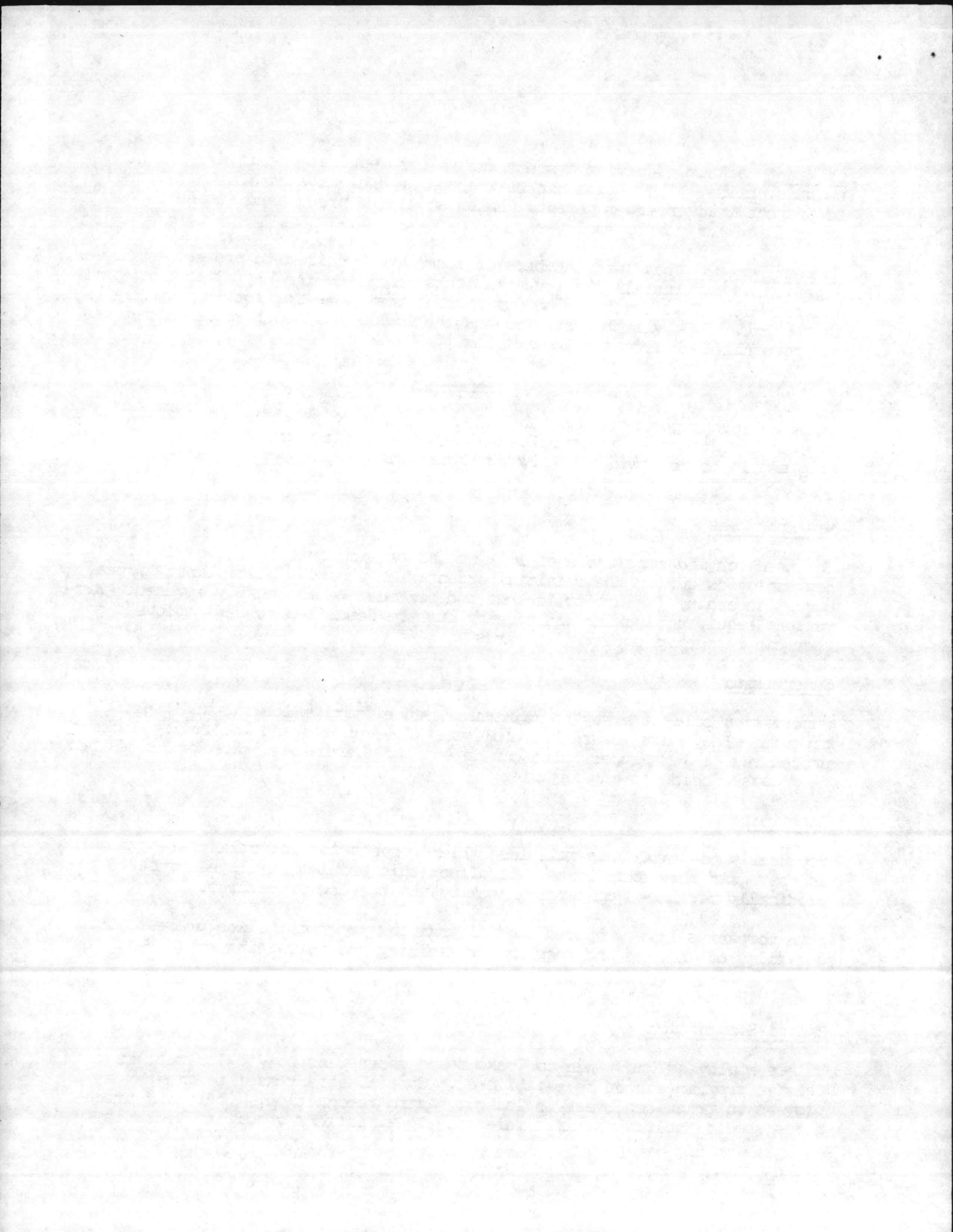
Retraining

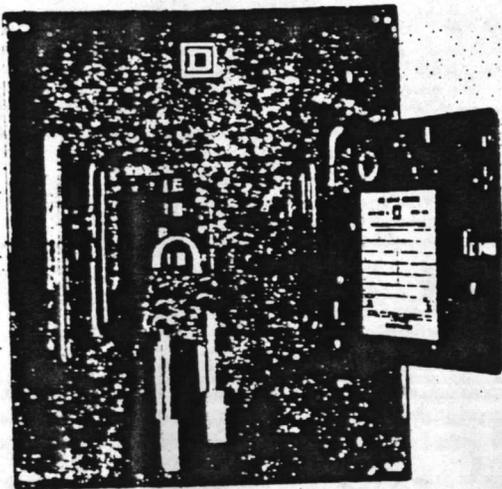
Frequently new employees will lose their respect for potential safety hazards as they gain more experience. To offset this problem, employees must be periodically retrained concerning locking and tagging procedures.

Some companies have prepared special training programs, slide presentations and films on locking and tagging for training and retraining employees.

Hazard Recognition

Unless employees know when to lockout and understand how to lockout, an effective program cannot be established. Special effort must be made by employers to train employees in lockout hazard recognition. Operating procedures should include specific reference to situations requiring lockouts.





LOCKING AND TAGGING PROCEDURE

Written procedures must be provided to insure employer knowledge and understanding. Education and enforcement would be very difficult without written procedures.

Preparation

All employee lockouts must be authorized by supervision or specified in operating procedures. This is necessary to insure proper lockouts for effectively protecting employees.

Supervision: Supervision of the group responsible for operating machinery and processes must authorize lockouts. Since the operating group is most familiar with hazards, they should insure effective deactivation and lockout.

Supervision of the exposed employees must insure proper lockout protection. They must confer with the operating group where applicable to insure that effective control measures are utilized.

Equipment

Employees must be provided and utilize proper lockout equipment including locks, tags, chains, etc. When numerous locks are required, supervisors should provide them. Lockout equipment should be kept near the area where it may be used. Having to search for locks and tags when needed will discourage their use.

Equipment Shutdown

The operating groups are responsible for insuring that equipment is properly deactivated and made ready for maintenance, cleanup, overhaul etc. They must insure that the proper electrical disconnect switches, valves, blank flanges, etc. are utilized to insure isolation. Also, the operating group must insure that toxic and hazardous materials are removed or isolated to prevent employee exposure.

All switches and valves operating machinery must be initially shutdown and locked by the operating group. This will eliminate premature shutdown or startup.

Locking and Tagging

Proper employee protection requires that all power sources and potential exposure from hazardous material be locked out. In some cases the potential hazard may be difficult to identify.

Power Sources

Some sources of power that must be protected against are:

- Electrical Circuits
- Hydraulic Systems
- Pneumatic Systems
- Gravity Systems

Lockout of power sources can be complicated due to the complex nature of modern equipment and processes. In some cases electrical circuits may be fed from more than one source. Primary and secondary circuits are often present.

Equipment having electrical, hydraulic and pneumatic sources of power require detailed lockout procedures to insure all hazards are eliminated.

To aid in identification of lockout equipment that feed from more than one electrical circuit, each circuit should be labelled.

Isolation

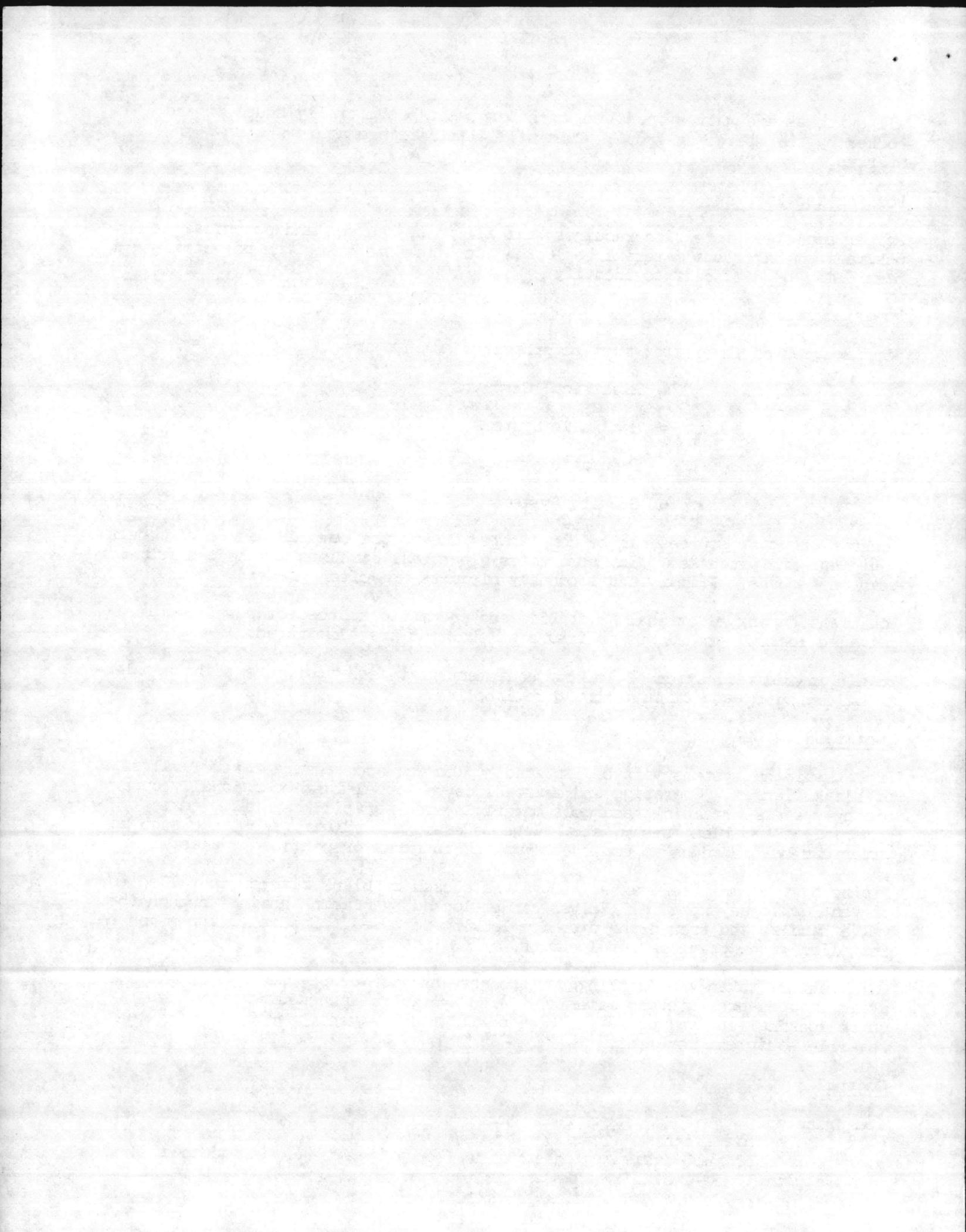
Process piping systems must be isolated by locking and tagging control valves or blank flanges. Operating and maintenance personnel must occasionally open piping systems containing hazardous materials such as acid, caustic, toxic material, flammables, steam, etc. In some cases an ordinary substance such as water can be hazardous to employees working in tanks or confined spaces.

Piping systems must be drained and valves closed or blank flanges installed to prevent employee exposure. Valves can be locked by placing chains through the valve handles and around the pipe for locking purposes. Special flanges can be installed with positions for lockouts.

Care must be taken when locking out process, hydraulic and pneumatic systems to avoid trapped pressure and material. Also hydraulic and pneumatic systems require locking vent valves in the open position to prevent pressure buildup and possible equipment movement.

Control

The principal control of locking and tagging procedures is supervision. They must insure that locks are installed properly by all exposed employees. Operating personnel must assist in identifying lockout positions. Disconnect switches should be installed as near the equipment they operate as possible and not on different levels or in other rooms.



* Testing

Effective lockout requires that controls be tested to insure they are installed properly. This is necessary to eliminate potential problems from locking out the wrong electrical switch or valve.

Start Switches

Electrical start switches operating the equipment being worked on must be activated to insure the power has been locked out. In some cases electrical disconnect switches fail and remain energized although the handle is in the off position and locked out. Also control switches could be labelled incorrectly.

Care must be taken when testing electrical systems to insure all limit switches and interlocks are closed. Open limit switches will nullify the test since energized equipment may not start due to the open limit switches.

Resetting

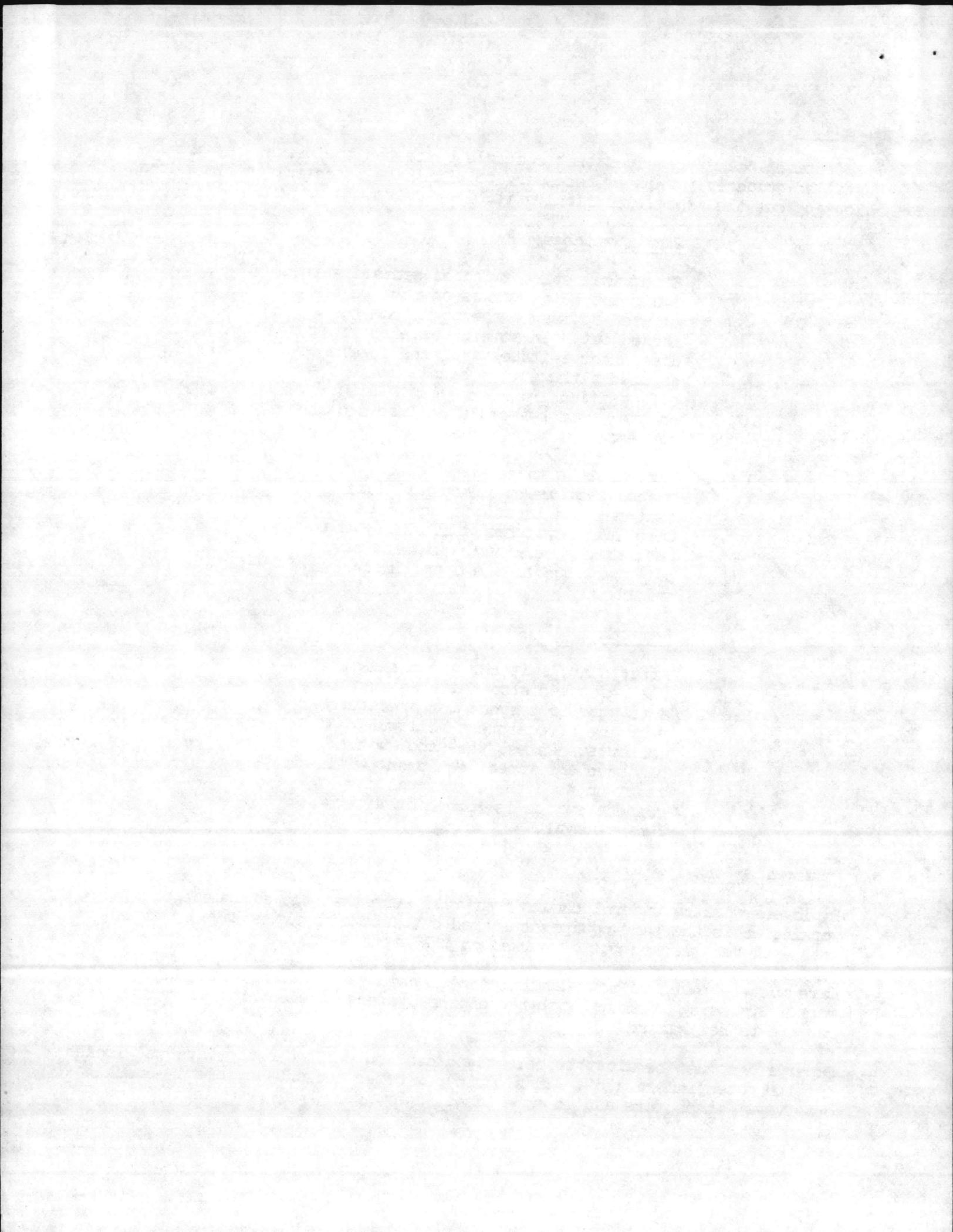
After start switches are activated the reset and stop switches must be activated to prevent the premature starting of equipment following lockouts. Unless the stop switch has been activated, equipment will start up when the electrical disconnect switch is turned on after lock removal.

* Performing Work

Employees working under lockouts must make sure that the equipment they are working on is the same equipment locked out.. Some injuries have occurred when employees locked out or worked on the wrong system.

Care must be taken to not eliminate the lockout protection during repair work. Bypassing lockouts with new piping systems or electrical circuits can create new hazards.

Supervisors must be alert to detect and caution employees who have not locked out the potential hazards. Such employees often include engineers, casual observers, inspectors and in some cases supervisors.



Lock and Tag Removal

Prior to removing locks and tags employees and supervision must verify that the equipment or system locked out is safe to operate. Some companies utilize check sheets listing the lockout positions and required checks prior to reactivating equipment. Supervision has the primary responsibility for final lock removal.

Some items that should be checked are:

- Guards: All guards must be installed.
- Electrical Systems: All exposed electrical wiring must be covered.
- Piping Systems: All open pipes must be closed and properly connected.

Equipment Operation

The responsibility for initial operation of machinery, equipment and process systems belongs to the operating group. Maintenance personnel should not start-up equipment.

Confirmation

Supervision must insure that systems and equipment are safe to operate prior to removal of lock and tags. Confirmation must usually be made by on-site inspections.

Exposure

Checks must be made to insure that no employees are exposed prior to operating equipment.

Operation

The operating group starts the equipment following all checks to confirm that it is safe to operate.

SPECIAL PROCEDURES

Special locking and tagging procedures may be required to effectively protect employees in some situations.

Unusual Jobs

The locking and tagging procedures previously described in this guide cover individual employee protection. In some cases large complicated jobs involving numerous employees are encountered. These jobs require special procedures.

Overhauls and Shutdowns.

Large overhauls and process shutdowns often involve many crafts and employees. In some cases from fifty to one-hundred locks and tags may be required.

To avoid each employee having to lockout each position, a supervisory lockout system is utilized. A supervisory representative of each group involved will witness the lockout by the operating group. A check sheet will be used.

Following the system lockout, the keys will be placed in a lockout box.

Lockout Box

Lockout Boxes are used to place keys to large scale lockouts in them for effective control. The box has numerous lockout positions on the lid to prevent the keys from being removed while employees are exposed. Each employee places his personal lock and tag on the lockout box, thus controlling the key(s) to many locks.

Fuse Boxes

Some electrical systems can be effectively isolated by pulling fuses and locking and tagging the cover to the fuse box. Routine use of fuse boxes for lockout should necessitate installation of lockout hasps on the fuse box covers.

Retaining Pins

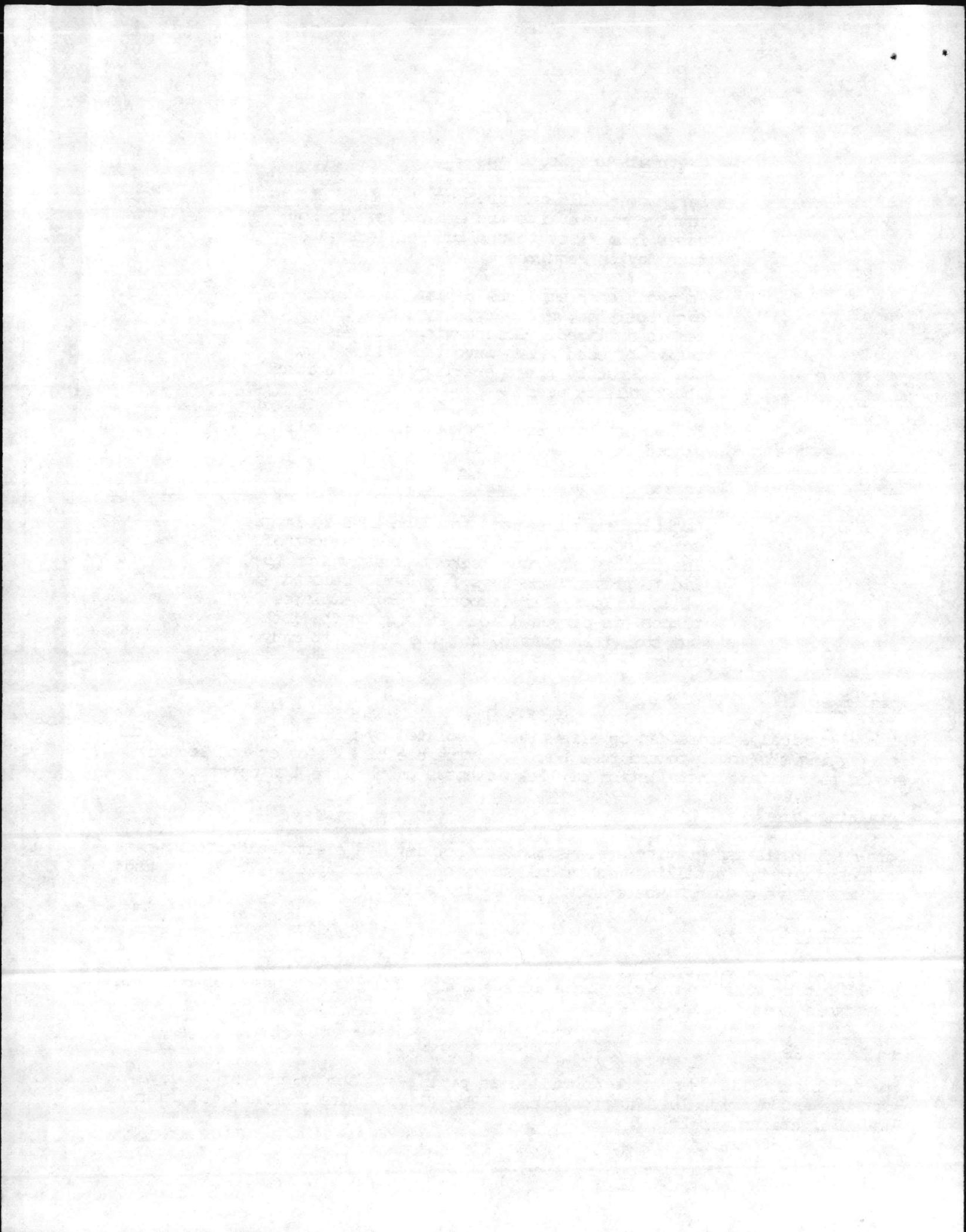
Some mechanical and gravity systems that do not involve electrical circuits must be locked out by installing mechanical stops or retaining pins. The stops and pins must have openings where locks can be installed.

Electrical Plugs

Electrical equipment operated with extension cords and electrical plugs can be locked out by placing the plug in a lock adapter so it cannot be plugged in a receptacle when locked.

Pipe Flanges

Special blank flanges must be installed in piping systems to prevent employee exposure and provide lockout provisions. The flanges have openings for installation of chains, locks and tags.



Keys and Wrenches

Some control systems are difficult to lockout due to lack of features for locking. Small "pet cock" type valves are most difficult to lock. In some cases valve handles or key wrenches can be removed and locked. Special covers or adaptors can be placed over controls for lockouts.

BASIC LOCKING AND TAGGING SAFETY RULES

MANAGEMENT RESPONSIBILITY

- Effective facilities for locking and tagging power sources and process systems must be provided to protect exposed employees from possible injury.
- Employees shall be provided with personal locks and tags for their use in protecting themselves.
- All employees shall be properly trained to insure they know, understand and follow locking and tagging safety rules and procedures.
- Supervisors shall recognize their responsibility to enforce all locking and tagging safety rules and procedures.

EMPLOYEE RESPONSIBILITY

- Each employee shall know, understand and follow established locking and tagging safety rules and procedures.
- Each employee shall insure that he does not expose his fellow employees to the dangers of moving machinery or process systems.

