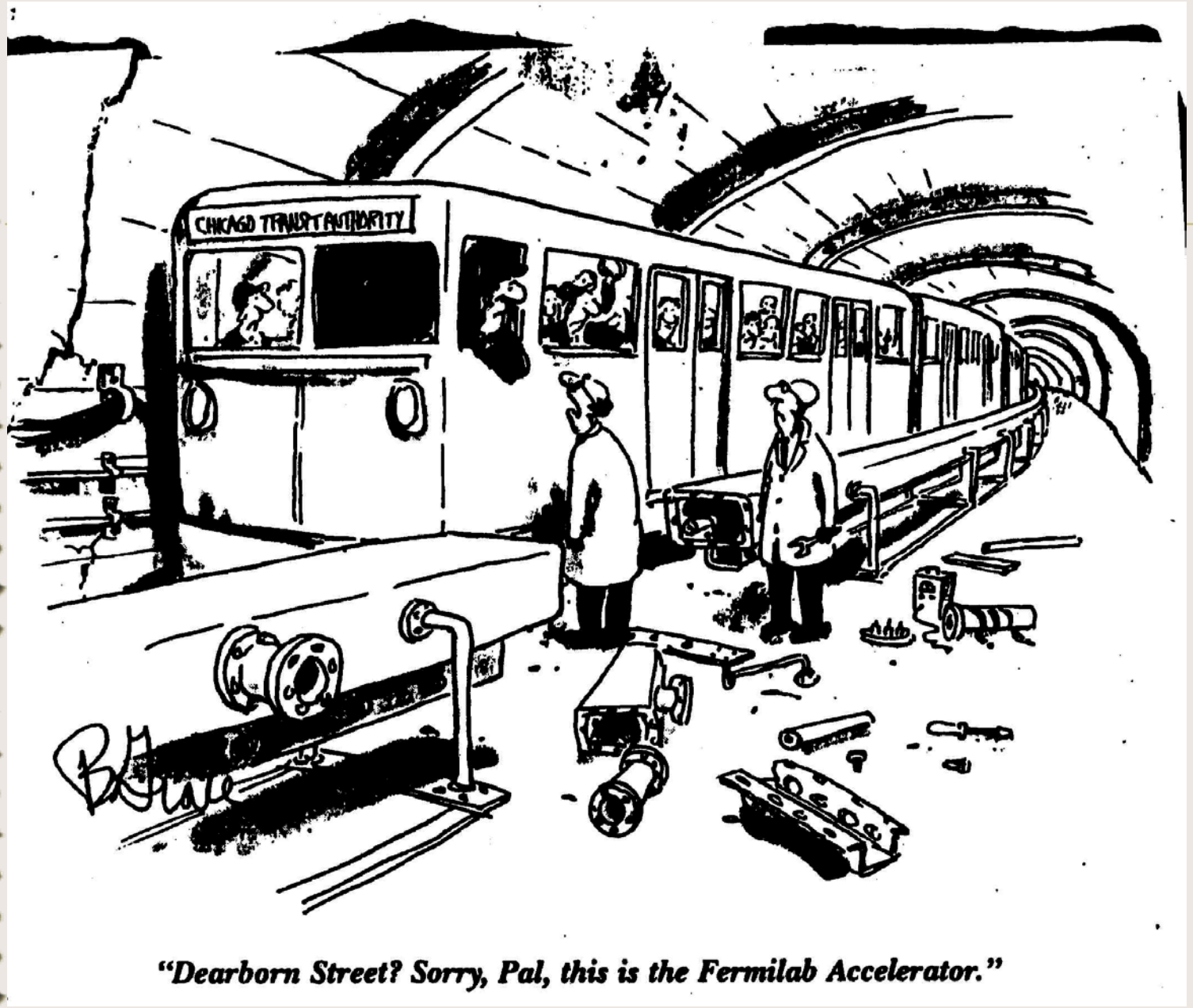



*"Dearborn Street? Sorry, Pal, this is the Fermilab Accelerator."*

# LOTO 2 Course

# Administrative Notes

- Emergency Exits
- Restrooms
- Cell Phones

- Pagers

- Attendance Sheet
- Length of class

# LOCKOUT/TAGOUT Level 2

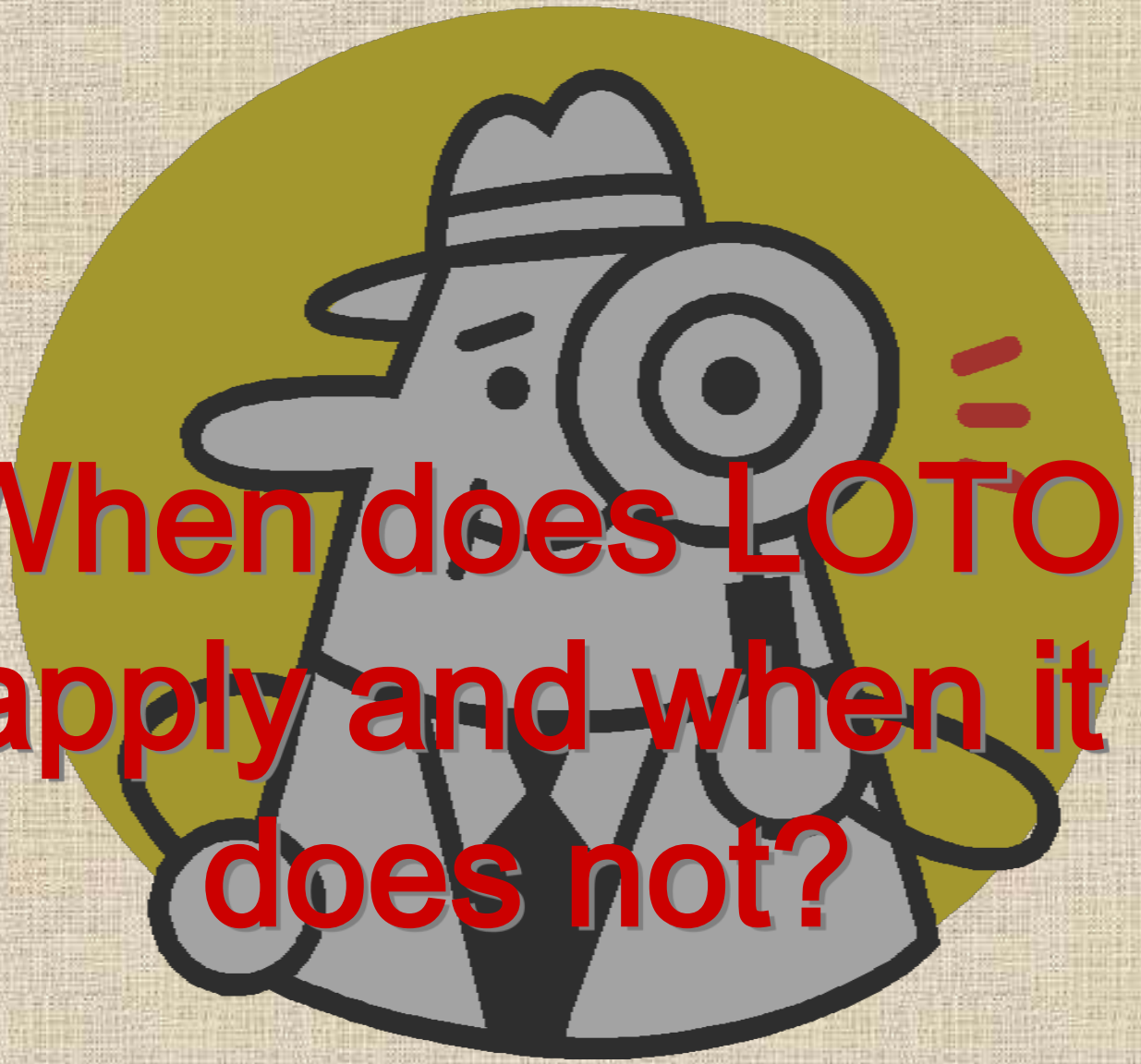
Course # FN000212

# Objectives

- State the Definition of a Lockout/Tagout
- Recognize Locks & Tags Used at Fermilab
- Recognize LOTO Activities
- State Consequences of Unauthorized Removal of Locks & Tags
- Recognize Hazardous Energy Sources
- Steps for Energy Isolation & Control

# Objectives

- State limitations of Tagout Devices
- Understand Differences Between Type A & Type B Group Locks
- Recognize When A Written LOTO Procedure is Required
- State LOTO Requirements During Shift Change
- Understand Requirements for Subcontractors



# When does LOTO apply and when it does not?

# LOTO Program Applies To

- Control of Hazardous Energy Sources During Service & Maintenance of Equipment
- Activities Near Hazardous Energy with the Potential for Injury if Energy is Released.
- Servicing or Maintenance when Guards and Other Protection is Bypassed
  - Plus potential for injury

# LOTO Does Not Apply To

- Work on Cord & Plug Connected Equipment
- Minor Tool Changes and Adjustment during Normal Operations
- Access to accelerator or beamline enclosures under controlled or supervised access conditions.
- Work On or Near Exposed Energized Equipment that Involves Inspection or Testing Covered under FESHM 5042 and 5041

# LOTO Does Not Apply To

- Installations Under the Control of Electric Utilities
- Hot Tap Operations Involving Utility Company Transmission and Distribution Systems
- If De-energizing Introduces Additional or Increased Hazards or is Infeasible Due to Design


Definitions

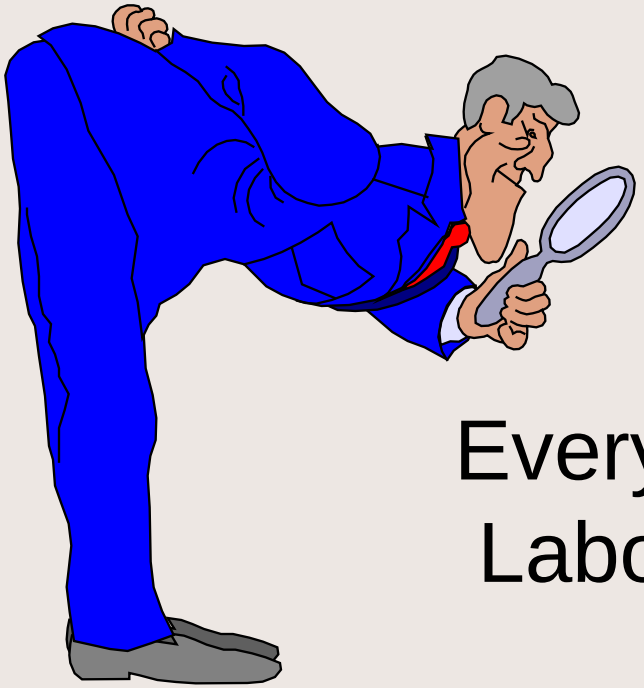
# Lockout/Tagout

- The Placement of a Lockout and/or Tagout Device on an Energy Isolating Device
  - In accordance with procedures
  - Ensures equipment cannot be operated until lockout device is removed

# Affected Employee

- An Employee whose Job Requires Operation or Use a Machine or Equipment on Which Servicing or Maintenance is Being Performed Under Lockout or Tagout
- An Employee whose Job Requires Work in an Area where such Servicing or Maintenance is Being Performed

# Who is an Affected Employee?



Everyone at the Laboratory!!!

# Authorized Employee

- Locks out/Tags out equipment in order to perform maintenance
- Authorized by line mgmt
- Qualified by training and experience
- Must determine if a written procedure exists
- Trained in written LOTO procedure

# Lead Authorized Employee

- Authorized employee who performs or coordinates one or more LOTO activity for multiple personnel

# Knowledgeable Employee

- Employee who Assesses Energy Source(s) Subject to LOTO and Writes the Procedure for the Equipment.

- This definition is specific to Fermilab.

# Exclusive Control

**If Equipment is Under Exclusive Control, the Plug is Within Your Sight and Reach.**

**(See OSHA Interpretation in your booklet)**

# Energy Sources

- Electrical
- Mechanical
- Pressurized Gases (includes cryogens and air
- Pressurized Fluids (hydraulics)
- Loaded Spring
- Gravity


General Requirements

# General Requirements

1. Violation of LOTO Program May Result in Disciplinary Action
2. Deviations from LOTO only Permitted with Written Approval of D/S Head
3. Machines and Equipment shall be Physically Isolated from Sources of Energy at an Energy Isolating Device

# General Requirements

4. If There is No Way of Placing a Lock then You Must Turn OFF the Equipment and Place a Tag

5. Machines Must Be Designed to Accept a Lockout Device

6. Management shall determine if a LOTO procedure is required for the job and shall have one written.

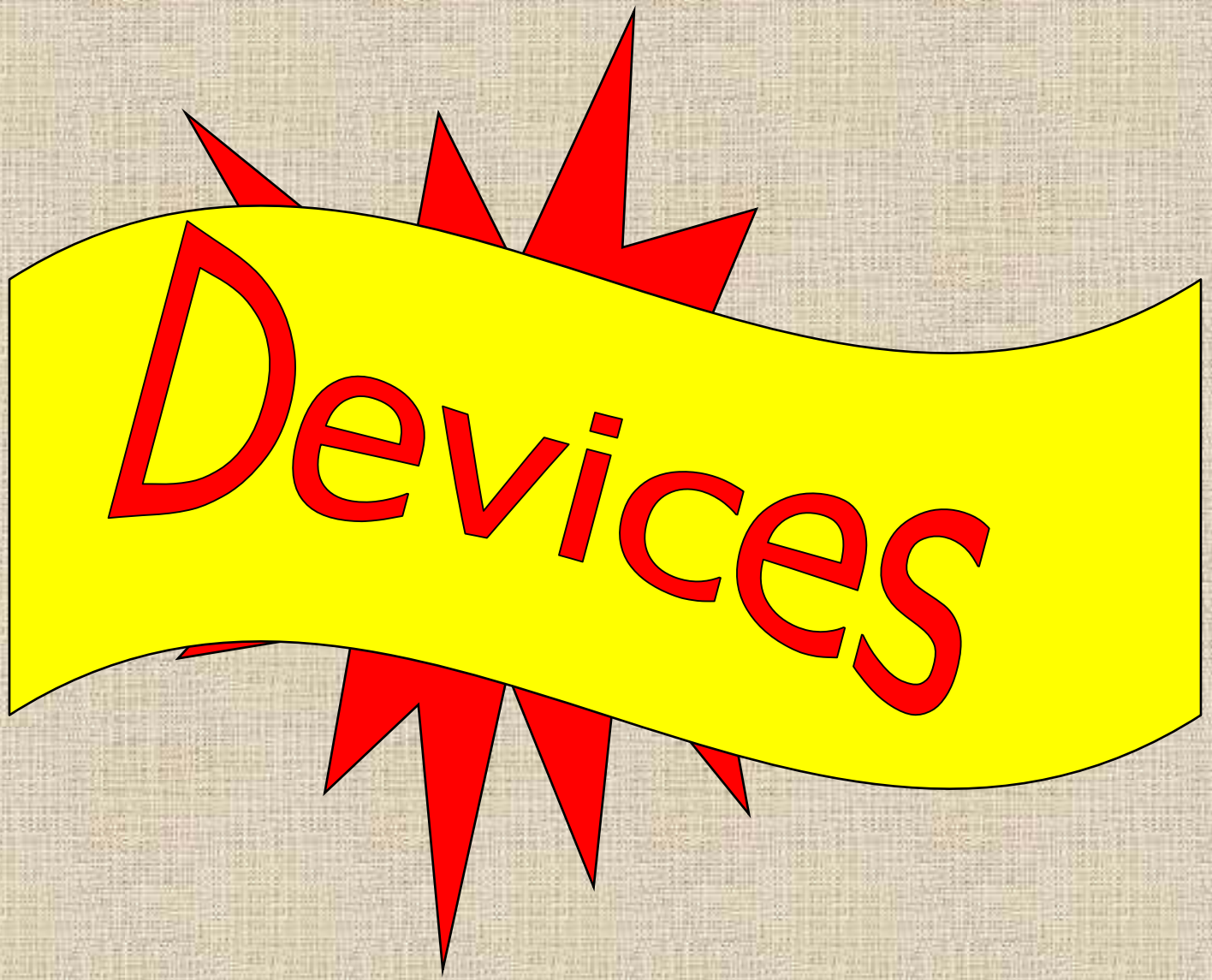
# General Requirements

7. The Authorized Employee is Responsible for Determining if a Written Procedure exists.
   - Annual training on procedure is required
   - You must follow the procedure
8. If there is no written LOTO procedure required the Authorized Employee will follow the General LOTO Procedure

# General Requirements

9. If the authorized employee feels a written procedure is needed where none exists - notify the supervisor but do not proceed with the work.

10. If there is a planned electrical outage and you have non-related work to do in the area
    - Apply LOTO at least 30 minutes before outage. Why?


Devices

# Lockout and Tagout Devices

- LOTO Locks are **RED**
  - Do not use red-colored locks for any other purpose
- 1 Key per lock
  - Destroy any other keys immediately
- Combination locks are Not Allowed
- When multiple locks are required for a single LOTO activity, locks with a common key may be used

# Lockout and Tagout Devices

- Tagout device states **“DANGER - DO NOT OPERATE”.**
  - Shall be white, black and red
  - Shall have a space for the authorized employee’s name.
  - Must have a reinforced eyelet capable of accepting a lock shackle of 0.25 inch diameter
  - In stock in warehouse


Device Application

# Lockout/Tagout Device Application

- Each employee must apply their own locks.
- Lockout devices are applied to hold the isolating device in a “safe” or “off” position.
- The employee must maintain exclusive control of the key

# Lockout/Tagout Device Application

- Only the authorized employee may remove his/her LOTO device
- Supervisor may overlock for additional control

# Lockout/Tagout Device Application

- A Tag must always accompany a lock.
- The tag must be placed as close as possible to the lock
- The tag must be securely attached
- The tag must clearly display the name of the authorized employee

# Lockout/Tagout Device Application

- The Tag may also display:
  - a picture of the authorized employee
  - the date of application
  - Other pertinent information
- Do not use string or tape to apply tags

# Lockout/Tagout Device Application

- A **tagout device** only is **allowed** when the energy isolating device is not capable of accepting a lockout device.
  - The tag must clearly indicate that operation or movement is **prohibited**
  - Use Laboratory designated tags
  - Tags must be securely attached to prevent inadvertent detachment


LOTO Procedure

# General LOTO Procedure

Notify

Prepare

Shut down

Isolate

Lock and Tag

And

**Verify**

# Establishing an Electrically Safe Working Environment

- Permitted operation under FESHM 5042.
- Determine all sources of electrical energy supply.
- Interrupt the load current
- Open disconnecting device/s for each source.

# Establishing an Electrically Safe Working Environment

- Visually verify all blades of the device are fully open. (Good Practice)

- Draw out Circuit Breakers are visually checked as withdrawn to a fully disconnected position, if possible (Good Practice).

# Establishing an Electrically Safe Working Environment

- Apply LOTO Device.
- Use rated voltage detector for range of voltage tested during verification.
- If required by the permit, wear arc flash protection PPE.
- Validation- Before and after each test, determine that the voltage detector is operating satisfactorily (NFPA 70E).

# Establishing an Electrically Safe Working Environment

- Ground the phase conductors or circuit parts before touching if the possibility of induced voltages or stored energy exists.

- Circuit conductors and circuit parts are considered energized until all energy is removed, disconnects are locked and tagged, and absence of electrical energy is verified.

# Establishing an Electrically Safe Working Environment

- During the verification process, the authorized employee will wear the PPE required under NFPA 70E for the hazard/risk category determined from the tables or calculated and as shown in the EHAWP.

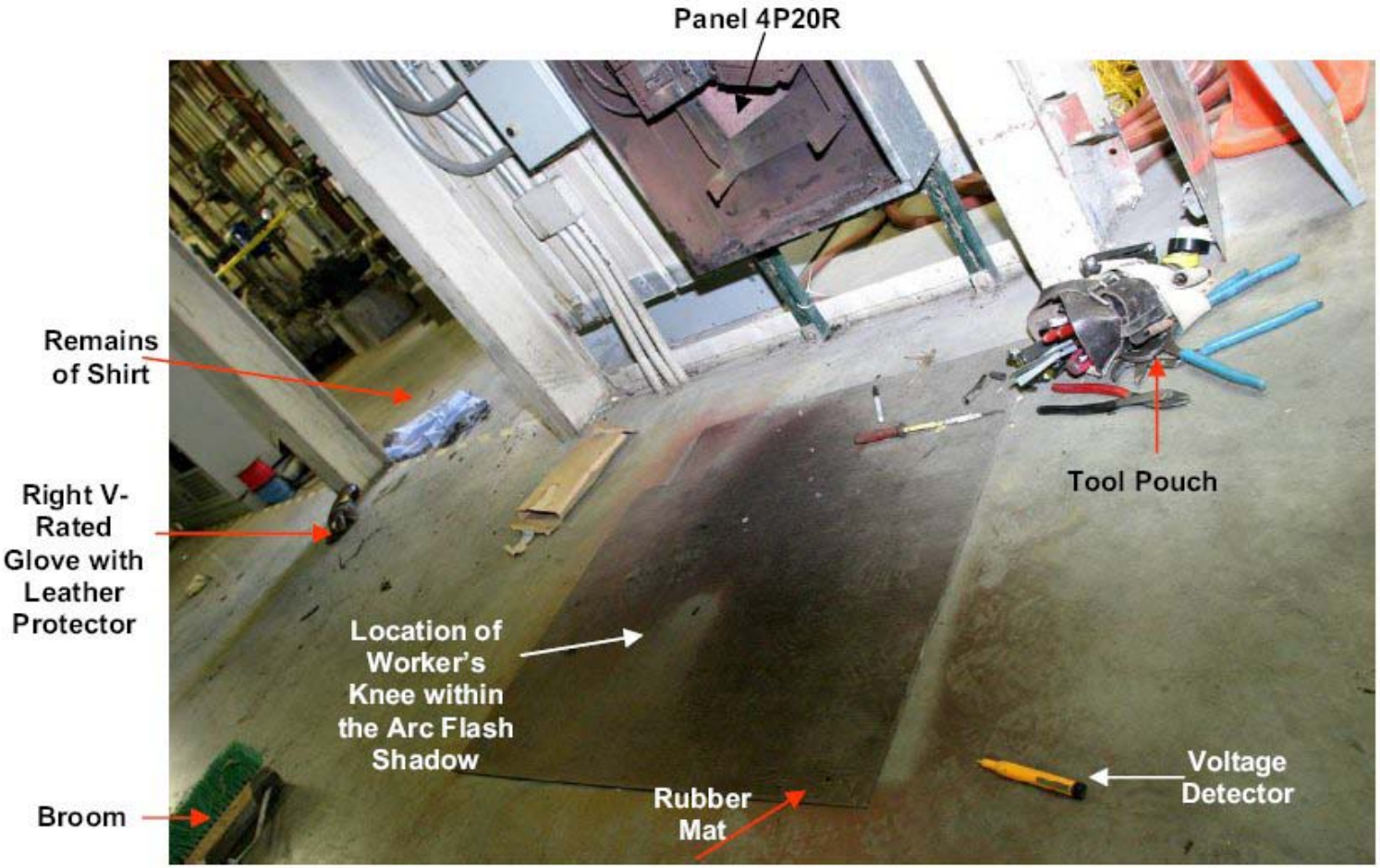



Figure 2-3. The insulating mat with the outline of BSE-1's knee in the arc flash shadow

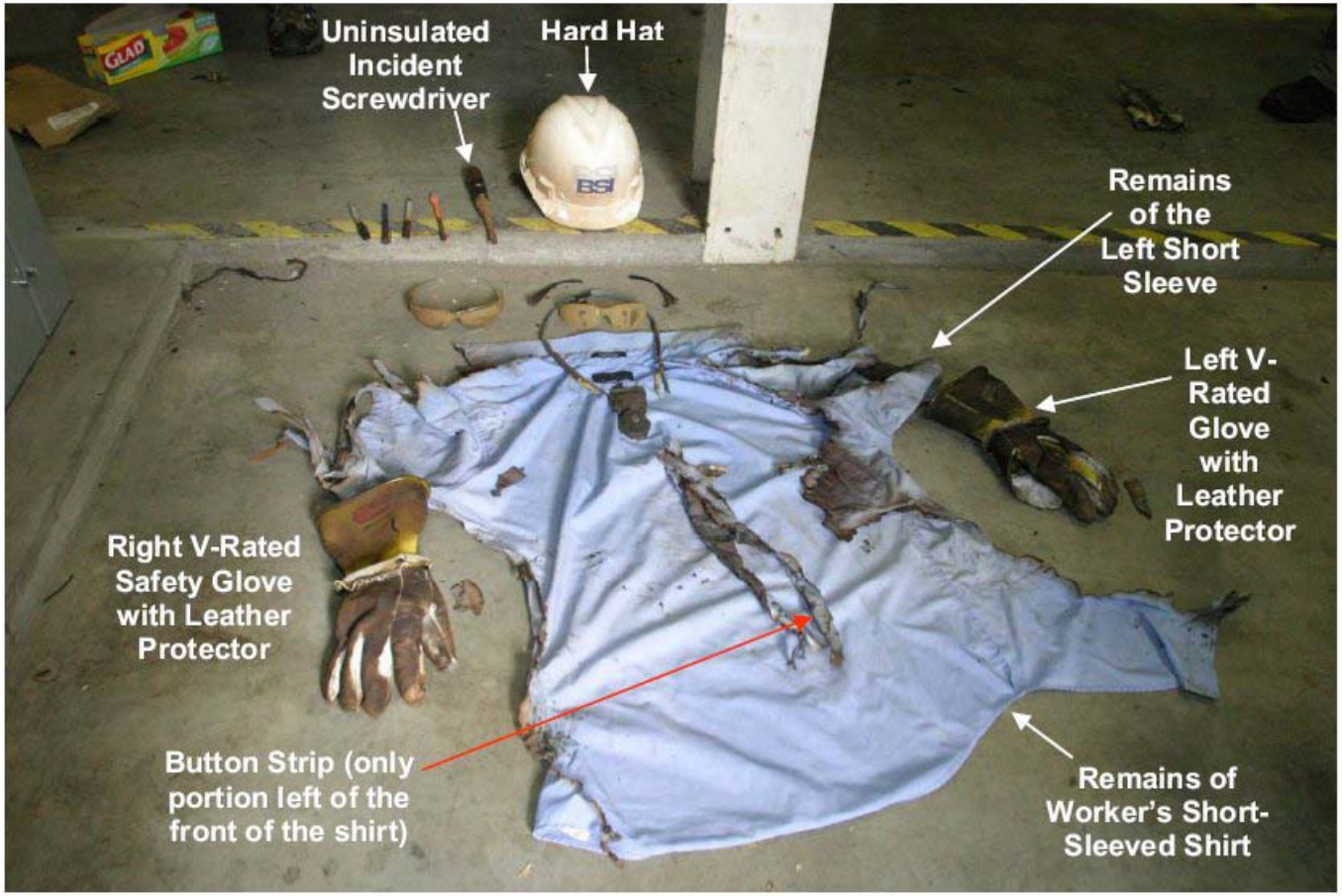
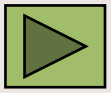



Figure 2-6. BSE-1's burned shirt and his flash-damaged PPE and tools

# Five Steps for Return to Service

1. Check equipment
2. Check work area
3. Verify that controls are in neutral, OFF or in a safe state.
4. Remove Locks and Tags, and energize if appropriate
5. Notify affected employees



# Written LOTO Procedures

## When are they required?

# Written LOTO Procedures When are they required

Under the OSHA safety standard procedures must be developed, documented and utilized ; i.e., written, if any of the following conditions exist.

# Written LOTO Procedures are required when ..

1. There is potential for stored energy or residual energy.
2. There are multiple energy sources or paths.
3. The isolation and locking out will not completely de-energize and deactivate the equipment.
4. Equipment cannot be isolated from the source and locked out during servicing or maintenance.
5. Single device will not achieve LOTO.
6. Lockout device is not under the exclusive control of the authorized employee.

# Written LOTO Procedures are required when…

7. The servicing or maintenance creates hazards for others.

8. There are documented incidents associated with this equipment where it activated or re-energized while under LOTO.

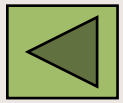
# Written LOTO Procedures

- Drafted by Knowledgeable Employee(s)
- Must include:
  - Statement of specific use
  - Specific LOTO steps
  - Specific steps for return to service
  - Specific steps for verification


Alternative Removal of Locks and Tags

# Temporary Removal of Locks/Tags for Testing or Positioning

- Follow **Five Steps for Return to Service**
- When done, use your procedure
  - General or Written



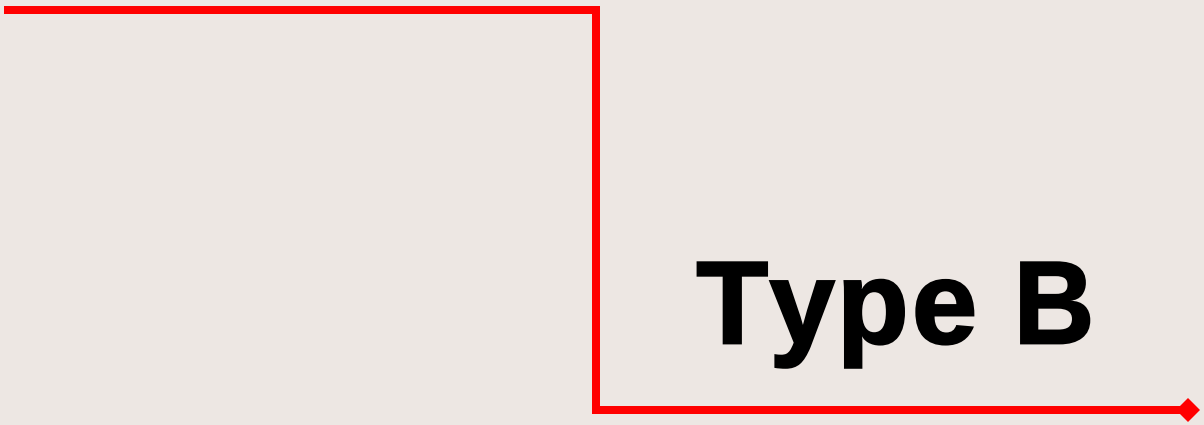
# Removal of Lock & Tags:
## Authorized Employee Not Available

- Supervisory personnel shall:
  - Make every effort to locate the Authorized Employee
  - Get written approval from D/S Head
  - Follow **Five Steps for Return to Service**
  - Inform Authorized Employee before he/she resumes work activities
  - Keep copy of written approval on file


Group LOTO Explained

# GROUP Lockout/Tagout
# Two Types

**Type A**



**Type B**

# Type A Group LOTO

- Lead Authorized Employee places lock & tag
- Everyone else locks behind him
- Everyone verifies equipment is de-energized
- Each worker removes his/her lock
- If there is a written procedure, only lead Authorized Employee needs to be trained

# Type B Group LOTO

- More complex activities
- Lead Authorized Employee performs LOTO
- Key goes into lockbox
- Everyone places lock on lockbox
- If there is a written procedure, only lead Authorized Employee needs to be trained


Shift or Personnel Changes

# Shift or Personnel Change

- If no one else will be working on system:
  - Leave LOTO as is
- If someone else will be working on system:
  - Transfer keys
  - Off-going employee unlocks
  - On-coming employee locks
  - Verification is very important!!

# Shift or Personnel Change

- Group LOTO:
  - Lead places his own lock to lock box.
  - The job lockbox and captured keys remain under the control of the lead authorized employee.
  - If absent, the lead authorized employee may designate someone else the lead while retaining control of job lockbox

# Shift or Personnel Change

- Group LOTO
  - Special circumstances may warrant the complete transfer of responsibility.
  - The off-going and on-coming leads would simultaneously remove and apply locks.


Supervised LOTO

# Supervised LOTO

- If an employee, visiting or guest scientist needs to perform LOTO and training is unavailable, an authorized employee may supervise the application of LOTO

# Supervised LOTO

- Conditions apply:
  1. System must be able to accept LOTO device
  2. The individual is briefed by the authorized employee
  3. If there is a written procedure, authorized employee follows procedure and applies LOTO – individual applies LOTO and verifies
  4. LOTO II taken ASAP


Inspections And Audits

# Inspections and Audits

- Divisions and Sections must perform and document annual inspections of written procedures. (Knowledgeable employee)
- Annual inspections required to assure that each written LOTO procedure continues to be properly implemented.

# Inspections and Audits

- Then reviewed by all employees authorized to perform the procedure
- The authorized employee observes the execution of the procedure .

# Sub-Contractors

## Handling under Fermilab LOTO Program

# Subcontractors

- Required to have their own LOTO program
  - Must share that information with Task Manager
- Two subcontractors must follow Fermilabs' program
  - Electrical and HVAC T&M
  - Must attend LOTO II training or prove they have been trained

# Subcontractors

- Locks and tags may be loaned without a tool loan form (FESHM 7010)
- Overlocking is allowed
  - Subcontractor locks first, then the you over lock.


Configuration Control Locks and Tags

# Configuration Control

- Used if equipment must remain unattended for long periods of time w/out being worked on
- Provides management control
- Removal of locks/tags may result in injury, damage, disruption of normal processes, or degradation of system

# Configuration Control - Examples

- Locking out overhead crane electrical disconnect
- Locking equipment while awaiting repair or parts
- Locking a valve to control the flow of fluids
- Locking radioactive waste container

# Configuration Control Locks

- Can use any shape or color of lock **EXCEPT RED.**
- Tags: **YELLOW, MANILA or RED (w/o DO NOT OPERATE wording are allowed.**
- **RED** locks and **DANGER: Do not Operate tags** are used exclusively for LOTO
  - Not for Configuration Control

# Configuration Control Locks

- Can use lock without a tag if use is obvious
- Combination locks are allowed
- Keyed locks may have more than one key.

# Configuration Control Locks

- Removal of lock is by person or group who applied it.
- Removal by other authorized or qualified person permissible if there is assurance that removal will not create unsafe condition


SUMMARY

# Summary

- You are on your way to becoming an Authorized Employee
- Red locks and danger tags mean LOTO in place
- LOTO is not to be violated

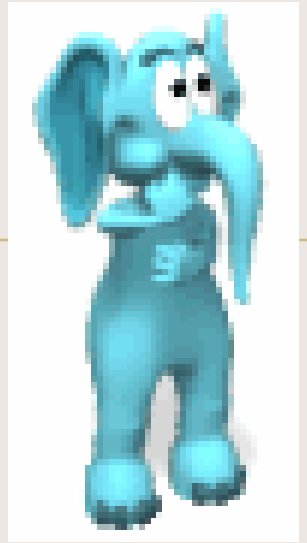
# Summary

- Remember the steps to lock out.
- Best Practices- Visual verification of disconnects and validation of voltage detector readings.
- Remember the five steps to return to service

# Summary

- Type A vs. Type B application
- Written procedures
- Supervised LOTO
- Shift change
- Subcontractors
- Configuration control


"I knew I should have used lockout/tagout!"



**Thanks! And do not forget what you have learned!**

**It may someday save your life.**




**LOTO 2**


DANGER
DO NOT
OPERATE
Signed By: PARZYCH
Date: 7/9/04
PANDUIT
PVT-41
DANGER
DO NOT
REMOVE THIS TAG
WITHOUT
AUTHORIZATION
SEE
OTHER SIDE


CAUTION
DO NOT REMOVE THIS TAG
TO DO SO WITHOUT AUTHORITY WILL MEAN IMMEDIATE DISCHARGE. IT IS HERE FOR A PURPOSE
SEE OTHER SIDE



**LOTO 2**