

HIGH-IMPACT ELECTRICAL SAFETY

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

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

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

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

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

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

INTRODUCTION

Three-fourths of all electrical accidents, including 100 deaths annually, are caused by unsafe work practices. Electricity, like our decision-making process, has the power to create or destroy. The same power we rely on to operate work place machines can also lash out and kill. Unlike our ability to think, electricity knows only to find the shortest path to ground and complete the circuit.

Electricity affects our bodies in three ways:

- ❶ through the tingling sensations of mild shock;
- ❷ immediate heart stoppage;
- ❸ internal and exterior burns from current, arcing and heat from contact.

We can also be affected by secondary actions that occur after a shock, including falls, drowning and asphyxiation. To prevent injuries from uncontrolled electrical exposure, it is important to have the proper training and experience before starting work on any circuit or piece of equipment.

This program presents 10 accidents. The causes and their prevention are discussed.

ACCIDENT 1

Unqualified Worker Causes Explosion

John Combs and Sherrill Foster were maintenance workers, but not qualified electricians. They volunteered to re-set the circuit on the main chiller; it had been tripping for several days. It exploded violently. Neither John nor Sherrill had any understanding of the possible consequences of their actions. John was killed and Sherrill suffered serious burns.

SAFETY TIPS: *You must be a qualified electrician to install, repair or maintain electrical circuits and equipment. You must know the construction, operation and hazards of each piece of equipment to be serviced.*

ACCIDENT 2

Failure to Lockout Production Heater Results in Death

Charles Sweet, maintenance electrician, worked on a 440-volt, 200-amp electric heater on a production machine number 2. He turned off the power but did not lock it out. His supervisor came to help find the problem and inadvertently threw the disconnect switch on as he passed by. Charles was killed instantly.

SAFETY TIPS: *Lockout of electrical power sources is vital to electrical safety; it's also required by OSHA.*

ACCIDENT 3

Failure to Communicate Accurately and De-Energize Circuits Results in Injury

Two maintenance electricians and their foreman were troubleshooting a 277-volt emergency lighting circuit. The foreman was flipping breakers on and off to try to locate the problem circuit. The men were in communication by radio. One of the men received a nasty shock and the other was electrocuted.

SAFETY TIPS: *While communication can be difficult, it is vital when performing electrical work. Before circuits can be considered de-energized, they must be checked by a qualified electrician. Controls must be placed in the "on" position for trial and returned to "off."*

ACCIDENT 4

Inadequate Distance from Power Lines Leads to Death

The mechanical crew from the maintenance department was in the process of upgrading the waste treatment system. The job on the system was to be completed at night. Before moving a crane beneath the 13,800-volt lines to the site to finish the job, the crew calculated the clearance height. But because they did not calculate the distance accurately in the darkness, the boom of the crane hit the wire. They also did not take into consideration the need to maintain a minimum 10-foot safe working distance around overhead lines. Consequently, a series of secondary accidents occurred that resulted in one death and the destruction of the nearby service truck.

SAFETY TIPS: *You must be qualified to work near electrical hazards and be aware of proper clearance distances. You should understand that crane booms, metal pipes, scaffolds and ladders can become electrical conductors.*

ACCIDENT 5

Ignorance of Proper Tool Grounding Results in Death

Jarvis Bunt decided to repair an extension cord that he and Alvin Potter had ran over with their forklift. Jarvis found a new end piece and put it on the cord, but was not aware that the wires must be connected to specific terminals. He connected the hot wire to the ground terminal. When Alvin used the cord to power a skill saw about 30 minutes later, he was electrocuted and the saw blade buried in his leg.

SAFETY TIPS: *You must be qualified to do any electrical job. Jarvis was not qualified to repair the cord. He did not understand why each of the three wires must be connected to a specific terminal.*

ACCIDENT 6

Removed Ground Pin Causes Electrocution

Ralph Watson, an electrician, and Herbert Clease were re-routing an old electrical conduit in the plant. Herbert used three extension cords to get power for the portable band saw that Ralph would use in cutting the overhead conduit. Herbert broke off a bent ground pin on the plug connecting the cords to the receptacle. When Herbert saw that Ralph was in trouble with the saw, he unplugged the cord and Ralph fell. His harness prevented his body from hitting the ground, but the electricity from the defective saw had already killed Ralph.

SAFETY TIPS: *Electricity will always seek the easiest path to ground. If the ground pin had been in place, the electricity that killed Ralph would have been safely taken to ground through the ground path provided by the cord.*

ACCIDENT 7

Ignoring Safe Work Practices Results in Electrocution

Melton Bush was using a portable electric welder in the machine shop to repair a broken piece on one of the machines. He knew the plug on the welder was broken, but he did not take the time to have it fixed or replaced. He thought it would surely work one more time. When he plugged it in, a short circuit occurred and he was electrocuted.

SAFETY TIPS: *Never use defective electrical equipment. Always mark or tag the items as defective and notify your supervisor so another person will not unknowingly place himself in danger.*

ACCIDENT 8

Safety Glasses Prevent Eye Injury

Mark Gilliams was an experienced lathe operator who never had an accident. When the lathe stopped working one day, he decided the cause was a blown fuse. Instead of shutting off and locking out the lathe's power supply, he went right to work by opening the control box. When he used his screwdriver to open the box, it contacted a hot terminal and shorted out to the side of the control box. The short caused an explosion which showered particles into Mark's face. Because he was wearing his safety glasses, he was uninjured in the incident.

SAFETY TIPS: *You must be a qualified electrician to work on electrical equipment. Mark was not qualified to check and replace fuses on his machine. He also did not de-energize the lathe and lock it out. Fortunately, Mark's safety glasses protected his eyes from the flash and slag created by the accident.*

ACCIDENT 9

"Rookie Mistake" Leads to Shock and Injury

Jim Cannon, a maintenance electrician, needed to work on the 110-volt power drop suspended above a workstation. Since the job wouldn't take long, he decided to use the aluminum ladder in the area instead of the approved fiberglass type. His screwdriver contacted a live wire and the ladder provided a path to one of the machines it was touching. Jim received a shock and was knocked off the ladder, but fortunately escaped serious injury.

SAFETY TIPS: *Always use equipment and tools required for the job at hand; metal ladders and electrical work do not mix. His knowledge of ladder safety rules should have told Jim not to stand above the last safe step on the ladder. Also, he should have de-energized the circuit before attempting repair.*

ACCIDENT 10

Paint Booth Explosion Results in Death

Warren Costino and his assistant were troubleshooting the paint booth lights when Warren's explosion-proof flashlight failed. His assistant retrieved the nearby 110-volt work light that was not intended for use in potentially explosive atmospheres. Warren, who helped write company policy regarding non-sparking equipment, ignored his own procedures when he decided to use the work light. When the light dropped, the unprotected bulb exploded and ignited the paint vapors. Warren died when he was engulfed in flames, his assistant was badly burned, and much of the plant was destroyed as a result.

SAFETY TIPS: *To be qualified, you must understand the hazards associated with the environment in which you are working. Warren did not use his knowledge of special requirements for working in the paint booth to protect himself and his assistant. Even if you are qualified to do electrical jobs, you must follow all correct work procedures.*

PREPARE FOR THE SAFETY MEETING OR TRAINING SESSION

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

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

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

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

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

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

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

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

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

CONDUCTING THE PRESENTATION

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

Explain that the primary purpose of the program is to help anyone that works around electrical hazards to remember to follow safe work practices.

Introduce the videotape program. Play the videotape without interruption. Review the program content by presenting the information in the program outline. Lead discussions about related accidents or dangerous situations. Use the review questions to check how well the program participants understood the information.

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

- Proper work practices that should have been followed to prevent the injuries and deaths in the video;
- Sources of problems that lead to electrical accidents;
- Reasons why a qualified electrician should perform electrical work.

HIGH IMPACT ELECTRICAL SAFETY
REVIEW QUESTIONS

Name _____ Date _____

The following questions are provided to check how well you understand the information presented in the program.

1. The type of electrician required to install, repair or maintain electrical equipment is _____.
 - a. an experienced maintenance mechanic
 - b. a qualified and authorized person
 - c. an experienced craft worker
 - d. a rigger

2. Before repairing an electrically powered machine, always _____.
 - a. disconnect the power
 - b. disconnect the power and lock it/tag it out.
 - c. lock it out

3. When de-energizing circuit _____.
 - a. obtain an entry permit to areas containing energized circuits
 - b. lockout and tagout the circuit
 - c. a qualified person must test and confirm the de-energized circuit
 - d. use the right type of radio

4. The reason the crane contacted the 13,800-volt power line and exploded was _____.
 - a. a 10-foot working distance was not considered
 - b. the line was installed too low
 - c. the crew calculated the clearance height incorrectly
 - d. both a and c

5. If an electrical plug is incorrectly wired, the result that can cause electrocution is _____.
 - a. the ground becomes hot
 - b. the neutral becomes hot
 - c. hot becomes neutral
 - d. the plug still works normally

6. The problem with plugging power tools into extension cords without ground pins is _____.
 - a. the case on the power tool can become energized
 - b. a short will go to ground
 - c. the cord will function properly

7. The lathe operator violated a safety rule when he _____.
 - a. restarted the lathe without putting on his safety glasses first
 - b. failed to lockout the lathe before beginning to work
 - c. did not use non-sparking tools to remove the fuse
 - d. attempted the task without being qualified or authorized

8. A qualified electrician was burned to death in a paint booth because he _____.
 - a. didn't remove the paint vapors from the booth before starting work
 - b. failed to follow his own procedures for working in explosive atmospheres
 - c. dropped the explosion-proof flashlight
 - d. didn't hear his assistant calling

ANSWERS TO THE REVIEW QUESTIONS

1. b

2. b

3. c

4. d

5. a

6. a

7. d

8. b