ELECTRICAL SAFETY AWARENESS TRAINING

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ELECTRICAL SAFETY TRAINING OUTLINE

- Hazards of Electrical Work
- How One Might Become Exposed to Electrical Hazards
- Where One Can Find Electrical Hazards in the Workplace
- Adverse Health Effects
- How to Protect Yourselves from Electrical Hazards

ELECTRICAL SAFETY TRAINING OUTLINE (cont'd)

- Supervisors' Responsibilities
- Workers' Responsibilities
- How to Respond in an Emergency
- How to Report Problems
- Video
- Questions & Answers
- Quiz

ELECTRICITY IS DANGEROUS SOME SOBERING FACTS

- An average of one worker is electrocuted on the job every day of every year
- Electrocution is the third leading cause of work-related deaths among 16 to 17 year olds, after motor vehicle deaths & workplace homicide
- Electrocution is the cause of 12% of all workplace deaths among young workers

ARE YOU CONCERNED ABOUT ELECTRICITY?

- How many sets of Christmas lights do you plug into one extension cord?
- Do you still use your hot sparking electric drill?
- Is your vacuum cleaner's cord twisted and frayed?
- Have you installed outlet covers to protect your toddler?

BASICS OF ELECTRICITY

- Electrical Source
- Electrical User
- Wires
- Electricity travels in a completed circuit
- Electricity always travels in the path of least resistance
- Electricity tries to travel to ground

HOW ONE MIGHT BE EXPOSED TO ELECTRICIAL HAZARDS

- Touching two wires that are at different voltages at the same time
- Touching both live wires of a 240 volt cable
- Wearing wet clothing, the presence of water, perspiration & high humidity
- Touching exposed wires
- Touching defective electrical equipment which is energized

HOW ONE MIGHT BE EXPOSED TO ELECTRICIAL HAZARDS (cont'd)

- The dangers from electrical shock depend on:
  - amount of electric current
  - duration of electric current
  - path of electric current
- Amount of current is inversely related to the resistance, V = I x R (Ohm's Law)

HOW ONE MIGHT BE EXPOSED TO ELECTRICIAL HAZARDS (cont'd)

- Low voltage doesn't always mean low hazards
- High voltages can cause additional injuries, such as:
  - violent muscular contractions
  - falls
  - internal bleeding
  - destruction of tissue, nerves and muscles

BODY'S RESISTANCE

- Skin offers most of the body's electrical resistance
- Increased resistance is found in thick & callused skin (foot and hand) and dry skin
- Decreased resistance is found in thin skin (inner forearm), wet or sweaty skin and broken or abraded skin (scratches)

RESISTANCE VARIES

- Different levels of electrical resistance exist for each person
- Ranges from 500 to several thousand ohms
- A similar voltage shock can be minor to one person and deadly to another

EFFECTS OF DIFFERENT LEVELS OF CURRENT ON THE HUMAN BODY

- 1 mA: Can be felt by the body
- 2-10mA: Minor shock, might result in a fall
- 10-25 mA: Loss of muscle control, may not be able to let go
- 25-75 mA: Painful, may lead to collapse or death
- 75-300 mA: Last for 1/4 second, almost always immediately fatal

PATH OF THE CURRENT

- Currents through the heart, chest or the nervous system are most dangerous
- Current through part of the limb before exiting the body can cause severe burns
- Current passing through the chest is often fatal
- Current passing between hands and feet involves lungs and the heart and is often fatal

BURNS CAUSED BY ELECTRICAL SHOCK

- **Electrical burns:** occur when improperly used or maintained electrical equipment is touched
- **Thermal burns:** occur as a consequence of electrical burns
- **Arc Blasts:** occur when high amperage current passes through air

WHERE ONE CAN FIND ELECTRICAL HAZARDS AT WORK

- Inadequate wiring
- Exposed electrical parts
- Overhead power lines
- Wires with bad insulation
- Electrical systems and tools that are not grounded or double-insulated
- Overloaded circuits

WHERE ONE CAN FIND ELECTRICAL HAZARDS AT WORK (cont'd)

- Improper grounding or lack of grounding
- Damaged power tools and equipment
- Using the wrong tool
- Using the wrong PPE
- Defective ladders and scaffolding
- Ladders that conduct electricity
- Wet location, equipment, or worker

HOW CAN YOU PROTECT YOURSELVES FROM ELECTRICAL HAZARDS?

- Electrical systems are inherently safe
- Injuries typically occur when:
  - procedures are inappropriate
  - procedures are not followed or ignored
  - safety systems are circumvented

HOW CAN YOU PROTECT YOURSELVES FROM ELECTRICAL HAZARDS? (cont'd)

- Review your assignments and safety practices with your supervisor
- Only work on areas which you are qualified
- Only qualified workers perform electrical work
- Have an action plan and safety plan before you begin your work
- Anticipate problems
- Work with a buddy

HOW CAN YOU PROTECT YOURSELVES FROM ELECTRICAL HAZARDS? (cont'd)

- Qualified workers should shut off and de-energize circuits. Lock out and tag out procedures should be used
- Test the circuit to confirm de-energization
- Treat all conductors even "de-energized" ones as though they are energized
- Remove jewelry and metal objects

HOW CAN YOU PROTECT YOURSELVES FROM ELECTRICAL HAZARDS? (cont'd)

- Plan to avoid falls
- Avoid wet working conditions
- Prevent overloaded wiring
- Use insulation and wire nuts
- Use overcurrent protection devices

HOW CAN YOU PROTECT YOURSELVES FROM ELECTRICAL HAZARDS? (cont'd)

- Use extension cords properly and inspect them routinely
- Use an extension cord with sufficient capacity for the current
- Do not coil or hang extension cords in any manner that could cause kinks or damage to insulation
- Do not pull on cords

HOW CAN YOU PROTECT YOURSELVES FROM ELECTRICAL HAZARDS? (cont'd)

- Use and maintain tools properly
- Inspect your tools before each use
- Use the right tool for the job and use it correctly
- Never carry a tool by the cord
- Protect your tools from heat, oil, and sharp objects
- Use double insulated tools

HOW CAN YOU PROTECT YOURSELVES FROM ELECTRICAL HAZARDS? (cont'd)

- Wear the correct PPE and follow the manufacturer's instructions
- Wear proper foot protection
- Wear a proper hard hat, if required
- Use the appropriate insulated gloves
- Use properly rated mats

SUPERVISORS' RESPONSIBILITES

- Review project carefully with your workers, unless they are routine assignments
- Emphasize safety practices
- Train workers on area-specific policies and procedures
- Check your employees' work practices to ensure compliance
- Check the final product to ensure that no deficiencies exist

EMPLOYEES' RESPONSIBILITIES

- Review each project carefully with your supervisor
- Become thoroughly familiar with your assignments
- Only perform work in which you are trained
- If at all in doubt, ask questions

EMPLOYEES' RESPONSIBILITIES (cont'd)

- Have your supervisor review your completed project
- Follow your supervisor's instructions
- Follow safe work practices
- Wear any required PPE
- Alert your co-workers to any unsafe work practices

EMPLOYEES' RESPONSIBILITIES (cont'd)

- Report all problems to your supervisor
- Know what to do in the event of an emergency

REPORTING PROBLEMS

- Do not ignore signs and clues of potential electrical problems
- Report all problems to your supervisor
- Tripped circuit breakers or blown fuses
- Tools, wires, connections, extension cords, cable and fuse boxes or junction boxes that feel warm to the touch

REPORTING PROBLEMS (cont'd)

- Burning odor
- Worn, frayed or damaged insulation
- GFIs that trip

EMERGENCY RESPONSE PROCEDURES

- Do not panic; remain calm
- In the event of a personal injury:
  - Call 911 immediately
  - If a person is being shocked, turn of the source of electricity
  - Do not touch someone being shocked
  - Remove the person away from the electrical source using a non-conductive material

EMERGENCY RESPONSE PROCEDURES (cont'd)

- Call Security at X4111 and EH&S at X4150
- Notify your supervisor

- In the event of an electrical fire:
  - Activate the fire alarm system
  - Do not use a Type A, water extinguisher
  - If you know how to use an extinguisher, use a CO_2 or dry chemical fire extinguisher
  - Alert everyone in the area to evacuate

EMERGENCY RESPONSE PROCEDURES (cont'd)

- Notify Security at X4111 and EH&S at X4150
- If you are not sure about using a fire extinguisher, leave the area and close any doors behind you
- Wait for the Fire Dept. personnel to arrive

IN SUMMARY

- Electricity will try to reach ground even if it means going through a person
- Even the “small” voltage from your home can cause serious injury
- Always inspect power tools and cords before each use and do not use them if damaged

IN SUMMARY (cont'd)

- Do not attempt to repair electrical equipment unless you are trained and qualified
- Always use lockout/tagout procedures to de-energize electrical systems
- Use electrical tools and equipment that are protected by a GFI

IN SUMMARY (cont'd)

- Review your assignments with your supervisors
- Utilize correct PPE
- Report all problems to your supervisors
- If at all in doubt, ask questions