

Toolbox Talks 2

062: Unsafe Acts: Power Lines

Discussion leader duties for this session:

Review any company safety information that addresses working around power lines.

What this Safety Talk covers:

Most injuries occur not due to unsafe conditions, but due to unsafe acts. This Safety Talk addresses unsafe acts related to power lines.

Discussion notes:

Unsafe acts related to power lines

- Allowing a crane to operate before ensuring all of the clearances are adequate. Whose job is it to measure how much room the crane has under overhead power lines and between lateral conductors? If you can't verify this has been done by a qualified person, it's unsafe for the crane to proceed.
- Measuring overhead clearances statically. When you measure clearances for overhead power lines, allow for movement of the line and the crane boom. Account for wind and terrain, erring on the side of caution. Trying to "thread the eye of the needle" when dealing with power line clearances is unsafe.
- Trenching without a recent buried cable survey. This used to be a huge problem, which is why every utility now has a program to address it. There is no excuse for hitting a buried cable, gas pipe, or water pipe. Yet this still happens.
- Using PPE as the primary defense against power line threats. PPE protects you after you've used other means to reduce the dangers. Don't use PPE as a license for ignoring safety procedures.
- Removing a power line ground in residential applications. Because of the way grounds and neutrals are applied in the USA, this creates an electrocution hazard.
- Removing a power line ground in commercial or industrial applications. This can disable the lightning protection system. But lightning from miles away can induce a voltage surge on the very power lines you are working on—even if they are de-energized. Look carefully at what actually needs to be disconnected, and provide temporary bypasses as needed.
- Touching a power cable without the appropriate PPE and verification. Suppose you need to move a power cable for some reason. If you go through lockout/tagout, does that mean the cable is safe to touch? No. The cable insulation may be damaged. Before touching a cable that is allegedly de-energized, verify with a meter.
- Stepping in puddles of water. This is one way in which you can be killed by a power line, without ever touching it. If any of the following are going on, there is a distinct possibility that water puddles are lethal: overhead line work, trenching, disconnecting of power cables, disconnecting of grounds, or investigation of cable faults.
- Standing with one foot on a ground rod. Despite basic electrical theory to the contrary, there's a pervasive myth in the industry that "electricity takes the path of least resistance." The fact is electricity takes all paths presented to it in reverse proportion to the resistance of each path. That's basic parallel circuit theory. If you put one foot on a ground rod, each foot is at a different potential. Don't assume you're safe because you're "grounded."

Review and discussion

1. If it's nobody's particular job to measure clearances for a crane, how do you know if anybody did these measurements? *[Note to Presenter: You don't.]*

And that's the whole point. Find out from your supervisor who is charged with this responsibility. The lead electrician on site should talk to that person to see exactly what has been done and communicate this to the rest of the crew. Never assume the job has been done, or done correctly. Verify.]

2. What's wrong with relying on installation drawings to provide you with the power line cable height and other information related to crane clearances? *[Note to Presenter: The grade may have changed, the cables may not be installed exactly per drawing, the wind can move the cables, crane operators don't function to fractions of an inch, and so forth.]*

3. What's your primary defense against hitting a buried cable, water pipe, or gas line?

4. What should you not use PPE as a license for?

5. Sometimes, it may be necessary to remove a ground at a service entrance. Why is this hazardous in residential applications?

6. Why is removing a ground hazardous in commercial or industrial applications? What should you do?

7. If the owner told you all of the power cables in a manhole have been de-energized, what should you do before going into that manhole?

8. What should you do before touching or disturbing the cables in a manhole? Why? What if there's water in that manhole? *[Note to Presenter: This concept wasn't directly addressed earlier. Before entering a manhole, assume all cables are energized unless verified otherwise. Cable jacket insulation may be damaged. Assume that touching a cable is the same as touching the live conductor inside and take the necessary precautions. If you disturb old cable, you may possibly cause damaged insulation to fall off and/or you may cause two cables to fault together through damaged insulation.]*

9. Why are water puddles dangerous? Does it make sense to treat them as though they are energized conductors? If so, why?

10. Why is it not true that standing on a ground rod protects you from electrocution? [Note to Presenter: You can do some simple parallel circuit calculations to show how much current would flow through a 100 ohm human body for a given fault current. As a simple example, assume 400A of current on a touch voltage of 480V, and a ground rod that is at 10 ohms to earth. For argument's sake, let's say any other paths are negligible. The ground rod would provide a path for 90% of this current, still leaving 40A to go through your body. To put this in perspective, we rely on GFCIs to trip at no more than 6mA at 120V.]

Participant's Signature and Date

[illegible]