



Meter Safety

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*For North Carolina Electric Meter School
Single Phase
Thursday, June 16, 2022 at 8:00 a.m.*

Meter Safety

YOU are responsible for your own safety on the job!

SAFETY FIRST



**Safety
Starts
Here**

Think Safe...
Work Safe...
Be Safe

Hazards in the Workplace

Hazard #1: Falls and Falling Objects

- Approximately 19,565 people die in the U.S. annually due to injuries caused by unintentional falls.
- Slips, trip and fall injuries cost employers approximately \$40,000 per incident.
- About 9.2 million people were treated in emergency rooms for fall-related injuries last year.



Hazards in the Workplace

Hazard #2: Chemical Exposure

- Breathing of contaminated air is the most common way that workplace chemicals enter the body.
- The CDC estimates more than 32 million workers in the US are potentially exposed to chemicals that can be absorbed through the skin.
- Roughly 860,000 illnesses resulting from chemical exposure occur in the workplace every year.



Hazards in the Workplace

Hazard #3: Fire Hazards

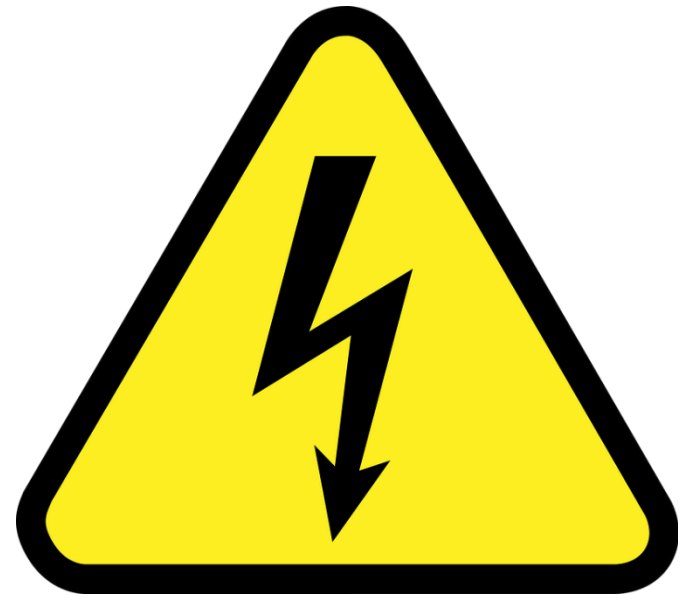
- A structure fire is reported approximately every minute of every day and results in approximately \$12 billion in property loss every year.
- According to the National Fire Protection Association, there were an estimated 3,340 fires in U.S. office properties per year.



Hazards in the Workplace

Hazard #4: Electrical Hazards

- The construction industry accounts for 52% of all electrical fatalities in the US workplace.
- Most incidents and fatalities were caused by direct worker contact with overhead power lines and contact with machines, tools, and hand-carried metallic objects.
- Engineers, electricians, and overhead line workers top the list of professionals who are most exposed to electrical hazards.
- The most common type of work to result in an electrocution is routine work involving repair and maintenance.



Hazards in the Workplace

Hazard #5: Repetitive Motion Injury

- According to the Bureau of Labor Statistics, Repetitive Motion Injury cases accounted for 33% of all worker injury and illness cases
- In the U.S., the costs associated with RMI's are estimated at \$20 billion every year according to OSHA



How Dangerous is Metering?

Electricity is Organized Lightning – George Carlin

Any Voltage without current will not kill you, but any voltage with current can kill you.



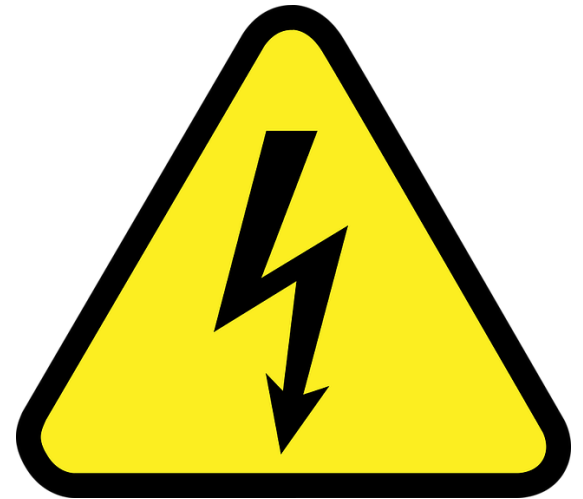
Electric Shock

What is Electric Shock?

Electric shock is a flow of electrical current through a person's body.

Damage to the skin or internal organs as a result of contact with electrical current is an electric injury.

Electric shock can cause a minor twinge, mild to serious injuries, or death, depending on the circumstances and voltage.



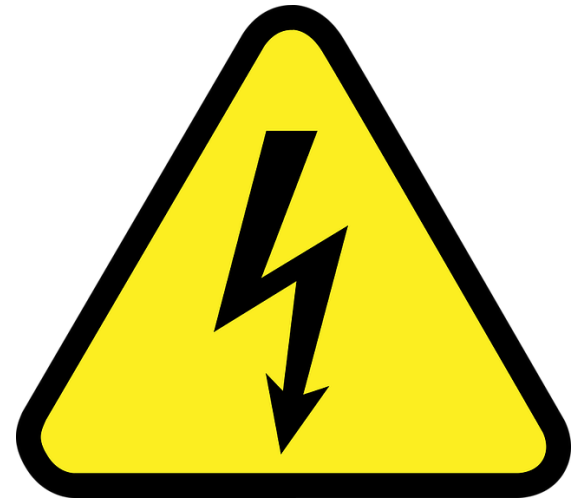
Electric Shock

What is Electric Shock?

The human body conducts electricity well, so it travels through the body with ease.

People can incur organ damage even if there is only a minor burn on the skin.

The most common areas injured by electric shock are the heart, muscles, and brain.



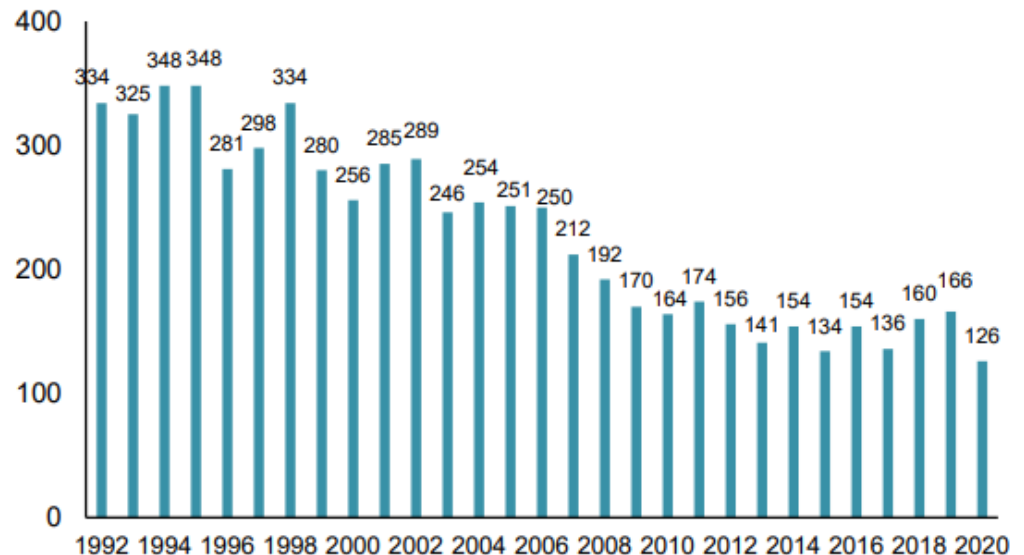
Electric Shock

Current	Effect
1 mA	Barely noticeable
16 mA	Maximum current before you can't let go
20 mA	Paralysis of respiratory muscles
100 mA	Ventricular fibrillation starts
2 Amps	Cardiac standstill and organ damage

Electrical Safety

- Electric shocks and electrocution are common threats to utility worker safety.
- In 2020, 126 workers died due to exposure to electricity.
- This represents a 24% decrease over 2019.
- This also represents the fewest fatal electrical injuries in nearly 30 years.

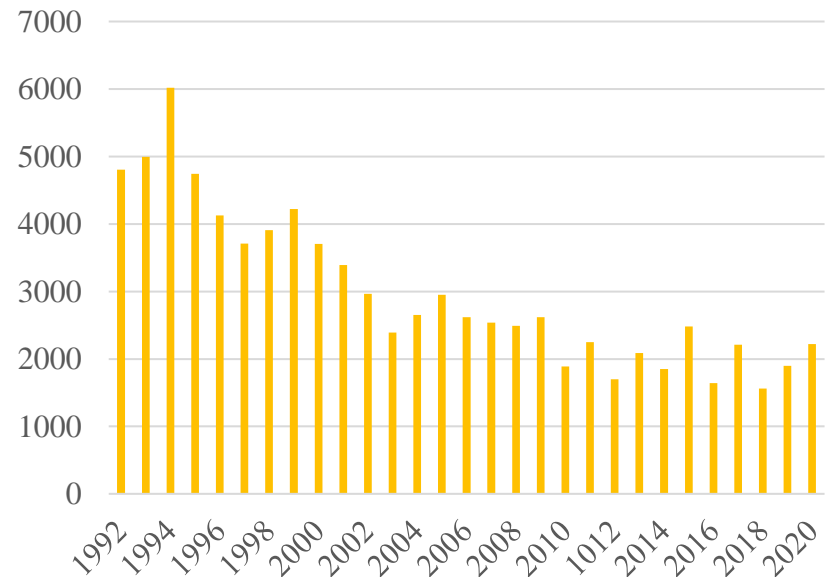
Figure 1. Fatal Work Injuries Caused by Exposure to Electricity, 1992–2020.



Electrical Safety

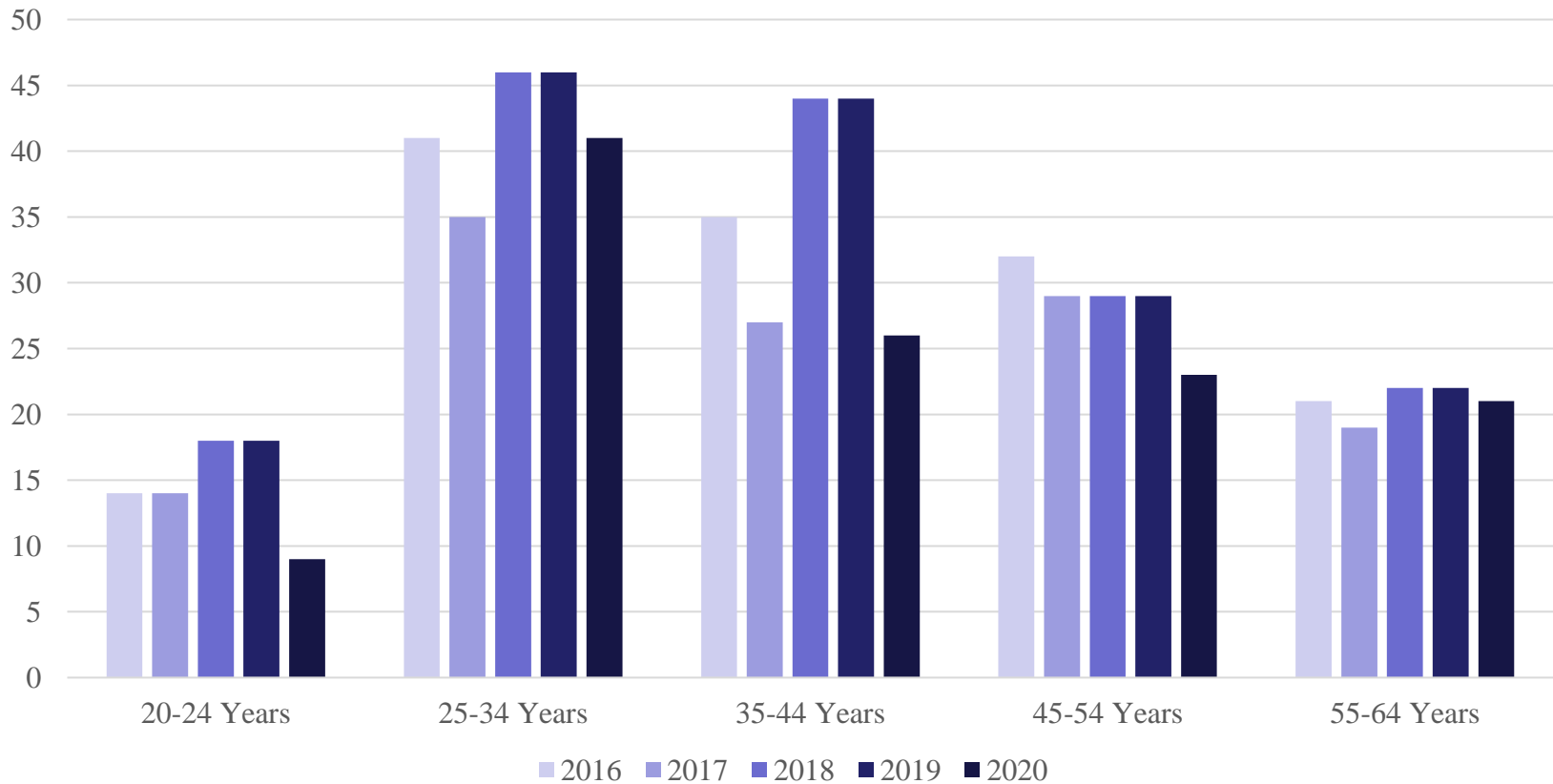
- Nonfatal electrical injuries involving missed days of work.
- In 2020 the median number of missed days from direct exposure to electricity, 220V or less was 3 days.
- In 2020 the median number of missed days from direct exposure to electricity, greater than 220V was 7 days.

Nonfatal Electrical Injuries



Electrical Safety

Fatal Injuries From Exposure to Electricity by Age Group



Arc Fault

What is an Arc Fault?

An Arc Fault is a type of electrical fault that results from the breakdown of an insulating medium between two conductors where the energy is sufficient to sustain an arc across open air.



Arc Flash

What is an Arc Flash?

An Arc Flash is an event that occurs when electrical current flows through an air gap between conductors.

An arc flash can cause extreme amounts of light and immense heat of more than 19,000° C. This can result in an explosive pressure wave called an arc blast.

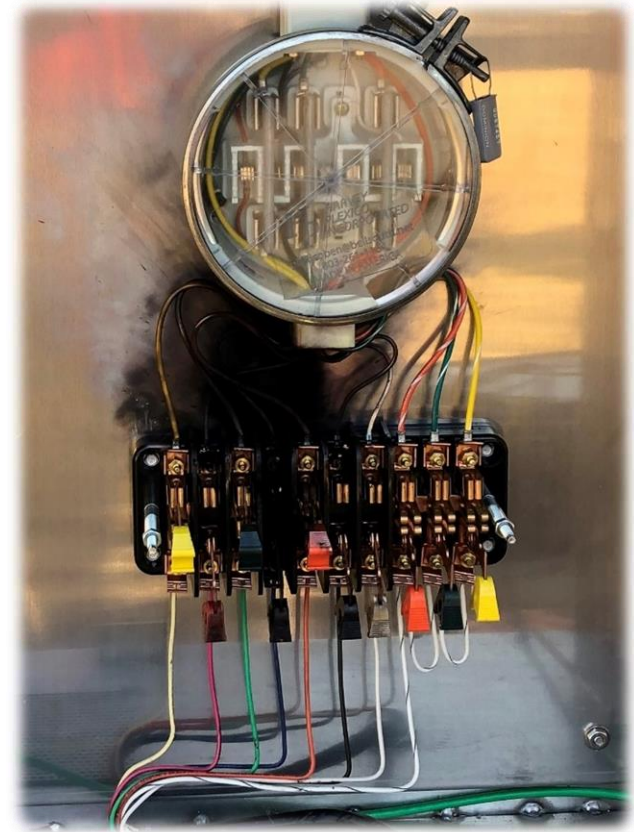
These forces combine to create a hazardous condition that can vaporize metal, destroy equipment, and pose a significant hazard to anyone in the vicinity.



Arc Flash

Arc Flash can also be caused by:

Common causes are the accidentally touching of a test probe to the wrong surface or a slipped tool.



Arc Flash

Arc Flash can also be caused by:

Sparks due to breaks or gaps in the insulation of the conductors.

Equipment failure, improper insulation, substandard parts or substandard material.

Magnetic fields created by dust, corrosion and other impurities can cause ionization of the surrounding air creating a path for a resulting flash.



Personal Protection Equipment (PPE)

This is why we wear our PPE.



Personal Protection Equipment (PPE)

Personal Protective Equipment

- Leathers
- Rubber Gloves
- Face Shield
- FR Clothing
- Safety Shoes
- Insulated Tools



Personal Protection Equipment (PPE)

Arc Flash PPE categories range from 1 to 4

Arc Flash PPE Category level 1 is the lowest risk level.

Arc Flash PPE Category level 4 is the highest risk level



A Common Scenario?

A crew arrives at a worksite, exits the vehicle and prepares to begin the assigned task. Everything needed appears to be on hand. But then someone realizes they forgot a piece of PPE on the truck. Thinking that the task will only take a minute, the worker proceeds with the task without the PPE.

The next thing you know, you've got a face full of something that, at the very least could inconvenience you, if not create a lifelong issue.



OSHA

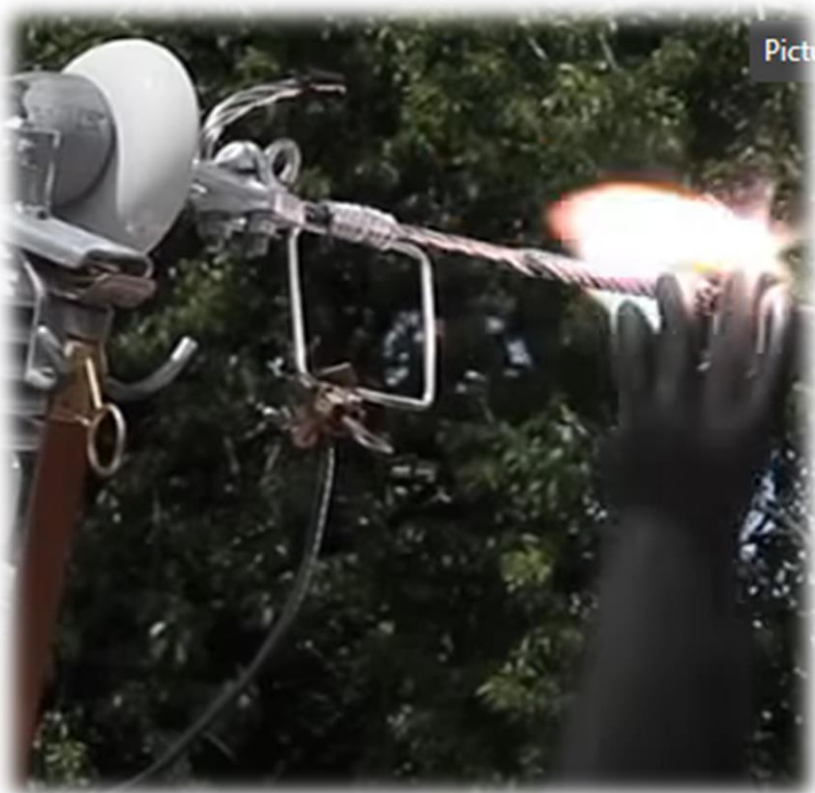
As with any industry, adhering to and complying with OSHA standards and company safety policies is a vital step in preventing injuries. OSHA standards that apply to the utilities industry include:

- Electrical – General Requirements (1910.303)
- Electrical – Wiring Methods (1910.305)
- Electric Power Generation, Transmission, and Distribution (1910.269)
- Personal Protective Equipment, Subpart I (1910)
- Fall Protection (1926.501)
- Hazard Communication (1910.1200)
- Respiratory Protection (1910.134)
- Lockout/Tagout (1910.147)

Basic Safety Rules



How Bad Can Things Get?



Many thanks to Dominion Power

<https://youtu.be/2Xoyb9M5-EA>

Rubber Gloves and FR 4:10

Meter enclosure shorted out 10:48

Back feed from generator 19:34

Field Audits/Troubleshooting/Testing

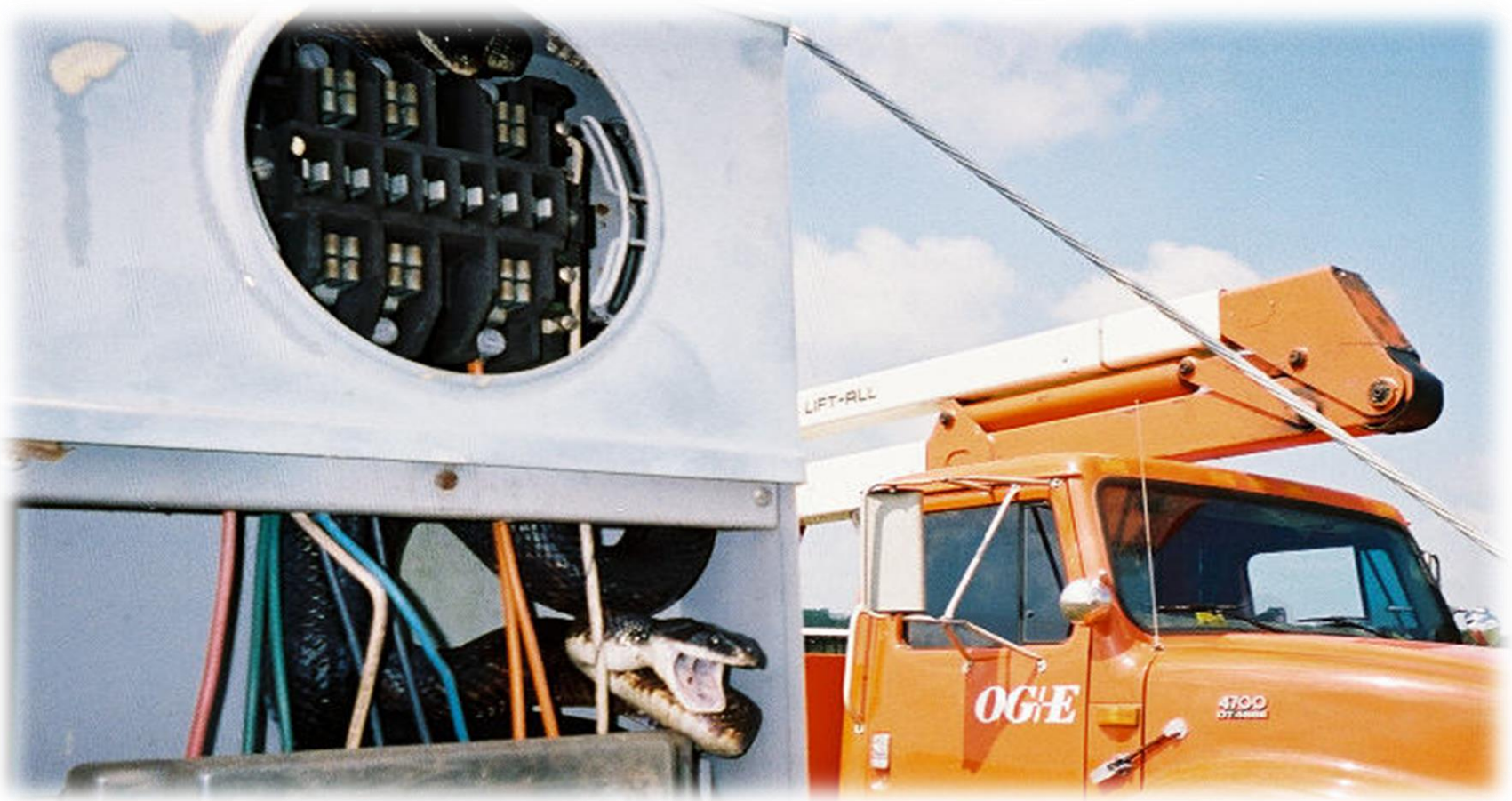
- Always approach an electrical service with caution and while wearing your full PPE. Why?
- Never stand directly in front of the meter when removing the meter
- Before you even open the box or get the cover off....
 - Live box
 - Bees
 - Other live animals
- Broken Seal
- Cover dropping off
- Uneven terrain



Field Audits/Troubleshooting/Testing



Field Audits/Troubleshooting/Testing



Issues to Look For Once the box is Open



- Open line – open line side connection to the meter socket.
- Missing neutral – missing neutral connection to the center lug in the meter socket
- Cross phase condition – cross wiring between the test block and the meter socket.
- Hidden jumpers: line to load – diversion on both legs.
- Dead Short - dead short phase to ground on the load side of one leg of the socket.
- Partial Short - partial short phase to ground on the load side of one leg of the socket.

Tools

- Socket Pullers
- Volt meters
- Insulated tools
- Specialized tools



Summary

- Be Careful
- Assume the box is live
- Assume there is something live in the box
- Treat electricity with respect
- Treat all meter boxes with respect



Personal Protection Equipment



- Issues that you may have seen in your service territory?
- Do you have issues with non-metering personnel performing metering operations?
- Unique issues in your service territory?
- Safety Issues not discussed?
- Are your meter techs typically putting safety first?

Questions?



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This presentation can also be found under Meter
Conferences and Schools on the TESCO web site:

www.tescometering.com