WELCOME!

- Pick up a handout and critique sheet.
- Please take a seat near the front of the room.
- I look forward to making this presentation to you!

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ELECTRIC SAFETY FOR THE

HIGH VOLTAGE

NON-ELECTRICAL WORKER

Presented by

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Serving Lincoln, Lane, Douglas, and Coos County
on the Oregon Coast

541-574-2040

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Lightning

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Are you a…

- Police Officer?
- Fire Fighter?
- Tow Truck Operator?
- Paramedic or EMT?
- Roofer?
- Painter?
- Handyman?
- Arborist?
- Landscaper?
- Reporter?
- Builder?
- Home Owner?
- Good Samaritan?

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Oregon's

High Voltage Line Safety Act

ORS 757.800 & 757.805

The law provides that no work activities take place within 10 feet of a high voltage overhead power line until two requirements are met

- You MUST notify the utility operating the line; and
- You and the utility must agree on precautions to insure the safety of the activity.

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Oregon OSHA Rules

Safety Relies on Communication!

Division 2 K – General Industry

437-002-0074 Proper Notification

The person(s) responsible for the (planned) activity must notify the owner/operator of the line or equipment, at their business office, at least 2 business days prior to the anticipated beginning of work *(business days are Monday through Friday, excluding federal and state holidays).* The notification must include: (1) the proposed date to start activity within restricted space; (2) the location of the planned activity; (3) a description of the planned activity; and (4) name and contact information of the contact person.

Oregon OSHA Rules

Safety Relies on Communication!

(2) General requirement.

Do not enter, perform any function or activity (such as handling, erecting, operating, transporting, or storing any tools, equipment or materials, moving a building or structure) within the restricted space surrounding an overhead high voltage line or equipment unless:

- ***(a)*** *Proper notification is provided; and*
  - ***(A)*** *The line and/or equipment is de-energized and visibly grounded by the owner of the high voltage system or their authorized agent; or*
  - ***(B)*** *Accidental contact is effectively prevented by use of insulating barriers or guards.*

Oregon OSHA Rules

Safety Relies on Communication!

- ***(a)*** *Proper notification is provided; and ...*
- (i) Be erected or installed by the owner of the high voltage system or their authorized agent;
- (ii) Not be attached to, or be part of the lines, equipment, or machinery;

- ***Note: Overhead line covers are only for visual reference, and their use does not allow entry into restricted space. If used, they must be installed by the owner of the high voltage system or their authorized agent.***

- (iii) Prevent all possible contact with the lines or equipment; and
- (iv) Insulate against the system's maximum voltage; or

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Oregon OSHA Rules

Safety Relies on Communication!

- (b) You are the owner, an authorized employee, or authorized (in writing) agent of the overhead high voltage system: or
- (c) Insulated lines (not tree wire) and equipment (designed and engineered to allow only incidental contact) are erected or installed by the owner of the high voltage system or their authorized agent.

- ***Note: Nothing in this standard shifts the responsibility for safe and healthy working conditions from the person(s) responsible for the activity to the owner of the lines or their agent.***

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Oregon OSHA Rules

Safety Relies on Communication!

- ***Note: Nothing in this standard mandates that the owner of the lines or equipment, or their authorized agent must agree to de-energize, move, barricade, guard, or insulate lines or equipment, or take other action to allow entry into restricted space.***

—(3) Do not move, reposition, or reduce restricted space in any direction by applying stress or force to a line, equipment, or supporting structure.

Oregon OSHA Rules

Division 3 K Construction

NOTICE: The Division 3 K Rules

437-003-0047

were re-written and published to parallel the Division 2 Rules.

This change is not reflected in the current release of the OR-OSHA CD set

CALL YOUR UTILITY!!

ELECTRIC · GAS

WATER · SEWER

CABLE · PHONE

ETC.

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Electricity Has No Conscience!

- Doesn’t care how old you are
- Doesn’t care how smart you are
- Doesn’t care how good looking you are
- Doesn’t care about your family
- Doesn’t understand good or bad luck
- Doesn’t care what the books say
- It just doesn’t care!

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Arrogance

- Law Enforcement - I have a badge!
- Fire Fighters - I have an axe!
- EMT - I have an emergency!

- Electricity - Yeah, so?

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What Will Get You Killed

We'll talk about these

- Touch Hazards
- Step Potential Hazards
- Induction Hazards
- Saving Time / Hurrying
- Tunnel Vision

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So, what will we discuss today?

- Electric Theory (simple and short)
- Hazards
  - Touch
  - Step
  - Induction
- Avoiding Hazards

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That sounds
simple enough,
doesn't it?

Sure it does…

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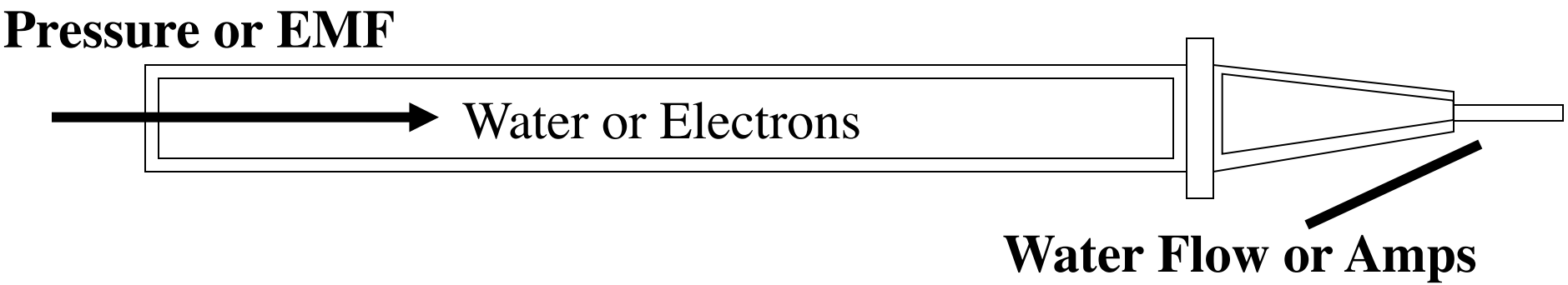
So, What Is Electricity?

- Think of a water hose
  - Water = Electrons
  - Water Pressure = Volts (electromotive force)
  - Restrictions to Water Flow = Resistance (ohms)
  - Rate of Water Flow = Amps
  -



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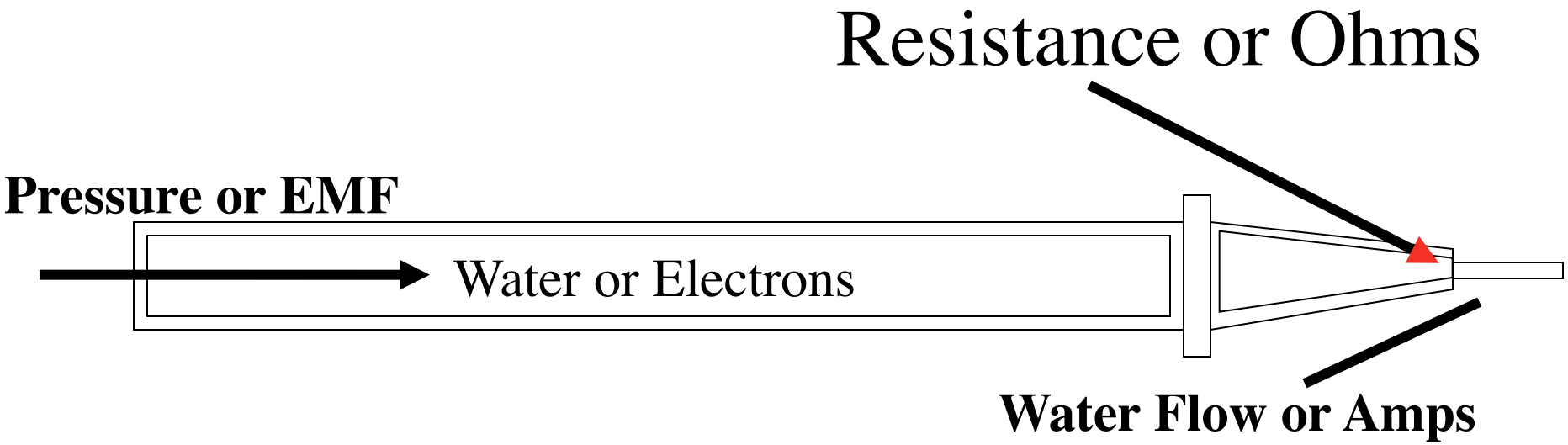
- Volts X Amps = Watts (work being done)
- Current flows from a high pressure area to a low pressure area
- For work to be done, their must be resistance (load) to flow
  - Restrictions to Water Flow = Resistance (ohms)
  - Adding Resistance uses up a part of the current
  - Creates a voltage drop with a difference of potential



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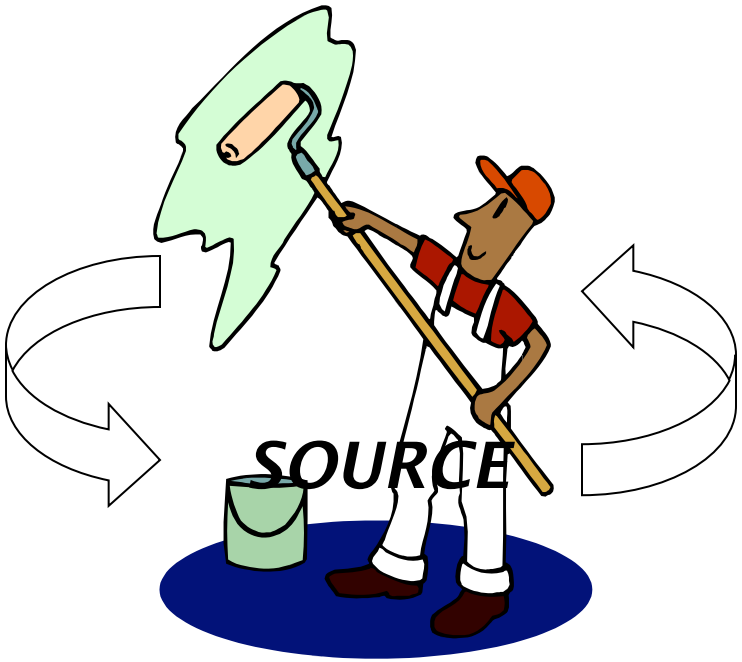
Electricity Always Returns to the

- It needs to complete its path back to the source.



• YOU want to take every precaution to avoid being a part of that path!

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You are the Load or Resistance!

- A circuit with no load has no current so there is no significant “voltage drop”
- When a load is added, voltage is “used up” in pushing the current through the resistance
- Current X Resistance = Voltage Drop
  - The resistance of the body may be significant
  - Significant voltage drops create significant heat
  - Significant heat results in significant injury
  - Significant injury is accompanied by significant PAIN
  - Or DEATH

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So, How Do I Avoid This?

- ***Learn***
- ***Look***
- ***Listen***

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LEARN

- Take the time to learn about the area you will be working in
- What is attached to Power Poles besides electric lines?
- Are underground electric lines in ducts or are they directly buried?
- Do other utilities (water, gas, sewer, cable…) use the same colors in their underground

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Fred Meyer
Chalet
Restaurant & Bakery
PACIFIC NORTHWEST FRESH
Fred Meyer

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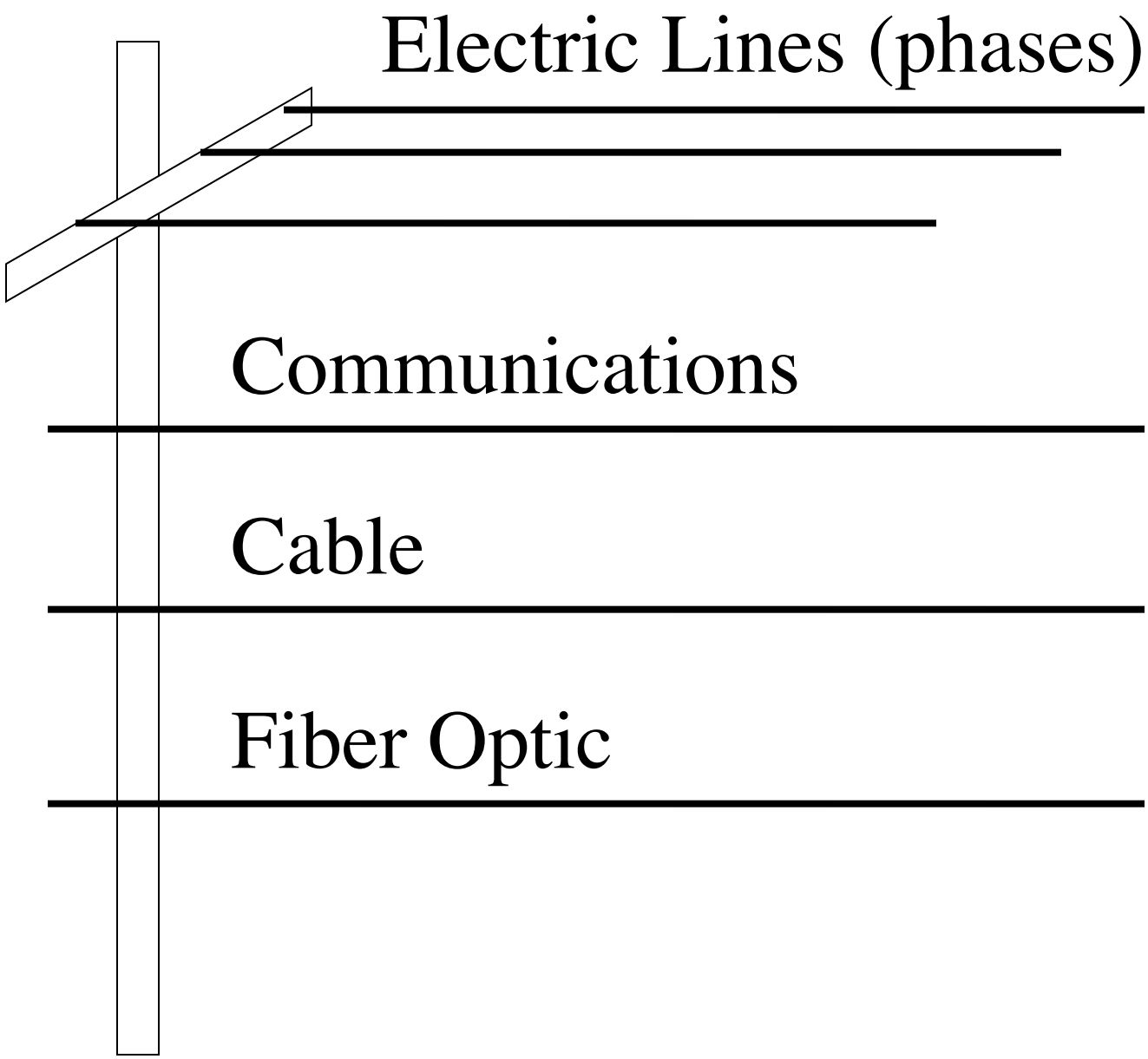

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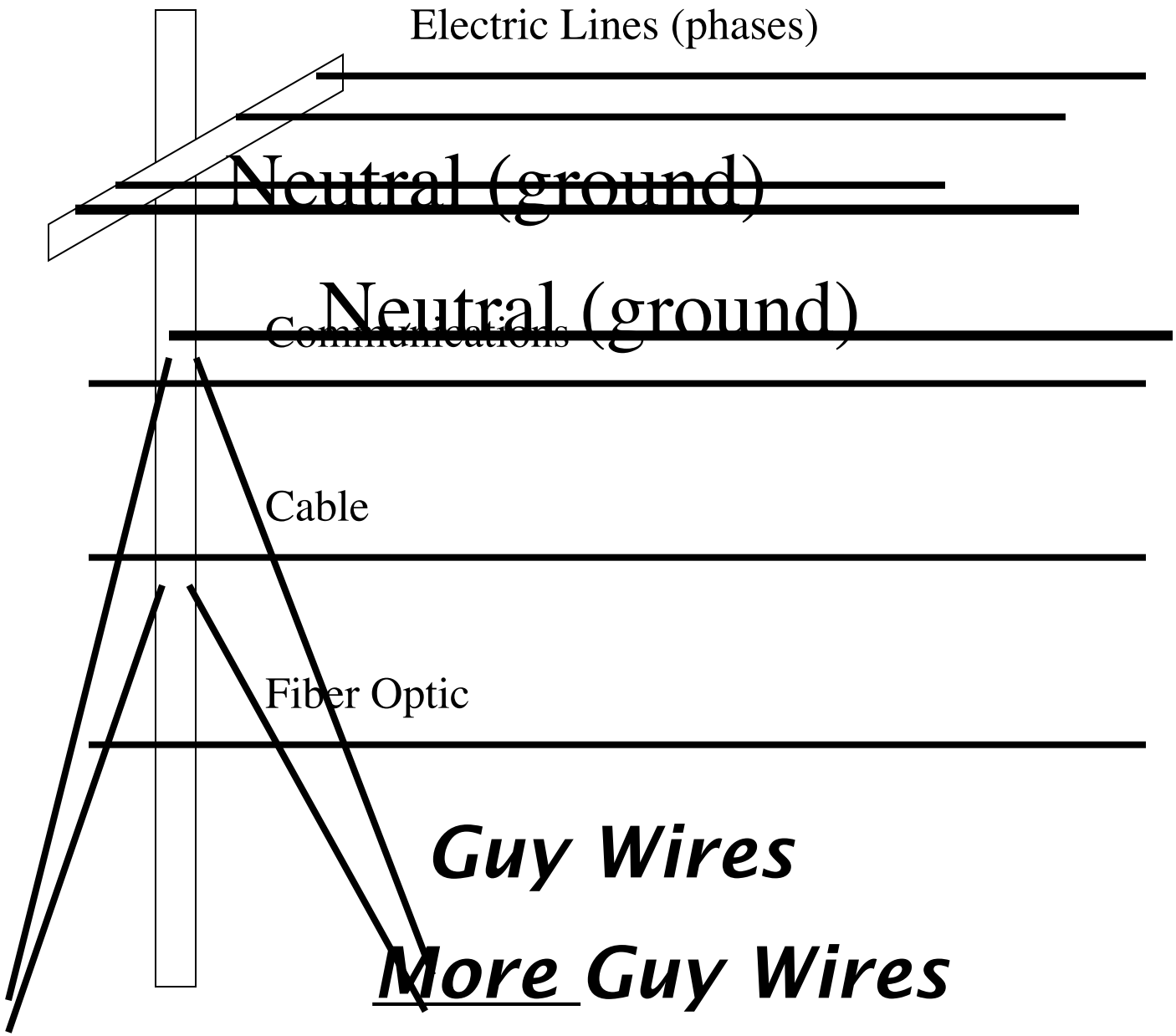
Electric Lines (phases)
Neutral (ground)
Neutral (ground)
Communications
Cable
Fiber Optic
Guy Wires
More Guy Wires

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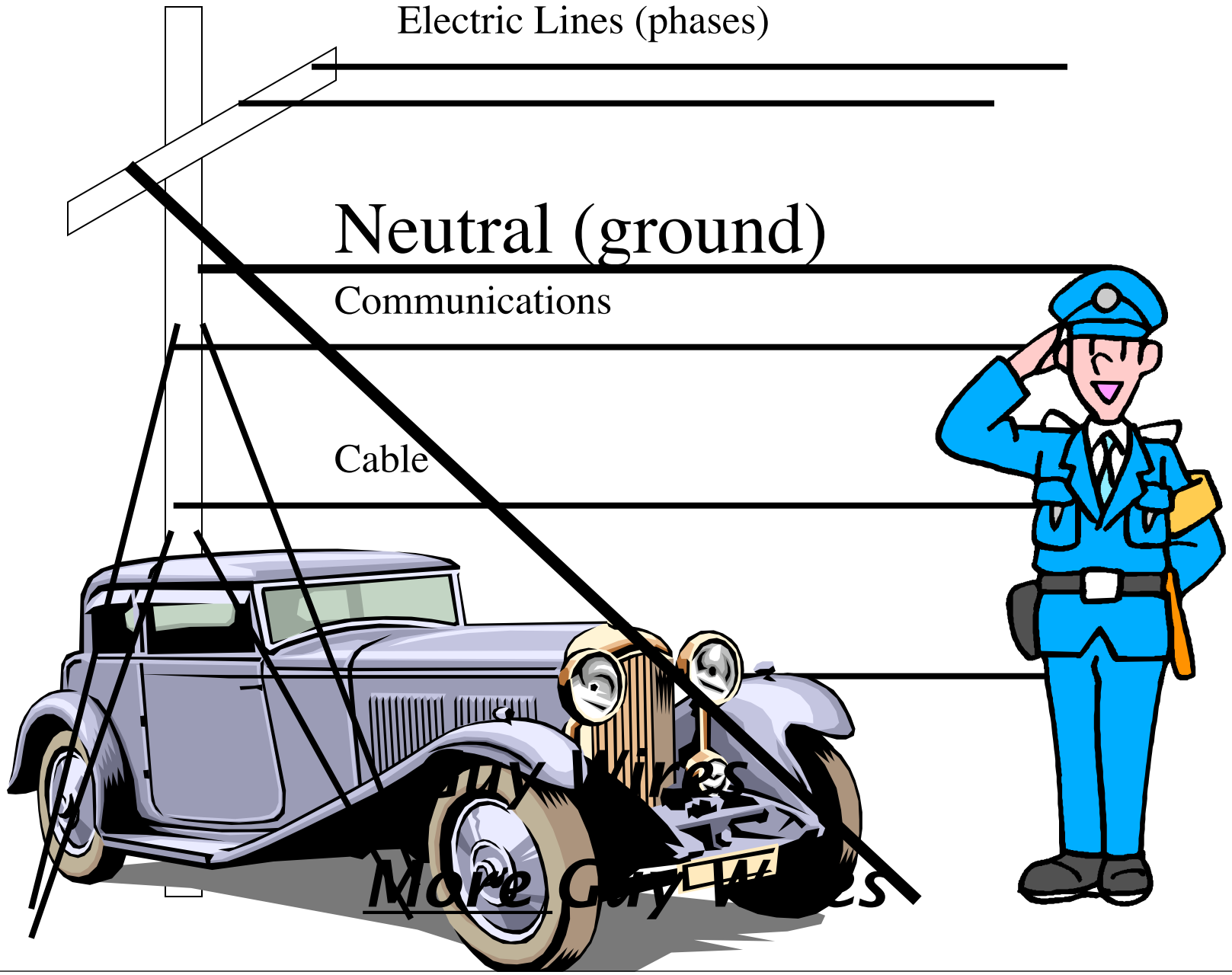
Electric Lines (phases)
Neutral (ground)
Communications
Cable

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POTENTIAL… it kills!

- Why can birds sit on a power line and not become a KFC special?
- Because their feet and body are at the same potential as the power line.
- In some states, power line workers work on high-voltage lines while they are energized!

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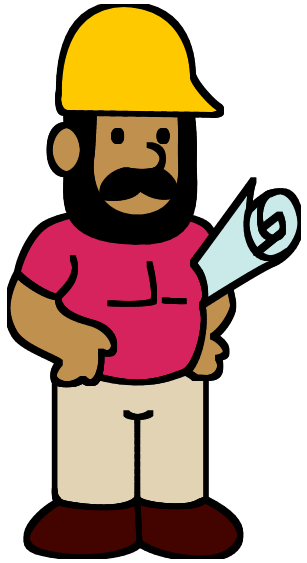
POTENTIAL… it kills!

- You aren't a bird!



- You aren't a qualified power line worker

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- The next slide is from a BPA video of some tests they conducted with well maintained switch positions under controlled conditions.
- You won't enjoy controlled conditions, so your "Hazard Effect Quotient" will be much higher.
- You'll be like the guy that is 30 feet away from the fault. You'll feel safe until your feet start burning.

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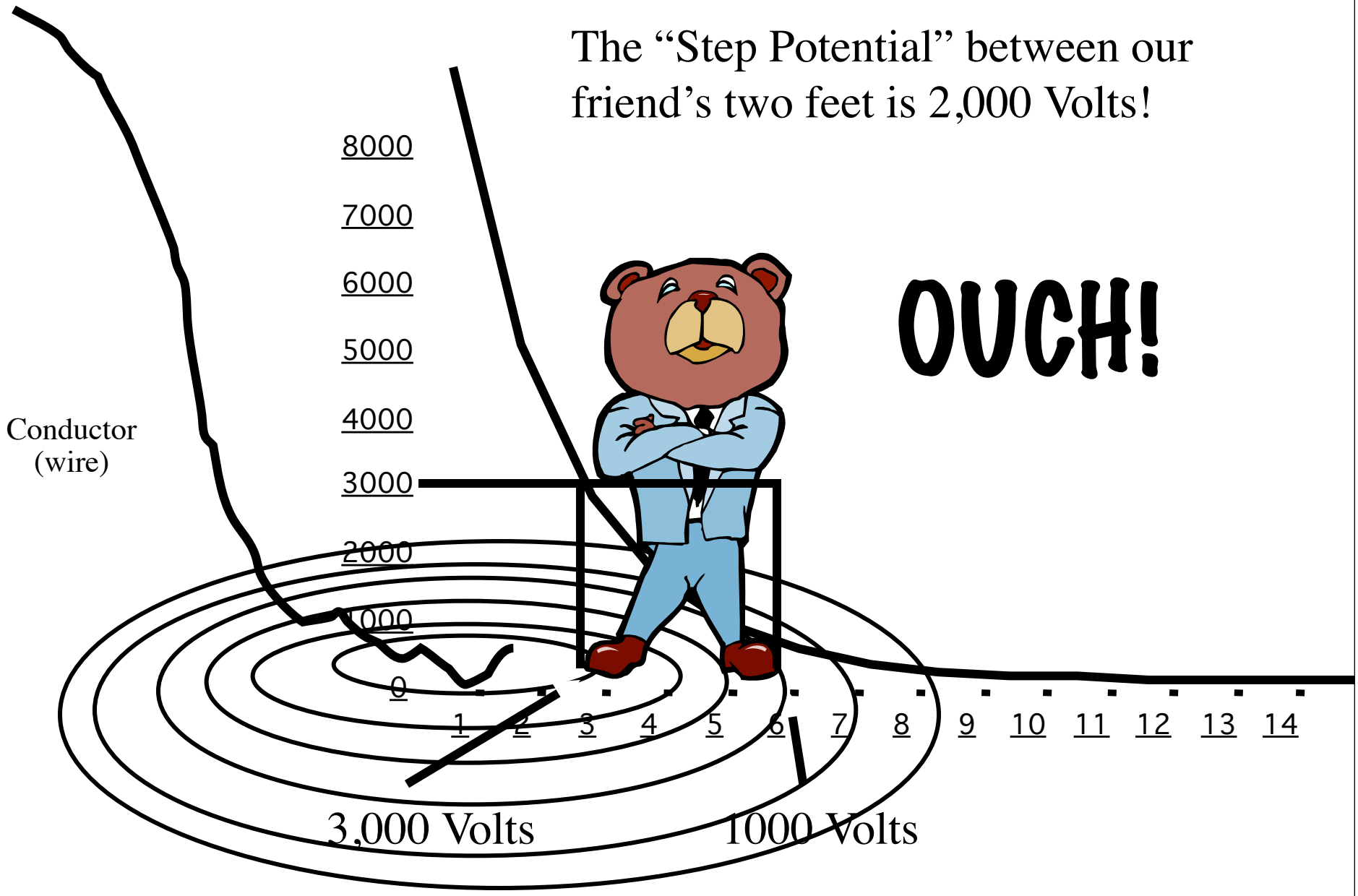
The "Step Potential" between our friend's two feet is 2,000 Volts!



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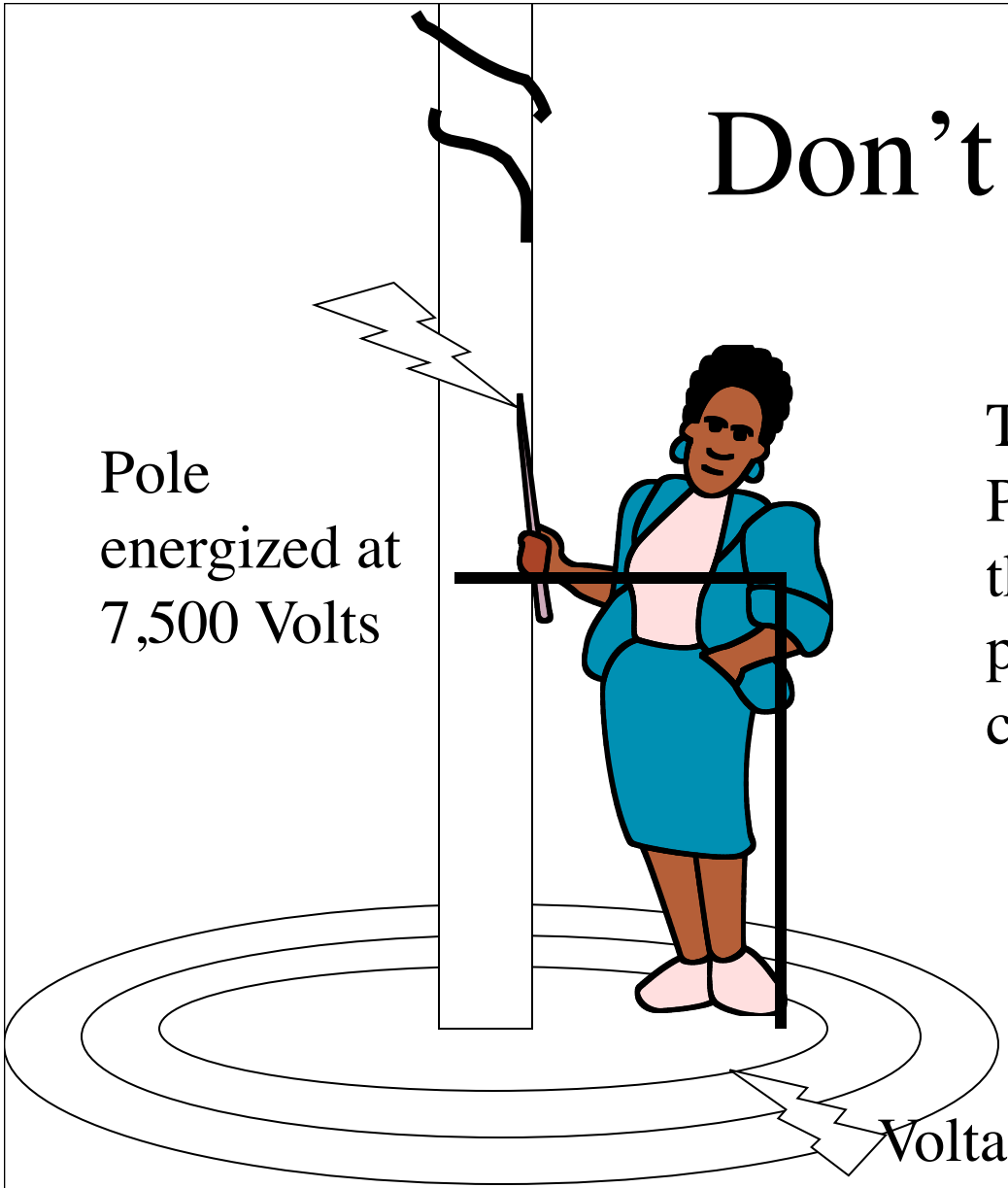
Don’t Touch That!



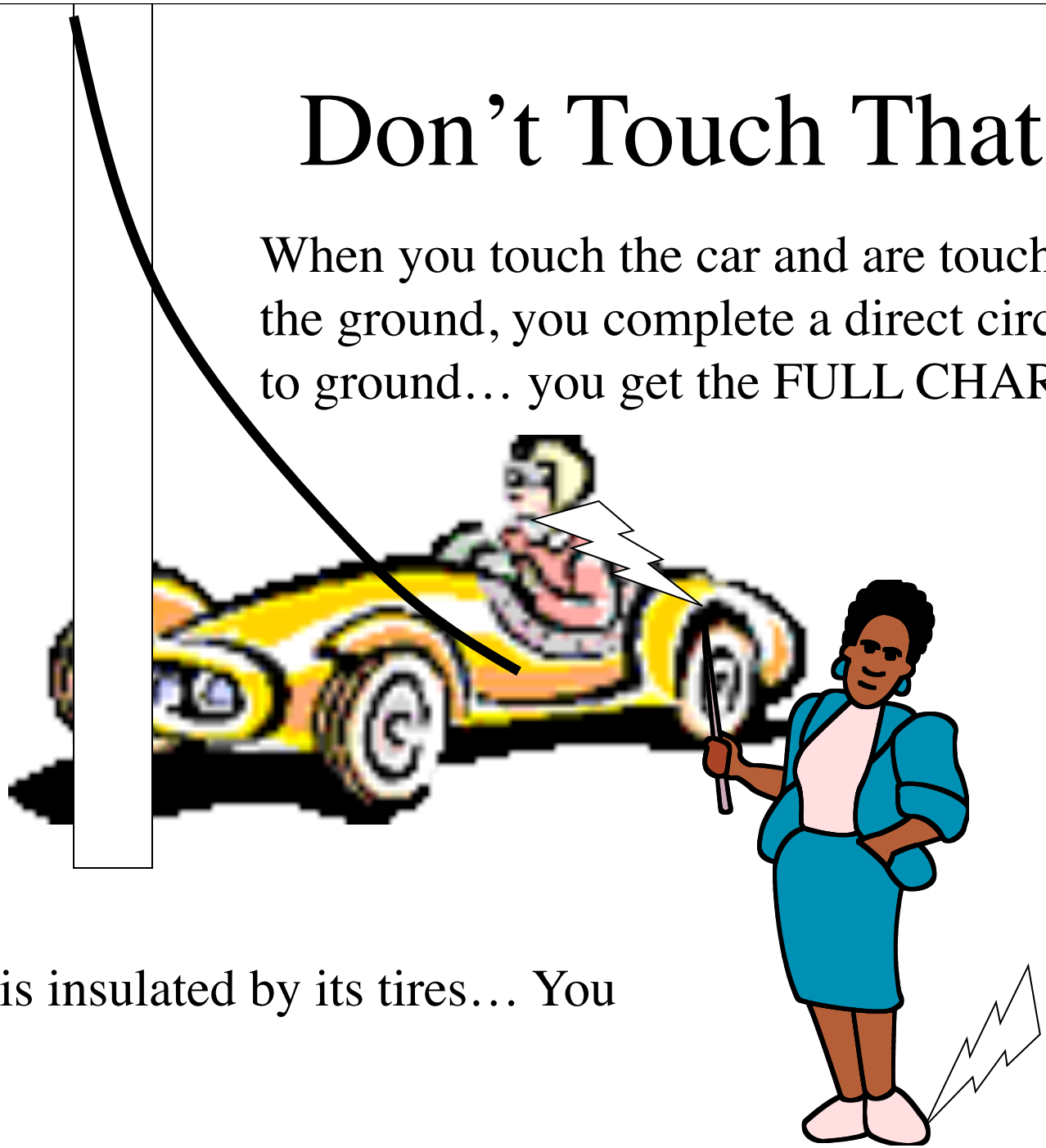
Pole energized at 7,500 Volts

Voltage gradient at 2,000 Volts

Touch Potential… like Step Potential… Hazards are simply the difference in electrical potential at two different contact points.

Don’t Touch That!

When you touch the car and are touching the ground, you complete a direct circuit to ground… you get the FULL CHARGE!



The car is insulated by its tires… You aren’t!

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Induction

- An ungrounded wire near a conductor
  - Has an induced voltage
  - Higher voltage when conductor's voltage is high
  - Higher voltage when conductor is closer
- Because it is ungrounded there is no current
  - Until the circuit is completed
  - Current flow will be sudden when circuit to ground is completed.
- Don't be the completing element!

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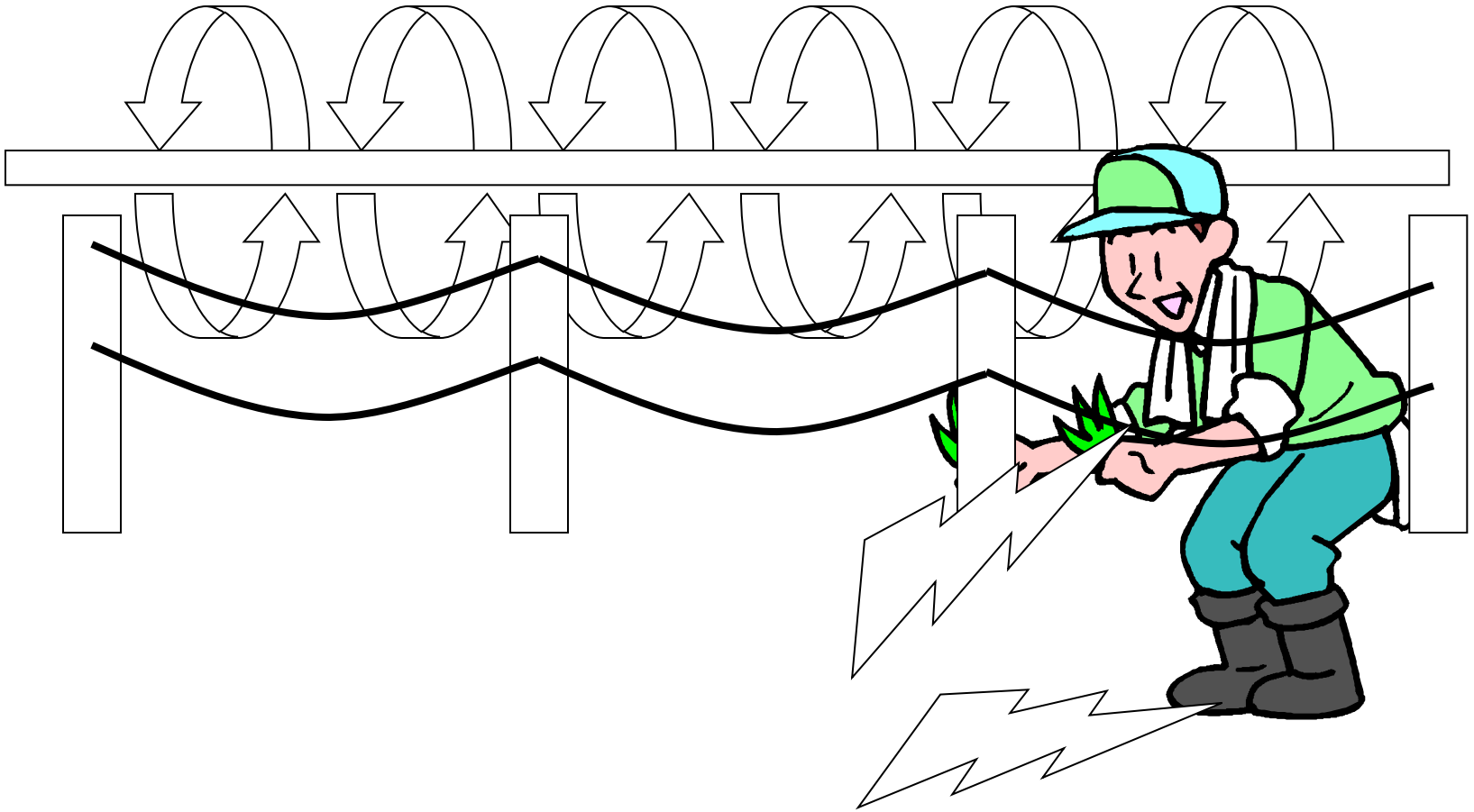

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Induction

- A grounded wire near a conductor
  - Has an induced voltage
  - Higher voltage when conductor's voltage is high
  - Higher voltage when conductor is closer
- Because it is grounded there is current
  - Current will be constant
  - Treat this like an energized, live wire!
- Don't become part of the circuit!

(Not in handout… sorry)

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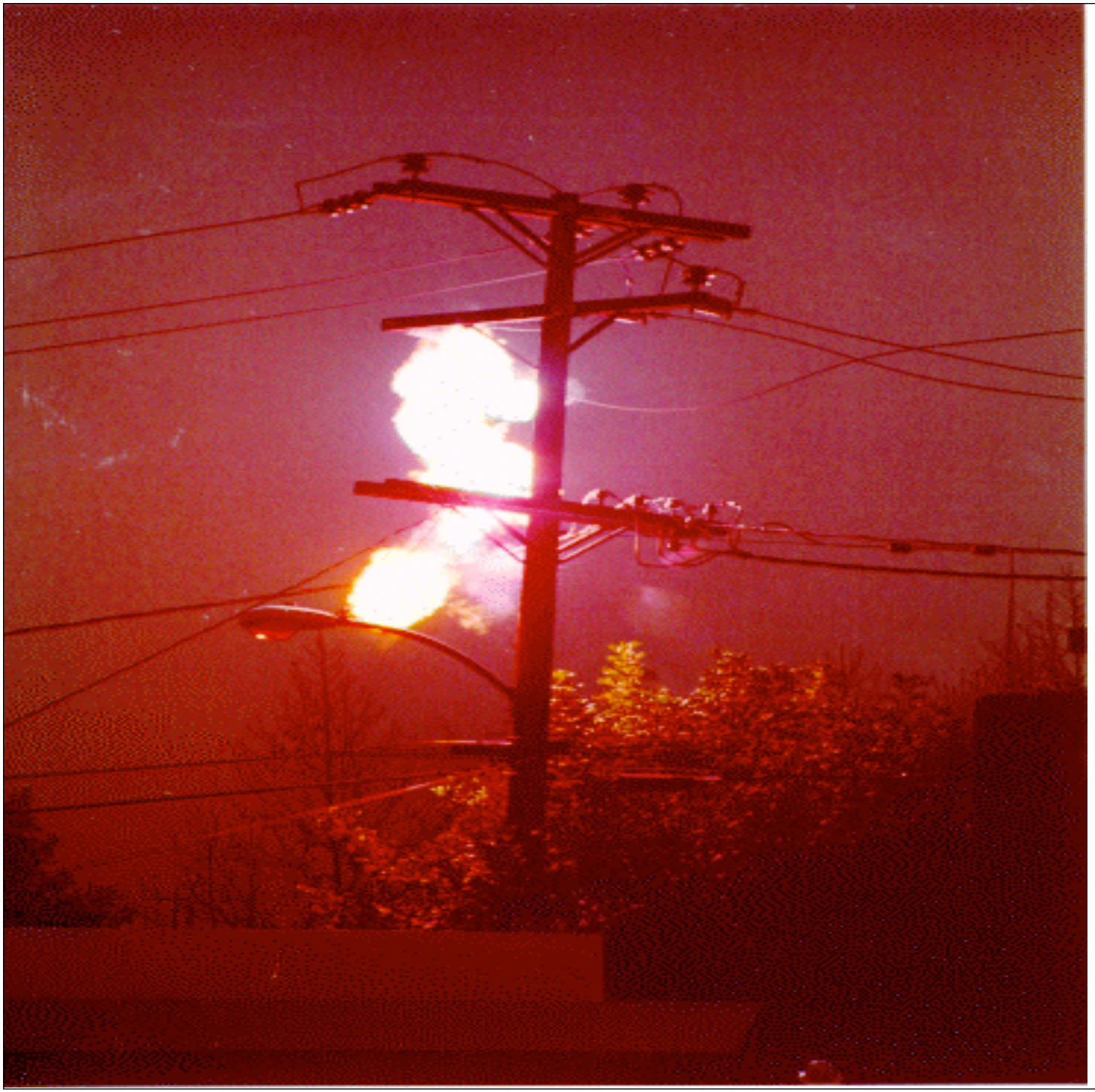

This is a graphic and tragic example of what happens when a person contacts different potentials.

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Look

- ALWAYS TAKE THE TIME TO LOOK UP!
  - Make sure you have the clearance to work safely
  - Make sure your concrete hose, dump body, extension ladder, paint roller, tree pruner, rescue line, etc…
  - Won't even come close to power lines

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Look

- Before you even get close to the scene of the incident…
  - Look to see that there are no wires hanging down… anywhere
  - Look to see that guy-wires are not loosened and contacting other wires
  - Look for arcs, sparks, smoke, or glass-like beads on the ground

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Look

- Before you even get close to the scene of the incident…
  - Look to see if there is any indication the pole is broken or unstable
  - Look to see if any conduit on the pole appears to be broken or hanging free
  - Look to see if there are puddles or muddy areas near the incident

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Tools You CAN'T Rely On

- Rubber boots
- Rubber gloves
- Wooden sticks
- Fiberglass handled tools
- Rope or Line of any kind
- These will get you killed

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Tools You CAN Rely On

- Radios, Telephones, Semaphore Flags!
- Communications with the Power Company
  - Pre-work briefing
  - Call from the site if an emergency exists
  - Call from the site if you aren't absolutely sure of what you are looking at!

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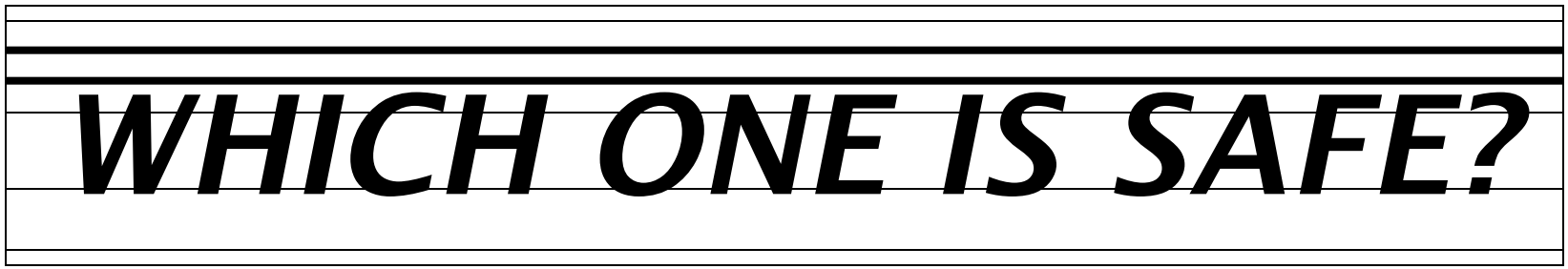
Underground Dangers

- Mis-Identified cables or conductors
- Confusing color codes
- Lack of color codes
- Inaccurate “locates”

Trench



The UNDERGROUND MESS

- There have been efforts to color code
- Adherence to color codes has not been consistent
- Customer Installations VS. Utility Installations
- “Evolved Subdivisions”
- Speculative Installations

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Underground Safety

- Never assume that you know the depth
- Always hand expose… CAREFULLY
- Never assume that Locates are absolutely correct
- Never assume the color you are looking at represents what is actually there!
- Utilities may be “stacked”… unusual

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CALL YOUR UTILITY!!

ELECTRIC · GAS

WATER · SEWER

CABLE · PHONE

ETC.

You want to get home… Safely

Thank You!
Questions?

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