Electricity Friend or Foe

Electrical Safety
Outcomes

- You will learn the hazards of electricity
- You will learn how electrical safety applies to Red Willow
- You will learn how to prevent electrical incidents
Friend or Foe

Electricity is our Friend

- It Provides lighting our homes and business
- It provides heat for our homes and business
- It provides air Conditioning
- It provides a renewable energy source (hydroelectric energy)
- It can be produced without pollution (hydroelectric and nuclear)
Friend or Foe

Electricity is also our Foe
- It can shock if you make contact with it
- It can burn if you make contact with it
- It can explode if there is an arc and a fuel source
- It can Kill! Electrocutations claim more than 400 lives each year
Red Willow Operations

- How is it our friend here at Red Willow?
  - It provides source of energy for some pumping units in the San Juan Basin and all of our pumping units in Texas
  - It provides power for our automation system

- How is it our Foe at Red Willow?
  - It can be the ignition source for a gas fire
  - It can be the cause of an injury do to a shock
  - It can be the cause of an explosion
How do we ensure it is not our foe

We need to have knowledge of electricity

Effects of Electrical Current in the Human Body

Current Reaction

- Below 1 milliampere: Generally not perceptible.
- 1 milliampere: Faint tingle.
- 5 milliamperes: Slight shock felt; not painful but disturbing. Average individual can let go. Strong involuntary reactions can lead to other injuries.

6–25 milliamperes

9–30 milliamperes: Painful shock, loss of muscular control. The freezing current or "let-go" range. Individual cannot let go, but can be thrown away from the circuit if extensor muscles are stimulated.*

50–150 milliamperes: Extreme pain, respiratory arrest (breathing stops), severe muscular contractions. Death is possible.

1,000–4,300 milliamperes: Rhythmic pumping action of the heart ceases. Muscular contraction and nerve damage occur; death likely.

10,000 milliamperes: Cardiac arrest and severe burns occur. Death is probable.

15,000 milliamperes: Lowest overcurrent at which a typical fuse or circuit breaker opens a circuit!

50 to 150 milliamps can kill!

100 Milliamps = .1 of an amp
Electrical Burns

Burns Caused by Electricity

Electrical burns can result when a person touches electrical wiring or equipment that is used or maintained improperly.

How do we prevent electrical burns?
(Contact with electricity)
Preventing electrical burns

- Avoid contact with electricity
- Use lock out/tag out procedure
- Wear proper Personal Protective Equipment
- Don’t use defective equipment
- Maintain equipment
- Close circuit boxes
- Use rubber insulation
- Call 811 for underground utility locates
Electrical Burns

**Burns Caused by Electricity**

- Arc-blasts occur when powerful, high-amperage currents arc through the air. Temperatures as high as 35,000°F have been reached in arc-blasts.
Preventing Arc Flash Burns

- Stay out of electrical panels unless authorized
- Close/open circuits by standing to side of circuit box
- Wear proper personal protective equipment which includes FRC, a face shield and electrical insulated gloves
Burns Caused by Electricity

- Thermal burns may result if an explosion occurs when electricity ignites an explosive mixture of material in the air. This ignition can result from the buildup of combustible vapors, gases, or dusts.
Explosions

- Explosions can be caused by electrical equipment being used in a flammable atmosphere

- How do we prevent this?
Preventing Explosions

- Eliminate the ignition source
  - Use a Hot Work Permit and follow its guidelines
  - Use intrinsically (explosion proof) safe equipment
  - Always carry and utilize your 4 gas monitor – *(Testing the atmosphere for an explosive gas is the most important step you can take)*
  - Pay attention to what your monitor is telling you.
Preventing Fires

- Fires can be caused by electricity

- How can we eliminate these fires?
Preventing Electrical Fires

- Don’t overload circuits
- Don’t use electrical cords that are not rated for the amperage/wattage of the equipment it is connected to.
- Inspect electrical system
How about batteries

- They create their own hazards
  - Hydrogen gas can build up creating an explosion hazard

- How can we prevent hazards from batteries?
Preventing Battery Hazards

- Know how to jump a battery
- Store them properly
- If you need to add water or conduct maintenance on a battery, wear proper PPE
One More Electrical Issue

- Static Electricity
  - Caused by separation of unlike materials
    - Walking on carpet
    - Transferring product from one container to another
    - Splash loading tanks and tankers

- How do we prevent static hazards?
Preventing Static Electricity issues

- Grounding and bonding (use your jumper)
- Use metal containers
- Use down comers
- Reduce volume when transferring the product
Summary

- Electricity can cause injury, fires and explosions.
- Know the causes and know the prevention techniques.
- Don’t work on or with electricity unless you have been properly trained and qualified!!