Occupational Safety near Electrical Infrastructure

ELECTRICITY...POWERING OUR NATION'S PROGRESS SINCE 1911

Occupational Safety near Electrical Infrastructure

Presented By:

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ELECTRICITY...POWERING OUR NATION'S PROGRESS SINCE 1911

Overview

- Generation and delivery of energy
- Typical BLPC infrastructure
- General safety considerations
- Protective systems
- Managing safety risks when near to electricity

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HSEQ POLICY

The Barbados Light & Power Company Limited is committed to the establishment and maintenance of a Health and Safety, Environmental and Quality (HSEQ) Management System that will help it to deliver consistent customer satisfaction, while safeguarding the health and safety of its employees, contractors, customers, the wider community, and protecting the environment.

The objectives of the HSEQ Management System are as follows:

1. A management system that satisfies the requirements of ISO 9001 Quality Standard, ISO 14001 Environmental Standard, and OHSAS 18001 Occupational Health and Safety Standard.
2. Continual improvement of the effectiveness of the HSEQ Management System by setting and reviewing objectives and targets on a regular basis and taking corrective action.
3. Commitment to:
   - Prevention of injury and ill health,
   - Pollution prevention and environmental conservation
   - Comply with quality requirements
   - Comply with relevant environmental, health and safety legislation and regulations
4. Empowerment of employees by ensuring the necessary resources and training are available to attain the standards required of an effective HSEQ Management System.
5. Achievement of a high level of awareness of the HSEQ Management System by all employees and contractors engaged by the Company.

Mark King
Managing Director

Date: April 2nd 2012

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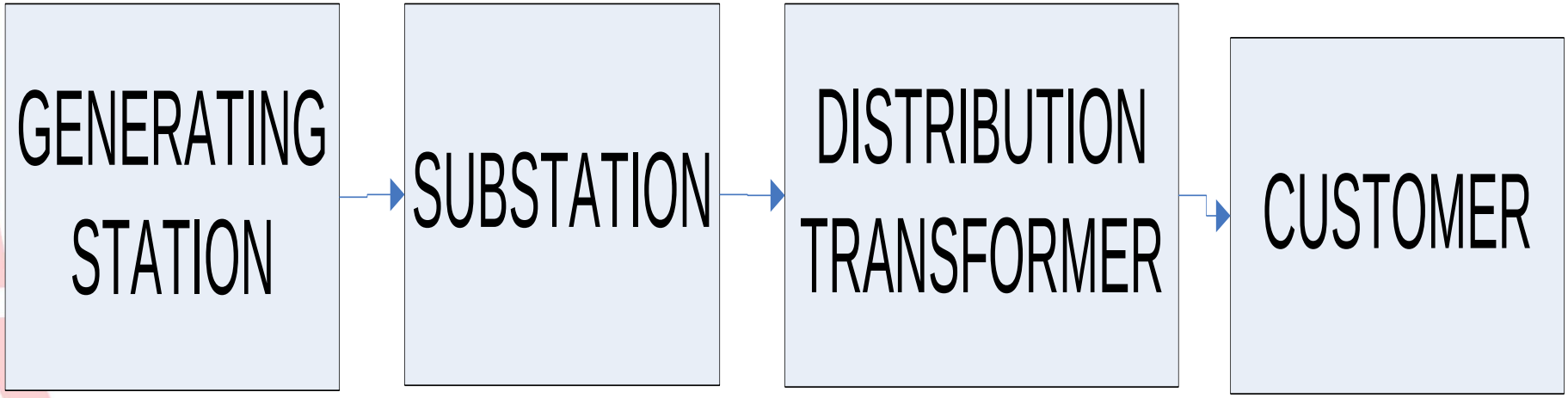
HSEQ Management Policy

The Barbados Light & Power Company Limited is committed to:

- **delivering consistent customer satisfaction,**
- **safeguarding the health and safety of its employees, contractors, customers and the wider community**
- **protecting the environment.**

GENERAL UNDERSTANDING OF ELECTRICITY PRODUCTION & DELIVERY IN BARBADOS

Delivery of electricity



Underground
Cable

69,000 V

Transmission
Lines

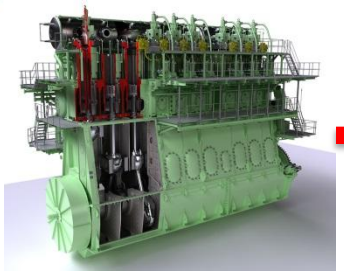
24,000 V

Distribution
Lines

11,000 V

115/230 V

Levels of Voltages



- Utility
  - Commercial
  - Industry

HT
- 6350V, 11000V, 14400V, 24900V,
- 69000V – Utility

- Non-Utility
  - Home
  - Work
  - Play

LT
- 115 – 400V

Safe use of Electricity

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TYPICAL BLPC EQUIPMENT

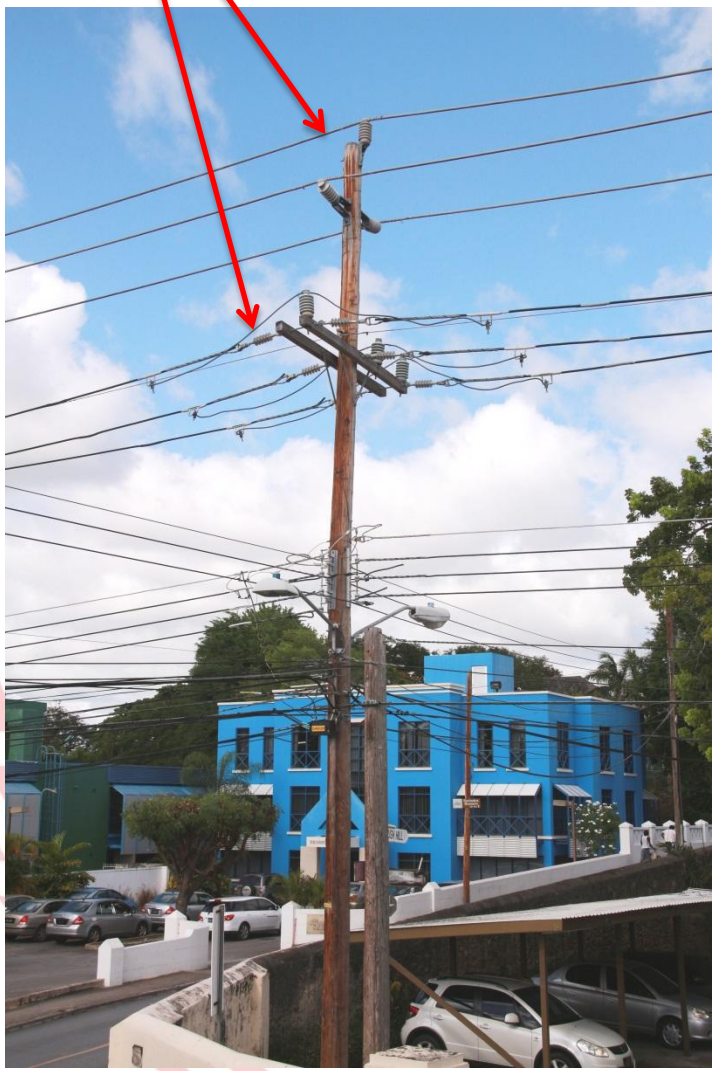
Ground mounted S/Gear

Pad mounted transformer

LT Turret

LT Turret

Armless &
Horizontal HT



2 Horizontal
HT circuits

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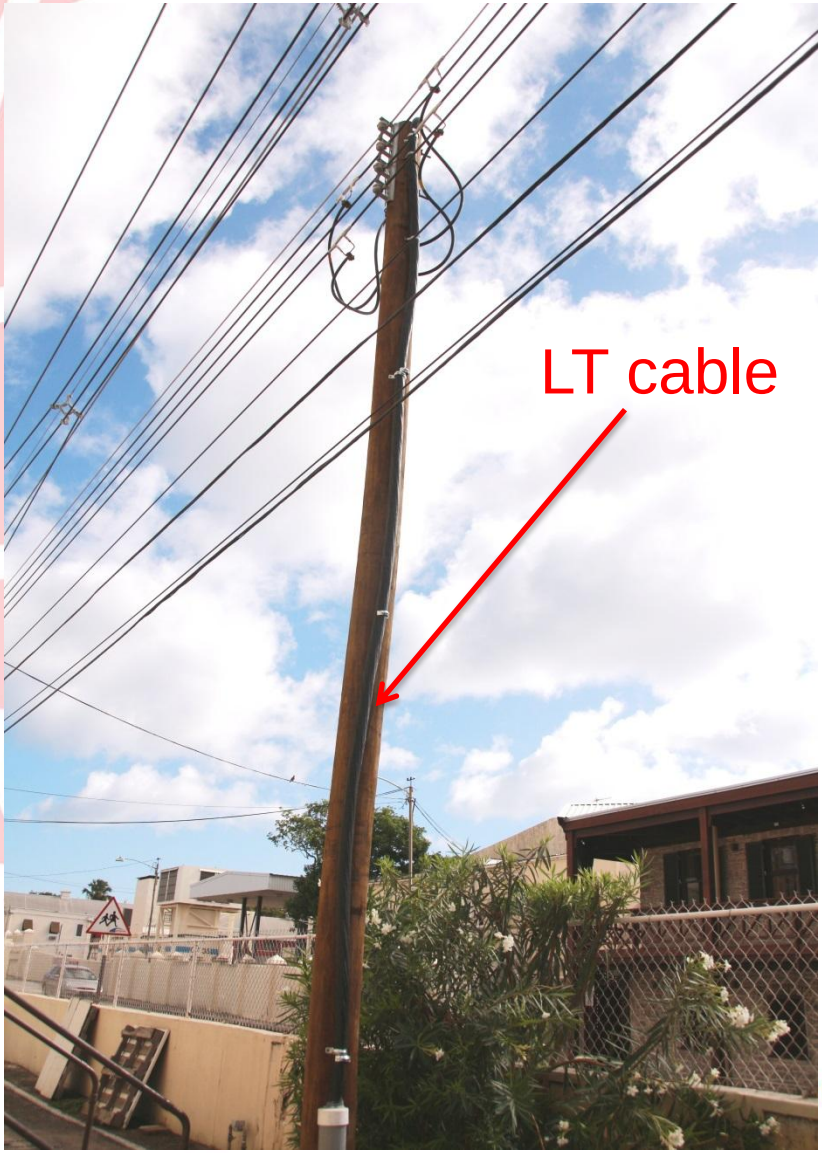

Gypsy HT

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Example of Line Construction

Transmission 24kV

Distribution 11kV

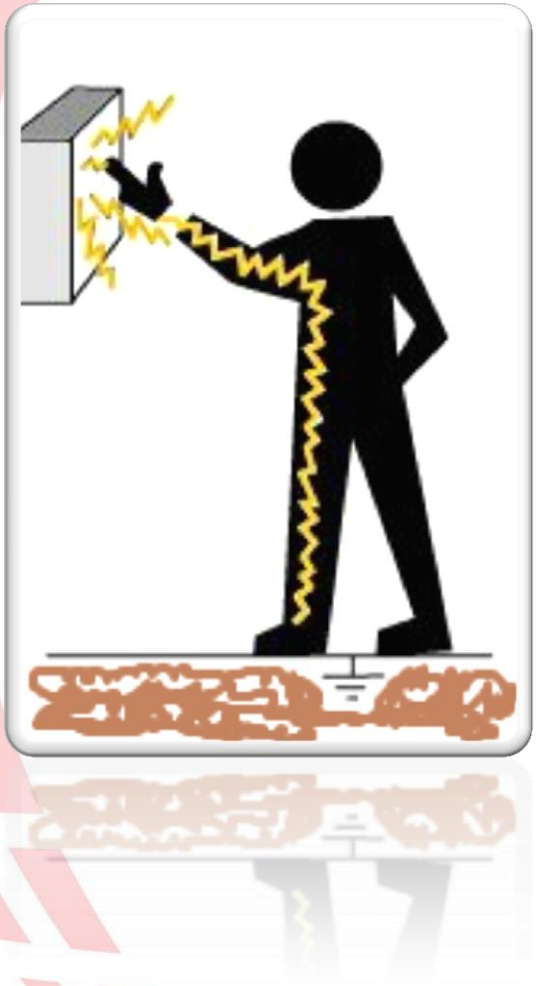
Low voltages (115 - 400 V)

Underground Cable (> 69kV)

Grid numbers

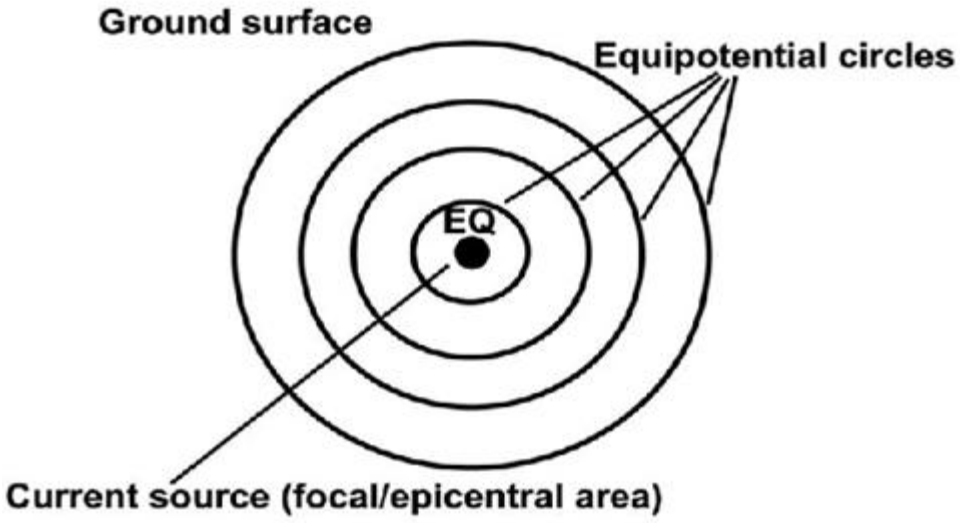
General Safety

TOUCH POTENTIAL



- Voltage difference between the energized object and the feet or the part of the persons that grounded
- Path of least resistance to ground

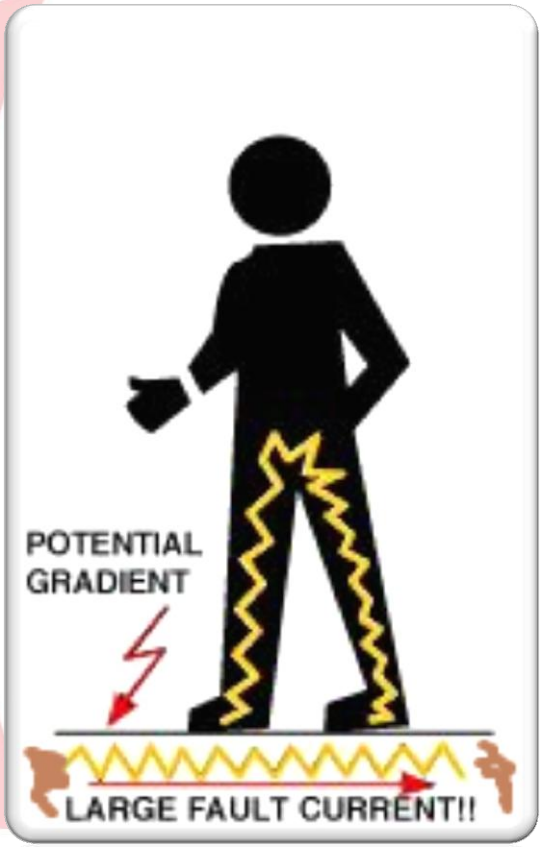
Electrical Potential Risk



Equipotential Zone

Step Potentials

STEP POTENTIAL



- Voltage difference between a person's feet
- Caused when current is flowing through the ground, resulting in a potential difference between two points on the ground.

Limits of Approach Near Conductors

Nominal voltages	Exposed Conductors
.75 to 15 kV	**10ft**
15 to 50 kV	**10ft**
50 to 150 kV	**15ft**
Conditions / Restrictions	General public, unqualified utility workers must maintain set distances as prescribed

Potential Breaches of Limits of Approach

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Cranes

Ladders/Elevated work platforms

Construction work

Downed power lines

Safe Limits of Approach

Damaged underground services

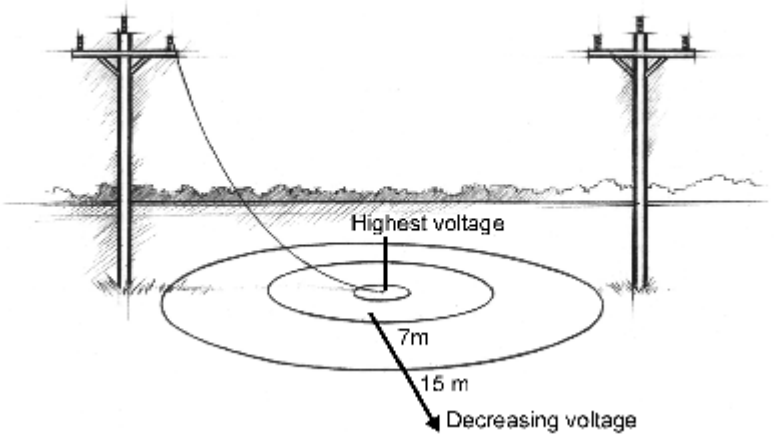
Picking fruit Trees near lines

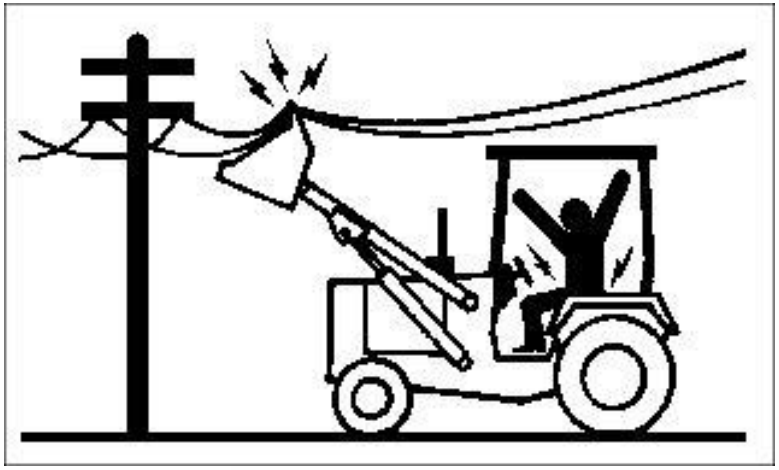
Positioning tower lights

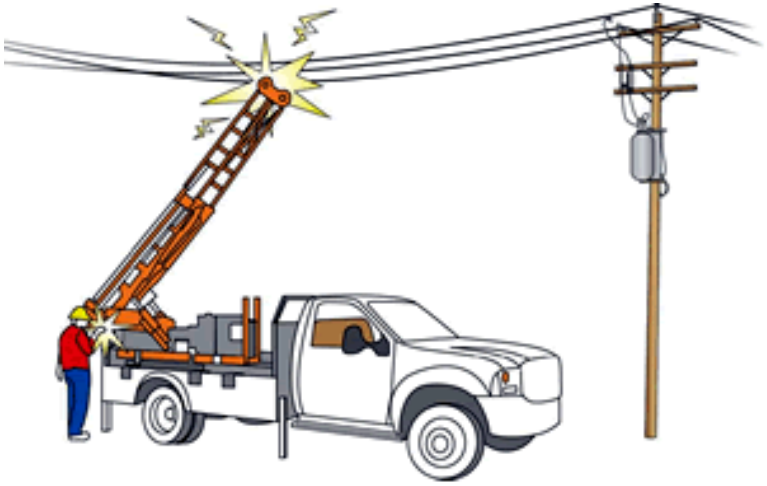
Working on roofs

Using a jet of water

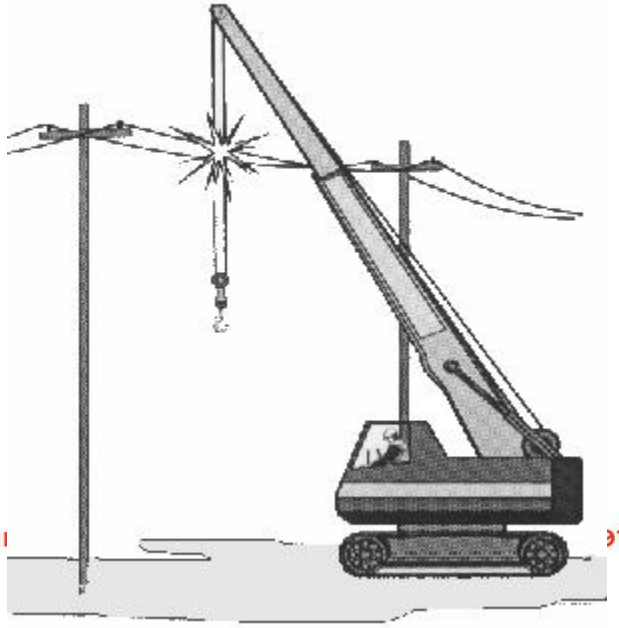
BREACHES OF LIMITS







Do not approach or touch anything (such as a vehicle, tree, or fence) that is in contact with a power line.



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Protective Systems at BLPC

Hotline Gloves

Hotline Sticks

Protective Systems

- **Overcurrent**
- **Earth Fault – “earth wires”**
- **Distance**
- **Fuses**
- **Circuit Breakers**

Impact of Trees on Power lines

Impact of Trees on Lines

Impact of Trees on Lines Cont'd

Down Power Lines and Personal Safety

Fallen Power Lines and Equipotential Zone

Damage to overhead conductors

- **Minimum 15ft above road level**
  - Skip Trucks
  - Tractor-Trailers (Containers, cane vehicles)
  - Kadooment trucks
  - Kites
  - Other utilities
  - Weather
  - Theft of earth wires

Damage to underground conductors

- Minimum 2.5 ft below surface
  - Excavations
  - Planting of trees
  - Other Utilities
  - Weather
  - Theft of earth wires


Time for
a Break

HOW TO BE SAFER?

Personal Risk Assessment

SAFE APPROACHES

Perform a scene survey

- Conducted before the work is to commence
- Determine whether BL&P equipment is involved or in close proximity
- Remember if conductors are to be de-energized this may take time to plan
- Measure distances to ensure LoA

SAFE APPROACHES

Assess the potential hazards

- Look for things which may cause you harm. Wires, structures, equipment, exposed and/or sparking conductors, etc
- Assess the weather conditions and pay attention to changes
- Determine the route any aerial devices will have to take
- Whether the terrain is flat, undulating or unstable

SAFE APPROACHES

Take control

- Develop an action plan
- Don’t rush the risk assessment
- Be observant small conductors may be missed
- Document the potential hazards and how you are managing them (SHaW)
- Determine equipment and PPE requirements
- Consider out of the ordinary scenarios (eg reaching, extension poles, etc)

Why document your hazards

- Proof that a proper check was made
- Consideration given of who might be affected
- All the obvious significant hazards dealt with
- The precautions are reasonable, and the remaining risk is low
- Involves your employees or their representatives in the process
- Helps the next time you do the same job.

SAFE APPROACHES

- Contact BLPC
  - 626 9000 emergencies
  - 626 1800 PBX

- What can BLPC do
  - Provide guidance on the hazards
  - Locate buried electrical cables
  - Provide on site supervision
  - Temporarily de-energize lines
  - Reroute lines if the operations require it

SAFE APPROACHES

Treat all power lines as energized

- Never dig unless you have confirmed there are no cables there
- Adhere to the limits of approach
- Do not take unnecessary risks (wood, PVC, etc)
- Wait for BLPC to make the power lines safe
- If the work cannot be done safely it should not be done at all

SAFE APPROACHES

Keep others away

- Communicate with others about the dangers (wave, shout, etc)
- Consult with new or inexperienced staff or subcontractors
- Erect a barrier, use cones or some other control measure
- Use a spotter for yourself and others

Emergency Response

- Never touch any conductors which are downed
- Assume that wires are live, even if they otherwise appear to be dead
- Remember that, even if lines are dead, they may be switched back on either automatically after a few seconds or remotely by the utility if we are not aware that the line has been damaged
- If the victim is still entangled
  - Shut off power at the breaker
  - Use a non-conductive item to dislodge them

Emergency Response

- Call the emergency services and BLPC
  - Give them your location
  - Tell them what has happened and that electricity wires are involved
- If you are in a vehicle that has touched a wire, either stay in the vehicle or, if you need to get out, jump out of it as far as you can
- Do not touch the vehicle while standing on the ground
- Do not return to the vehicle until it has been confirmed that it is safe to do so.

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SUMMARY

- Electricity is Essential
- Electricity may pose risks
- **ALWAYS CONDUCT A RISK ASSESSMENT**
- Avoid being in close proximity to energized equipment
- Adhere to the Limits of approach
- Always call BLPC – 626 9000, 626 1800

QUESTIONS...