

CHAPTER II Operations
SUBJECT 3 Emergency Operations
TOPIC 16 Electrical Emergencies

A. SCOPE

To establish standard operating procedures to be used at the scene of emergencies where energized electrical equipment is involved.

B. PRIORITIES

1. Scene Size-Up
2. To protect lives and property.
3. To secure and isolate the area effected by the electrical emergency.
4. Rescue victims from the area.
5. Request additional resources if necessary, including requesting the Utility Company to respond.
6. Regardless of the source, all electrical equipment must be treated with respect and safe operations must be the priority. Ensure that all members are aware that electricity can be fatal and that extreme safety precautions shall be taken at all incidents involving electrical equipment.

C. ELECTRICAL EMERGENCY DEFINED

An Electrical Emergency is defined as any abnormal condition involving electrical wires or equipment.

D. SAFETY

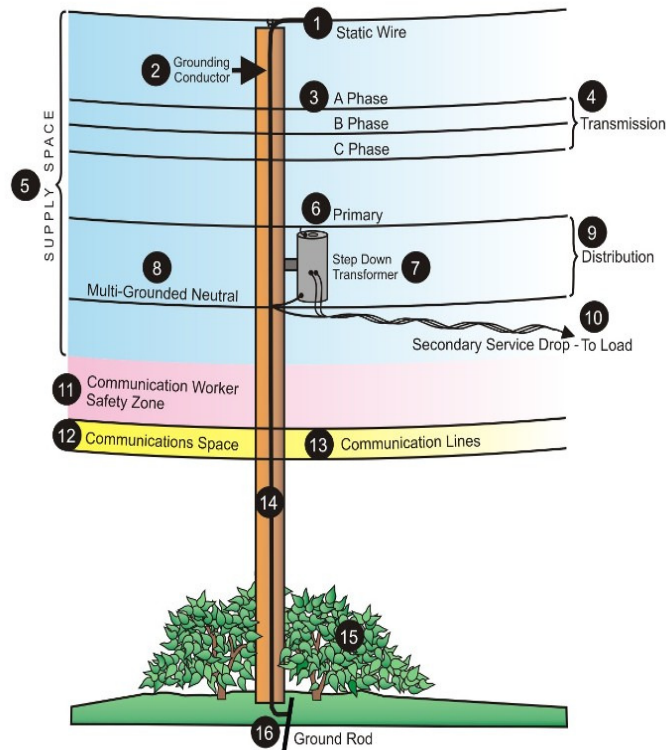
1. Shall treat all electrical incidents as potentially lethal.
2. Wear full protective clothing in case of fire; however, PPE (gloves, boots, etc.) **will not** provide protection from electrical shock.
3. Treat all wires as "hot" and being high voltage (even low voltage can cause serious injury or death).
4. Proceed carefully in an area where wires are down. Minimum circle of safety

from the point of contact is 30 feet for distribution lines and 100 feet for transmission lines.

5. **Never** cut or move a wire until the Utility Company de-energizes the wire and gives you the OK, even when lives are in danger of being lost.
6. When more than one electrical wire is down, consider all other wires equally dangerous even when only one of the wires is arcing.

IF YOU MUST ASSUME, ALWAYS ASSUME THE EQUIPMENT OR WIRE IS ENERGIZED.

7. When wires are down in areas near fences or other metal objects (guard rails, etc.), use extreme caution as electrical energy can be conducted to areas remote from the primary hazard.
8. All wires (including cable and telephone) can be energized to ~~high voltage~~ due to contact with other wires.
9. Entering an electrical vault or station is extremely hazardous. Never enter without the direction of the Utility Company .
10. Never assume the power is off or the breaker is tripped.

E. THE ANATOMY OF A UTILITY POLE

- (1) Static Wire- Protection against static electricity & lightning (ground)
- (2) Grounding Conductor- Connects Static Wire to the Grounding Rod
- (3) Three Phase (A, B, & C) Primary Distribution or Transmission Lines- See Transmission & Distribution Lines below for Voltage Range.
- (4) Could either be Transmission Lines- 69,000-138,000 Volts or Distribution (Primary) Lines 12,470-34,500 Volts
- (5) Supply Space – Electrical Supply Area
- (6) Distribution (Primary) Lines 12,470-34,500 Volts
- (7) Transformer (contain oil)
- (8) Multi-Grounded Neutral
- (9) Distribution (Secondary) Lines 120-480 Volts
- (10) Secondary Commercial / Industrial Service Drop – up to 13,200 Volts
- (10) Secondary Residential / Light Commercial Service Drop 120-480 Volts

- (11) Communication Worker Safe Zone- Space that separates the Communication Lines from the Electrical Lines.
- (12/13) Communication (Cable, Telephone, Alarm Wiring) - can become energized when touched by any of the above.
- (14) Pole Number
- (16) Ground Rod

*Voltage Values are approximate values per Duke Energy.

** Transmission Lines span Sub-Station to Sub-Station. Most Poles in the City of Cincinnati do not have transmission lines on them. There could be more Primary Distribution Lines on those poles. All Transmission Lines and Primary Distribution Lines are High Voltage.

F. VICTIM IN CONTACT WITH ELECTRICAL EQUIPMENT AND/OR WIRES

A victim in contact with live electrical equipment or wiring presents a real challenge to the Fire Department. Fire fighters find it extremely difficult to stand by when a human life is at stake. If the energy is high enough to injure the victim, it will also injure the firefighter.

1. Do not attempt to rescue a person in contact with a power line. Firefighters must wait for the Utility Company to de-energize the equipment or wire before attending to the patient.
2. If the victim is awake, have them remain still and not move until the power is de-energized.

G. OUTSIDE INCIDENTS

1. WIRES DOWN

- a. Establish a secure area (operational perimeter); include fences, vehicles, guardrails, railroad tracks, and puddles of water that may be energized. Use traffic cones and caution tape to secure the area from vehicle and pedestrian traffic.
- b. Request the Utility Company to respond, emergency basis if life hazard. Also, give the Dispatcher the following information:
 - i. The wires are down pole-to-pole or pole to building.
 - ii. The pole number.
- c. Standby and keep the public away from the scene (isolate) until wires are

de-energized by the Utility Company. (Police may relieve you if, in your opinion, the scene is secured).

- d. Be careful when spotting apparatus. Allow one additional wire span for safety, as additional lines may fall.
- e. Assign at least one (1) member to keep visual contact with the wires, “power surges”, and / or a “back feed”, can make wires “dance” or have movement over a large area. Always keep constant watch over the entire area, especially above you.
- f. Wind or Ice Storms.
 - i. There may be large numbers of wires down requiring isolation. The Duty Chief should be alerted of the Department Status. If a large number of Companies are going to be out of service for an extended period, a recall should be initiated. Recalled members will be stationed at barricades to secure the scene. In most cases, a single member can isolate the hazard area using barricades, barrier tape, and/or light cars.

Recalled members will be assigned to Districts. The District Chief will document time spent at various locations, and manage the incident within their District. The Fire Alarm Dispatcher may elect to have the District Chiefs dispatch Companies to electrical problems and other calls within their District.
 - ii. The District Chief may limit the response to a single Company due to a high volume of incidents.

2. VEHICLE INCIDENTS

a. Rescue From an Electrical Energized Vehicle

If occupants are uninjured, have them remain in vehicle. If occupants must vacate, because of fire, ~~caution~~ have them to jump clear with both feet at the same time. There must be no contact between the person and the vehicle after the jump.

b. Vehicle Fire with an electrical wire involvement.

- i. Protect Exposures.
- ii. Life Hazard; Use Dry Chemical Extinguisher.
- iii. No Life Hazard; Let Burn.

3. TRANSFORMER FIRE

- a. Do **not** use water on a transformer fire until the power is confirmed shut off by the Utility Company.
- b. Protect exposures **near** electrical hazards by using a **fog** pattern or dry chemical extinguisher.
- c. Exercise caution; burning oil may overflow from the transformer tank.

Extinguish any oil burning on the ground with foam or a dry chemical extinguisher .

4. SUBSTATION FIRE

- a. Request Utility Company to respond.
- b. Stay clear and let equipment burn itself out.
- c. Protect Exposures.

5. UNDERGROUND MANHOLE / VAULT FIRES

- a. Do **not** park apparatus or stand over manhole covers in the area.
Manhole covers weigh approximately 75 pounds. They can become projectiles when there is a pressurized explosion in an underground vault.
- b. Request Utility Company to Dispatch their underground electric team.
- c. Let burn until advised by the Utility Company, underground vaults contain high voltage at a minimum of 13,200 Volts.
- d. If Utility Company is going to enter the vault, CFD may need to set up for a potential confined space rescue.

6. LIGHT RAIL (STREET CAR) – Procedure Forthcoming.

H. INSIDE INCIDENTS

1. STRUCTURE FIRES & SMELL OF SMOKE IN A BUILDING

- a. Use caution during Ladder Truck Operations- High Voltage can jump several feet from wire to the aerial ladder. Ladders should be a minimum of ten (10) feet from electrical wires.
- b. If fire has damaged or in any way impacted electrical wiring and / or hardware, the power must be shut down to that portion of the structure or the entire building. This can be achieved by:
 - i. Requesting the Utility Company to cut at the pole or pull the meter. The CFD does **not** cut live wires or pull meters.
 - ii. Shutting down circuit breakers (do **not** reset tripped breakers)
 - iii. Once the Fire Department shuts down the electric; the CFD does **not** turn it back on.
- c. If unable to determine source or odor of smoke, have the owner / tenant call an electrician or building maintenance personnel to respond to the scene to investigate and determine the cause.
- d. Use Thermal Imaging Camera (TIC) to determine defective electric source or equipment.
- e. Check Elevators for occupants prior to turning off power.

2. HIGH VOLTAGE AREAS (TRANSFORMERS INSIDE BUILDINGS)

Stay clear of area and request Utility Company to respond.

3. ELECTRICAL POWER FAILURE

- a. At the Fire House
 - i. Notify Dispatch and appropriate District Chief.
 - ii. The Officer is to carry a portable radio and monitor Main Dispatch for runs.
 - iii. Keep telephone lines open.
 - iv. Check overhead doors for manual operation.
 - v. Test generators and lights.

b. Elevator Rescue

See Section 203.05 Elevator /Escalator Emergencies

3. WATER LEAKS

- a. Electric Hazards can be caused by water leaks.
- b. Shut Off electric in affected areas.
- c. Remove Equipment sitting in water from the area after power to them is shut off.
- d. Do **not** restore electric service to building once it is shut off.
- e. Investigate entire building, including the basement for potential electrical hazards caused by the water leak.

I. SPECIAL FACILITIES

There are facilities or areas at an incident, where shutting all power down could possibly lead to a larger more hazardous condition, with a high degree of risk and life safety.

If it is determined that the power should be shut down for any period of time, the Incident Commander should ask for a representative from the utility company and a building supervisor to respond to the incident to help with technical assistance. Planning should take place prior to the Order to shut down power if at all possible to minimize the harmful effects that it may cause. The following are areas of concern:

- High Rise buildings or other large residential or commercial properties.
- Hospitals, Nursing Homes, and other buildings with patients on life-support systems.
- Housing for the elderly or disabled.
- Buildings using ammonia refrigerant systems which must remain operating.
- Buildings that contain unknown Hazardous Materials, which may respond negatively to the loss of power. (i.e. Laboratories, etc.)
- Incidents where people can be trapped if power is lost (i.e. elevators, trains, etc.)
- When there is danger of an electrical spark causing ignition (i.e. gas leaks).
- Fire in an underground vault or transmission equipment.

J. SITUATIONS TO WATCH AND / OR AVOID

- Caution when working around over head wires. Use a spotter when using aerials and ground ladders. Maintain a distance of at least ten (10) feet from all wires.
- Working with tools and equipment around potential electrical hazards.
- Buildings under construction or renovations: be aware of open splice boxes, unfinished wiring, breaker/fuse boxes with no covers on them and bare wires.
- Metal roofs, ceilings, studs and wire mesh in plaster walls and ceilings can conduct electrical current.
- Electrically fed motors can store electricity in the motor, even after the power is shut off.
- Avoid using or carrying conductive equipment (metal ladders, wet hose, etc.) when working in a Duke Energy facility, or any other high voltage location.

K. SUMMARY

- Treat all wires as energized and dangerous.
- Do **not** pull meters or cut service wires.
- Do **not** enter sub-station fires. Secure area and await the arrival of the utility company.
- Exercise extreme caution when approaching electrical emergencies especially at night.
- Establish a safe zone and prevent unauthorized personnel from entering.
- Use thermal imaging cameras (TIC) at all electrical emergencies.
- If inside a building, shut down individual circuit breaker(s) or main circuit breaker to the smallest area possible to mitigate the hazard.
- Consult with utility company and building maintenance before shutting down power to special facilities.
- Once the power is shut down, never turn it back on.
- Class "C" (Electrical) fires; only exist when electrical energy is present. Once de-energized, a Class "C" fire no longer exists. The primary tactic when dealing with live electrical equipment is to de-energize whenever possible. Most

electrical fires can be de-energized by opening a circuit, pulling a plug, or operating a switch.

- Many times, wires that were de-energized, due to a fault, will become energized as the substation switchgear tries the line again. Even a line that is known to be de-energized, may again become energized, due to re-energizing by the Utility Company or other electrical lines feeding through a downed line.
- Never touch or move an electrical wire, even when lives are in danger of being lost.