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| **Response to Electrical Hazards** | Related Policies:  |
| *This policy is for internal use only and does not enlarge an employee’s civil liability in any way. The policy should not be construed as creating a higher duty of care, in an evidentiary sense, with respect to third party civil claims against employees. A violation of this policy, if proven, can only form the basis of a complaint by this department for non-judicial administrative action in accordance with the laws governing employee discipline.* |
| Applicable SC Statutes: |
| OSHA: |
| NFPA Standard: 1500  |
| Date Implemented: | Review Date: |

1. **Policy:** The policy of the Fire Department is to respond to reports of power lines down and other hazards involving energized electrical equipment (transformers, substations, electrical vaults, manholes, etc.) in order to stabilize the situation, provide fire protection to exposures, and protect the public. At such incidents, the fire department will work in conjunction with the power company using unified command to safely manage the incident. Until the power company arrives on scene and confirms through face-to-face communication that power to the wires or equipment has been terminated, all wires and electrical equipment shall be treated as being energized.
2. **Purpose:** This procedure will establish a standard operating procedure for the response to incidents involving down power lines and/or energized electrical equipment.
3. **Safety**
4. **General**
5. There are numerous natural and man-made phenomenon that can cause power lines to become dislodged and contact the ground or other objects. In all cases, the potential for electrical shock, electrocution, and secondary fires must always be considered.
6. Electricity will travel any available conductive path as it seeks a ground. A person’s body can become a direct path to ground when contact is made with an energized object. An indirect path to ground occurs when a person is holding or touching an object that comes in contact with an energized object. This could occur when a firefighter touches a chain link fence, vehicle, or other object that is in contact with something energized.
7. *Gradient Voltage (Step and Touch Potential)* When an energized power line is down, it will energize the ground around it. The voltage will lessen as it radiates out from the point of contact. If a person’s feet are simultaneously touching the ground in two areas several feet apart and there is a voltage difference between the two areas, electricity could travel through the person to complete the circuit, resulting in an electrocution or electrical shock injury. This phenomenon is called a “step potential.” This danger could be indicated by a tingling sensation in the feet and serve as a warning to back away from the area, but personnel should not assume a warning of such a condition will be present. The danger from step potential is more severe when the ground is wet.
8. Electrical distribution wires are categorized as:
	* 1. Transmission line voltage - 115,000 to 1,000,000 volts.
		2. Sub-transmission line voltage - 7500 to 34,000 volts.
		3. Primary distribution line voltage - 4800 volts.
		4. Service line voltage - 480 / 220-110 volts.
9. SCBA must be used when ever personnel are exposed to smoke at an electrical incident, including light smoke conditions.
10. **Key Safety Points for Downed Wire Incidents**
11. Downed wires must always be considered energized with potentially lethal current.
12. Downed wires that appear to be dead, can reset and become “hot” or “energized” again by manual operation of a switch, by automatic re-closing methods (either method from short or long distances away), by induction where a de-energized line can become hot if it’s near an energized line, or through back feed conditions.
13. Power lines tend to have “Reel Memory” and may curl back or roll on itself when down.
14. Avoid using hose streams on or around energized wires or electrical equipment. Hose streams can conduct current! Never direct streams directly onto power lines.
15. In an extreme case where water must be applied near down wires or electrical equipment, use a fog pattern and as little water as possible. The primary responsibility is to protect the exposures, not extinguish burning wires or electrical equipment.
16. Firefighters cannot determine the voltage of a power line by the size of the conductor. Most overhead conductors are not insulated.
17. As a general rule, the higher the wires are on a pole, the higher voltage. However, this is a relative matter as comparable looking wires on similar appearing poles in different areas may carry different voltage.
18. Do not assume that down telephone or cable wires are not energized. The damage that caused the wires to fall may also have caused wires elsewhere to contact and energize the telephone and cable wires.
19. Voltage can travel through both dry and especially wet ground for considerable distances.
20. Electricity can flow through the ground or other conductive objects (fences) to point far from the scene.
21. **Response to Down Wires**
22. **The following procedures shall be followed at all wires down incidents**
23. Use extreme caution when approaching the scene, particularly at night or in inclement weather.
24. As soon as there is confirmation that wires are down, the power company shall be requested to respond. If possible, obtain and provide the closest pole number.
25. Treat all down wires as ***energized.*** Never assume telephone and cable wires are safe.
26. Do not touch or contact any downed wires. Maintain a safe distance from any down wires.
27. Even where power is out in an entire neighborhood or portion of the community, do not assume down wires are de-energized. Improperly installed household or commercial fuel-powered generators, solar panels, and wind-powered electrical generators may cause electricity to backfeed into the grid.
28. Position apparatus away from down wires and affected power poles. Apparatus should never be placed under involved overhead lines even if parked multiple poles away. Wires, poles, or connectors could fail dropping wires onto apparatus or personnel.
29. As a general rule of thumb, apparatus should be positioned at least one undamaged utility pole away from the scene. Be sure there is at least one full span of poles with wires in their normal location between the incident and parked apparatus. If the wires appear to be sagging below their normal position between any two poles, back up one more pole.
30. Secure the area, establish perimeter control, and deny entry.
31. Make ample use of caution tape to establish a perimeter, but be mindful that caution tape alone cannot be relied upon. Post a guard when ever practical.
32. Identify any associated hazards such as wires down on a chain link or metal fence, and take appropriate precautions to extend the perimeter.
33. Request additional resources as necessary, including police to block off streets.
34. Ladders and aerial devices should not be used around energized or possibly energized electrical wires. A minimum distance of ten (10) feet shall be maintained from all wires. An even greater distance should be maintained from high voltage lines.
35. During periods of high activity when the power company has a backlog of requests, the Incident Commander may choose to leave one (1) crewmember on-scene with a radio to wait for power company personnel provided the member can safety control the perimeter and there is no danger of fire.
36. **When down power lines are in contact with a vehicle, in addition to the above, personnel shall also use the following procedures:**
37. Request priority response from the power company.
38. Do not touch the vehicle, and assume it is energized.

1. Advise the occupants to remain in the vehicle until power can be terminated or confirmed to be terminated. Request EMS response if EMS has not already been dispatched.
2. If occupants must leave the vehicle (fire or other threat to life) instruct them to open the door, ***but not to step-out***! They must be instructed to jump free of the vehicle without touching vehicle and ground at the same time; once free from the vehicle they should walk away from the vehicle taking very small steps in the process to minimize the risk of injury from step potential.
3. **Sub-Station, Transformer, Electrical Vault and Manhole Incidents**
4. **Fires and emergencies in electrical sub-stations, transformers, electrical vaults and manholes pose serious risks to firefighters.**
5. Sub-stations, transformers, electrical vaults and manholes may contain high energy equipment capable of arcing through the air, and/or exploding.
6. Assume that all transformers and energized electrical equipment contains PCBs, which may be released in fire smoke, as well as from any liquid coming from the equipment. PCB are highly toxic and carcinogenic. Smoke from burning transformers and electrical equipment must be avoided when ever possible. SCBA use followed by thorough decon will be required if smoke cannot be avoided.

Note: Most transformers today do not contain PCBs, and those that contain PCBs are required to be clearly marked. However, the safest approach is to treat all transformers as if they contain PCBs.

1. **The following procedures shall be followed at all incidents involving fires or emergencies in electrical sub-stations, transformers, electrical vaults and manholes.**
2. Use extreme caution when approaching the scene, particularly at night or in inclement weather.
3. Upon confirming the nature of the incident, request the power company to respond.
4. Secure the area, establish perimeter control, and deny entry.
5. Under no circumstances will fire personnel enter a vault or manhole, even to investigate, unless and until the power company representative arrives on the scene, confirms entry can safely be made, and the Incident Commander approves of the entry. Any entry into a confined space will also require compliance with the confined space rescue SOP.
6. Avoid contact with smoke or any fluids coming from the equipment. Assume all smoke and fluids contain PCBs.
7. Be aware of the potential for equipment to explode.
8. Place apparatus in a safe location away from overhead power lines and manhole covers.
9. Protect exposures.
10. Pad-mounted and overhead transformers can explode.
11. Until grounded, equipment can contain electric potential, which can cause severe injury or death.
12. Do not make entry until the power company representative has verified that the electrical equipment has been de-energized. The utility representative may have to make entry to uninvolved sections to safely de-energize the equipment.