



Engineering Sciences Section – 2007

C56 Downed Power Lines and High Impedance Faults and Their Role in Electrocutions and Injuries

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After attending this presentation, attendees will understand methods for dealing with the ramifications of high impedance faults.

This presentation will impact the forensic community and/or humanity by demonstrating the dangers of high impedance faults and, if undetected, the serious public safety hazard they pose.

A distribution primary fault, which cannot be detected by ordinary overcurrent or ground fault protection, is called a high impedance fault (HIF). These faults can occur when a conductor comes in contact with an object such as a tree, or falls on a surface of poor conductivity (e.g., ground or asphalt). Typically, a high impedance high voltage fault exhibits arcing and flashing at the point of contact.

High impedance faults generally do not create imminent danger to power systems due to the fact that the magnitude of the fault current generated is too low to harm most electrical apparatus; however, undetected HIF's can cause fire, electric shock or death. The significance of these hard to detect faults is that they represent a serious public safety hazard as well as a risk of arcing ignition for fires.

HIF detection devices are becoming available to utility companies, but these detection devices require an extended time (sometimes up to a minute) to reliably differentiate an HIF from a normal load disturbance. Field-testing is one solution to detect these anomalies; however, laboratory testing using previously recorded high impedance fault and feeder load waveforms is the most economical.

Downed power lines can also carry an electric current strong enough to cause serious injury or possibly death. Dangerous currents can be transmitted through materials other than just power lines such as a wooden pole, a kite, puddles, or other normally poor conducting material. The authors will be exploring several cases where downed power lines and streetlight failures caused death and injury and fires while the fault currents remained undetected.

Examples of HIF will be shown using photos and videos to illustrate public and worker hazards and the risk of an arcing ignition source for fire.

Power Lines, High Impedance Faults, Electrocutation