BS3 Electrical Death, Injury, Arc-Flash, and Lightning Investigation Methods

Helmut G. Brosz, PEng, BASc, Brosz Forensic Services, 64 Bullock Drive, Markham, ON L3P 3P2, CANADA*

The goal of this presentation is to provide an overview of the key steps and investigative methods used when dealing with electrical death and injury.

This presentation will impact the forensic science community by improving the ability of Authorities Having Jurisdiction (AHJ), including medical examiners, police and fire departments, insurers, lawyers, prosecutors, and engineers, to investigate and document complex scenes where an electrical incident has taken place. Attendee knowledge of electrical phenomena is expected to increase.

AHJ attending to an accident scene or homicide scene discerning between natural death and death involving electricity, including lightning. There are on average, between 500 and 1,100 electrocutions per year in the United States and Canada including suicide, auto-erotic, accidental, homicide, etc. There are also ten times as many nonfatal electric shocks. Some minor shock situations cause falls or reactions which can lead to death and injury. Low-voltage electrocutions often leave no visible marks on the deceased. High-voltage electrocutions mostly leave distinctive marks and devastating injuries.

Lightning deaths may or may not leave readily identifiable marks. Arc-flash burns may sometimes obscure contact entry and exit marks. Scene photos, hospital admission notes and sketches, autopsy photos, and reports are important data to be created, then assembled, studied, and anlyzed.

Review and study of applicable standards and codes can assist the AHJ or investigator. For example, electrical utility contact accidents involve the National Electrical Safety Code (NESC) or an equivalent or similar state code such as General Orders 95 and 165 and 128 as in California. The other significant regulations are OSHA 26 CFR 1910 and 26 CFR 1926. OSHA regulations also rely on NFPA 70E to a significant degree.

The National Electrical Code (NEC) which applies to residential, commercial, and industrial electrical construction is the governing rule book for many states. Cities such as New York City and Chicago, for example, have created their own rules in this regard.

Other standards pertain to the electrical products such as Underwriters Laboratory Canadian Standards Association (UL/CSA). International Electrotechnical Commission (IEC) may also apply and will be discussed briefly. This presentation will provide a brief overview from a forensic engineering perspective of the physics and biology of electrocution and shock to humans and animals.

Overhead downed power line contacts with humans can lead to electrocution. Power line contacts with vegetation can lead to wildfires and other problems. This breakfast will be supported by presentations of cases, eamples, and artifacts. Laboratory replication of electrical incidents will also be discussed.

Electrocution, Arc-Flash, Shock

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