

Litigation Services & Information Expert Witness in Electrical Engineering

Laurence "Lo" Lehman, P.E.

Lehman Engineering Company



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Lehman Engineering has been providing engineering, design, and consulting services for electrical power systems to electric utilities and industrial facilities since 1993. Specialties include System Protection (e.g. Relaying & Surge Suppression), Electrical Safety, Reliability and Maintenance Technology.

Lehman Engineering also provides expert witness testimony, accident investigation, and consultation for cases involving electrical safety, electrocution, electrical contact, shock, injury, property damage and loss. Our services include rendering independent expert opinions, providing litigation support, and offering strategic advice to attorneys and clients, regarding the technical issues involving electrical failures, accidents, safety violations, negligence and incompetence.

As President of Lehman Engineering, Lo Lehman specializes in electrical power system studies, failure analysis, and equipment design for low, medium, and high voltage systems. Mr. Lehman is thoroughly knowledgeable and able to evaluate and assure compliance with the National Electrical Safety Code (NESC) and the National Electric Code (NEC), OSHA & applicable NFPA standards. Mr. Lehman is a registered and licensed Professional Engineer, and is a highly skilled specialist with over 35 years of experience. He is well qualified to offer expert opinions in a court of law in the field of utility and industrial electrical power systems.

*Thank you for your time and consideration.
Please feel free to contact me about your case.*

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I. Areas of Litigation Expertise

- Electrical Accidents, Incidents and Failures
- Electrocution and Electrical Contact
- Electrical Shock and Arc Flash Injuries
- Electrical Fire and Explosion (Hazardous Locations)
- Electrically Produced Falls, Slips, Trips, Injuries and Death
- Electrical Safety & Safe Work Practices (OSHA & NFPA 70E)
- National Electric Safety Code (NESC) Practices
- National Electric Code (NEC) Practices
- Clearances and Safety of Overhead Power Lines & Underground Facilities
- Design of Distribution, Substation & Transmission Systems
- Electric Utility (Power Company) Practices, Policies & Procedures
- Electrical Equipment Design, Failure & Malfunctions
- Power Quality, Reliability, and Maintenance Technology
- Electrical Surges, Lightning Protection, TVSS
- Service Interruptions, Outages, Blackouts, Brownouts
- Property Damage / Equipment Damage
- Product Liability - Design & Application

II. Expert Witness, Forensics, & Litigation Services

Forensic & Litigation Services for Attorneys (Plaintiff or Defense), Utilities, Manufacturers, Facilities, Insurance Companies, Individuals. Available to participate in Trial, Arbitration and Mediation cases, and as an expert advisor impaneled by the court. No geographic limits in USA.

- Expert Witness Testimony at Deposition and Trial
- Articulate, Accurate, and Believable Testimony
- Trial Preparation & Trial Exhibit Services
- Forensic Engineering & Failure Analysis
- Engineering Assessment of Evidence
- Engineering Evaluation of Technical Merits of Case
- Electrical Accident Investigation and Accident Reconstruction
- Determination of Cause and Origin of Loss
- Electrical Code Compliance & Application (NESC, NEC, NFPA, OSHA)
- Review of Applicable Codes, Interpretations, Statutes, and Industry Standards & Practices
- Assistance In Case Development, Interrogatories, Depositions and Trial Questions
- Consulting To Determine Veracity of Allegations & Develop Strategies
- Technical Literature Research and Analysis
- Analysis of Findings and Opinion / Oral and Written Reports
- Thorough Documentation In Easy-To-Understand Language

III. Areas of Engineering Expertise

- ***Electric Power Distribution Systems:***

- Electric Utility (T&D), Industrial, Manufacturing, OEM's Facilities, Hospital, Commercial, Residential, Buildings
- High Voltage, Medium Voltage & Low Voltage / AC & DC
- Design, Construction, Operation, & Maintenance of Electric Power Systems
- National Electric Safety Code (NESC) Practices
- National Electric Code (NEC) Practices
- Substation, Transmission & Distribution System Design (T&D)
- Overhead Power Lines / Underground Distribution / URD
- Overvoltage Protection: Lightning / Surge Suppression / TVSS / Insulation Coordination
- Grounding: Systems, Equipment, Grids, SRG (ADP Rooms)

- ***Power System Studies:***

- Short Circuit / Fault Calculations / Coordination
- Relaying, Motor Starting, Voltage Drop, Flicker
- Harmonics, Load Flow, Power Factor, Arc Flash Hazard
- Network Grid System Modeling & Analysis
- Engineering Economics / Cost Analysis

- ***Power Quality / Energy Management:***

- Computer Grade / Clean Power
- Energy Efficiency & Conservation
- Demand Side Management

- ***Electrical Safety / Code Application & Compliance:***

- National Electric Safety Code (NESC) Practices
- National Electric Code (NEC) Practices
- OSHA - 29 CFR Parts 1910 & 1926
- NFPA 70E - Standard for Electrical Safety in the Workplace
- NFPA 70B - Electrical Maintenance
- IEEE Standards / ANSI / ASTM (As Applicable)

- ***Reliability / Maintenance Technology:***

- PM, PdM, RCM, CBM, TPM
- Mission-Critical Facilities
- Data Centers & Server Farms / ADP Rooms
- Emergency & Standby Generation Systems

III. Areas of Engineering Expertise (*continued*)

- ***Equipment Design:***

- Generators, Transformers, Motors, UPS's, Cable, Conductors
- Reclosers, Breakers, Sectionalizers, Relays, Fusing
- Switchgear, Panelboards, Capacitors, Filters, Arresters
- Wiring, Splices, Connectors, Pole-Line Hardware, Insulators

- ***Quality Assurance & Control:***

- Plant Inspections, Surveillance, and Audits
- Material Receipt Inspections
- QA/QC Procedures Designed and Implemented
- Project Management

IV. Equipment & Products

Lo Lehman has the qualifications to render expert opinion on the following types of equipment and products, which may have caused or be a contributing factor to electrical accidents, fires, explosions or electrocution. Any aspect concerning the design, specification, construction, application, operation, use of, and maintenance of the following equipment can be addressed.

- Electric Power Overhead Lines & Poles
- Primary, Secondary & Service / Service Entrance
- Underbridge & Outdoor/Indoor Installations
- Underground Lines / Padmounted and Submersible Equipment
- Transformer Vaults, Trenches, Duct Bank
- Generators, Transformers, Motors, Motor Controls (MCC)
- Switchgear / Switches / Switchboards
- Automatic Transfer Switches
- Protective Relays, Fuses, Fusing Components, CT's
- Circuit Breakers, Reclosers, Sectionalizers
- Power Distribution Panels / Panelboards / Load Centers
- Wire, Cable, Conductor, Splices, Connectors
- Wiring Accessories & Components
- Variable Speed Drives / Adjustable Frequency Drives
- Electrical Appliances and Apparatus
- Pole-Line Hardware & Insulators
- Lightning & Surge Protection
- Arresters and Surge Suppressors (TVSS)

IV. Equipment & Products (*continued*)

- Voltage Regulators
- Uninterruptible Power Supplies (UPS) / Power Conditioners
- Capacitors, Inductors, Filters
- Electromechanical / Rotary Equipment
- Street Lighting (Circuits, Systems, & Equipment)

V. Sample Cases

Following is a summary of the cases in which Mr. Lehman has provided litigation support, expert witness testimony or proximate cause determination:

- A sailboat mast comes into contact with overhead primary power lines located over a recreational water crossing, electrocuting the boater. Utility fusing misoperates causing back-up circuit recloser to operate multiple times. Utility was shown to be negligent in maintaining clearances across navigable waters.
- An explosion occurs due to accumulated gaseous vapors in a sidewalk vault installed in an underground network grid system (New York City) serving a commercial facility, and injures a nearby worker.
- A worker for a national tree trimming company receives injuries from making electrical contact with high voltage line with a broken and downed (yet energized) neutral, while working from an aerial lift truck. (Neutral had broken and fallen onto trees). Plaintiff was shown conclusively to have been negligent in not following safe work practices.
- Utility's primary voltage underground cable comes into contact with secondary cables causing electrical damage to residence. Plaintiff awarded damages.
- A contractor is electrocuted while moving (relocating) a steel building due to lack of proper clearance of utility's high voltage overhead line. A small wire antenna on the building roof contacts a high voltage primary conductor. It was shown that the power company had a duty to safeguard the energized wire by de-energizing the line or guarding or isolating the line (e.g. physically raising the conductor).
- A contractor was trimming vegetation in a utility right of way with a construction excavator, when a small tree was pushed into a transmission line paralleling the path being cleared. The transmission line burned down and dropped onto an underbuilt circuit of lower voltage and caused millions of dollars in damage to customer equipment connected to the underbuilt circuit.

V. Sample Cases (*continued*)

- A self-employed electrician was replacing light fixtures and wiring in a food store and was shocked by a live wire in a junction box in the ceiling. The shock caused the electrician to fall off his ladder 14 feet off the ground. The electrician was shown to have violated several OSHA rules and was responsible for his own injuries. He had failed to properly Lockout and Tagout a circuit breaker and was using a metal ladder to perform the work.
- A man in his home was shocked by a high voltage wire that had fallen onto a hedge of bushes in the home's backyard. The utility company accused the man of trying to pick up the conductor with his hand. It was demonstrated that the wire had fallen off the hedge of bushes near the man which caused the electrical contact. The wire over time had burned the vegetation which released the wire, allowing it to fall to the ground. It was also shown that the energized line had fallen from the pole line due to an improperly applied connector that overheated due to galvanic corrosion, and melted the wire causing it to sever and fall onto the bushes.
- Electrocutation from fallen power line: Resident is electrocuted and killed when he steps barefoot onto a downed, energized conductor laying on his front yard property. A dump truck had caught and contacted a power line when its dumping bed was left in the upright position. The mechanical stress on the pole line caused short-circuits and two overhead conductor to fail; circuit recloser was alleged to have misoperated. Accident reconstruction was successfully performed and the root cause of the failure was determined (a connector that was improperly installed had caused overheating and melting of the fallen conductor).
- Case involved the drowning death of a female toddler due to *electric shock drowning*. A defective electrical junction box, located on a boat pier, in conjunction with a defective installation of the circuit's ground wire, caused the electrocution of the child when she came into the vicinity of stray voltage in water caused by electrically energized metallic part (in contact with water) as she stood in the shallows/shore line of the lake.
- Victim was severely shocked by a downed high voltage power line outside his residence. This Expert uncovered through analysis of policies, procedures and insightful discovery that two separate electric utility employees (a hazard responder and a supervisor) failed to standby and safeguard the public from the electrical hazard. Expert's Report thoroughly identified the NESC safety codes, standard industry practices and internal corporate rules that were violated by the power company which led to the Plaintiff's injuries (loss of arm and leg). As a result, lawsuit was settled in favor of Plaintiff for \$22,000,000.00.
- Substation contractor was working inside substation owned by City and failed to follow NESC and OSHA rules to ensure work was being performed on de-energized lines. A worker was subsequently electrocuted and the city was sued. Case was successfully settled by Plaintiff, with contractor having to share 50% of liability. (This shared liability enabled settlement to be within

V. Sample Cases (*continued*)

the City's insurance limits.)

- Property damage is alleged to have occurred in a homeowner's residence, coincident with a distant failure of a electric utility company's facilities. A primary high voltage line falls and comes into contact with an "underbuilt" lower primary voltage line, and is alleged to have induced high voltage into a residence.

(In addition, the distant fault on the circuit serving a major newspaper printing plant, a sectionalizer was thought to have misoperated. Accident reconstruction showed that the sectionalizer worked correctly and did not have bearing on case as previously thought.)

- Victim was electrocuted by a poultry feeding system. Case involved the design of the electrical system and the use of 16 gauge wiring and the approved design by the Canadian Standards Association (a Nationally Recognized Testing Laboratory; NRTL).

- Utility Lineman was severely shocked when he came into contact with high voltage line while not wearing PPE. Plaintiff attempted to blame the installation of a radio antenna and associated control cabinet, mounted on the pole and used to transmit smart metering data to utility office. The transmitter and antenna were shown to meet applicable and relevant NESC clearances and that the proximate cause of the accident was Lineman's failure to follow NESC, OSHA and internal utility safety rules.

- Plaintiff claimed being struck by lightning while driving in a storm. It was shown that such injuries are not possible due to Faraday Cage protection of metal car exterior body.

- After a car accident tore down a wood pole, power company linemen temporarily repaired pole but failed to ensure proper NESC road clearances. After the scene was released for public travel, a truck snagged the improperly strung telecommunication line conductor/messenger which tore off part of the repaired pole which then hit an oncoming car in the opposite lane causing physical harm to Plaintiff. The electric utility and the telecommunications utility were both shown to be negligent in their actions by failing to ensure proper NESC clearances (no measurements taken) and to follow other NESC safety rules and procedures.

- Roofer came into contact with residential service connector that was not covered (missing connector cover). Utility was shown to be at fault for not performing required NESC inspections and maintaining facilities in safe condition.

- Plaintiff was on scaffolding and was electrocuted when a metal plank made contact with a nearby power line. Power Company had been called to provide protection (cover-up, de-energization, relocation, etc.) on the pole line but had canceled the request for the utility to

V. Sample Cases (*continued*)

evaluate the construction site for guarding against electrical hazards.

- Plaintiff traveling in his automobile on interstate highway became entangled in high voltage power lines that had fallen across the highway. The electric utility company blamed the downed power lines (and poles) on a low hanging telecommunication line that they claimed was snagged by another vehicle that pulled down the poles which subsequently caused the power lines to fall and drape across the highway. It was successively shown by Mr. Lehman's report that the falling of the downed power lines was caused by a crack in the top of the pole, poor guying practices and design (that exacerbated and opened the crack), and poor maintenance, as well as a lack of protection from pole top rot.
- A telecommunication contractor employee was working on a joint-use distribution pole and was electrocuted through contact with a high voltage power line. It was shown that the pole framing, as installed, violated the rules of the National Electrical Safety Code requiring a "Communication Worker Safety Zone" (CWSZ) clearance. The CWSZ (which is a required 40 inch clearance between the electrical supply and communication facilities) provides headroom clearance from overhead power lines in order to safeguard telecommunication workers as they work at the level of telephone lines. The Plaintiff's death was directly caused by this NESC violation and unsafe condition on the pole line. It was also shown that a proper Job Briefing was not held. (A Job Briefing is used to scope out the extent of work to be done, but more importantly, to also identify the hazards of the job, as required by the NESC) .

In addition, it was shown that the employer/contractor had a safety rule (in their safety manual) that required telecom workers to stay 36 inches away from the power company secondary lines, which would place a worker in an impractical, uncomfortable and fatiguing position to work on the telecommunication lines. This demonstrated a lack of understanding of the NESC's and OSHA's "Minimum Approach Distance" criteria used by telecom workers and linemen. This internal, contractor rule was not followed in this case (It is doubtful that any worker for the contractor on any joint-use job was complying with this internal work rule). Such misunderstanding and ignorance in the company's safety manual breeds confusion, apathy and indifference to the safety rules and thus endangers employees.

- A woman was riding her bicycle on a concrete sidewalk in a residential neighborhood. She collided with a guy wire that had been improperly located within the pathway of the sidewalk she was traveling, which subsequently caused her injuries. The guy wire had been installed by the telecommunications utility (by a contractor) on a joint-use pole. In addition, no guy marker had been installed which would have made the guy wire visible, at the level where pedestrians and cyclists travel. The NESC violations were identified and outlined in an affidavit and the case settled before litigation was needed.

V. Sample Cases (*continued*)

- Case involved a downed high voltage primary conductor (wire) that fell off a crossarm on the power company pole line located in an alleyway. The conductor was still attached to two poles on either side of the incident pole. The conductor drooped very low to the ground (about 2 feet off the ground as it was still attached to the adjacent poles). The conductor was still energized at 8,000 volts and was also hanging within several inches of a grounded steel wire and post fence.

The male victim (Plaintiff) was injured by an arc flash which occurred while he was observing the unusual and curious defective power line, when his body pushed up against the grounded steel rope fence and moved the steel rope into the sagging energized conductor, thus making electrical contact between the high voltage conductor and the grounded fencing.

This contact caused a short circuit arcing fault that released a fireball of heat energy that burned the Plaintiff all over his body (~80%) with 1st, 2nd, and 3rd degree burns.

Defendant (a large, publicly owned electric utility) alleged that the Plaintiff had reached out to touch the energized wire. This Expert, in his comprehensive report, proved that the Plaintiff never touched the energized conductor, but rather, was harmed by the thermal energy from the arc flash caused by the defective installation (which was non-compliant with the NESC). This was evidenced by the fact that Plaintiff's burns were widespread (as to be expected when engulfed in a wave of heat energy), as opposed to having localized burns at an "entrance" and an "exit" wound (i.e. two points of electrical contact) should he have actually physically touched the utility conductor.

In addition, this Expert outlined the various violations of the NESC by the electric utility to inspect and maintain power lines and equipment. Also addressed were policy and procedure failures of a key power company employee (Troubleman) to properly patrol and locate the downed conductor that had been reported by a neighbor. The Troubleman failed to patrol the line and thus did not locate the downed conductor which remained energized overnight and created a public hazard for about 14 hours, until the Plaintiff came across it.

In addition, the power company's Customer Service Rep who took the call that reported the downed conductor, failed to warn the caller to stay away from the wire and to keep children and pets away from it also.

VI. Contact Information

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