EPRI | ELECTRIC POWER RESEARCH INSTITUTE

PSE&G Pioneers Safe Helicopter Live Working with Tests at EPRI Lenox Laboratory

Success Story

"Using the EPRI Lenox Laboratory to perform electrical testing of the new helicopter platform and live working procedures has helped us increase worker safety and improve transmission line maintenance. EPRI is known throughout the industry for doing quality work, and this collaboration allows us to share what we've learned with the rest of the industry."

—Tom Verdecchio, Senior Live Line Coordinator, Public Service Electric & Gas Company.

The Challenge

With today's interconnected and heavily loaded transmission network, putting lines out of service for maintenance is no longer economically viable. Live working—performing maintenance on energized lines—is an increasingly attractive option.

Public Service Electric & Gas (PSE&G) has pioneered live work since the 1970s, making worker safety its top priority. Beginning with land-based procedures using ladders and bucket trucks to put workers in position, PSE&G progressed in the 1990s to aerial live work—using helicopters to speed workers to remote areas to perform repairs.

Although some private companies were already performing helicopter live work, their equipment and practices were not backed by thorough engineering or uniform safety standards. A particular problem was the worker platform in use at the time. The platform was mounted on the helicopter landing skid, so the legs of workers seated on the platform extended below the skid. This presented two problems: serious leg injuries in event of a hard landing, and the risk of dangling legs impinging on the air insulation space between wires, which can cause sparkover **[*correct?*]**.

The Solution

PSE&G worked with George Washington University to design an ergonomically advanced helicopter platform for live work. The new platform is mounted higher to keep the worker's legs within the helicopter envelope. This helps maintain proper clearance between phases and reduces the risk of leg injuries.

To test the new platform's performance, PSE&G turned to the EPRI Lenox Center in Massachusetts—the only laboratory with the equipment and expertise to perform extensive tests on energized high-voltage lines with a helicopter fully loaded with fuel.

The Center has an array of transmission structures and high voltage test equipment to allow full-scale engineering testing that replicates real-world conditions. The Center's engineering staff has more 15 years experience in developing, testing and training the full range of live work practices, as well as expertise in electrical discharge and corona phenomena.

Center staff performed a series of electrical tests to evaluate the platform's performance in an actual live working environment. For example, tests were conducted to detect any voltage differences between the platform components, or between the platform and a mannequin representing the worker. A voltage differential could cause sparkover that might affect the worker or interfere with the helicopter's instruments.

Findings showed no voltage differences between platform components. Some signs of low-level sparking were observed between the platform and mannequin, and the Center staff recommended minor modifications to minimize its occurrence. The staff also made recommendations for maintaining a good electrical connection between the bonding wand and platform to ensure worker safety.

Testing on 230 kV

Although helicopter live work has been performed on 500 kV and 345 kV lines, it had not been performed on lower voltage lines, which have smaller interphase spaces. As PSE&G gained experience and proficiency with aerial live work, the utility sought to extend its capability to lower voltage lines. In collaboration with Pacific Gas & Electric (PG&E) and EPRI, PSE&G recently completed a series of helicopter live work tests at Lenox on 230kV transmission lines. The tests included evaluation of helicopter approach distances to ensure proper clearance could be maintained between phases, and also involved training of live work procedures with the new worker platform. Results demonstrated that helicopter live work on 230kV is feasible and that proper clearances can be maintained.

Benefits

Safety is the top priority in live work, especially aerial work where the combination of high-voltage wires and hovering helicopters offers scant margin for error. By developing sound, engineering-based live work equipment and practices—and testing them in the Lenox Center's full-scale, real-world environment—PSE&G has increased worker safety, improved transmission circuit reliability, and decreased maintenance costs.

Building on its own live working experience and EPRI research, PSE&G is now working with IEEE, EEI, and OSHA to develop uniform safety standards for aerial live work that will help ensure the adoption of safe practices throughout the industry.

Contact Information

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